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Is Extreme Poverty Going to End?

An Analytical Framework to Evaluate Progress in Ending Extreme Poverty

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Abstract

The World Bank has recently adopted a target of reducing the proportion of population living below US$1.25 a day at 2005 international prices to 3 percent by 2030. This paper reviews different projection methods and estimates the global poverty rate of 2030 modifying Ravallion (2013)'s approach in that it introduces country-specific economic and population growth rates and takes into account the effect of changes in within-country inequality. This paper then identifies key obstacles to meeting the target and proposes a simple intermediate growth target under which the global poverty rate can be reduced to 3 percent by 2030. The findings of the analysis lend support to Basu (2013)'s argument that accelerating growth is not enough and sharing prosperity within and across countries is essential to end extreme poverty in one generation.

Is Extreme Poverty Going to End?

An analytical framework to evaluate progress in ending extreme poverty

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I.   Introduction

The main objective of this paper is to propose a new analytical framework to diagnose progress toward ending extreme poverty. The World Bank has recently announced twin goals of "ending extreme poverty" and "promoting shared prosperity," both of which are pursued in an environmentally, socially and fiscally sustainable manner. The target of ending extreme poverty is measured by whether the percentage of the world's population whose household expenditure per capita is below US$1.25 per day at 2005 international prices can be reduced to 3 percent by 2030. This new goal, which is sometimes called "ending poverty in one generation," might have sounded impossible nearly 10 years ago when the Millennium Development Goals (MDGs) were set. But now that the development communities will almost certainly achieve MDG 1, halving global poverty by 2015, optimism for this new target is on the rise.

The key questions are, how difficult it is to achieve this new goal and what needs to be done. To answer the first question, we project the global poverty rate. But projecting the global poverty rate for such a distant future as 2030 is always a challenge. It is almost impossible to predict the pace of global economic growth and poverty reduction for the next almost two decades. This is particularly challenging for projections of global poverty rates because of the limited availability of global poverty data, which are available only from 1981 and every three years since (except for the most recent spell between 2008 and 2010). Such a limited availability of poverty data restricts our ability to conduct rigorous econometrics or time-series analysis.

Ravallion (2012, 2013) presents a practical solution. He projects future poverty rates *if the developing world keeps the current pace of poverty reduction*. This approach does not indicate whether the developing world can actually continue the current pace of poverty reduction. Nevertheless, this projection provides a good benchmark for policy makers and development partners on whether they should keep their status quo or need to accelerate their pace of growth and poverty reduction.

Ravallion (2013) calls this scenario, in which the developing world maintains its pace of growth and poverty reduction in the recent past, "optimistic," and defines it in two ways. First, he studies the pace of poverty reduction by looking at global poverty rates since 1981 and finds the global poverty rate has been declining roughly one percentage point per year. Using this past trend, he projects that the poverty rate of the developing world would reach 3 percent by 2027. Second, he simulates global poverty rates against different rates of growth using the 2008 global distribution of household expenditure per capita. He finds that if household expenditure per capita grows at 4.5 percent annually, the poverty rate of the developing world will decline to 3 percent by 2027, three years in advance of the new World Bank Group target. Since household expenditure per capita has been growing at more than 4.5 percent over the past 10 years, the second analysis also guarantees that *if the developing world maintains the current pace of growth and poverty reduction*, the poverty rate of the developing world will decline to 3 percent by 2027.

This paper examines how realistic the scenario set by Ravallion (2013) is by re-evaluating assumptions made implicitly or explicitly in his papers. For example, this paper evaluates how much growth is needed to maintain the pace of poverty reduction—one percentage point per year. Also, his second approach assumes no change in the global income distribution over time and that the populations of all countries grow at the same rate. This paper quantifies the implications of these assumptions and finds they might be too optimistic.

This paper then proposes a benchmark scenario by replacing some seemingly overly optimistic assumptions with more realistic ones. For example, we use the latest country-specific population growth projections prepared by the World Bank data group. Ravallion (2013) assumes a uniform population growth rate for all countries, but the latest population projections show large variations in population

growth across countries, which can have non-negligible impacts on poverty projection. We incorporate the latest population growth projections into our benchmark scenario.

This paper also incorporates the effects of changes in the global distribution of household expenditure per capita. As mentioned above, the second approach of Ravallion (2013) assumes that global distribution will not change until 2030. However, as he shows, global distribution has been changing over time and can become more unequal because either each country grows at a different pace or inequality within a country increases, or both. Following Lanjouw et al. (2013), Edward and Sumner (2013), and Chandy et al. (2013), we use country-specific growth rates from the past 10 years, or more precisely a period between 2002 and 2010. Furthermore, we introduce an adjustment to incorporate the effect of changing inequality within a country over time. Our benchmark scenario incorporates these population and distribution effects. Under this scenario, the global poverty rate is projected to be 8.6 percent in 2030, which is much higher than the 3 percent target.

To answer the second question—what needs to be done to achieve the goal—this paper conducts a decomposition of contributors to the 2030 poverty projection under the benchmark scenario. We find that if all countries grow at the same rate as the world average growth rate of 4.7 percent annually, the global poverty rate is projected to be below the 3 percent target by 2030. However, the pace of poverty reduction has been delayed substantially because many poorer countries have experienced slower economic growth and faster population growth than the developing world as a whole, while inequality within a country has on average been widening (Ravallion 2013). Our decomposition analysis shows that the biggest contributor to the slow pace of poverty reduction is the large cross-country variation in growth of household expenditure per capita; the second biggest contributor is a variation in population growth across countries; and the last is increasing inequality within a country.

While the importance of economic growth in poverty reduction is well documented (e.g., Dollar and Kraay, 2002, and Dollar et al. 2013), our conclusion adds to the recent argument by Basu (2013) that accelerating growth is not enough to end extreme poverty by 2030 and sharing prosperity within and across countries is essential to achieve the target. This paper shows that if inequality within and across countries continues to widen, the developing world needs to grow at an unprecedented and virtually impossible pace. To achieve the extreme poverty target, it is essential to attain more shared growth by accelerating growth among the less well-off countries and among the less well-off in those countries.

Furthermore, given how difficult it is to achieve the goal, even a small shock in currently good performing countries can derail the prospect of ending extreme poverty. It is therefore important to help all countries become more resilient to shocks and create an international system from which countries facing crises receive immediate and substantial support so that the crisis does not have a long-lasting impact.

Findings of this paper suggest interesting links between the World Bank Group's goals. To end extreme poverty, it is crucial to achieve the other goal of promoting shared prosperity, which is measured by growth of the less well-off for each country. Also, the WBG goals stress the importance of sustainability. Only a difference is that to end extreme poverty by 2030, prosperity (or economic growth) needs to be shared not only between the rich and the poor within a country, but also between rich and poor countries.

This paper is organized as follows. Section II provides a literature review to examine several methodologies used to project the extreme poverty rate by 2030. Section III examines which assumptions made in Ravallion (2013) seem too optimistic. Section IV proposes a benchmark scenario after replacing these optimistic assumptions with more realistic ones. Section V shows results of projections and decomposition analysis. Section VI proposes an intermediate growth target for each country under which the target can be achieved on time. Section VII concludes.

Finally, as mentioned above, the objective of this paper is not to produce a new set of projections of extreme poverty in 2030. Instead, it is to propose a new approach to analyze the level of challenge in

achieving this target of ending extreme poverty and elicit strategic guidance using publicly available data only to ensure transparency in the analysis. To facilitate transparency, the annex includes a detailed description of source data as well as our projection approach.

II.   Literature Review and Comparisons of Projection Methodologies

Poverty projection based on constant growth elasticity or semi-growth elasticity

Future poverty is often projected under an assumption of constant growth elasticity or semi-growth elasticity. Growth elasticity refers to the ratio of a percent change in the poverty rate to a percent change in income or consumption. Semi-growth elasticity refers to the ratio of a percentage point change in the poverty rate to a percent change in income or consumption. Klasen and Misselhorn (2006) argue that semi-growth elasticity is more useful for policy makers who usually focus on the percentage point reduction of the poverty rate.

Table 1: Growth elasticity and semi-growth elasticity under the 2010 global distribution

Global poverty rate	Growth	Semi-Growth
20	-1.94	-0.39
10	-2.42	-0.24
5	-2.22	-0.11

Source: Authors' estimation using PovcalNet (October 2013 version).

While many used this approach for poverty projection within a country, Bourguignon (2003) and Klasen and Misselhorn (2006) showed that these approaches can work well for projection of poverty in a cross-country setting. Dercon and Lea (2012) used the constant semi-growth elasticity approach to project global poverty rates.

However, both constant semi-growth elasticity and constant growth elasticity are problematic when we need to estimate poverty rates for the distant future. Chandy, Ledlie, and Penciakova (2013) explain why the constant (semi-) growth elasticity approach does not work. Income distribution is not flat and often shows a large concentration of population in the middle income group. When the poverty rate is very high, a poverty line is often located in the huge population mass. As a result, even a small improvement in income can lift many out of poverty. However, as the poverty rate continues to decrease, not many are located near the poverty lines; as a result, a small increase in income can lift only a few out of poverty. Therefore, semi-growth elasticity tends to decline as the poverty rate declines. The effect of this curvature of income distribution to growth elasticity is more complicated because as the poverty rate declines, even a small *percentage point* change in the poverty rate can cause a large *percent* change in the poverty rate.

Table 1 shows how growth elasticity and semi-growth elasticity change if the 2010 global distribution in PovcalNet—the World Bank's database of global poverty—is used.[4] As expected, semi-growth elasticity declines as the global poverty rate declines, while changes in growth elasticity are much more complex.

In conclusion, since poverty rates are expected to change significantly over a long time horizon, it is likely that projections for poverty in the distant future based on constant growth elasticity or semi-growth elasticity will be misleading. In particular, the projection based on semi-growth elasticity likely overestimates the pace of poverty reduction.

Distribution-neutral projection

Due to the aforementioned problems on the constant (semi-) growth elasticity approach, some authors take a "distribution-neutral approach" (see Ravallion 2013, Lanjouw et al. 2013, Karver et al. 2012, Edward and Sumner 2013, and Chandy et al. 2013). All use the income or consumption distribution of a

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[4] See more details about PovcalNet in the annex.

particular year available in PovcalNet to project future poverty rates. To be precise, this approach should be called an inequality-neutral approach because authors typically use the World Bank's global poverty database, PovcalNet, to conduct this analysis where the distribution is allowed to change as long as its Lorenz curve remains the same.

An advantage of this approach is that it can predict the true poverty rate if income or consumption grows as expected without changing inequality. This approach uses the actual income or consumption distribution, so poverty rates fully reflect the curvature of the income or consumption distribution. Therefore, unlike the constant growth or semi-growth elasticity approach, this approach can predict poverty rates well *as long as inequality does not change*.

Needless to say, the biggest disadvantage of this approach is the fact that it assumes no changes in inequality. And as Ravallion (2013) and Ravallion and Chen (2012) show, inequality has also been changing over time. Inequality was slowly declining in the 1980s and the 1990s, but, as the pace of poverty reduction started to accelerate in the 2000s, global inequality also started to increase. At the country level, the changes are even more complex. Evidently, assuming no changes in inequality is a strong assumption.

Use of growth projections based on national accounts or household survey mean

All recent studies project global poverty rates against income or consumption growth rates from either national accounts or household survey data (see Ravallion 2013, Lanjouw et al. 2013, Karver et al. 2012, Edward and Sumner 2013, and Chandy et al. 2013). It is important to decide which should be used to estimate growth rates since growth rates often vary largely depending on this choice. When national accounts are chosen, the resulting growth rates are often discounted when they are converted to growth rates from household survey mean (e.g., Chandy et al. 2013 and Lanjouw et al. 2013,).

The challenge with using national accounts is two-fold. First, the ratio of growth rates from the household survey mean to those from the national accounts varies across countries and over time. After extensive investigation of the statistical differences between the household surveys and national accounts, Dhongde and Minoiu (2013) conclude that:

> *Estimates of global poverty vary significantly when they are based alternately on data from household surveys versus national accounts (Dhongde and Minoiu, 2013, p.1).*

Nevertheless, several authors use growth rates from national accounts to project those from the household survey mean. For example, Karver et al. (2012) simply assume that both sets of growth rates will be the same, and growth rates from national accounts are used to project future poverty rates. Chandy et al. (2013) convert growth rates calculated from national accounts into growth rates from the household survey mean by adopting uniform conversion rates between the two. The ratio is estimated at 0.91 for income surveys and 0.81 for consumption surveys. However, the use of uniform conversion ratios masks large variations in conversion rates across countries and over time and likely causes non-negligible biases in global projections.

The second challenge is that global poverty rates are estimated based mainly on household survey data, although national accounts are used in a circuitous way. Ravallion (2013) explains how data in PovcalNet are created and used to estimate global and regional poverty rates. PovcalNet includes some 900 household surveys for 125 countries.[5] It provides estimates of poverty measures for "reference years" spanning 1981–2008 at three-year intervals and for 2010. Given the irregular and unsynchronized spacing of surveys, PovcalNet uses an interpolation method that employs growth rates in private consumption

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[5] This does not include countries for which no valid PPP is available (Afghanistan, Marshall Islands, Mongolia, and Uzbekistan).

from the national accounts for those dates when surveys are not available.[6] In this sense, national accounts are used but only for interpolation, and the main sources of growth rates remain the household survey mean.

Aggregation bias

It is important to determine at what level projections should be carried out. Ravallion (2013) conducted projections of the global poverty rate at the global level, or using a global income or expenditure distribution, and noted the risk of aggregation bias. For example, he mentioned that China has been a key contributor to global poverty reduction and it is expected that growth in China will continue. However, if the high growth rate persists, China's poverty rate will soon reach zero, after which China's growth will cease to contribute to the pace of global poverty reduction. To minimize this aggregation bias, it is recommended that country-level poverty projections be conducted first, then aggregated into global poverty. Other major recent studies on global poverty projection have taken this approach (see Lanjouw et al. 2013, Edward and Sumner 2013, and Chandy et al. 2013).

III.   How Optimistic Are the Poverty Projections Done by Ravallion (2013)?

This section reviews the approach used by Ravallion (2013) and identifies assumptions considered to be optimistic. It is first important to note how global poverty is defined. Ravallion (2013) estimates the percentage of those living on less than US$1.25 per day per capita in all developing countries, as was the practice based on the 1990s definition. However, the World Bank Group goal includes developed countries in its definition of the global poverty rate. Since the poverty rate in the developed world is negligible, the poverty rate in the developing world is higher than that of the world. To clarify the distinction, we refer to poverty rates estimated in Ravallion (2013) as the poverty rate of the developing world.

Ravallion (2013) conducted two approaches to project poverty rates of the developing world in 2027, namely a linear projection approach and a distribution-neutral approach. The linear projection approach means the poverty rate of the developing world will continue to decline by the same percentage point value per year. Ravallion (2013) estimated the average percentage reduction of the poverty rate per year from the global poverty rates between 1981 and 2010 and found that the poverty rate of the developing world has been declining by one percentage point per year (or more precisely 1.04 percentage points per year). If this pace continued, the global poverty rate would be 3 percent in 2027.

The distribution-neutral approach assumes that all countries in the developing world share the same growth rates of mean household expenditure per capita and populations without changing the shape of the distribution from the reference year.[7] Ravallion (2013) found that if all countries grew at 4.5 percent per year, and the shape of the distribution were the same as for 2008, the poverty rate of the developing world in 2027 would be 3 percent.

Why were these projections considered optimistic?

Both approaches seem to assume that the current pace of poverty reduction would continue until 2030. This assumption may sound realistic and reasonable, but the following analyses will show that it is indeed quite optimistic.

For example, maintaining the pace – one percentage point per year – becomes increasingly difficult as the poverty rate declines. To show this, we calculate the growth rates of household expenditure (or income)

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[6] See more details in Ravallion (2013), Chen and Ravallion (2010), and Chen and Ravallion (2013).

[7] More precisely, mean household expenditures (or income) per capita will grow without changing a Lorenz curve of their distribution. This is because Ravallion (2013) calls this approach an "inequality-neutral" projection.

per capita required to reduce the global poverty rate one percentage point per year if the distribution of household expenditure does not change and population growth is uniform for all countries between 2010 and 2030, as assumed in Ravallion's second approach (2012, 2013). The required growth rates rise rapidly once the poverty rate reaches 10 percent (see Figure 1). If the poverty rate continues to decline one percentage point per year, it will reach 8.6 percent by 2022. To reduce it further to 6.6 percent in the next two years (2022–2024), the developing world needs to increase the annual growth rate of household expenditure per capita from 4.1 percent to 5.1 percent, which is higher than the average growth rate of the developing world as a whole between 2002 and 2010. To reduce the global poverty rate further from 6.6 to 4.6 in the following two years (2024–2026), the annual growth rate needs to increase to 7.4 percent. The required growth rate will continue to increase in the next four years to 47.9 percent.

Figure 1: Required Growth Rates of Mean Household Expenditure/Income Per Capita (annualized, %)
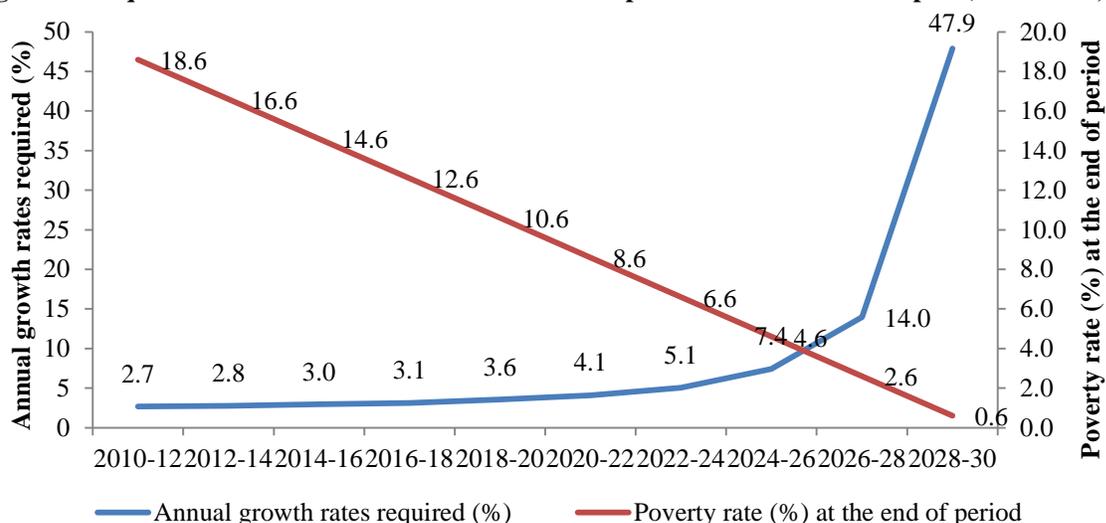
Source: Authors' estimations using PovcalNet (October 2013) and poverty projections of Ravallion (2012). The distribution of household expenditure per capita in 2010 is used to estimate growth rates required to reduce the global rate 1 percentage point per year.

Ravallion (2013) recognizes possible nonlinearity in the pace of poverty reduction once the poverty rate reaches 10 percent. The above analysis clarifies why we tend to have such nonlinearity. Maintaining the linearity of poverty reduction requires increased growth rates. Our analysis confirms that once the global poverty rate reaches around 10 percent, a huge rate of economic growth (7 percent or higher) is required, which makes maintaining the pace of poverty reduction almost impossible.

Another way to illustrate the nonlinearity in the pace of poverty reduction is to compare the path of the distribution-neutral projection with the path of the linear projection. In both approaches, the poverty rate of 2030 is projected to be very close to 3 percent. However, the distribution-neutral projection with a constant annual growth rate of 4.5 percent shows clear nonlinearity, which means the pace of poverty reduction slows gradually but persistently (see Figure 2) if household expenditure grows at a constant rate. Indeed, it is clear that the pace of poverty reduction is much more than one percentage point per year in the beginning and slows to near zero between 2028 and 2030.

Assessment of the distribution-neutral approach

The distribution-neutral approach conducted in Ravallion (2013) makes three key assumptions: (i) a uniform population growth rate across all developing countries; (ii) uniform growth rates of mean household expenditure per capita; and (iii) no change in inequality within a country. We evaluate whether these assumptions are likely to hold and if not, the implications of a violation of these assumptions of the poverty projection.

Figure 2. Comparison of Poverty Reduction Trend using Distribution-Neutral Projection and Linear Projection
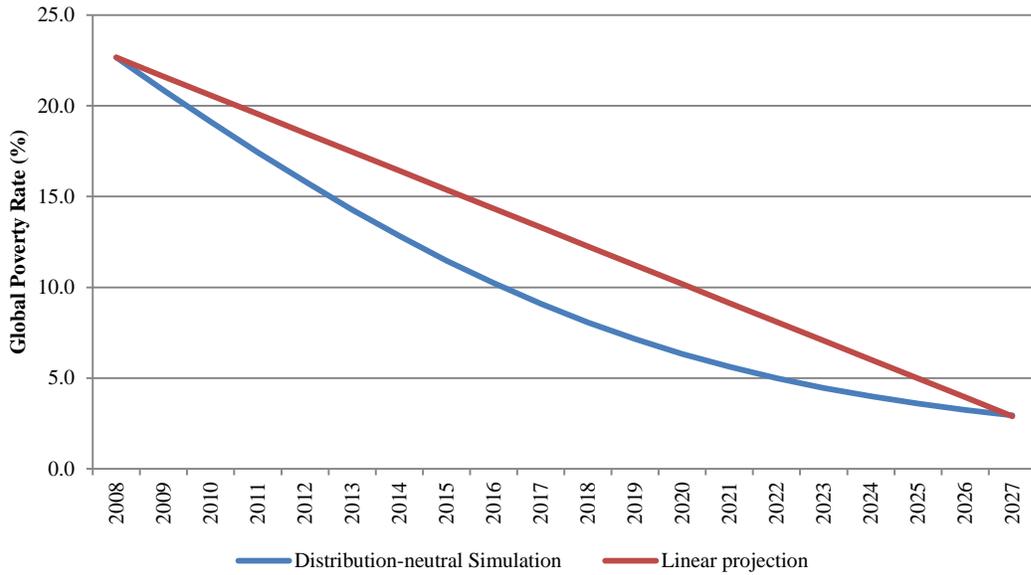
Source: Authors' re-estimation using the 2008 global distribution from PovcalNet (as of October, 2013).

Figure 3: Projection of Population Growth Rate by Region (%, annual)
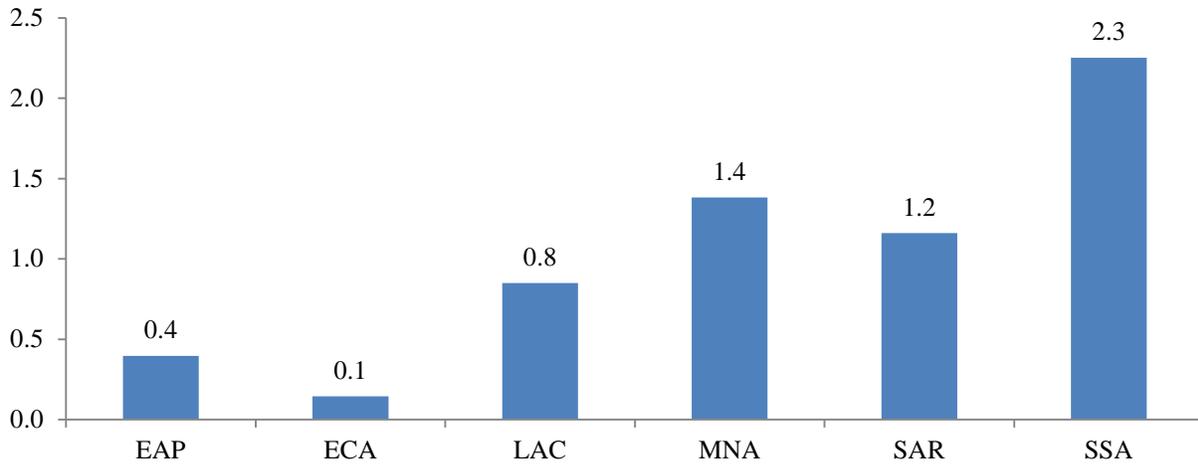
Source: Population Projections by World Bank Data Group (as of October 9, 2013).

First, the assumption of uniform population growth rate does not seem consistent with the World Bank Data department's latest population projections where population growth rates differ significantly, and more importantly, the population of the poorest region, Sub-Saharan Africa (SSA), is expected to grow the fastest (see Figure 3). The violation of this assumption has implications for the global projection of poverty. To see the impact, we estimate the poverty rate of the developing world in 2027 assuming that the populations of all regions grow as the World Bank Data Group's projections predict with no difference in the population growth rate within a region. This assumption of no change in the population growth rate within a region is a strong one, but it is made to reduce the computational burden.

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Once we accept the World Bank's population projections, even if all countries grow at 4.5 percent, the poverty rate of the developing world in 2027 is no longer 3 percent, but 3.7 percent.[8] This increase in the poverty rate is caused mainly by increasing the population share of the poorest region in the developing world, i.e., SSA, from 14.1 percent to 18.7 percent between 2010 and 2027. To achieve a 3 percent poverty rate by 2027, all countries must grow faster than 4.5 percent. Note that this analysis does not take into account the full effects of country-specific population growth rates, which will be done in Section IV.

Table 2: Average Annual Growth Rates of Mean Household Expenditures by Region (2002–2010)

Region	Growth rates (%)
East Asia & Pacific	6.4
Europe & Central Asia	6.5
Latin America & Caribbean	5.0
Middle East & North Africa	1.6
South Asia	2.3
Sub-Saharan Africa	2.1
Developing world	4.7

Source: Authors' estimations using PovcalNet (October 2013)

Table 3: Changes in Gini Coefficients for Select Countries

Country	Year	Gini Coefficients (%)
Brazil	2009	54.69
	1999	59.78
China	2009	42.06
	1999	39.23
India	2009.5	33.90
	1993.5	30.82
Indonesia	2010	35.57
	2002	29.74
Russian Federation	2009	40.11
	2002	35.70

Source: PovcalNet (October 2013)

Second, the assumption of uniform growth of mean household expenditure (or income) is unlikely to hold. In fact, our estimation of annual growth rates of household expenditure per capita indicates there is a significant variation across regions. We estimate these growth rates by first calculating country-level mean expenditures from PovcalNet for 2002 and 2010, then estimating the population weighted mean for all regions for both years, and finally calculating the global growth rate from the regional mean. As mentioned before, the average growth rate in the developing world is 4.7 percent, which is higher than the required growth rate of 4.5 percent under the distribution-neutral assumption in Ravallion (2013). However, Table 2 shows East Asia and the Pacific (EAP), Europe and Central Asia (ECA), and Latin America and the Caribbean (LAC) regions exhibit much faster growth than Middle East and North Africa (MNA), South Asia (SAR), and SSA. The biggest concern is the slow growth of SSA, the poorest region, which certainly slows down the pace of poverty reduction at the global level.

Third, the distribution-neutral assumption does not hold not only because countries and regions grow at different paces, but also because inequality within a country might be changing. It is often the case that inequality increases as a country becomes richer, although recent experiences in LAC where many countries show a significant reduction in inequality in recent years present exceptions. Table 3 shows trends of Gini coefficients for select countries. The durations are selected based on data availability and comparability. Brazil shows a significant reduction in Gini coefficients between 1999 and 2009, while China, India, Indonesia, and Russian Federation all showed some increases in Gini coefficients for the select durations.

Both differences in growth rates across countries and changes in inequality within a country likely have a huge impact on projection of the global poverty rate in 2030. For example, Ravallion (2013) compares growth rates required to achieve the 3 percent target if the global distribution of household expenditure per capita changes. According to Ravallion (2013), the global distribution of household expenditure per capita is most equal in 1999. As mentioned before, the growth rate needed to achieve 3 percent by 2027 is

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[8] World Bank's population projections are not available for 2027. The authors projected the 2027 populations using population projections of 2025 and 2030 assuming annual regional population growth rates are constant between 2025 and 2030.

4.5 percent if the 2010 distribution is used. However, if the 1999 distribution is used, the required growth rate would be only 3.4 percent. Therefore, implications of distributional changes are likely large.

In conclusion, both the linear projection and the distribution-neutral approach appear to suggest that if the developing world continues its pace of growth and poverty reduction in the past few decades, the poverty rate of the developing world can be reduced to 3 percent by 2027. However, some assumptions made for these projections are deemed too optimistic. In the next section, we will propose a new benchmark scenario after replacing these optimistic assumptions with more realistic ones.

IV.   Projections of Poverty Rates under a Benchmark Scenario

As discussed above, the distribution-neutral approach used by Ravallion (2013) makes the following assumptions, which are deemed too optimistic:

- Population growth rates are the same for all countries;
- Growth rates of household expenditure (or income) per capita are the same for all countries; and
- The distribution of household expenditure within a country will not change over time.

Instead, we replace these with more realistic ones and call them a "Benchmark Scenario":

- The World Bank Data Group's latest population growth projections for 2030, which differ across countries.
- Growth rates of household expenditure per capita are estimated for each country separately, based on estimated mean expenditures of 2002 and 2010 available in PovcalNet (as of October 2013); and
- The effect of changes in distribution of household expenditure per capita on poverty rates for each country are estimated and incorporated into the projection of poverty rates.

Population projections

Following a convention of PovcalNet, we draw the latest version of the World Bank Data Group's database for population estimates and projections (as of October 1, 2013), which is available in http://data.worldbank.org/data-catalog/population-projection-tables. This database is updated twice a year (April and July).

For around 70 percent of countries, this database draws projections calculated under a "medium fertility" scenario in the United Nations Population Division's World Population Prospects (WPP) 2012 Revision (http://esa.un.org/unpd/wpp/Documentation/publications.htm). For the remaining countries, which have good vital registration data or frequent updates of population data, the World Bank projects future population figures using its own population estimates of the base year (2010 when this paper was prepared) and information on future fertility (medium fertility), mortality, migration, and population composition from UN WPP 2012 Revision.

Growth rates of mean household expenditure per capita

Annual growth rates of mean household expenditure (or income) per capita between 2002 and 2010 are estimated using data in PovcalNet (October 2013). PovcalNet is an interactive web-based database, with which poverty rates can be estimated with any level of poverty lines. The World Bank research department maintains the PovcalNet database and also estimates global and regional poverty rates using this database. In PovcalNet, users can estimate global and regional poverty rates for so called "lining-up"

years such as 1981, 1984, 1987, 1990, 1993, 1996, 1999, 2002, 2005, 2008, and 2010.[9] When a country does not have a household survey for these years, poverty rates and mean expenditures are interpolated if the year is between two household survey years, and extrapolated using household survey data in the closest year and data from national accounts.

Growth rates of mean household expenditure per capita in PovcalNet are not as popular a statistic as those of GDP per capita or other national accounts, but we prefer these because they are fully consistent with past global and regional poverty estimates. Ravallion (2013) shows that the relationship between growth rates of GDP per capita or other national accounts and those of mean household expenditure per capita in Povcalnet differ largely across countries and over time. Therefore, it is difficult to project future poverty rates from national accounts.

We estimate the growth rates from mean household expenditures per capita of the lining up years of 2002 and 2010, although we could estimate the growth rates of mean household expenditure of survey years. The latter is more direct in that mean household expenditures per capita are estimated directly from household survey data with no influence from other data sources. On the other hand, mean household expenditures per capita in the lining up years are influenced by national accounts if they are either interpolated or extrapolated. However, the benefits of using the mean expenditures in the lining up years are (i) the duration used to estimate the growth rates is exactly the same for all countries and (ii) the global and regional poverty rates are estimated from the same database.

Incorporating the effect of changing inequality over time

As mentioned before, the distribution of household expenditure per capita is changing over time for many countries. In the following analysis, we propose what may be termed "inequality-adjusted growth rate" to capture the impact of change in inequality on poverty. Although we will still have to rely on the distribution-neutral growth assumption using the 2010 income distribution in PovcalNet, we do so, for all available countries, by translating changes in inequality between 2002 and 2010 into the projected growth rate such that countries that have reduced inequality during this period would have a higher projected growth rate than the actual growth rate (so that projected poverty rate in 2030 will be lower) and vice versa. An underlying assumption is that the trend in inequality between 2002 and 2010 would continue between 2010 and 2030.

The inequality adjustment is carried out in the following manner. In PovcalNet, for each country, we choose the 2010 distribution, and keep shifting the mean of the distribution until we obtain the 2002 poverty rate.[10] The ratio of the original mean to the resulting mean will give us the total growth rate required to reduce the poverty rate measured at US$1.25 per day between 2002 and 2010 if the distribution is constant at the 2010 level. Finally, we annualize the required growth rate.

Figure 4 illustrates this process. The upper panel shows the 2002 and the 2010 distributions of household expenditure per capita. In this example, it appears that the 2010 distribution is more unequal than the 2002 distribution. The raw growth rate of mean household expenditure per capita is calculated by comparing mean expenditures. In the lower panel, the 2010 distribution is moved leftward until the poverty rate becomes identical to the 2002 poverty rate, while keeping the shape of distribution the same, except for the mean. In this illustration, the resulting distribution needs to have a higher mean (indicated

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[9] For the lining-up years, Povcalnet produces global and regional poverty estimates for certain years. If some countries do not have household surveys for the years, it estimates poverty of these countries by interpolating or if necessary extrapolating poverty rates of nearby years. This exercise of producing poverty rates for the given years is called "lining-up" and the years "lining-up years". More details are available in the annex.

[10] Practically speaking, the user of PovcalNet must keep reducing poverty line (as opposed to increasing the mean) from the default value of US$38 (the monthly value of US$1.25 per day poverty line) until we obtain the 2002 poverty rate, because poverty line is the only variable in PovcalNet.

by M in the lower panel) than the mean of the 2002 distribution because the former is more unequal than the latter; and as a result, the inequality-adjusted growth is smaller than the raw growth rate.[11]

A difference between a raw growth and an inequality adjusted growth can change if the reference year changes. Since all projections will be conducted with the 2010 distributions, we choose 2010 as the reference year.

Figure 4: Illustration of Inequality-Adjusted Growth Rates
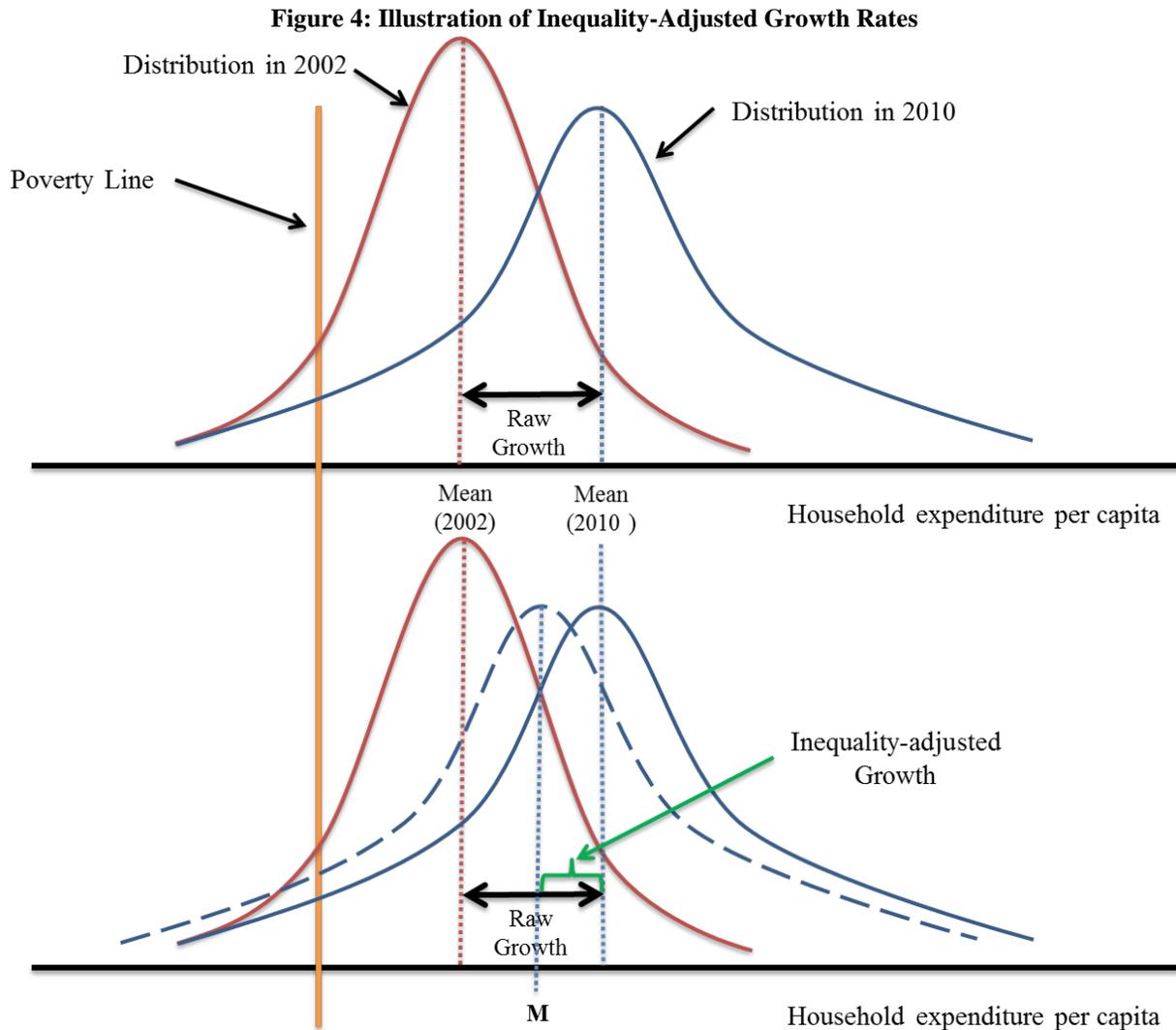
Source: Authors' own illustration

In summary, our benchmark scenario implies that each country will continue to grow at the same pace as the average inequality-adjusted growth rate of its mean household expenditure per capita between 2002 and 2010. Poverty rates of 2030 at the country level are calculated with the 2010 distributions available in PovcalNet after increasing the mean household expenditure as much as the inequality-adjusted growth rate suggests. To aggregate country-specific poverty rates of 2030 up to the global and regional poverty rates, we use the latest World Bank Data Group's population projections for 2030.

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[11] This simple example suggests that if the poverty rate is high enough, both distributions are symmetrical, and both poverty rates are higher than 50 percent, then the inequality-adjusted growth is larger than the raw growth rate.

There are a few final remarks. First, all projections below show the global poverty rates against the world population rather than the developing world's population following the definition of the new World Bank Group's goal. Ravallion (2013) follows the MDG approach whereby poverty rates are estimated for the sum of populations of all developing countries as of 1990. It is assumed that the population in the developed countries living on less than US$1.25 per day is negligible. Second, Ravallion (2013) conducted projections using the 2008 distributions of household expenditure per capita since the 2010 distributions were not available when the paper was written. However, below, we use the 2010 distributions available in PovcalNet. The database in PovcalNet and population projections will change whenever new or revised household survey data are provided to the World Bank. Therefore, all projections here are also subject to changes. All analyses below are conducted using the PovcalNet database and population projections available on October 10, 2013.

V. Results and Decomposition of Contributors

There are several factors that can affect global poverty rates. To decompose the effect, we gradually add a new assumption and observe any resulting increase in the poverty rate.

The first projection assumes growth rates of mean household expenditure per capita (or simply the survey mean) and population are uniform across countries (see scenario (i) in Table 4). The uniform growth rate of the survey mean is assumed at 4.7 percent, which was the average annual growth rate of the developing world between 2002 and 2010. This approach is close to that of Ravallion (2013) except that (i) the global poverty rate is now estimated against the world population rather than the population of the developing world, and (ii) the growth rate of the survey mean is set at 4.7 percent. Under this scenario, the global poverty rate is projected to be around 2.1 percent by 2030.

The second projection assumes country-specific population growth rates while assuming the uniform growth rate of the survey mean to be 4.7 percent (see scenario (ii) in Table 4). Introducing the country-specific population growth increases the global poverty rate from 2.1 percent to 2.8 percent. This means the global poverty rate increases by one third, which is large. Such an increase happens because populations of poorer countries or regions grow faster.

The third projection assumes that for each country, the survey mean grows at its own average growth rate for the period between 2002 and 2010 and while maintaining country-specific population projections of the World Bank Data Group (see scenario (iii) in Table 4). This introduces full variations in country-level growths, but does not still incorporate the effects of changing inequality or distribution.

Introduction of country-specific growth effects has a large impact on the global and regional poverty projections. It increases the global poverty rate substantially, from 2.8 percent to 8.5 percent. If we focus on the developing world, the introduction of country-specific growth effects increases the poverty rate of the developing world from 3.2 percent to 9.8 percent.

The fourth and final projection uses country-specific and inequality-adjusted growth rates (see scenario (iv) in Table 4). Introduction of the inequality adjusted growth has a very limited impact once country-specific growth effects are incorporated – the global poverty rate increases from 8.5 percent to 8.6 percent. The poverty rate of the developing world also increases only marginally from 9.8 percent to 9.9 percent. Although the global impact of within-country inequality is limited, regional projections suggest that it has had significant impact for some regions but the impact is largely offset. For example, consideration of changes in inequality over time reduces poverty rates in LAC and EAP, while it increases poverty rates in ECA and SAR.

These results here are broadly in accordance with Lanjouw et al. (2013) that applied a set of assumptions comparable to but less optimistic than those in Ravallion (2013). Lanjouw et al. (2013) projected poverty

rate of the developing world in 2030 to be in the range of 6.3 percent and 8.9 percent while holding within-country inequality constant and assuming country-specific population and economic growth rates. Although our projected poverty rates are at the high end of Lanjouw et al. (2013)'s projections, we share a similar view that maintaining the pace of economic growth in the recent past would not be sufficient to achieve three percent poverty rate by 2030.

Figure 5 separates contributions of each factor to the global poverty rate. A comparison of poverty rates between scenario (i) and (ii) illustrates the impact of introducing country-specific population growth. As mentioned above, it is limited in terms of percentage points, but this is likely due to the fact that the poverty rate before introducing country-specific population growth is as low as 2.1 percent. In fact, the percent change between (i) and (ii) is 33 percent, which is substantial. A comparison between (ii) and (iii) clearly shows that the biggest contributor for the very high poverty projection of 2030 is a large variation in country-specific growth rates. Introduction of country-specific growth rates increases the global poverty rate by three-fold and nearly 6 percentage points.[12] Finally, the impact of considering the within-country inequality effect is minimal.

Table 4. Projected Extreme Poverty Rate (%) in 2030

Assumptions of growth rates	Survey mean	Uniform (4.7%)		Country-specific	
	Population	Uniform	Country-specific		
Scenarios		(i)	(ii)	(iii)	(iv)
Developing countries as of 1990	EAP	0.17	0.17	1.13	0.78
	ECA	0.09	0.09	0.24	0.35
	LAC	2.18	2.21	3.21	2.68
	MNA	0.13	0.13	1.76	1.73
	SAR	0.45	0.45	7.87	8.92
	SSA	13.80	14.29	34.98	35.00
	Total	2.44	3.20	9.77	9.91
Developed countries as of 1990		0.00	0.00	0.00	0.00
World		2.08	2.78	8.51	8.63

Source: Authors' estimations based on population projections of 2030 from World Bank Data Group; PovcalNet (as of October 2013)

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[12] We also projected poverty rate in 2030 assuming uniform population growth rate and country-specific economic growth rate. Under this scenario (not shown in Table 4), the projected poverty rate for the world in 2030 is 6.7 percent, significantly higher than 2.08 percent in scenario (i). This underscores the significant effect on future poverty projections of the large variation in country-specific economic growth rates.

Figure 5: Decomposition of Global Poverty Projections
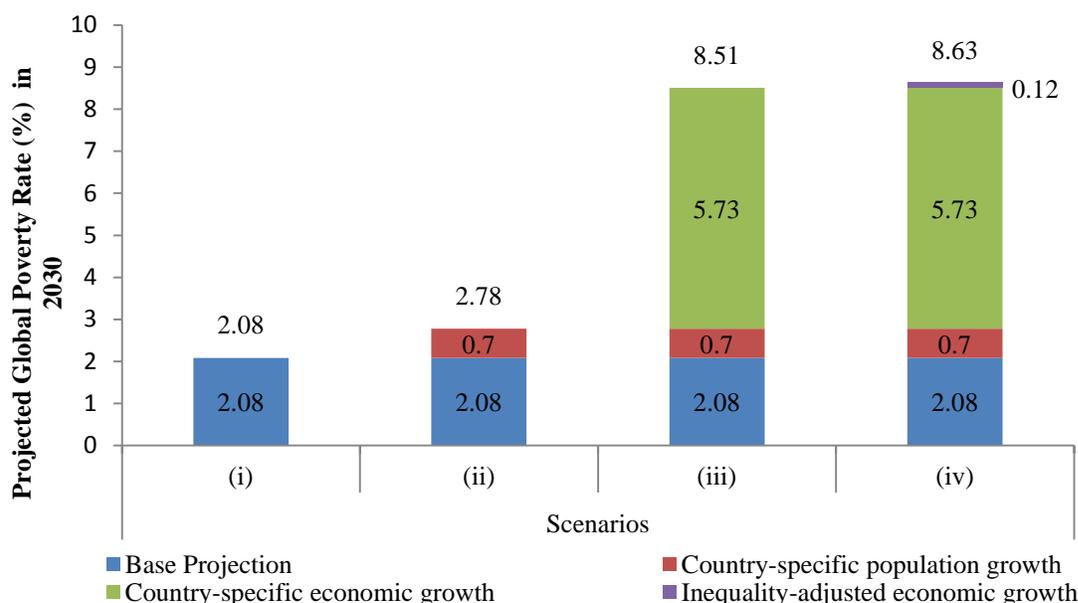
Source: Authors' estimations using data from PovcalNet (October 1, 2013).

In conclusion, under our benchmark scenario, the global poverty rate in 2030 is projected to be 8.6 percent. In other words, if all developing countries maintain their paces of growth and poverty reduction between 2002 and 2010, the global poverty rate is projected to be 8.6 percent in 2030. This projection is much larger than that of Ravallion (2013). Consideration of country-specific growth patterns is a main source of this difference, but the use of population growth projections by World Development Data Group and within-country inequality adjustments also contribute to the increase in the global poverty projection.

VI. Bending the Arc of History

It is clear that achieving the new target of reducing extreme poverty to 3 percent by 2030 is very challenging if the developing world maintains its current pace of growth and poverty reduction. The analysis above shows that under the benchmark scenario, the global poverty rate is projected to be as high as 8.6 percent in 2030. Therefore, to achieve the new target, it is necessary for developing countries and their development partners to improve the pace of poverty reduction. Is that possible? If so, how can we achieve the target?

There are an infinite number of ways to reduce the global poverty rate and each of them imposes different levels of burden on countries and regions around the world. Reducing poverty rates uniformly for all developing countries is one way, while focusing on a few very poor countries is another. Of course, the implications of these approaches are very different for all countries. This paper looks for a uniform growth target, which is simple, fair, and desirable. It begins by investigating the simple question of whether accelerating all countries' growth by the same percentage point is enough.

Is accelerating growth only enough?

To achieve the extreme poverty target, it is necessary to either accelerate growth or improve income (or consumption) distribution, or both. Here, we test whether only accelerating growth can achieve the goal.

15

To see this, we add a uniform rate of growth to the inequality-adjusted growth rates of all countries between 2002 and 2010. If all countries' growth rates were accelerated by 3.75 percentage points, the global average growth rate would be 7.9 percent and the global poverty rate for 2030 would still be slightly above 3 percent (3.03 percent).

Note that the global growth rate refers to the growth rate of the survey mean. Since the growth rate of the survey mean is usually lower than that of gross domestic product (GDP) per capita, this implies that the developing world's GDP per capita needs to grow at nearly 10 percent on average every year. Since that has never happened since 1980, we can say that accelerating growth only is not enough to achieve the global target.

How are these findings related to the recent study by Dollar et al. (2013) who concluded that "growth still is good for the poor"? Some might think their findings are not consistent with a conclusion of this paper—that growth alone is not enough to achieve the target of ending extreme poverty—but that is not the case.

Basu (2013) clarifies that Dollar et al. (2013) illustrate the situation over the past few decades and also points to the fact that what happened in the past does not tell us what we need to do and what can happen in the future. To illustrate his argument, he creates an interesting hypothetical empirical study of "tradicines." Tradicines include virtually all the traditional medicines of various schools and also modern medicines that are not antibiotics. Then he poses a hypothetical situation where an economist does an empirical study of what cures infectious illnesses in 1930, just two years after penicillin was discovered. Simply because antibiotic was not popular yet, the empirical study would likely find that tradicines cure almost all illness. This is a clear example that empirical studies do not necessarily tell us what will work and what we need to do in the future.

In fact, like Dollar et al. (2013), we found that the main driver of poverty reduction will be growth if the developing world maintains its current pace and patterns of growth and poverty reduction. We also found that the contribution of changes in within-country inequality will be minimal if all developing countries maintain the current pace of growth and poverty reduction. This is perfectly consistent with the findings of Dollar et al. (2013).

However, we go on to argue that it is not possible to achieve the target of ending extreme poverty by maintaining the current pace and patterns of growth and poverty reduction. Under the benchmark scenario, the global poverty rate of 2030 will be far above 3 percent. Therefore, this paper argues that a dramatic change in patterns of growth and poverty reduction is necessary.

Sharing prosperity within and across countries

Given that accelerating growth only is not enough to end extreme poverty, other approaches are necessary. According to the above decomposition study, the developing world *as a whole* is growing fast enough to achieve the global target, but a problem is that poorer countries and regions, in general, grow more slowly than richer ones, which decelerates the pace of poverty reduction at the global level. What is needed is therefore to share the benefits of growth more widely by reducing the cross-country variation of growth, which did not happen in a systematic manner in the past according to both our study and Dollar et al. (2013).

Another important finding from the above decomposition study is that the developing world as a whole has exhibited little evidence of accelerating the pace of poverty reduction by shrinking within-country inequality. If there is limited room for accelerating growth directly, reducing within-country inequality is a potentially effective option. As Basu (2013) rightly points out, the limited success of reducing within country inequality so far is not a proof that this approach is ineffective, but can be a reflection that successful implementation of policies for reducing inequality is still rare at the global level. In fact, regional decompositions show encouraging results for reducing within country inequality is found in LAC and to a less extent, in EAP. In the case of Mexico and Brazil, the effect of reducing within country

inequality increases the annual growth rate by 2 percentage points and 3 percentage points, respectively. A more systematic analysis on how to reduce within-country inequality is necessary. [13]

Importance of sustainability and the World Bank Group Goals

Furthermore, maintaining the sustainability of good performance is important. Even if a country performs well now, sudden breakouts of economic crises or natural disasters can slow the pace of poverty reduction. Therefore, helping countries experiencing a severe economic crisis or a large-scale natural disaster recover quickly will be crucial to meet the global target of ending extreme poverty. Also, it is important to ensure that acceleration of growth and achievement of more shared growth are attained in a fiscally and environmentally sustainable manner. Otherwise, today's success just increases a risk of a future collapse.

These findings suggest interesting links between the WBG goals. To end extreme poverty, it is crucial to achieve the other goal of promoting shared prosperity – increasing growth of the less well-off for each country – and ensure the process remains environmentally and fiscally sustainable. Only a difference is that to end extreme poverty by 2030, prosperity or economic growth needs to be shared not only between the rich and the poor within a country, but also between rich and poor countries.

VI.1. Analysis of Regional Poverty Projections and a Proposed Intermediate Target

It seems reasonable or inevitable to enhance shared prosperity in the developing world in order to end extreme poverty by 2030. But what do we need to do? In the next subsections, we will review regional poverty projections and propose a simple target that can lead the global poverty rate to reach 3 percent by 2030.

Table 5. Minimum growth rates required to achieve the 3 percent targets globally

Region	SAR	SSA
Population shares in 2030 (%)	23.91	17.0
Poverty rates in 2010 (%)	31.0	48.5
Maximum poverty rates allowed in 2030 (%)	12.54	17.65
Actual growth rate (%)	2.14	1.93
Required annual growth rates (%)	1.46	4.06

Source: Authors' estimation based using PovcalNet and population projections by World Bank Data Group (as of October 2013).

Sub-Saharan Africa and minimum regional requirements to achieve the extreme poverty target

The benchmark projection indicates that SAR and SSA will likely dominate the population of the extreme poor in 2030. Due to their dominance in the share of poor populations in the world, there is a possibility that even if all other regions end extreme poverty by 2030, if one region fails to achieve a certain level of poverty by 2030, the global target of 3 percent by 2030 cannot be achieved. We call this a "maximum poverty rate allowed for one region" above which the region will singlehandedly fail the global target of 3 percent poverty rate in 2030. For example, if SAR cannot reduce the regional poverty rate to below 12.54

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[13] Dollar et al. (2013) are pessimistic about finding policy instruments that can promote shared prosperity. Their empirical analysis does not find any specific policy that effectively reduces inequality between the rich and the poor and accelerates growth of the less well-off to exceed the average. However, this result can be due to their empirical strategy—conducting empirical analysis using a cross-country database. As shown before, some countries in the LAC region could successfully accelerate growth among the poorer populations to well over that of the average population, but such successes are still outliers from a global perspective. As a result, a typical cross-country regression analysis does not capture this well.

percent by 2030, even if all other regions including SSA record a zero percent poverty rate, the global poverty rate would be higher than 3 percent. Similarly, if SSA cannot reduce the regional poverty rate to below 17.65 percent by 2030, even if all other regions record a zero percent poverty rate, the global poverty rate will be higher than 3 percent. To achieve the maximum poverty rates allowed, SAR needs to grow at least 1.5 percent annually. This is unlikely to be a huge challenge for SAR countries because all countries in SAR exhibit higher than a 1.5 percent average annual growth rate between 2002 and 2010.

However, the situation is different for the SSA region. To achieve the maximum poverty rate allowed, SSA needs to grow at 4.06 percent annually. If all SSA countries fail to achieve this level of growth on average for the next 20 years, even if all other regions record a zero percent poverty rate, the global poverty rate in 2030 would be higher than 3 percent.

Table 6: SSA Region Achieves at minimum 4.06 percent Growth Annually while All Other Countries Maintain Growth in the Benchmark scenario between 2010 and 2030

Region	Headcount rate (%)
East Asia & Pacific	0.78
Europe & Central Asia	0.35
Latin America & Caribbean	2.69
Middle East & North Africa	1.73
South Asia	8.92
Sub-Saharan Africa	17.06
Developing World	6.41
World	5.58

Source: Authors' projections using PovcalNet (October, 2013)

Between 2002 and 2010, only 8 out of 47 countries in SSA have achieved higher than a 4.06 percent annual growth rate after adjusting inequality, but the remainder, which is the majority of SSA, failed to achieve the growth rate. In this sense, maintaining the minimum requirement to achieve the global target is a significant challenge for many countries in SSA.

If all countries with growth rates lower than 4.06 percent between 2002 and 2010 raised their growth rates to 4.06 percent, and all countries with growth rates larger than 4.06 percent continued the pace of growth, the poverty rate for SSA would decrease to 17.06 percent by 2030, but the global poverty rate would still be as high as 5.58 percent unless other regions do not improve their performance. This means that efforts from SSA alone might not be enough.

Figure 6: Trends in Projections in South Asia Region
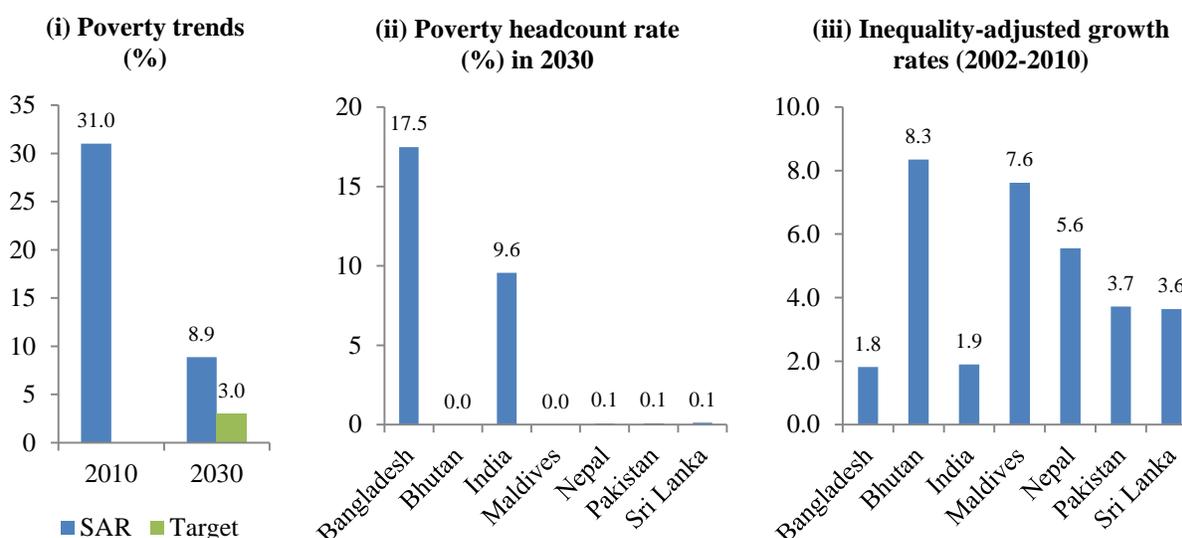
Source: Authors' estimations using PovcalNet data (October 1, 2013 version).

18

South Asia Region and encouraging recent achievements in India

To achieve the global target of 3 percent by 2030, it is critical to improve the pace of poverty reduction in SAR. If all countries in SAR continued their pace of growth and poverty reduction between 2002 and 2010, SAR's regional poverty rate would decline from 31 percent to 8.9 percent. This is a significant reduction, but the regional poverty rate is still nearly three times the global target of 3 percent. Furthermore, since SSA's poverty rate is likely to be significantly higher than 3 percent, to achieve the global target, other regions need to achieve a poverty rate significantly below 3 percent. Given that the population share of SAR is projected to be high (around one-quarter), it is almost certain that the global poverty rate would be higher than 3 percent in 2030 unless SAR achieves a regional poverty rate below 3 percent.

According to Figure 6, all countries but India and Bangladesh will end extreme poverty if they can maintain the pace of poverty reduction between 2002 and 2010. In this sense, for these countries, their policy question is how to maintain the pace. But, for India and Bangladesh, they need to accelerate their performance in poverty reduction significantly; otherwise, it is almost certain that not only they but also SAR as a whole will fail to reach 3 percent.

Table 7: Official poverty estimates in India (%)

	Rural	Urban
2004-05	41.8	25.7
2009-10	33.8	20.9
2011-12	25.7	13.7

Source: Press Note on Poverty Estimates, 2011-12. Government of India, Planning Commission, July 2013.

However, encouraging news came from India's latest official poverty estimates for 2011/12. According to the Planning Commission of the Government of India, both urban and rural poverty rates declined rapidly between 2009/10 and 2011/12 (see Table 7). More importantly, the pace of reduction is accelerated. In rural areas, the annual rate of poverty reduction between 2004/05 and 2011/12 was 6.7 percent. It increases to 12.8 percent if we focus on the last two years. In urban areas, the same observation holds—the annual rate of poverty reduction increases from 8.6 percent to 19 percent if we focus on the last two years. Based on these, we project the annual growth rate of the survey mean for the period 2004/05 to 2011/12 to be 3.2 percent, while that of the 2009/10 and 2011/12 period is 6 percent. It is likely that maintaining the growth rate of 6 percent is difficult because this high rate is the result of rapid recovery from one of the worst droughts in history in 2009/10. Yet, the inequality-adjusted growth rate of 3.2 percent is still more than one percentage point higher than the growth rate used in the benchmark scenario for India.

If India can grow at a rate of 3.2 percent after adjusting for inequality changes since 2010, then India's poverty rate in 2030 would be as low as 2.5 percent, and the South Asia region's poverty rate will decrease to 3.6 percent by 2030. If Bangladesh could also grow at a rate of 3.2 percent, then South Asia's poverty rate would decline to 2.37 percent by 2030.

Accelerating the annual growth rates of India and Bangladesh to 3.2 percent enables the South Asia region to meet the 3 percent target, but it is still not likely enough to achieve the global target. For example, even if SSA countries could achieve the minimum annual growth rate of 4.06 percent and both India and Bangladesh could raise the annual growth rate to 3.2 percent, the global poverty rate would be 4 percent. Further, even if all countries in both SSA and SAR could achieve the annual growth rate of 4.06 percent, the global poverty rate would be 3.66 percent in 2030, which is still higher than 3 percent.

Table 8: Annual rates of change (%)

	Poverty reduction		Survey mean (inequality adjusted)
	Rural	Urban	National
2004/05 - 2011/12	-6.7	-8.6	3.2
2009/10 - 2011/12	-12.8	-19.0	6.0

Source: Authors' estimation using PovcalNet database and Press Note on Poverty Estimates, 2011-12.
Government of India, Planning Commission, July 2013.

Other regions' required contributions

Given that achieving the minimum 4.06 percent annual growth rate for two decades is already very challenging for these two regions, it seems reasonable to ask other regions to contribute to bridging the remaining gap. However, this is difficult because (i) the population share of the remaining regions is limited; (ii) the projected poverty rates under the benchmark scenario are already low; and (iii) the inequality-adjusted growth rates of most countries in these regions are already quite high. For example, even if all countries in these regions, in addition to SAR and SSA, grow at a minimum 4.06 percent annually (inequality adjusted), the global poverty rate is 3.31 percent, still above 3 percent. Increasing the threshold further in these regions will help the global poverty rate reach 3 percent, but that might create a sense of unfairness because it is not clear why poor countries in these regions need to face tougher conditions than poor countries in SAR and SSA.

A proposal – An intermediate growth target

We propose a simple intermediate growth target—*maintaining a minimum 4.4 percent annual inequality-adjusted growth rate for all countries in the developing world*. Our projection suggests that if all countries with growth rates lower than the minimum threshold could accelerate their growth to an annual rate of 4.4 percent and the rest maintain their growth rates under the benchmark scenario, the global poverty rate will be 2.97 percent by 2030. We also found that even if all countries with the benchmark growth rates higher than the minimum threshold failed to maintain the growth rates, as long as they could maintain at least 4.4 percent, the global poverty rate would be 3.1 percent by 2030.

Maintaining a minimum 4.4 percent annual inequality-adjusted growth rate is clearly not an easy task. For example, historically, although the developing world as a whole grew at an annual rate of 4.7 percent between 2002 and 2010, the inequality-adjusted growth rate was just 2.8 percent. Furthermore, in the Sub-Saharan Africa region, 8 out of 47 countries recorded growth rates more than 4.4 percent between 2002 and 2010. More importantly, this is one of the best spells, with more than six years in terms of growth rates in the region. However, as discussed above, it is almost impossible for the rest of the world to fill the gap created by the SSA region if SSA cannot grow at a minimum rate of 4.4 percent annually. In this sense, feasibility defines this target.

It is also worth noting that this target is defined by inequality-adjusted growth rates. When countries are growing, inequality often increases. Therefore, it is typically the case that inequality-adjusted growth rates are lower than raw (or unadjusted) growth rates when countries are growing. But, this is not always the case. Some countries in LAC show great successes in reducing inequality and promoting sharing of growth benefits between the rich and the poor. For example, Brazil's average raw growth rate between 2002 and 2010 was 4.5 percent, while its inequality-adjusted growth rate was 7.7 percent. Mexico also exhibited similar success in promoting shared prosperity—its raw growth rate was 3.5 percent, while its inequality-adjusted growth rate was 5.5 percent.

VI.2. A Continuous Tracking System of the Extreme Poverty Target

Finally, we propose a continuous update of the analysis above whenever PovcalNet and other source data are updated. Repetition of the analysis allows us to monitor progress in the extreme poverty target in a systematic manner and also identify what each country and region needs to do from the time of the analysis onward.

As time passes, new household survey data will be collected and included in the PovcalNet, while population projections and national accounts will be also updated. New global, regional, and country-level poverty rates at the US$1.25 poverty line will be estimated accordingly. PovcalNet has updated all poverty rates every three years, except for the last spell between 2008 and 2010. Population projections of the World Bank Data group are updated twice a year. Other data in the World Development Indicators are now updated every quarter.

With these changes in the source data, results from all the analyses above will likely change. Some countries might fail to achieve the annual rate of 4.4 percent growth by the next update. As a result, if the analysis is repeated, we might find that the pace of global poverty reduction is not achievable even with the intermediate growth target. In that case, the minimum growth requirement might need to be raised. Furthermore, the analysis might reveal new obstacles to the global target. In the analysis above, the unequal pace of growth across countries is the main challenge, although changes in within-country inequality and the unequal pace of population growth across countries can also slow the pace of global poverty reduction. Furthermore, the situation might change and other factors might be identified as key obstacles to the global target.

VII. Conclusion

This paper proposes a new analytical framework to understand what is needed to achieve the target of ending extreme poverty. The approach first projects the global poverty rate in 2030 under a benchmark scenario, where all countries will grow at the same rate as in the past 10 years or so and their populations will grow as projected by the World Bank Data Group. It modifies a projection model used in Ravallion (2013)—the distribution neutral approach—so that the effect of changes in inequality on the pace of poverty reduction can be incorporated, and also takes into account country-specific rates of population and economic growth.

The analysis based on this approach reveals how important it is to incorporate country-specific growth rates. Even if the developing world as a whole has been growing fast enough to achieve the target of 3 percent by 2030, the different paces of growth across countries reduce the global pace of poverty reduction and lead to a projected poverty rate of 8.6 percent in 2030. Surprisingly, incorporating changes in within-country inequality has a minimal impact on the global projection, while it does have a large impact on some regions, particularly the LAC region. All in all, ignoring country specific factors can produce overly optimistic projections about the future status of poverty.

Findings of the analysis provide interesting insight on what needs to be done to achieve the end of extreme poverty target. The analysis above confirms that ending extreme poverty by 2030 is very challenging. While economic growth is important, accelerating growth is not enough and sharing the pace of growth within and across countries is essential to achieve the target of ending extreme poverty. Indeed, our analysis shows that lack of growth is not a key constraint. The developing world as a whole has been growing fast enough to reduce the global poverty rate to below 3 percent by 2030. A key problem is that poorer countries in general have experienced slower economic growth and faster population growth than richer countries. To end extreme poverty by 2030, it is crucial to not only accelerate growth but also improve sharing of the growth within and across countries. Also, given that even a small shock can derail

the path to end poverty, it is essential to protect countries from crises and facilitate a country's quick recovery in case of a crisis, and ensure any policy that accelerates growth and improves sharing of the growth is implemented in an environmentally and fiscally sustainable manner.

These requirements to achieve the end of extreme poverty target are consistent with the WBG goals. The other goal of WBG encourages a developing country to improve growth of the less well-off in the country. Also, the WBG goals need to be achieved in an environmentally and fiscally sustainable manner. Only an addition is that the above requirements for ending extreme poverty target include improving sharing of economic growth between rich and poor countries. With this additional condition, the pursuit of WBG goals makes the dream of the world free of poverty possible.

A challenge is that policies to improve sharing of growth within and across countries are little known. As Dollar et al. (2013) show, the past data fail to show any policy that can effectively reduce within country inequality although the above studies suggest learning from recent experiences in LAC is promising. How to improve sharing of growth across countries is even less known. It is urgent to explore policies to improve sharing of growth within and across countries.

Finally, it is very important to update the analysis above whenever source data are updated. Our proposed framework uses publicly available data only and produces poverty projections that are fully consistent with global and regional poverty estimates in the past. For example, to calculate growth rates, we used household expenditure (or income) per capita data available in PovcalNet. In this way, all growth estimates are fully consistent with the global and regional poverty rates published in MDGs and other official global poverty databases. Furthermore, by using only publicly available data, anyone who is interested in the projections in this note can replicate our results. Such replicability with publicly available data is critical for transparency. We include in the annex a detailed explanation of how all projections were conducted using the publicly available data.

However, as a result, like all other statistics, all projections conducted in this paper are subject to changes since the source data are being updated continuously. This implies that once the source data are updated, all projections also need to be updated. In this sense, we would recommend that this analysis be repeated when the source data are updated. Frequent repetition of this analysis will continuously give us a solid grasp of where we stand in terms of the target of ending extreme poverty and help update intermediate targets.

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Annex

The objective of the annex is (i) to document data sources consulted in this paper and (ii) delineate the methodology used to calculate a series of projected poverty rates in 2030 reported in this paper. Two data sources are consulted: PovcalNet and World Bank Population Projection. Both datasets are publicly available. All data used in this paper were current as of the time of writing (October 1, 2013). Since these databases are periodically updated, exact replication of the results in this paper may not be possible if data are taken at a later date. For interested readers, the datasets used by the authors are available upon request.

PovcalNet

PovcalNet (http://iresearch.worldbank.org/PovcalNet/index.htm?0) is an online poverty measurement tool maintained by the World Bank's Development Research Group. PovcalNet provides two types of poverty estimates: country-specific poverty estimates as of the year of household surveys and so-called "line-up" year estimates that allow for comparisons of poverty estimates across countries in reference years. The current note exclusively relies on line-up year estimates as they are the official international poverty estimates of the World Bank.

Line-up Year Estimates

PovcalNet reports line-up year estimates every three years starting in 1981, with the only exception being the latest 2010 estimates, two years after the previous estimate in 2008. As availability of household surveys differ across countries, poverty rates must be imputed when no survey is available in a given reference year in PovcalNet. PovcalNet adopts three approaches to imputing poverty rates.

First, if a survey is not available for a country in a given line-up year, but is available either before or after the line-up year, PovcalNet adjusts the mean income/expenditure observed in the survey year by a growth factor in private consumption per capita in the national accounts to infer an unobserved mean income/expenditure in the line-up year. It then uses this new mean income/expenditure to calculate poverty indicators. What is implicitly assumed here is that the underlying relative distribution of income/expenditure remains unchanged between the survey year and the line-up year.

If the line-up year falls between two survey years, PovcalNet repeats the process above twice by extrapolating the mean income/expenditure forward and backward to the line-up year. This will yield two poverty headcount rates for the line-up year. PovcalNet then takes a linear interpolation of the two to calculate the poverty headcount rate for the line-up year.

Finally, if a country has no survey available, PovcalNet applies the weighted average headcount rate of the region to which the country belongs. This, of course, assumes that the country with no available surveys has the same poverty headcount rate as the regional average.

For more details about how line-up year estimates are calculated, see the Methodology and FAQs sections in PovcalNet and references therein.

Poverty Rates in Aggregation

PovcalNet reports regional average poverty rates as a population weighted average of the country-level poverty rates. The average poverty rate for the developing world is then calculated as a population weighted average of the regional average poverty rates. Although not reported in PovcalNet, we report the poverty headcount rate for the world. This is calculated by simply using the total population in the world, instead of that in the developing world, assuming that there are no extremely poor individuals in developed countries.

World Bank Population Projection

Population data play a critical role in calculating average poverty rates at higher levels of geographical aggregation. We rely on the World Bank Population Projection (http://databank.

worldbank.org/Data/Views/VariableSelection/SelectVariables.aspx?source=Health%20Nutrition%20and %20Population%20Statistics:%20Population%20estimates%20and%20projections) for the projection of average poverty rates by regions as well as those for the developing world and for the world. The only exception is when we report poverty estimates in 2010 that are the basis of poverty projections. For the 2010 estimates, we rely on population data reported in PovcalNet to be consistent with the official poverty estimates of the World Bank.