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Can Dreams Come True? Eliminating Extreme Poverty in Africa by 2030

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ABSTRACT

Can Dreams Come True? Eliminating Extreme Poverty in Africa by 2030*

With the year 2015 – the MDG finishing line – approaching, post-2015 goals as they impact Africa need to be firmed. The goal of ending extreme poverty remains paramount. Globally, the World Bank set goals to end extreme poverty by 2030 and to promote shared prosperity in every society. We examine feasibility of these objectives for Sub-Saharan Africa, the world's poorest but rapidly rising region. We find that under plausible assumptions on consumption growth and redistribution, eliminating poverty by 2030 is out of the region's reach. Even under our 'best case' scenario of accelerated growth and redistribution from the richest 10 percent to the poorest 40 percent of the population, the poverty rate would still be around 10 percent in 2030. A more realistic goal for the region would be reducing poverty by a range from half to two thirds. At this rate, especially if in part achieved by lowering inequality, the Africa region would meaningfully contribute to the global agenda. Policies need to focus on mutually reinforcing objectives of making growth stronger, resilient to shocks, and inclusive.

JEL Classification: I32, E21, J11, C63

Keywords: poverty reduction, inequality, inclusive growth, Africa, numerical simulations

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I. Introduction

With the year 2015 – the MDG finishing line – approaching, post-2015 goals for Africa need to be firmed. Given the continent's vast potential and the track record of the past decade, the extreme poverty reduction agenda beyond the MDGs should focus on building prosperous and resilient Africa. This can be achieved with strong, sustained, and inclusive growth (AfDB, 2013; AfDB et al., 2010).

In 2013, the World Bank adopted two goals to guide its work for the next decade and beyond: (i) to end extreme, chronic poverty by 2030 and (ii) to promote shared prosperity in every society. In this context, the extreme poverty means living on a less than $1.25 a day (in 2005 ppp adjusted prices). The specific targets are: (i) to bring the share of global population living below this threshold to less than 3 percent; and (ii) in each country, foster the per capita income growth of the poorest 40 percent of the population. These goals are to be pursued in environmentally, socially and fiscally sustainable ways (World Bank, 2013; Basu, 2013).

The twin ambitious goals follow from analysis suggesting that bringing the extreme poverty below 3 percent of the global population by 2030 would be highly challenging but achievable. One scenario where extreme poverty could be reduced to such a low level assumes that progress with poverty reduction achieved during 2000-2010 is maintained until 2030 (Ravallion, 2013). The optimism behind this scenario has been also well noted. In particular, progress with poverty alleviation will likely slow at low poverty levels where poverty depth often rises (Chandy et al., 2013; Ravallion, 2013; Yoshida et al., 2014).

From perspective of Africa and especially Sub-Saharan Africa, these globally appealing targets mask differences among regions, with Sub-Saharan Africa expected to fare notably less favourably than other regions except perhaps South Asia. While by 2030 the extreme poverty could be eliminated at the global level, the rate in Sub-Saharan Africa is likely to be well above 3 percent even under some very optimistic scenarios.

Against this background, this paper focuses on: (i) poverty outcomes that Africa can achieve by 2030 under different assumptions on growth and inequality; (ii) what can be done to improve upon these outcomes; and (iii) targets for post-2015 development agenda for Africa.

We find that under reasonable assumptions on future (consumption) growth and redistribution, eliminating poverty by 2030 is out of Sub-Saharan Africa's reach. Even under our 'best case scenario' of accelerated growth and redistribution from the top richest to 40 percent poorest segments of population, the poverty rate would be around 10 percent of population in 2030. A more realistic goal for the region thus seems to be reducing poverty by a range from half to two thirds. Poverty-reducing policies need to focus on mutually reinforcing objectives of making growth stronger and resilient as well as more inclusive.

The rest of the paper is organized as follows. Section II shows various growth and redistribution scenarios and their impact on Sub-Saharan Africa's poverty paths and outcomes. Section III examines differences among groups and countries. Section IV outlines policies, while Section V concludes with discussion of poverty reduction goals for Africa.

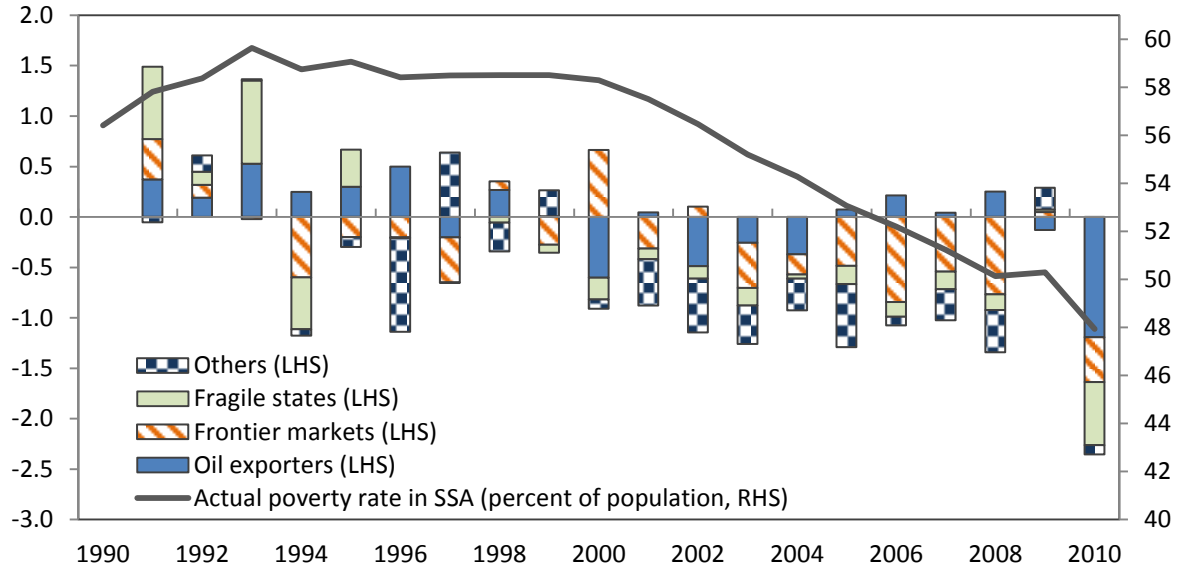
II. Scenarios for Reducing Extreme Poverty in Africa[1]

II.1 Extreme Poverty in Africa: Where Are We Now?

Before projecting plausible poverty paths for Sub-Saharan Africa, we need to characterize the starting point for this journey and how the region got there. The global poverty rate, measured as the share of people living in households with consumption per person below $1.25 a day, has been declining since the 1950s.[2] In contrast to the steady progress with poverty reduction globally, Sub-Saharan Africa – the poorest world region in 1990 – was a latecomer to this process, having made strides only since the mid-1990s. At 54.5 percent in 2005, the poverty rate in the region was still the highest in the world -- more than double of the global rate (25.7 percent) and above that in South Asia, with rate of 40.2 percent (Chandy and Gertz, 2011).

In 2010, poor still accounted for striking 47.9 percent of Sub-Saharan Africa's population (Figure 1). Figure 1 illustrates contributions of various African subgroups to the total change in poverty between 1990 and 2010. While frontier markets played an important role in the 10-percentage point poverty reduction in Sub-Saharan Africa during 2000 – 2010, contribution of fragile states to reducing poverty has been much less pronounced. Substantial differences exist also within these groups. Among frontier markets, for example, Zambia has maintained very high rates of extreme poverty, while countries such as Cape Verde or Seychelles have almost completely eliminated it. Among fragile states, both large (e.g. Democratic Republic of Congo) and smaller countries (e.g., Liberia) posted very high poverty rates in 2010.

Figure 1. Sub-Saharan Africa: Evolution of poverty rates, percentage points, 1990 - 2010



Source: Authors' calculations based on the World Bank database.

[1] Extreme poverty is consumption-based poverty line of $1.25 a day in 2005 international prices. It was derived as the average of the national poverty lines in the poorest 15 countries during 1990 to 2005.All references to poverty in the rest of the paper are made to this definition of poverty. By Africa, unless specified otherwise, we mean Sub-Saharan Africa, that is 820 million people in 2010 and 1474 million people in 2030, as under the UN population projections (constant fertility): http://esa.un.org/unpd/wpp/unpp/panel_population.htm

[2] With respect to measuring current economic welfare, household consumption per person is typically preferable to income, and also measured more accurately than income.

In sum, extreme poverty was unevenly distributed among world regions as well as groups and individual countries within regions. In Africa, some of the largest countries (e.g., Nigeria) had also high shares of population living below the $1.25 a day poverty line in both 2010 and 2030, making them a key contributor to poverty in the region. In 2010, besides fragile states, poverty rates exceeded half of the population in a number of smaller countries, including the frontier markets (e.g., Mozambique) and middle income countries (e.g., Swaziland).

II.2 The Baseline Scenario

To carry out some plausible scenarios for poverty paths in Africa, we adopt approach of Chandy et al. (2013) and draw on two main sources of information: (i) the projected growth of the mean level of real consumption per capita and (ii) the redistribution of consumption across population between top 10 and bottom 40 percent of population by income.

Our ***baseline scenario*** for poverty reduction in Africa until 2030 assumes that: (i) the real consumption per capita will grow as projected in the EIU database; (ii) distribution of consumption will stay constant (Figure 1). For each country, the initial (2010) consumption levels and distributions were obtained from the World Bank's PovcalNet database; (iii) population growth was obtained from the UN projections, the constant fertility scenario.[3] With this information, we estimate poverty for each African country and for every year between 2010 and 2030, using the Beta distribution of the Lorenz curve.[4] We then derive the region's (population-weighted) poverty headcount ratio in year *t*, H_{At}^{w}, as in Quah (2002):[5]

$$(1) \qquad H_{At}^{w} = \sum_{j=1}^{N} H_{jt} \frac{P_{jt}}{P_{At}} \quad \text{with} \quad P_{At} = \sum_{j=1}^{N} P_{jt}$$

where P_{At} is Africa's population at *t*, P_{jt} is population in country *j* at time *t*, H_{jt} is poverty headcount share (in percent of population) in country *j* and year *t*, and *N* is the number (53) of African countries analyzed (Figure 2).[6] To show whether under these assumptions, future poverty would be more concentrated in larger or smaller countries, we calculate an un-weighted (simple average) Africa's poverty headcount in *t* , H_{At}^{u} :

$$(2) \qquad H_{At}^{u} = (1/N) \sum_{j=1}^{N} H_{jt}$$

Under the baseline scenario, poverty rate in Africa would fall from 47.9 percent of the region's population in 2010 to 27 percent in 2030 (Figure 2 and Table 1). However, poverty

[3] Where EIU projections of consumption growth were not available, we utilized AfDB real GDP growth projections from the African Development Bank database. The methodology is detailed in Annex I.

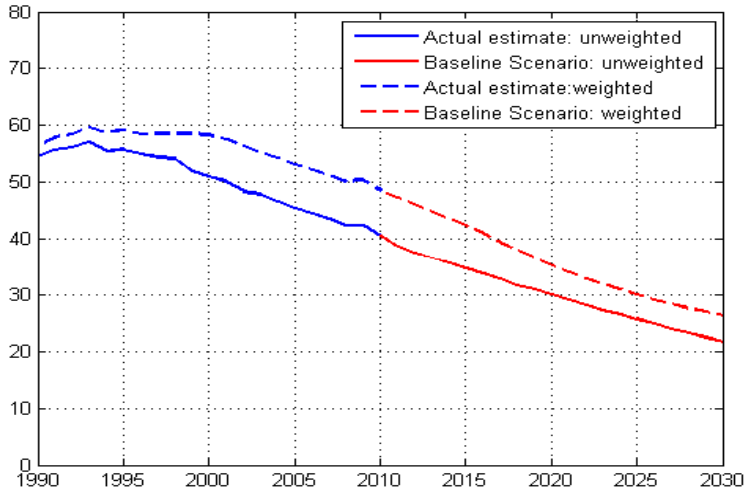
[4] This choice was guided by the observation that results obtained with the Beta distribution have a better predictive quality (i.e. fit well with our data) than alternatives (e.g., quadratic distribution).

[5] This country-by country approach differs from that of Milanovic (2002) who worked with aggregated data.

[6] The variations of *H* are due to the dynamics of population and to the dynamics of the headcount index of poverty at individual countries levels: $\frac{dH_{At}^{w}}{dt} == \sum_{j=1}^{N} \frac{dH_{jt}}{dt} \times w_{jt} + \sum_{j=1}^{N} H_{jt} \times \frac{dw_{jt}}{dt}$ where w_{jt} is the share of the population of the country *j* in group in Africa's population.

would remain almost unchanged in terms of the number of people, in fact posting a small increase from 393 to 398 million. Under this scenario poverty in Sub-Saharan Africa alone would exceed the 3 percent global target set for 2030. Moreover, the daily consumption of at least another quarter or more of the region's population would be in the range of $1.25 - $2 a day, underscoring the vulnerability of poverty reduction achievements. With adverse income shocks (financial crisis, commodity price shocks, etc.), people in this category could fall back to poverty and stay there unless adequate social protection or other mitigating mechanisms are in place. From this perspective, Africa's policymakers need to strive to improve upon the baseline scenario to make a dent in the region's and global poverty by 2030.

Figure 2. Poverty rates in Africa: Baseline scenario (% of total population), 1990 – 2030



Source: Authors' calculations based on the AfDB, World Bank and EIU databases. **Note:** Growth of consumption is taken from EIU projections and its distribution from PovcalNet.

Table 1. Evolution of poverty in Africa, baseline scenario, 2010 – 2030

	2010	2015	2020	2030
	Percent of population			
1st poverty line (<$1.25)	47.9	42.7	36.0	27.0
2nd poverty line ($1.25-$2)	28.0	28.6	28.0	25.1
Floating class ($2-$4)	18.3	21.3	25.2	28.5
Above	5.8	7.5	10.8	19.4
Total	100.0	100.0	100.0	100.0
	Millions of poor			
1st poverty line (<$1.25)	393	403	393	398
2nd poverty line ($1.25-$2)	230	270	306	370
Floating class ($2-$4)	150	201	275	420
Above $4	48	71	118	286
Total	820	944	1,091	1,474

Source: Authors' calculations based on the AfDB, World Bank, and EIU databases.

II.3 Alternative Scenarios

In this section, we derive other plausible poverty paths by altering the baseline assumptions about real growth of consumption per person and its distribution for each African country.

First, *we increase (decrease) growth of consumption per capita by 2 percentage points a year*, while maintaining its distribution as in the baseline scenario (Figure 3a). When

consumption growth is 2 percentage points above the baseline, poverty rate falls to 15 percent of the African population in 2030 or 221 million people (Table 1a, Annex). This represents decline in both poverty rate and people, with the number of poor falling by 172 million since 2010. Such poverty achievements would be more robust than under the baseline scenario, as almost two thirds of the population would achieve middle income or higher status by 2030 (Table 1b, Annex).[7] Conversely, should consumption growth decline by 2 percentage points a year, the poverty rate would rise to 42.1 percent of population (620 million people) in 2030, with additional 227 million people living in extreme poverty in 2030 relative to 2010.

Figure 3. Poverty Rates: Alternative scenarios, 1990 – 2030 (percent of Africa's population)

Figure 3a. African consumption growth (+ or - 2 perc. points a year)

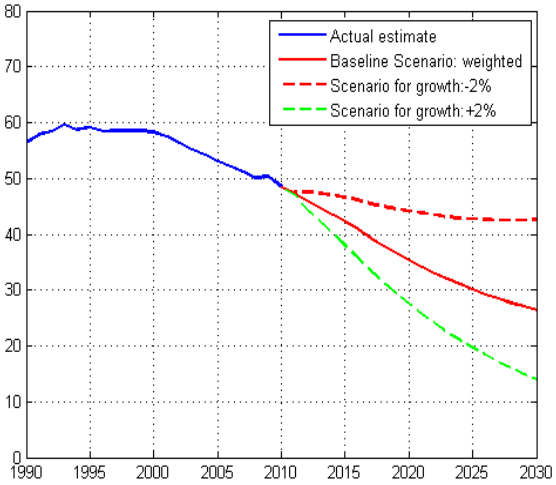
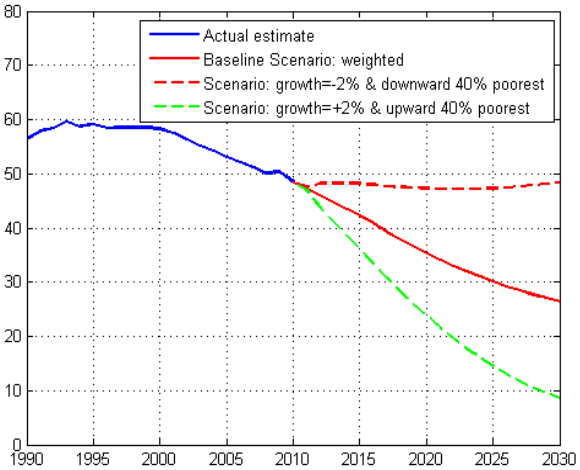


Figure 3b. Consumption growth & distribution, (+ or - 2 perc. points a year and redistribution)



Source: Authors' calculations based on the AfDB, World Bank and EIU databases.

Second, we consider *combined changes in per capita consumption growth and redistribution* where besides changes in consumption growth, we consider trade-offs in consumption shares between the poorest 40 and the richest 10 percent of population in each country. Specifically, there would be a steady shift in favor of one or other group between 2010 and 2030 by 0.4 percentage point every year, reflecting the distribution trends in historical data for Africa.[8]

Figure 3b shows poverty outcomes for the following scenarios: (i) a higher consumption growth and a steady shift in consumption share towards the bottom 40 percent of population ('best case'); and (ii) a lower consumption growth by 2 percentage points and a steady shift in consumption by 0.4 percentage points a year towards the top 10 percent of population ('worst case'). Relative to the benchmark case, poverty outcome improvements are striking under our 'best case' scenario of higher consumption growth and redistribution from top 10 percent to the bottom 40 percent of population. More specifically, the poverty rate would fall to 9.9 percent of the population (146 million people) by 2030. While the 3 percent poverty target for the region would not be achieved, under this scenario 247 million people (or 63 percent of the

[7] Middle class is defined as people living on $2 - $20 a day (in 2005 ppp terms), as in Lufumpa et al. (2014).

[8] We estimate the scale of the long term distribution trend observed in historical data on African countries as: $Share_{it}^{40\%\_poorest} = \phi.Share_{it}^{10\%\_richest} + \varepsilon_{it}$. Thus1 percentage point decrease in consumption share by the top 10 percent results in 0.4 percentage point increase in the share among bottom 40 percent and vice versa.

original level) would escape extreme poverty between 2010 and 2030. Moreover, at this rate, Africa's poor would account for only 1.7 percent of global population in 2030. Poverty reduction achievements are again more resilient to reversal than under the benchmark scenario, with only 17 percent of population living on $1.25 - $2 a day. If this scenario were to materialize, more than 70 percent of the population would live above the second poverty line of $2 a day (Table 1c). In contrast, under our 'worst case' scenario, the poverty rises to 45.9 percent of population (676 million people) in 2030, adding 283 millions of people into the pool of the extremely poor (Table 1d).

The above scenarios, with a wide range of possible outcomes, highlight the uncertainty that surround the various poverty paths and likely 2030 poverty outcomes (Table 2). The disparity of results is due to their sensitivity to changes in both consumption growth and redistribution. Other factors not considered in our paper, such as changes in population growth, would add additional possibilities. Still, even with the wide range of plausible poverty outcomes for Africa, the 3 percent or lower poverty rate by 2030 is not among them.

Table 2. Summary of poverty rate projections (percent of SSA population)

	Baseline	Change in consumption growth		Combination scenarios	
		2	-2	best	worst
		percent of total population			
2010	47.9	47.9	47.9	47.9	47.9
2015	42.7	39.4	46.0	38.0	47.0
2020	36	29.1	43.7	25.7	45.5
2030	27	15	42.1	9.9	45.9
2030 (millions of poor)	398	221	620	146	676
2030 (difference from the baseline, millions of poor)	0	-177	223	-252	279

Source: Authors' calculations based on the AfDB, World Bank, and EIU databases.

The challenge of reducing extreme poverty in Sub-Saharan Africa is further underscored by the asymmetry of results under opposite scenarios where reductions in poverty are driven mostly by growth. The number of additional poor under the downside scenarios (e.g. the slow growth scenario and the combined scenario with more unequal consumption distribution) exceeds the additional number of people escaping poverty under the corresponding upside scenarios. On a positive note, significant poverty reduction is possible with strong, sustained and inclusive growth – growth that is accelerated and shared across and within African countries (AfDB et al., 2010; Brixiova, 2010).

Our results raise both hopes and concerns about poverty outcomes in Africa. While eliminating poverty (i.e. 3 percent poverty rate) by 2030 seems out of reach, Africa can markedly reduce both relative and absolute poverty. Based on our scenarios, this can happen if the region accelerates growth of income/consumption per capita and/or reduces inequality between the top 10 and the bottom 40 percent of the population. The intermediary objectives of higher growth and reduced income inequality can be mutually reinforcing, especially at low growth levels, where redistribution may boost growth (Kraay, 2004 and others).

II.4 Projected Poverty Dynamics

While results of our upside scenarios are encouraging, with hundred(s) of millions of African people having a chance to escape poverty by 2030, reducing poverty will become increasingly challenging over time. After the initial acceleration until about 2017, the progress is projected to slow even in all our scenarios (Figure 4). This is because in the outer years, as the poverty rate declines and fewer people are concentrated in the neighbourhood below the poverty line, getting people out of poverty will require more resources.

Figure 4. Poverty rate dynamics: Alternative scenarios, 1990 - 2030 (percentage change)

Figure 4a. Consumption growth

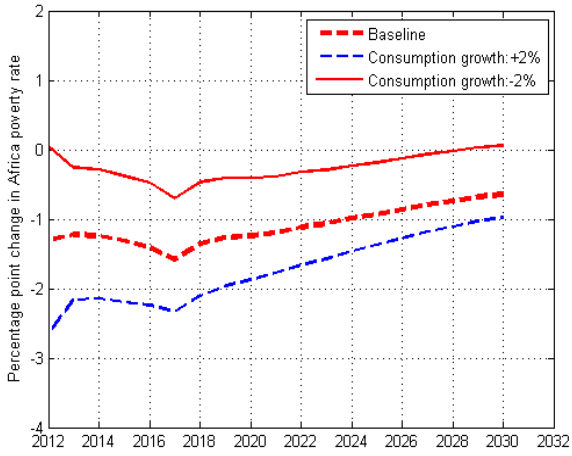
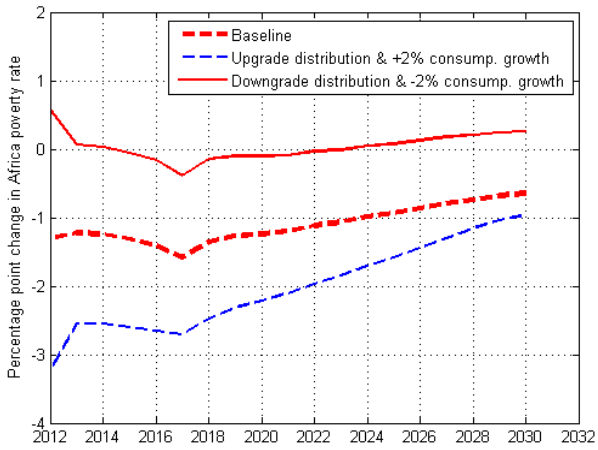


Figure 4b. Consumption growth & distribution



Source: Authors' calculations based on the AfDB, World Bank and EIU databases.

Table 3. Sub-Saharan Africa: Growth and semi-growth elasticity of consumption, 2010 - 2030

	SSA	
Poverty rate (%)	(Mean) consumption growth elasticity	(Mean) consumption growth semi-elasticity
45	-1,043	-0,465
40	-1,236	-0,454
35	-1,463	-0,424
30	-1,756	-0,398
25	-1,858	-0,368

Source: Authors' calculations based on the AfDB, World Bank, and EIU databases. **Note:** Calculations were carried out under 2010 Africa distribution from PovcalNet.

Differently put, in countries with high poverty rates semi-growth elasticity – the ratio of a percentage point change in the poverty rate to a percent change in consumption – tends to decline over time (for given distribution). As Chandy et al. (2013) and Yoshida et al. (2014) show globally, when a poverty line sits in the large population mass even a small increase in consumption can lift many out of poverty. With declining poverty rate, fewer people are located near the poverty lines, reducing the number of people that can be lifted out of poverty with the same increase in consumption (income). Semi-growth elasticity tends to decline with poverty reduction – a trend projected also for Africa during 2010 – 2030 (Table 3).[9]

[9] The effect of income distribution on growth elasticity is more complex. At low poverty rates, even a small *percentage point* change in the poverty rate can correspond to a large *percent* change. More formally, the elasticity of headcount poverty *(H)* w.r.t. growth of mean consumption for Beta Lorenz curves can be described

III. Looking beyond Aggregates

The aggregate results in Section II hide differences among countries and groups.

III.1 Differences across Countries

Poverty in Sub-Saharan Africa is concentrated in several countries, and increasingly so over time (Table 4a). For example, in 2010, the top four contributors to poverty accounted for more than half of the poor living in the region. Similarly, top ten contributors accounted for 73 percent of the poor, while they are projected to account for even higher share -- 77 percent -- of the poor in 2030. At the same time, some of the frontier market countries that were among top ten contributors to Africa's poverty in 2010 are projected to leave the group of top ten contributors by 2030 (e.g., Ethiopia, Uganda). Overall, today's fragile states are projected to have highest poverty rates in 2030 (Table 4b).

Table 4a. Countries contributing the most to Sub-Saharan Africa's poverty, 2010 and 2030

	2010-Share of the poor	Poverty rate		2030- Share of the poor	Poverty rate
Country	% of SSA poor	% of total population	Country	% of SSA poor	% of total population
Nigeria	26.2	68.0	Nigeria	20.8	28.3
Congo DR	12.9	86.3	Congo, DR	20.1	70.7
Tanzania	7.3	67.0	Tanzania	8.0	36.0
Ethiopia	6.6	31.4	Madagascar	5.9	58.9
Total	53.0		Total	54.8	

Table 4b. Countries with highest projected poverty rates in 2030 (baseline)

	2010	2030, baseline	2030, best case
Congo DR	86.3	70.7	44.8
Madagascar	81.3	58.9	29.2
Chad	44.3	53.9	21.7
Central Afr. Rep.	62.9	51.9	27.1
Liberia	83.2	50.5	15.7
Average (for group)	71.6	57.2	27.7

Source: Authors' calculations based on the AfDB, World Bank and EIU databases. **Note:** Un-weighted average.

It also needs to be underscored that under the baseline scenario, a disproportionate share of the poor would be concentrated in large countries (Table 4 and Figure 2).[10] Specifically, the poor in Nigeria, the Congo Democratic Republic, and Tanzania would account for almost half of the region's poor in 2030. While the poverty rate in Tanzania would decline from 64 percent in 2010 to 37 percent in 2030, the poor in this country would account for 7 – 8 percent of all Sub-Saharan Africa's poor, as in 2010 (Table 4). This is because of the substantial population growth that the country is projected to experience.[11]

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as: $\varepsilon_C = -\frac{z}{\mu H L''(H)}$ with $L''(H) = \theta H^{\gamma}(1-H)^{\delta}\left[\frac{\gamma(1-\gamma)}{H^2} + \frac{2\gamma\delta}{H(1-H)} + \frac{\delta(1-\delta)}{(1-H)^2}\right]$, where μ is the mean consumption, z is the poverty line. Semi-elasticity of poverty with respect to growth of mean consumption is then given by $\varepsilon_C^{semi} = \varepsilon_C \times H$ (Kakwani, 1990 and Datt, 1998).

[10] This is also evident from the un-weighted headcount ratio being below the weighted one since the late 1990s.

[11] The impact of population growth in poverty reduction is left to further research.

Figure 5. Projected poverty rates Ethiopia, Nigeria, Congo DR and Tanzania

Figure 5a. Ethiopia: Probability density functions, various years

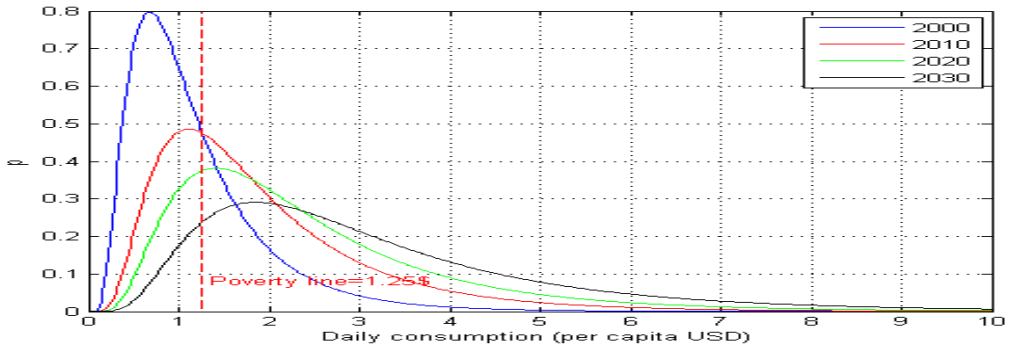


Figure 5b. Nigeria: Probability density functions, various years

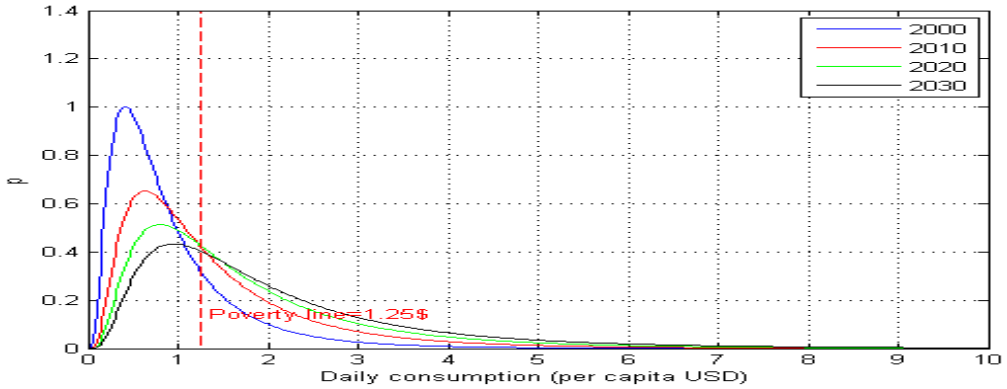


Figure 5c. Ethiopia: Cumulative density functions, various years

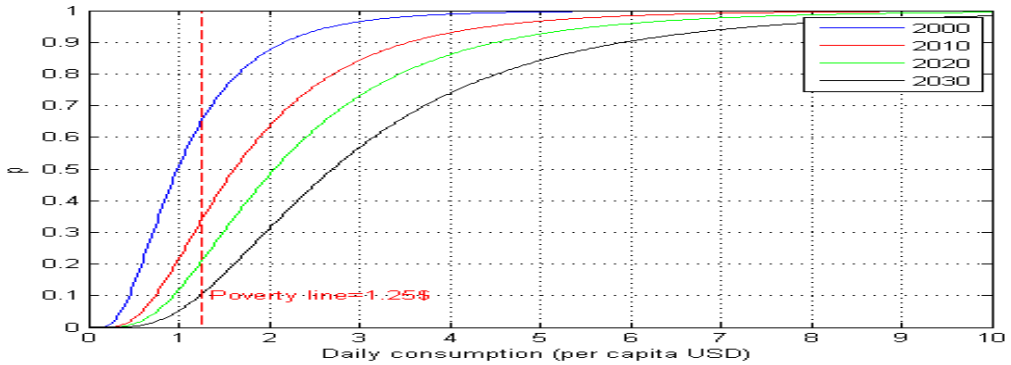


Figure 5d. Nigeria: Cumulative density functions, various years

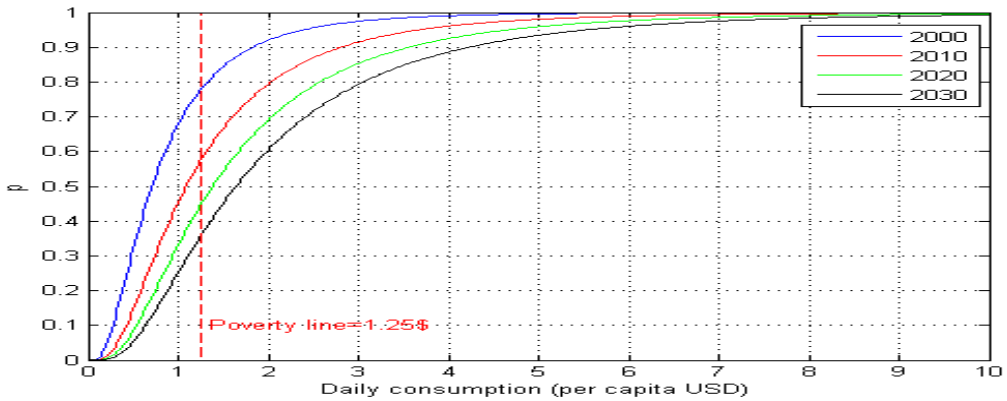


Figure 5e. Congo Democratic Republic: Probability density functions, various years

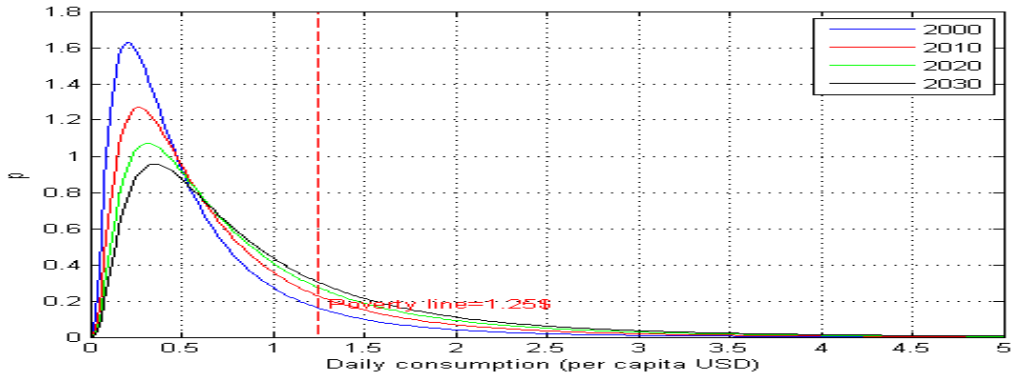


Figure 5f. Tanzania: Probability density functions, various years

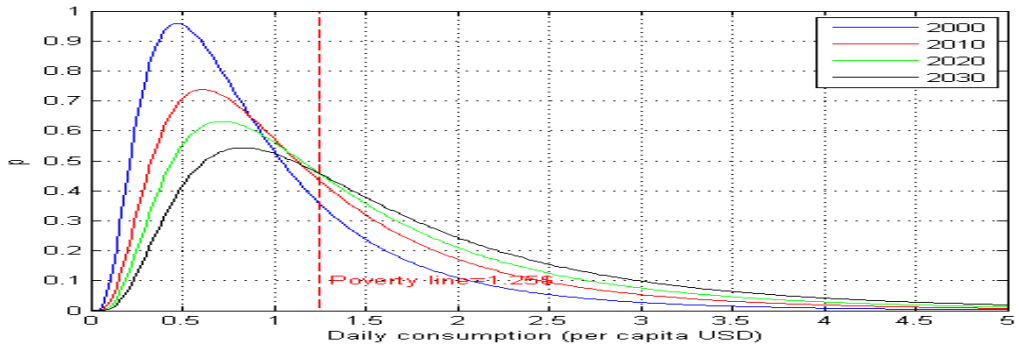


Figure 5g. Congo Democratic Republic: Cumulative density functions, various years

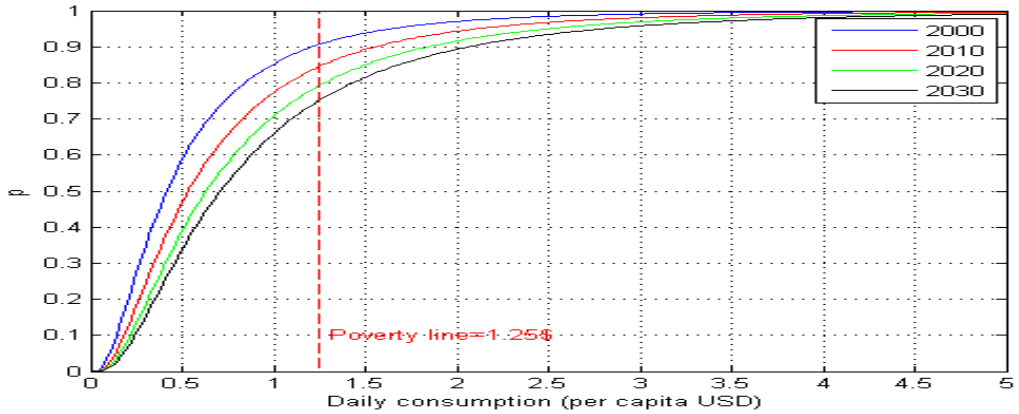
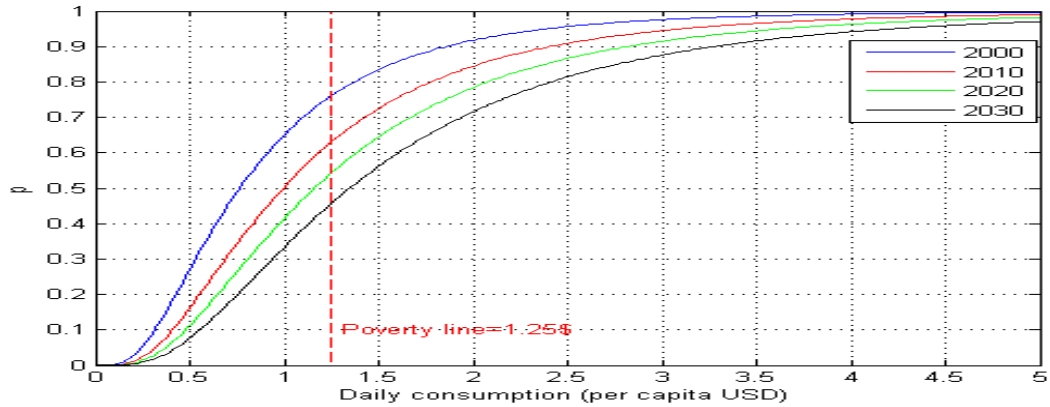


Figure 5h. Tanzania: Cumulative density functions, various years



Source: Authors' calculations based on the AfDB, World Bank and EIU databases.

Evidence suggests that large African countries with high poverty rates where the bulk of Africa's poor will live, such as Nigeria and Congo Democratic Republic, should receive special attention in policymakers' efforts to tackle poverty. However, progress will be increasingly difficult at low poverty levels, with poverty increasingly concentrated in countries with substantial poverty depth, such as Democratic Republic of Congo. Figure 5 also illustrates that as countries reduce poverty rates, additional poverty reduction will become increasingly challenging. This is because lower shares of the poor will live right below the $1.25 a day poverty line, and hence getting them over the $1.25 benchmark will require more resources.[12]

III.2 Differences across Africa's sub-groups

To understand the drivers of poverty reduction in Africa, we examine the performance of the main sub-groups: (i) oil exporters; (i) frontier markets; (iii) fragile countries; and (iv) others. Denoting H_{jt} as the headcount poverty rate of country *j* at time *t* (as percent of the country's population), P_{jt} the population of this country at time *t*, P_{Gt} the population of Africa's group, n the number of countries in a group, and m the number of groups, the weighted headcount poverty rate for each analytical group, H_{Gt}^{w} is obtained as [13]:

$$(3) \qquad H_{Gt}^{w} = \sum_{j=1}^{n} H_{jt} \frac{P_{jt}}{P_{Gt}} \qquad \text{with} \quad P_{Gt} = \sum_{j=1}^{n} P_{jt}$$

where in turn $H_{At}^{w} = \sum_{G=1}^{m} H_{Gt}^{w} \frac{P_{Gt}}{P_{At}}$. The contribution of a group to the change in Africa's poverty rate depends on the evolution of its share Africa and the evolution of its poverty rate.

Against this background, today's fragile states are expected to remain well above the rates recorded by other groups during 2010 – 2030, pulling the region's poverty rate up and (Figure 6a). Starting from a high poverty rate in 2010 (almost 60 percent of population), they are projected to maintain the highest poverty rate even in 2030 (close to 40 percent of population). As a group, these countries constitute the greatest challenge for eliminating poverty in Africa and warrant special attention and actions. In contrast, oil exporters will significantly contribute to Africa's poverty reduction in the coming decades (Figure 6b).

IV. How to Improve Africa's Poverty Outcomes?

Two policy implications follow directly from our analysis. First is that attempts to reduce poverty in Africa to very low levels need to address challenges of poverty reduction in large countries such as Nigeria. In this regard, the availability of timely and reliable data on the

[12] Based on data from the Nigerian National Consumer Survey (NCS) of 2003/2004, Anyanwu (2012) examined factors behind poverty among Nigeria's households, disaggregated by gender and rural vs. urban areas.

[13] The variations of *H* are due to the dynamics of population and to the dynamics of the headcount index of poverty at individual countries levels: $\frac{dH_{Gt}^{w}}{dt} == \sum_{j=1}^{N} \frac{dH_{jt}}{dt} \times w_{jt} + \sum_{j=1}^{N} H_{jt} \times \frac{dw_{jt}}{dt}$ where w_{jt} is the share of the population of the country *j* in group *G*.

Figure 6. Sub-Saharan Africa: Poverty rates and dynamics, 2011 – 2030, by sub-groups

Figure 6a. Poverty rates, total and by sub-groups, 2011 - 2030 (percent of population)

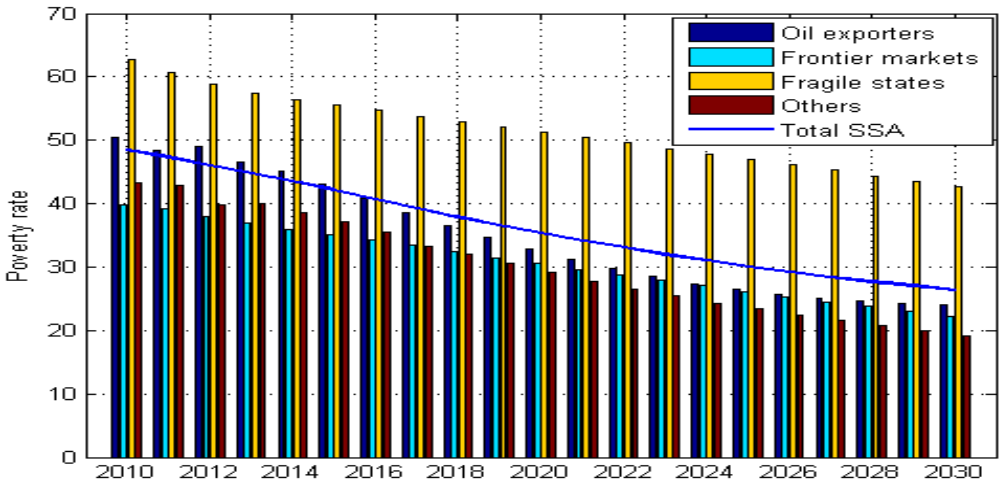
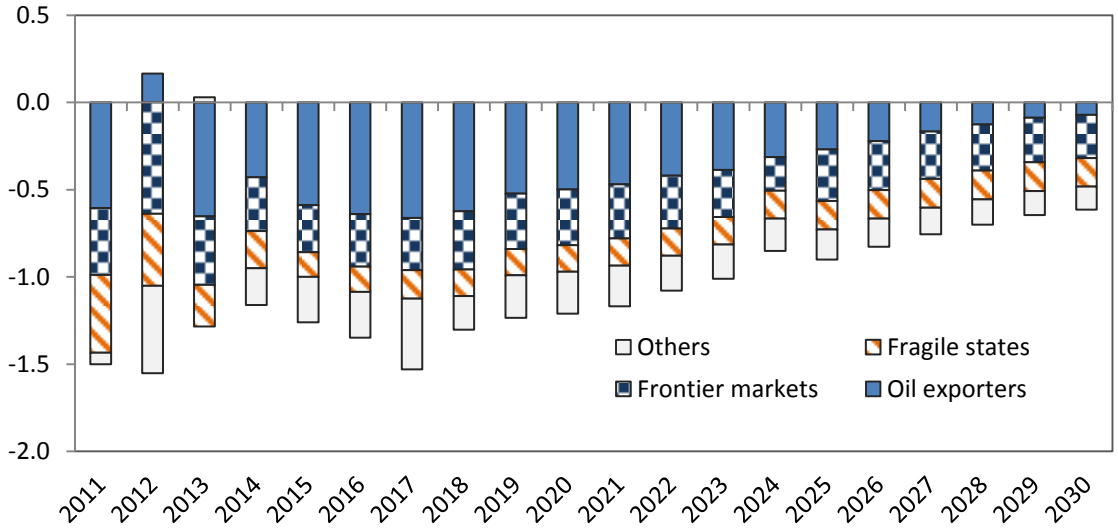


Figure 6b. Contribution to poverty reduction, by sub-groups, 2011- 2030 (percentage points)



Source: Authors' calculations based on the AfDB, World Bank and EIU databases**. Note:** Baseline scenario.

Table 5. Evolution of poverty by Africa's sub-groups, baseline scenario, 2010- 2030

	2010	2015	2020	2030
	percent of population			
Fragile states	62.8	55.5	51.3	42.6
Oil exporters	50.5	43.1	32.9	24.0
Frontier markets	39.8	35.2	30.6	22.2
Others	43.3	37.1	29.1	19.2
Total (SSA)	47.9	42.7	36.0	27.0

Source: Authors' calculations based on the AfDB, World Bank and EIU databases**.**

extent of poverty and its characteristics in these countries for analysis and country-specific responses is critical. Second implication is that since poverty in Africa will be increasingly concentrated in today's fragile states (e.g., Congo Democratic Republic), policymakers will need to focus on safeguarding stability and promoting prosperity in these countries.

Sustaining growth and reducing its volatility is particularly challenging for the fragile states where periods of growth are often followed by stagnation and even decline. The Strategy for Fragile States of the African Development Bank and the Report of the High Level Panel on Fragility outline ways to support growth and reduce poverty in these countries.

High growth that Africa has exhibited since the early 2000s was a key factor behind its poverty reduction in the past decade, even though the rate of poverty reduction was less rapid than growth. Experience of other regions also indicates that maintaining and even accelerating growth should remain a priority for poverty reduction agenda (Dollar et al., 2013). In Sub-Saharan Africa, real GDP growth could rise by 2 percentage points a year if the region's sizeable infrastructure gap were closed (Foster and Briceño-Garmendia, 2010). Further, growth needs to be inclusive and generate decent jobs for large segments of population, based on lessons from Latin American and other countries that were successful in poverty reduction.[14] The sources of growth thus clearly matter: for substantial poverty reduction, new jobs need to be created by productive and employment-intensive sectors.

Our simulations indicate that the impact of growth on poverty reduction will be limited in the absence of 'shared prosperity', that is reduced income inequality between the bottom 40 percent of the population and top 10 percent. In this context, the importance of building social protection to foster inclusive growth cannot be emphasized enough (Ncube et al., 2014). Raising the capacity of the poor – through better education – to benefit from opportunities offered by structural transformation is also critical (Timmer and Akkus, 2008). In a globally constrained fiscal environment, countries will need to rely more on domestic revenue mobilization, including innovative finance, to fund such programs.[15]

To tackle poverty, Africa can draw on experiences of countries in other regions, especially BRICs. Analysis of how *China* escaped from extreme poverty and the policy lessons that Africa could draw from this experience can be particularly illuminating, despite substantial differences between China's and Africa's context. The lessons from China, underscored in Ravallion (2009), suggest that to reduce poverty African countries should focus on raising productivity of agriculture through market-based incentives and public support. The increased agricultural productivity also facilitated poverty reduction through structural transformation, as manufacturing sector absorbed a large number of migrant workers from rural areas (Yu, 2012 and UNIDO and UNU-MERIT, 2012). Moreover, given the importance of agriculture for Africa's growth, countries will need to raise the sector's resilience, including against climate change impacts (Devarajan et al., 2013). Creating well-functioning state institutions is also critical.[16] Since Africa is not one country, it can raise its cohesion through integration to bridge inequities within and across societies.

Brazil has also made remarkable strides in reducing poverty and inequality, due to both high growth and effective social policies. Public services and cash transfers have played a major role, latter notably through the successful "Bolsa Familia" programme (Arnold and Jalles, 2014; Ncube et al., 2014). While *Brazil's* track record with poverty reduction during 1985 –

[14] Using counterfactual simulations, Azevedo et al. (2013) showed that among various factors such as demographics, labor income, public transfers and remittances, for most countries in their sample (16 Latin American countries), labor income was the most important contributor to poverty reduction.

[15] Mubiru (2010) summarizes options for domestic revenue mobilization in Africa.

[16] The emphasis on agriculture as a driver of poverty reduction was also emphasized by Mwabu and Thorbecke (2004). Since poverty is to a large extent a rural phenomenon, the authors underscored the need for agriculture and non-farm rural sector to complement each other in the process of rural development.

2004 was relatively weak (Ferreira et. al, 2010), poverty and inequality indicators have improved especially in recent years due to social policies (Ferreira de Souza, 2012). Brazil's experience underscores that the government can play an important role in reducing poverty through well-designed redistributive program even in slower growing economies such as Africa's middle-income countries in Southern Africa.[17] Chile's achievements in reducing absolute poverty through a mix of market measures, government interventions, and social policies also give an example to resource-rich middle income countries (Ncube et al., 2014).

Finally, Africa should also tap into its own successful experiences. For example, the recent global financial crisis and the resilience that the region exhibited have reiterated the useful role of macroeconomic stability and buffers (Brixiova and Ndikumana, 2013). Social protection schemes were also successful in selected low income countries, such as Rwanda's community-based health insurance (Shimeles, 2011).

V. Conclusions and Implications for Africa's Poverty Goals

In this paper, we have illustrated the challenges that Sub-Saharan Africa is likely to encounter in its efforts to meet the twin goals of eliminating poverty and raising shared prosperity by 2030. The main message is that while the region cannot eliminate poverty (i.e. reduce it to 3 percent of population) within this time frame under plausible scenarios, it can make a serious dent in its reduction. Effective social protection could go a long way in reducing inequality and poverty in the region. In the area of domestic resource mobilization, such programs could be funded from taxation of the more prosperous segments of the society. Our results also point to the need to put fragile and large countries in the center of poverty reduction efforts. For reaching these objectives, the importance of building transparent and well-functioning state institutions cannot be overstated.

Looking forward, reaching the 3 percent poverty rate target by 2030 seems out of Sub-Saharan Africa's reach. Based on our various numerical simulations, a more realistic goal would be reducing poverty by a range from half to two thirds. At this rate of poverty reduction, especially if partly achieved through grater equality between the top 10 and bottom 40 percent income segments of population, the region would meaningfully contribute to the global agenda of eliminating poverty and shared prosperity.

[17] Ostry et al. (2014) found that the direct and indirect effects of redistribution—including the growth effects of the resulting lower inequality—are on average pro-growth. Macroeconomic data do not indicate a big trade-off between redistribution and growth. Bagchi and Svejnar (2013) find that wealth inequality reduced growth. More disaggregated analysis reveals that wealth inequality due to political connection reduces growth, while the impact of wealth inequality that is not politically connected does not have significant impact on growth.

ANNEX I. DATA SOURCES AND METHODOLOGY

Data sources

In our calculations of poverty rates, we focused on consumption aspect of poverty, as it captures individual welfare better than alternative measures (income, assets) and is less vulnerable to external shocks (volatile) than income.[18] Since correlation between consumption and income in Africa is relatively high, the choice of one over the other is likely to have only limited impact on outcome. Moreover, at lower income levels, the difference between consumption and income is small (AfDB, 2011).

Several data sources were used in this paper to capture and project extreme poverty rates and the number of people living under $1.25 a day in Sub-Saharan Africa. The primary sources were: (i) the World Bank's PovcalNet database for the initial (2010) consumption level (or the latest year) and its distribution;[19] (ii) the EIU database for the private consumption growth projections during 2011 and 2030; (iii) the UN database for population projections during 2011- 2030. Where consumption growth projections are not available, we use income (i.e. real GDP growth) projections from the AfDB African Economic Outlook database when available or four-year moving average. In the case of missing countries, we use regional growth averages. Specifically, poverty rates in a country with missing data are assumed to be identical to regional poverty rates, as in Chandy at el. (2013).

Country Groups

Oil exporters (8): Angola, Cameroon, Chad, Equatorial Guinea, Congo Republic, Cote d'Ivoire, Gabon, Nigeria

Frontier markets (17): Benin, Botswana, Burkina-Faso, Cape Verde, Ghana, Kenya, Lesotho, Mauritius, Mozambique, Namibia, Senegal, Seychelles, South Africa, Rwanda, Tanzania, Uganda, Zambia

Fragile states (14): Burundi, Central African Republic, Djibouti, Eritrea, Guinea, Guinea-Bissau, Liberia, Mali, Sierra Leone, Sao Tome and Principe, Togo, Zimbabwe, Somalia, Democratic Republic of Congo

Other countries (8): Comoros, Ethiopia, Gambia, Madagascar, Malawi, Mauritania, Niger, Swaziland

Methodology

Our methodology builds on Chandy et al. (2013) and is related to AfDB (2011). Specifically, in the consumption growth projections, we address inconsistencies between private consumption in national accounts and in household surveys (Ravalion, 2003; Deaton 2005) by discounting the projected EIU (AfDB) consumption (income) growth as in Deaton

[18] Analysis of Africa's middle class based on asset ownership is in Ncube and Shimeles (2013).

[19] World Bank's PovcalNet database, which provides detailed distributions of either income or household consumption expenditures by percentile, based on household survey data. In addition, PovcalNet provides information on mean household per capita income or consumption levels in 2005 PPP US dollars.

(2005).[20] The country discount rates were obtained as in Deaton (2005) by regressing an average annual survey consumption growth (between all consecutive surveys) on the private consumption growth from national accounts over the corresponding period:

$$w_i\left(\frac{C_{it+k}^{survey}-C_{it}^{survey}}{C_{it}^{survey}}\right)=\kappa.\left(\frac{C_{it+k}^{Nat.Account}-C_{it}^{Nat.Account}}{C_{it}^{Nat.Account}}\right)w_i+u_{it} \quad \text{(A1)}$$

where w_i is the population weight of country i in total population of Sub-Saharan Africa, C_{it+k}^{survey} ($C_{it+k}^{NatAccount}$) is consumption from household survey (from national account) of country i in year $t+k$, and κ is the discount rate. The disadvantages of applying the same discount factor across countries are well recognized, but the lack of data does not so far allow for country-specific analysis of this factor.

For each year, poverty rates for each SSA country (47 countries in our sample) are estimated from (i) mean consumption per capita and (ii) distribution around that mean, estimated/projected for 2011- 2030 based on information in Povcal Net, EIU and AfDB databases. Drawing on method of Datt (1998), we utilize this data to obtain estimates of Beta Lorenz Curve (Kakwani, 1980) or Quadratic Lorenz Curve where Beta is not performing (Villasenor and Arnold, 1989). These Lorenz curves take the following forms:

a. Beta Lorenz Curve:

$$L(p)=p-\theta p^{\gamma}(1-p)^{\delta} \quad \text{(A2)}$$

where p is cumulative proportion (or percentage) of population and L is the corresponding cumulative proportion (or percentage) of consumption expenditure (i.e. the Beta Lorenz curve). Since p is a function of the poverty line z, we can obtain the headcount index of poverty (H) when the first order derivative of L is evaluated at the poverty line:

$$\theta H^{\gamma}(1-H)^{\delta}\left[\frac{\gamma}{H}-\frac{\delta}{1-H}\right]=1-\frac{z}{\mu} \quad \text{(A3)}$$

where μ is the mean consumption per capita.[21]

b. Quadratic Lorenz Curve

$$L(1-L)=a(p^2-L)+bL.(p-1)+c(p-L) \quad \text{(A4)}$$

[20] Using 557 surveys from 127 developing countries, Deaton (2005) shows that consumption in the national accounts, which contains items not consumed by the poor, grows faster than consumption in household surveys. Ravallion (2003) points out that private consumption in national accounts is often over-stated, since – being often a residual – it contains consumption of non-profit organizations and unincorporated business. Growth of household consumption can substantially deviate from consumption growth of these entities.

[21] The Beta Lorenz is such that the following conditions must be hold: $\theta>0$ and $0<\{\gamma,\delta\}\leq 1$. For Burundi, Botswana, Congo, Republic, Lesotho, Namibia, Swaziland and Zambia the condition $\gamma\leq 1$ does not hold. Therefore, in our calculations for these countries, we replace the Beta Lorenz curve with the Quadratic version or constrain the parameter γ to be equal to 1.

where *p* is again cumulative proportion (or percentage) of population, *L* is the corresponding cumulative proportion (or percentage) of consumption expenditure, and *a*, *b*, and *c* are parameters. The headcount poverty is described as:

$$H = -\frac{1}{2m}\left[n + r(b + \frac{2z}{\mu})\left\{(b + \frac{2z}{\mu})^2 - m\right\}^{1/2} \right] \qquad \text{(A5)}$$

where $m = b^2 - 4a$ is a parameter and μ is again the mean consumption per capita.[22]

After obtaining the Lorenz curve estimates, the projected poverty rates for $1.25 a day and shares of population under different ranges of consumption a day (in 2005 ppp) are then computed utilizing the UN constant fertility variant population projections. Given that projections were computed for 20 years, 47 countries and 5 scenarios, we have repeated this numerical procedure 4700 times to derive results for our paper.

Simulations were carried out in Matlab R2014a and the data labelling in Stata 13.

[22] For further detail please see Datt (1998).

ANNEX II. SUB-SAHARAN AFRICA: POVERTY OUTCOMES UNDER ALTERNATIVE SCENARIOS

Table 1a. Higher consumption growth scenario (+2 percentage points a year)

	2010	2015	2020	2030
	Percent of population			
1st poverty line (<$1.25)	47.9	39.4	29.1	15.0
2nd poverty line ($1.25-$2)	28.1	28.3	26.5	17.2
Floating class ($2-$4)	18.0	22.9	28.2	32.8
Above	5.9	9.4	16.2	34.9
Total	100.0	100.0	100.0	100.0
	Millions of poor			
1st poverty line (<$1.25)	393	372	318	221
2nd poverty line ($1.25-$2)	231	267	289	253
Floating class ($2-$4)	148	216	308	483
Above $4	48	89	177	514
Total	820	944	1,091	1,474

Table 1b. Lower consumption growth scenario (-2 percentage points a year)

	2010	2015	2020	2030
	Percent of population			
1st poverty line (<$1.25)	47.9	46.0	43.7	42.1
2nd poverty line ($1.25-$2)	27.8	28.1	27.7	25.9
Floating class ($2-$4)	18.3	19.1	20.8	22.0
Above	6.0	6.9	7.8	10.0
Total	100.0	100.0	100.0	100.0
	Millions of poor			
1st poverty line (<$1.25)	393	434	477	620
2nd poverty line ($1.25-$2)	228	265	302	382
Floating class ($2-$4)	150	180	227	324
Above $4	49	65	85	147
Total	820	944	1,091	1,474

Table 1c. 'The best case' scenario (higher consumption growth and less inequality)

	2010	2015	2020	2030
	Percent of population			
1st poverty line (<$1.25)	47.9	38.0	25.7	9.9
2nd poverty line ($1.25-$2)	28.6	28.9	26.0	17.2
Floating class ($2-$4)	18.1	24.1	31.7	33.2
Above (>$4)	5.4	9.0	16.6	39.8
Total	100.0	100.0	100.0	100.0
	Millions of poor			
1st poverty line (<$1.25)	393	359	280	146
2nd poverty line ($1.25-$2)	235	273	284	253
Floating class ($2-$4)	149	227	346	489
Above (>$4)	44	85	181	587
Total	820	944	1,091	1,474

Table 1d. 'The worst case' scenario (lower consumption growth and higher inequality)

	2010	2015	2020	2030
	Percent of population			
1st poverty line (<$1.25)	47.9	47	45.5	45.9
2nd poverty line ($1.25-$2)	29.9	31.6	31.2	29.7
Floating class ($2-$4)	17.2	16	17	16.5
Above (>$4)	5	5.5	6.3	7.9
Total	100.0	100.0	100.0	100.0
	Millions of poor			
1st poverty line (<$1.25)	393	443	496	676
2nd poverty line ($1.25-$2)	245	298	340	438
Floating class ($2-$4)	141	151	186	243
Above (>$4)	41	52	69	116
Total	820	944	1,091	1,474

Source: Authors' calculations based on the AfDB, World Bank, EIU and UN databases.

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