Growth and Development Finance Required for Achieving Sustainable Development Goals (SDGs) in Africa

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Abstract

This paper attempts to estimate the level of additional investment that will be required to meet some of the developmental goals of the Sustainable Development Goals(SDGs), and the additional financial resources that will be required assuming that savings, foreign direct investment (FDI) and official development assistance (ODA) stay at their current level. It particularly focuses on the first SDG on ending extreme poverty by 2030. However, we also experiment with alternative scenarios on reducing poverty and inequality. The results show that ending poverty will almost be an insurmountable task, unless effort is made to strengthen the responsiveness of poverty with respect to income. Africa will require a growth rate of 16.6 per cent per year between 2015 and 2030 to end extreme poverty by 2030. This corresponds into investment to GDP and financing gap to GDP ratios of 87.5 and 65.6 per cent per annum, respectively. However, the results vary widely across sub-regions, levels of development and individual countries. Countries and sub-regions with low initial poverty levels and higher responsiveness of poverty to income will be able to end poverty with relatively a low growth rate, and their corresponding financing gap is quite narrow. Further experiments suggest that targeting halving poverty and inequality simultaneously will require quite attainable growth and financing targets. The innovative aspect of this study is the computation of the continent's financing needs to address both poverty and inequality simultaneously unlike similar previous attempts that focus solely on halving the former. In addition, the paper outlines the potential policy implications of these findings for mobilizing resources to finance the post-2015 agenda.

[1] The views expressed in this paper are those of the authors and do not necessarily represent those of the United Nations Economic Commission for Africa.

1. Introduction

The year 2015 is a watershed year for international development. The Millennium Development Goals (MDGs) which were agreed upon in 2000 will be expiring. Deliberations are underway to chat new 15-year developmental goals, which will be termed Sustainable Development Goals (SDGs). Efforts are also underway to decide the means of implementation to achieve the SDGs. More specifically, conferences will be help to discuss the funding modalities, and the regional and international cooperation required to ensure that sufficient resources are mobilized to finance the SDGs. In order to get some sense about the resource mobilization effort at country, regional and international level, there is a need to assess the additional efforts that is required to achieve the SDGs.

In this paper, an attempt is made to estimate the growth required and the financing gap required to achieve some of the SDGs by 2030. In particular, the focus of this exercise is on SDG 1, which relates to ending extreme poverty, and SDG 10, which emphasises the reduction of inequality. There are two reasons why the paper focusses on these universal welfare goals. First, these goals are more explicit on what needs to be achieved. Second, these are outcome goals, while some of the goals are intermediate goals. Achieving the intermediate SDGs will likely result in poverty and inequality outcomes. In short, the effort growth and financing gap required to address the SDGs embeds efforts needed to address the other SDGs. For instance, addressing goals associated with health, education and infrastructure will have a significant impact on poverty as well as inequality.

To estimate the *financing gap* required to address the above-stated goals, we followed three steps. First, we determined the annual growth rates of real GDP required to address the SDGs goals linked to poverty and inequality depending on a given scenario. Second, we computed the investment required to achieve this growth rate. Finally, we estimate the *financing gap* by comparing this investment level required to the current level of savings and other financial resources currently available from other sources such as FDI, ODA, and remittances.

Previous studies recognize that determining the growth required to address the issues of poverty reduction is the appropriate way of arriving at the *financing gap* (see Devarajan, *et al*, 2002; Atisophon, *et al*, 2011). As argued earlier, this is mainly due to the fact that growth has a powerful effect addressing other goals such as those on health (e.g. infant mortality, maternal health, communicable diseases, HIV), and education (school enrolment, gender equality). Devarajan, *et al* (2002) identified two channels through which growth can have a spillover effect on achieving goals of health and education. First, an increase in growth results in increased per capita incomes and subsequently to a rise in demand both for quantity and quality of health and education. Second, increased growth creates the potential to increase government revenue which can be allocated to the provision of health and education services.

It is important to emphasize that determining the *financing gap* is a complex and speculative exercise. This, of course, has been acknowledged by previous studies (see Devarajan, 2002; Atisophon, 2011). The complexity stems from at least two sources. Firstly, the resource requirement to achieve the SDGs will largely depend on many factors that will vary across countries. It is clear that countries have varying capability of mobilising domestic resources and attracting private and public foreign capital. Other factors include, among others, the effectiveness of the economic policies, social inclusion and social protection policies, the quality of institutions and the extent to which such policies address issues relating to corruption and prioritize service delivery. Countries such as Mauritius and Botswana with more effective economic and social policies, better quality institution and effective service delivery are likely to have a narrower *financial gap* than countries with the history of weaker institutions and service delivery. Therefore, the resource requirement shall vary from country to country depending on some initial conditions and the effectiveness with which countries will use resources. To account for heterogeneity across countries, we provide our estimates growth and financing gap disaggregated by level of development (i.e. *low income, lower middle income, and upper middle income*) and by region (*Central Africa, East Africa, North Africa, Southern Africa and West Africa*). In addition, we provide continent wide estimates of both growth and financing gap. Regardless, the estimated *financing gap* should be interpreted with caution and can only be used as indicative of the financing required the SDG goals of poverty and inequality. Due to the

uncertainties and lack of precision involved in such computations researchers provide their estimates in intervals.

The second source of complexity is the fact that there is ignorance and the huge uncertainty surrounding the range of assumptions that have to be made about the variables used to determine the *financing gap* (Atisophon et al 2011). These variables include, among others, poverty levels, investment, savings, initial growth rate and population growth. This is mainly due to the absence/reliability of existing data, the need to make numerous assumptions and value judgments. In other words, we work in the context of a number of caveats and data uncertainties because what we do not know outweigh what we know. In the current paper, the complexity is compounded by the potential changes in focus under SDGs as opposed to MDGs which limit the lessons learnt from past financing gap computations. Given the uncertainties, it is instructive and appropriate to take our *financing gap* estimates as approximations or rough guides for the resources required to address issues of poverty and inequality by 2030. As in other financing gap exercises in the literature, such figures should not be taken as precise estimates. Despite the complexity and speculative nature of estimating the *financing gap*, it is still a worthwhile exercise as it enables countries to know the approximate resource mobilization effort needed to finance development.

In light of the complexity and speculative nature, we try to come up with different scenarios to arrive at different growth rates and levels of financing. It is envisaged that such diversity in scenarios will assist us to arrive at reasonable estimate for different contexts. In looking at different scenarios, we also contribute to the existing studies whose focus has mainly been on poverty reduction. In the current paper, the scenarios explored consider objectives of reducing not only poverty, but also inequality. More specifically, the scenarios are as follows: (i) What is the *financing gap* needs to be bridged to eradicate poverty, while keeping the same level of inequality by 2030? (ii) What is the *financing gap that* needs to be bridged to halve poverty and inequality by 2030?(iii) How long will it take to eradicate extreme poverty if Africa grows at 7 per cent? Incorporating the additional scenarios that deal with inequality is the main contribution of the paper as previous studies have only focused on financing to achieve the goal of poverty reduction and not inequality.

It is important to underscore the fact that our estimates of growth rates and financing gap are extremely high compared to historical experience. Readers might misinterpret the figures to suggest that they are sufficient to achieve the poverty and inequality goals for Africa. This is misleading because achievement of or lack of achieving the SDG goals will not only be due to shortfalls in finance and/or targeted growth rates. Why? This is mainly due to the fact that development is a long-term complex process that depends on numerous factors above and beyond solving a supply-side constraint on resources and/or achieving a certain rates of economic growth. Simply put, we need more than finance and growth rates to achieve long term development objectives such as SDGs.

Specifically, the results of this study show that Africa needs a growth rate of 16.6 per cent per year between 2015 and 2030 to end extreme poverty by the end target date. This implies an investment required and a *financing gap* of 87.5 and 65.6 per cent of GDP per annum, respectively. However, the growth required and associated *financing gap* varies widely across sub-regions and levels of development, depending on factors such as initial poverty rate and the elasticity of poverty with respect to income. North Africa will have the lowest required growth of 2.7 per cent per annum between 2015 and 2030, and there is no additional resource required to finance this growth rate given that the high level of savings in the region. East Africa will have the highest required growth and *financing gap* of 25 per cent and 83 per cent of GDP per annum respectively. As per our results disaggregated by the level of development, upper middle income countries need to grow only at the rate of 2.4 per cent for the next 15 years and they do not require any additional financial resource to eradicate poverty. Lower-middle income countries will require a growth rate of 13.8 per cent per annum, while low income countries will require 22.6 per cent growth rate. This corresponds to a *financing gap* of 76.4 per cent of GDP, respectively.

Based on the results on the last scenario, if countries sustain a 7 per cent growth rate into the future, it will take at least 33 years on average for Africa to eradicate extreme poverty. This, however, varies widely across the levels of development of countries. For upper-middle income countries it will take will take 9 years (2024) while it takes 26 (2041) years and 43 (2058) years for lower-middle income lower income countries. For lower income countries, the dream of

eliminating extreme poverty is closer to the end year of Africa's transformative vision articulated in AUC's Agenda 2063. Historically sustaining the 7 percent average GDP growth rate for the continent is not a trivial achievement. Therefore, realistically eliminating extreme poverty in the next 15 years is beyond our reach. However, it is important to note that some countries such as Tunisia, South Africa, among others will be able to meet this target with relative ease because their initial poverty headcount is low and the responsiveness of their poverty to income is quite high (i.e. growth elasticity of poverty).

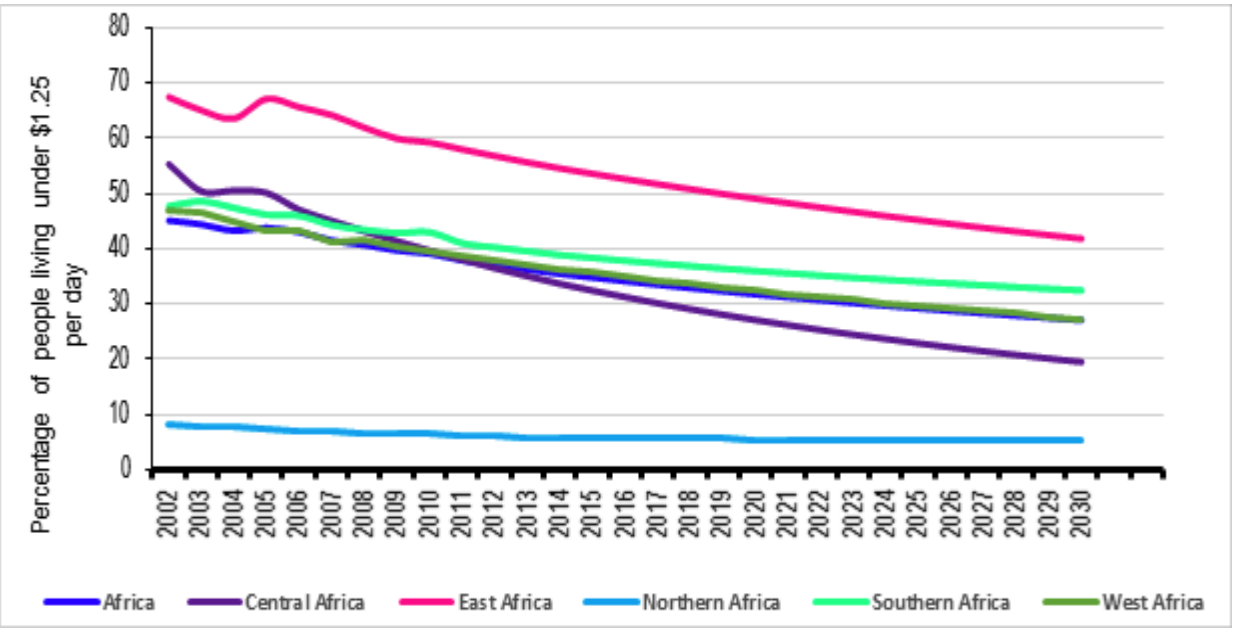
The remainder of the study is organized as follows. Section 2 defines and discusses the goal of ending poverty in 2030, and the conceptual and analytical implication of this goal. Section 3 outlines and discusses the methodology and data issues. Particularly, we discuss how the poverty lines of different countries are determined, how the Lorenz curves are estimated, how the required growth rate and the *financing gap* are determined. In this section, we also discuss the incidence of poverty in Africa. Section 4 presents and discusses the results on the required growth rate and the associated *financing gap* to address the objective of ending extreme poverty. We present our results based on various scenarios. Section 5 presents the conclusions and policy implications of the study.

2. ENDING EXTREME POVERTY – WHAT IS FEASIBLE?

Sustainable Development Goal 1 (SDG 1) advocates for complete eradication of extreme poverty, currently measured as people on less than $ 1.25 a day (UN, 2015). This implies that no person should live below $ 1.25 per day by 2030. This goal poses a number of challenges both from a practical and analytical point of view. From a practical point of view, the goal does not take into account that countries have different initial conditions. More particularly, countries have different levels of poverty. For instance, those with the highest initial poverty rates need extraordinary efforts to improve their poverty situation relative to others with lower rates of poverty to start with. For example in Africa, currently available data suggests that in some countries, such as the Burundi and DRC, the proportion of population living under 1.25 is as high as 80 per cent in 2014, while in countries such as Tunisia, Egypt, Algeria, Gabon and South Africa, the proportion is below 10 per cent. In all likelihood, eliminating extreme poverty in Burundi and DRC by 2030 is a toll order given historical precedents.

If poverty were to decline at the same rate as it did between 2002 and 2012, Africa will only achieve a poverty level of just below 30 per cent by 2030 (see Figure 1). Moreover, given the actual growth rate of the population coupled with the possibility of the poverty line to shift up before 2030, income per capita should grow faster to ensure that the size of the population below the poverty line is close to zero or at least below 3 per cent in less than 16 years. This illustrates that the effort needed to reduce poverty are quite daunting within the 15 year window.

Figure 1: Projection of poverty headcount by sub-region in 2030



Source: ECA calculations based on data from World Development Indicators (World Bank, 2015).

Moreover, even if poverty were to be eliminated to zero at one point, it is possible that at any point in time, people may temporarily fall back into poverty due to reasons beyond their control

(World Bank, 2015). This might happen due to, for example, global shocks such as financial crises, natural disasters, sudden outbreak of war and diseases.

From an analytical point of view, reducing extreme poverty to zero, given the current elasticities of poverty and poverty lines with respect to income and inequality will imply that countries' GDP will need to grow at historic levels well above the recent robust growth rates prevailing in Africa.

In light of the fact that reducing extreme poverty to zero might be unrealistic for most countries, there has been extensive effort to determine what is feasible. Example of studies include World Bank (2015), Ncube, *et al*. (2015), Ravallion, (2013), Chandy *et al*. (2013), Hughes, *et al*. (2009). Ncube, *et al*. (2015) uses simulation-based experience to show that eliminating extreme poverty by 2030 will not be possible even under the best case scenario on growth and redistribution. They show that a more realistic goal, especially for Africa, would be reducing extreme poverty by two-thirds of its current level. For instance, if the initial head count ratio is 30%, the likely target to be pursued should be to reduce it to 10% by the target date of 2030. However, most researchers argue that a target of 3 per cent poverty level by 2030, while so ambitious, is a possibility at least for some group of countries. For this reason, and in light of the fact that the zero per cent target is impractical, we use the 3 per cent as the target for ending extreme poverty by 2030. In this regard, for countries with a level of extreme poverty below 3 per cent (e.g. North African countries) in 2014, the assumption is that that they will have the same level of extreme poverty in 2030. Even if this assumption is realistic, keeping constant the level of extreme poverty is not always easy specifically for countries that are already close to the vision of zero poverty (World Bank, 2015).

We made attempts to generate our results based on various scenarios that reflect the existing reality on poverty. For instance, we categorised into two sample grouping. The first consists of countries with modest levels of initial poverty, while the second sample is composed of countries with very high levels of initial poverty.

3. METHODOLOGY

In choosing the methodology, several considerations were made such as applicability of the existing methodologies to Africa.[2] In this regard, it is important to note that existing MDGs costing models such as the World Bank's MAMS model – (a computable general equilibrium-based model (CGEM)), is quite a useful tool. Its applicability to Africa is limited because most African countries have not developed Social Accounting Matrices (SAMs) needed for CGEM applications. Data availability, quality and accuracy remain challenges for the continent which inevitably affect the reliability of the current exercise we are undertaking (Jerven, 2009). An alternative costing methodology involves computing cost estimates for each of the intermediate SDG targets such as targets on education, health, etc. However, as discussed in the introduction, adding up the cost elements of these intermediate SDGs may result in '*double counting'* problem as achieving these SDGs indirectly results in poverty reduction (Deverajan et al 2002).

Against this background, our methodology relies on an end goal i.e. eradicating poverty. Specifically, it is based on determining the growth efforts, the associated investment and *financing* that will be required to end poverty by 2030. The methodology closely follows the methods provided in the ECA (1999) and Atisopon, *et al* (2011) but we also account for inequality- a goal neglected in the past.

Our approach has three components. The first component discussed in Section 3.1 involves determining the poverty lines for the respective countries. In the current SDG 1, the poverty line for extreme poverty is already set at $1.25 per day, and therefore determining the poverty line is not necessary. the second component as discussed in Section 3.2 focuses on how to determine the growth required under the various scenarios. Section 3.3 discusses the third component of the methodology which involves determining the investment required to meet the required growth rate, and the *financing gap* that needs to be filled given the current level of financing (i.e. tax, FDI, ODA, etc.).

3.1 The poverty-lines

This section discusses the methodology for determining the poverty lines and poverty indices as defined by the FGT index (Foster, Greer and Thorbecke, 1984). Based on the poverty lines, the

[2] For a detailed review of the existing methodologies, see Shimeles, Rebei and Ndikumana (2009).

section also briefly discusses the state of poverty in Africa. To determine the 2014 poverty lines for African countries, the poverty line regression of Ali (1999) is updated to 2014. To do so, data on mean consumption for all African countries is required. As highlighted earlier, there are a number of challenges in relation to data which require a number of assumptions. First, a complete list of poverty lines is not available. Thus, we generate the poverty lines data by adjusting the 1999 poverty lines reported in Ali (1999) with an international PPP conversion compounding factor, which is computed as follows: $\left(\frac{PPP_{t+n}}{PPP_t}\right)^{(1/n+1)} - 1$, where *PPP* is the purchasing power parity conversion factor, *t=1999*, and *n* is the number of years between 1999 and the current year, i.e. *n=1 if year is 2000, n= 2 if year =2001…etc*. Through this process, we are able to create a panel data of poverty lines for 20 African countries over the 15 year period (2000 – 2014).[3]

The next data challenge is that only 17 out of the 20 countries whose poverty lines are computed as described above have consumption survey data for the period after 1999. Moreover, survey data is only available for a maximum two years in most cases. Thus to determine mean consumption, we compute a compounding factor for the growth of mean consumption between the two available survey years. Then this compounding factor is used to determine the mean consumption level for the missing years to create a panel data of 17 countries over 15 years. For the remaining 3 countries with no survey data, data on consumption per capita reported on the World Development Indicators (WDI) Database of the World Bank is used. Only yearly data is available so division by twelve gives mean consumption per month. The data we used to determine the financing gap include data on savings, GDP, FDI, remittances and ODA which are sourced from various sources such as the WDI, OECD and UNCTAD databases.

As a starting point, estimation of the poverty line equation using the panel data on mean consumption and poverty line from the 20 countries is undertaken using equation (1) below. It is important to note that expenditure and income of households are conventionally used as the two key measures of household welfare. Often the use of household consumption expenditure per capita is preferred because data on this variable is accurately collected in developing countries

[3] Note that in case of ending extreme poverty as in SDG1, the poverty line is already given as $1.25. Thus the sample of countries with available data is 43.

relative to income. This is consistent with the internationally agreed guidelines when one works on poverty analysis using data from developing countries (Deaton and Zaidi, 2002). Note also that the two variables are strongly and positively correlated as an increase in household income often translates into an increase of food and non-food household consumption expenditure. The results of our estimation are reported below (where figures in parentheses are robust standard errors; z is the poverty line and μ is mean consumption expenditure per person per month in 2005 PPP USD):

$$\underset{(s.e.)}{\ln z} = \underset{(0.04)}{3.119} + \underset{(0.00)}{0.0066}\mu - \underset{(0.00)}{0.00000116}\mu^2 \quad (1)$$

From equation (1), the elasticity of poverty line with respect to mean income is derived as:

$$\varepsilon = \frac{d \ln z}{d \ln \mu} = 0.0066 - 0.00000232\mu \quad (2)$$

The coefficients of our estimated poverty line equation are slightly larger than those of Ali (1999) with respect to the constant term and the second parameter of the equation, but much closer to the one computed by Ravallion, et al (1991). Using equation (1), poverty lines are estimated for 2014. These poverty lines were then fed into the *PovCal* routine of the World Bank to estimate the quadratic *Lorenz curves* of the countries.

As commonly used in the literature, poverty is reported using the FGT indices (Foster, Greer and Thorbecke, 1984). Three indices can be computed using the FGT formula. The most commonly computed index is the head-count ratio, which is defined as a ratio of number of population in poverty to total population and captures the incidence of poverty. The poverty-gap ratio which is computed on the basis of finding the income level required to life the poor to the level of the poverty line and measures the depth of poverty. It is often used as a proxy to measure inequality and a large poverty gap ratio is associated with high inequality. Finally, the square poverty-gap ratio captures the severity of poverty. Given their properties such as additive decomposition and sub-group decomposability, the FGT indices are most widely used (Ali, 1999; Lachaud, 1996;).

$$P(\alpha, z) = \frac{1}{n} \sum_{1 \le i \le q} \left(\frac{g_i}{z} \right)^{\alpha} 1_{\{y_i \le z} \quad (3)$$

where:

$\alpha =$ a parameter reflecting the degree of aversion to poverty. If $\alpha = 0$, one gets the headcount index. Letting $\alpha = 1$, results in the poverty-gap ratio which measure the depth of poverty or the average distance to the poverty line. If $\alpha = 2$, one gets the square poverty gap ratio which denotes the severity of absolute poverty. As the alpha parameter increases the weight given to inequality considerations is stronger and the poverty severity index gives more weight to the distribution of income among the poor);

$n =$ the size of the population (poor and non-poor);
$q =$ the size of the population of poor;
$z =$ poverty line;
$g_i =$ is the difference between the poverty line and income of individual "i" $(z - y_i)$, i.e. the poverty gap.

To estimate poverty indices, we assume that they depend on the distribution of expenditure - or income- indicated by the Lorenz curve. In this regard, estimating poverty indices required the estimation of the Lorenz curve for a given value of the poverty line and an average distribution of expenditure or income in the population. Hence, the poverty indices can take the form:

$$P = P(\mu / z, m) \qquad (4)$$

where μ is the mean per capita income or consumption; z is designated poverty line; and m is a measure of income inequality, usually captured by the Gini coefficient.

P is negatively correlated to μ as an increase in mean per capita income will translate in a decrease in the size of the population of poor resulting in a reduction of poverty indices. P is also positively correlated to m. A reduction in inequality results in a decrease in the size of the population of poor. Regarding the property of P, it is a function homogeneous of degree zero with respect to μ and z. This implies that, a proportional increase in mean income and the poverty line will result in an unchanged increase on the state of poverty. This property is fundamental as it implies that if growth is to have a positive impact on poverty, the elasticity of the poverty with respect to mean per capita income should be less than one (Ali, 1997).

By differentiating equation (4) with respect to μ and m, the dynamics of the poverty equation[4], which captures how poverty changes over time is given as;

[4] We provide details of derivations upon request.

$$P^* = [(1-\varepsilon)\eta]\mu^* + \nu m^* \quad (5)$$

Where $P^* = \frac{d \ln P}{P}$; $\mu^* = \frac{d \ln \mu}{\mu}$ and $m^* = \frac{d \ln m}{m}$; ε is the elasticity of poverty line with respect to mean income; η is the elasticity of poverty with respect to mean income; ν is the elasticity of poverty with respect to the Gini coefficient/inequality and star over a variable indicates percentage change over time. P^*, μ^* and m^* are respectively the growth rates of poverty, income per capita and inequality(Gini coefficient) between two periods *t* and *t+n* ; $n \in \{1, 2, 3, \ldots, N\}$.

3.1.1 The state of poverty and inequality in Africa

Tables 1 and 2 report the headcount, poverty-gap and squared poverty-gap ratios, Gini coefficients obtained from *PovCal* based on poverty lines derived from equation (1). The tables have average poverty and inequality measures for Africa weighted by population[5] and presented by sub-regions and by level of development, respectively. The average poverty line for Africa stands at USD 45.22 per month (i.e. USD1.5 per day) in 2014, albeit it varies widely across the sub-regions and level of development. At the sub-regional level, North Africa has the highest poverty line of approximately USD 65.75 per month, followed by Southern Africa (USD 61.47), Central Africa (USD 47.85), West Africa (USD 35.04) and East Africa (USD 32.87). By level of development, the poverty line varies from a high of USD 93 for upper-middle income countries to a low of USD 31.90 for low-income countries. The variation of mean consumption/income across sub-regions and level of development corresponds to the variation of the poverty line. Meaning the two variables co-move such that a higher mean consumption expenditure is associated with a higher the poverty line. At USD 159.50 North Africa has the highest mean monthly consumption, followed by Southern Africa (USD 128.56), Central Africa (USD97.02), West Africa (USD 64.57), and East Africa (USD 56.02). The mean monthly consumption

[5] $P_G(\alpha, z) = \sum \frac{Pop_i}{Pop_G} P_i(\alpha, z) 1_{\{i \in G} = \sum w_i P_i(\alpha, z) 1_{\{i \in G}$ where $\sum_{i \in G} w_i = 1$, $P_G(\alpha, z)$ is a measure of poverty indices in group $G = \{Africa, Nort\ Africa, Southern\ Africa, etc\}$ Pop_i is the size of the population in country i, Pop_G is the size of the population where belongs country i, $P_i(\alpha, z)$ is a measure of poverty indices in country i, and $1_{\{i \in G}$ is a dummy variable which takes the value 1 if country i belongs to group G and 0 otherwise.

expenditure of upper-middle income, lower-middle income and low-income countries is USD 218.60, USD 106.10 and USD 51.90 respectively.

Table 1: Poverty in a sample of African countries, 2014

Region	N. of Countries	Poverty line ($)	Head- Count ratio (%)	Poverty- Gap ratio (%)	Sq Poverty Gap ratio (%)	Gini coefficient (%)	Mean Consumption ($)*
Central Africa	4	47.85	38.43	14.94	7.78	45.49	97.02
East Africa	8	32.87	39.81	15.2	7.83	45.4	56.02
Northern Africa	6	65.72	26.95	7.52	3	36.42	159.5
Southern Africa	6	61.47	59.46	28.82	17.31	54.97	128.56
West Africa	13	35.04	39.2	13.55	6.36	40.05	64.57
Africa	37	45.23	40.55	15.56	8.06	43.62	92

Table 2: Poverty in a sample of African countries by level of development, 2014

Economies by per Capita	N. of Countries	Poverty line ($)	Head-Count ratio (%)	Poverty-Gap ratio (%)	Sq Poverty Gap ratio (%)	Gini coefficient (%)	Mean Consumption ($)*
Upper middle income	5	93.0	38.1	16.0	8.7	47.9	218.6
Lower middle income	12	47.5	38.1	14.8	8.0	42.7	106.1
Low income	20	31.9	42.6	15.9	8.0	43.1	51.9

The head count ratio shows that the continent's poverty incidence is high. As displayed in Table 1, the headcount poverty ratio for Africa is estimated to be 40.6. This rate is expected to fall to between 16% and 30% by 2030 which is nowhere near the 3% cutoff point required to eliminate extreme poverty (World Bank, 2013). Southern Africa has the highest headcount ratio of 59.5 per cent, followed by East Africa (39.8 per cent), West Africa (39.2 per cent), Central Africa (38.43 per cent), and North Africa (27 per cent). Disaggregation by level of development shows that low income countries have the highest headcount ratio at 42.6 per cent while upper-middle income and lower-middle income countries have a slightly lower poverty headcount ratio of 38.1 per cent.

The intensity of poverty as measured by the poverty gap also remains quite high in Africa.[6] It is currently 15.9 per cent for the continent. Southern Africa also has the highest poverty gap of 28.8 per cent, almost double that of the continent's. This is a reflection of the underlying severe income disparity prevailing in Southern Africa. East Africa has the second largest poverty gap of 15.2 per cent, followed by Central Africa (14.9 per cent), West Africa (13.55 per cent), and

[6] The poverty gap measures the average poverty gap in the population as a per cent of the poverty line.

North Africa (7.52 per cent). The poverty gap ratio does not vary significantly by level of development of countries. The evidence suggest to the need to tackle the intensity of poverty and inequality within a group of poor households in all countries. With the increased attention given to inequality in international discussions and commitment to reduce it (e.g. draft SDGs), we expect Africa to make progress to tackle inequality in the next 15 years which in turn enhances the poverty reducing power of growth.

The severity of poverty as measured by the squared poverty gap ratio varies between 8 and 8.7 per cent. At the sub-regional level, poverty severity is the highest for Southern African countries at 17.3 per cent and lowest for North Africa at 3 per cent. The severity of poverty in Central, East, and West Africa is quite similar, and is 6.4 per cent for the latter, and 7.8 per cent in Central and East African sub-regions.

3.2 Determining the Growth Rate required to Address Poverty and Inequality

Despite the remarkable growth story in Africa over the last decade, the discussion in the preceding section shows that the continent still faces huge challenges of poverty and inequality as the expiry of the MDGs draws to a close. It is therefore unsurprising that reducing poverty and ensuring inclusive growth have been integrated into the post-2015 SDGs. This section presents and discusses the methodology used to determine the GDP growth rate that will be required to address issues of poverty and inequality under different scenarios:

i. **Scenario 1**: Ending extreme poverty by 2030 based on the $1.25, while keeping inequality constant;
ii. **Scenario 2** Halving poverty based on the poverty lines derived in Section 3.1 as well as international poverty lines;

In principle, the growth required to reduce poverty and inequality depends on the size and sign of four elasticities as defined in equation (5) : (i) ε (ii) η (iii) ν, and (iv) elasticity of inequality with respect to income, denoted by κ, defined in equation (7) below. For a given level of inequality, an increase in income per capita will translate into a reduction of poverty within a given poverty line. This reduction in poverty will be greatest if η is negative and large, while ε

is close to zero. The size of ε is particular important because it relates to how the poverty line shift in response to a change income. If ε is unity then increased income will simply shift the poverty line up by double the initial poverty line leading to no change in poverty. Furthermore, η is assumed to be negative to the extent that, for a given poverty line and a lower value of ε, an increase of income per capita will result in a reduction of the size of the number of people below the poverty line. This dynamic process will be faster if poverty is highly elastic to income — i.e. η highly negative. Regarding the relationship between poverty and inequality, it expected that a reduction in the Gini coefficient by a percentage point reduces poverty significantly. Therefore ν should be positive and highly elastic. The above elasticities are a measure of the extent to which a per cent change in growth passes-through to poverty and inequality.

Therefore, using equation (4) or equation (5), it is possible to explore the growth and distribution implication of the required growth rate. In this regard, there is a need for additional information on the distribution of income over time or an alternative which might help to capture that behavior. Following Sarel (1997) and Ali (1999) we used the estimated Kuznets curve based on the formulation suggested by Anand et al (1993) and presented as follows:

$$m = \underset{(33.7)}{46.4} - \underset{(-12.6)}{0.00145}\,y - \underset{(-1.99)}{1940}\left(\tfrac{1}{y}\right) + c'X \qquad (6)$$

Adjusted R^2 = 0.521

where m is the Gini coefficient, y is the income variable measured in 2005 PPP-adjusted dollars per person per year. X is a vector of other explanatory variables in the equation and c' is a vector of their estimated coefficients. From equation (6), it is possible to estimate the elasticity of the Gini coefficient with respect to income, k, which is given as follows:

$$k = \frac{d\ln m}{d\ln y} = \left[-0.00145y + 1940/y\right]m \qquad (7)$$

Using equations (2), (5), (7) and the average population growth rate, the required growth rate is given as follows:

$$g_G^* = \mu_G^* + n_G \qquad (8)$$

g_G^* is the required GDP growth rate for group G (i.e. either an income or geographical grouping for a given country), μ_G^* is the required income per capita growth for group G and n_G is the average population growth rate in group G. Technically, μ_G^* and n_G are computed as follows:

$$\mu_G^* = \frac{\sum_{i=1}^{p} \mu_i^* Pop_i 1_{\{i \in G}}{\sum_{i=1}^{p} 1_{\{i \in G}} \text{ and } n_G = \frac{\sum_{i=1}^{p} n_i 1_{\{i \in G}}{\sum_{i=1}^{p} 1_{\{i \in G}} \qquad (9)$$

where $1_{\{i \in G}$ is a dummy variable which takes the value 1 if country i belongs to group G and 0 otherwise. Pop_i is the size of the population in country i. Once g_G^* is computed, it is now possible to determine the investment required to achieve this and the corresponding financing gap that this would imply. This is the subject of our discussion in Section 3.3.

3.3. Determining the *Financing Gap*

Once the target growth rate needed to SDGs under the scenarios (i) and (ii) is determined, a set up akin to the Harrod-Domar model is used to determine the resources needed. Thus, the target growth in per capita income rate μ_G^* is modeled as follows;

$$\mu_G^* = f(s, \theta, FDI, ODA, n_G, A) \qquad (10)$$

where s=saving rate, θ= ICOR[7], FDI=Foreign Direct Investment, ODA=overseas development assistance (aid), n_G=population growth, AR=additional resources. All the variables are assumed to be fixed and determined as of 2014 except the unidentified AR which can be computed after rearranging equation (2). Therefore, AR is a residual net of existing finance sources (such as FDI, ODA, savings….etc) and is critical to our effort to compute financing gap required for achieving the goals defined under the two scenarios.

Two approaches are followed to derive θ in 2014. The first option is to use the θ estimates of Nkurunziza (2015) for the period 1995-2010, which are available for 35 African countries. For

[7] Following Nkurunziza (2015) $\theta_i = \frac{\frac{I_{it}}{GDP_{it}}}{g_{it}}$ where I_{it} is the level of investment in country *i* at time and measures as the gross fixed capital formation (current US$), GDP_{it} is the Gross Domestic Product in country i at time t(current US$) and g_{it} is the GDP growth rate in country i at time t.

countries whose θ is not available, we use the *median ICOR* estimates of the 35 countries. It was therefore possible to determine θ for the period 2011-2014, and to that end we use the *average growth* in θ for the period 1995-2010 to generate and update estimates for θ for 2011-2014.

Therefore, based on a simple Harrod-Domar model, where savings is the only source of financing, μ_G^* as described in (10) can be defined as a function of savings rate (s), θ and n_G as follows:

$$\mu_G^* = \frac{s}{\theta} - n_G \qquad (11)$$

Total savings (as a share of income), sY is assumed to be entirely invested domestically, and is augmented with other resources such as FDI, ODA, and any other ***additional resources***, either from internal or external sources, defined here as A. Equation (11) can be rewritten as follows:

$$\mu_G^* = \frac{sY + ODA + FDI + A}{Y} * \frac{1}{\theta} - n_G \qquad (12)$$

In equation (12), *s, FDI, ODA, Y,* θ and n_G are taken as given, and the targeted growth rate, μ_G^* is predetermined depending on the targeted goal. By rearranging equation (12), it is thus possible to derive financing gap/additional resources as;

$$Additional\ resources(A) = \overbrace{\underbrace{(\mu_G^* + n_G) * Y * \theta}_{\text{Required Investment}} - sY}^{\text{Residual Finance}} - (\underbrace{ODA + FDI}_{\text{External Finance}}) \qquad (13)$$

4. Results and Discussion

This section presents and discusses the elasticities upon which the required growth is determined and the results on the required growth rates, and the corresponding *financing gaps*. Section 4.1 presents and discusses the elasticities under the two sets of poverty lines considered (i) the international poverty line of $ 1.25 per day per person, and (ii) poverty lines we estimated using data from different countries. Section 4.2 presents and discusses the results on required growth rate and the corresponding *financing gap* for various scenarios taking the above two poverty lines under (i) and (ii) into consideration. Finally, Section 4.3 presents the number of years required to eradicate extreme poverty if African countries grow at 7 per cent.

4.1 The Poverty and Poverty Line Elasticities

In Tables 3 and 4, the elasticities based on the $1.25 poverty lines are presented. In Table 5 and 6, the elasticities based on our estimated poverty lines are presented. In all cases, the elasticities are presented by sub-region and level of development of countries in the respective tables. Generally, the sensitivity of the poverty headcount ratio with respect to growth is higher than its sensitivity with respect to inequality, except for the upper-middle income African countries. On the other hand, the elasticity of the poverty gap (intensity of poverty) with respect to growth/income is lower than that with respect to inequality. Similarly, the elasticity of severity poverty (squared poverty-gap ratio) with respect to inequality is more than twice as much as its elasticity with respect to income. These elasticities are computed with the belief that growth is a faster way of reducing the total number of people living below the poverty line. Likewise, income redistribution through social protection programmes can be a faster route to reduce the intensity and severity of poverty. In other words, tackling inequality speeds up the poverty reducing impact of growth. In what follows, we discuss the rate of GDP growth required to address issues of poverty and inequality under the two scenarios highlighted earlier.

Table 3: Elasticities of poverty Measures with respect to income and the Gini coefficient by sub-region: $1.25 poverty line

Region	Head count ratio: w.r.t. Income (Gini)	Poverty Gap: w.r.t. Income and Gini	Square Poverty Gap: w.r.t. Income and Gini
Central Africa	-1.58(1.80)	-2.33(4.73)	-3.04(7.62)
East Africa	-1.25(0.62)	-1.84(2.19)	-2.35(3.74)
Northern Africa	-7.64(21.21)	-12.10(38.49)	-16.48(55.61)
Southern Africa	-1.94(10.82)	-3.48(24.30)	-4.91(37.58)
West Africa	-1.11(0.46)	-1.63(1.99)	-2.05(3.49)
Africa	**-2.60 (6.13)**	**-4.08 (12.49)**	**-5.47 (18.78)**

Note: w.r.t. = with respect to. All the elasticities in parentheses are elasticities with respect to the Gini coefficient.
Source: ECA's calculations

Table 4: Elasticities of poverty measures with respect to income and the Gini coefficient by level of development: $1.25 poverty line

Economies by per Capita	Head count ratio: w.r.t. Income and Gini	Poverty Gap: w.r.t. Income and Gini	Square Poverty Gap: w.r.t. Income and Gini
Upper middle income	-3.62(18.02)	-6.08(38.30)	-8.50(57.69)
Lower middle income	-3.74(8.85)	-5.90(16.99)	-7.96(25.05)
Low income	-1.24(0.57)	-1.83(2.12)	-2.34(3.66)

Note: w.r.t. = with respect to.
Source: ECA's calculations

Table 5: Elasticities of poverty Measures with respect to income and the Gini coefficient by sub-region: Estimated poverty line

Region	Head count ratio: w.r.t. Income and Gini	Poverty Gap: w.r.t. Income and Gini	Square Poverty Gap: w.r.t. Income and Gini
Central Africa	-1.26 (1.11)	-1.66 (3.31)	-2.03 (5.47)
East Africa	-1.43 (1.39)	-2.10 (3.90)	-1.32 (6.37)
Northern Africa	-1.98 (2.18)	-2.84 (5.18)	-3.70 (8.18)
Southern Africa	-0.72 (0.39)	-1.12 (2.18)	-1.45 (3.92)
West Africa	-1.51 (1.09)	-2.20 (3.25)	-2.85 (5.38)
Africa	**-1.41 (1.22)**	**-2.05 (3.54)**	**-2.34 (5.82)**

Source: ECA's calculations

Table 6: Elasticities of poverty measures with respect to income and the Gini coefficient by level of development: Our Estimated poverty line

Economies by per Capita	Head count ratio: w.r.t. Income and Gini	Poverty Gap: w.r.t. Income and Gini	Square Poverty Gap: w.r.t. Income and Gini
Upper middle income	-1.39 (1.69)	-2.05 (4.64)	-2.70 (7.55)
Lower middle income	-1.45 (1.35)	-2.03 (3.68)	-2.59 (6.00)
Low income	-1.40 (1.03)	-2.05 (3.17)	-2.10 (5.28)

Source: ECA's calculations

4.2 Required Growth Rates and *Financing Gap* under the various Scenarios

4.2.1 Ending extreme poverty by 2030 based on the international poverty line of $1.25, while keeping inequality constant

SDG1 advocates for ending the proportion of the population living under $1.25 per day. However, as noted earlier, the target to be achieved in headcount terms is extreme poverty rate of 3 per cent. The 2014 MDG report suggests that the absolute number of people living under the USD 1.25 poverty line has increased to 414 million from 376 in 1999 (ECA, 2014). And there are various explanations why the number of poor people increased in Africa. These include, among others, a high rate of population growth, data quality, and the relative concentration of growth proceeds among the non-poor. Table 7 and 8 reports the required growth rates in per capita income and real GDP to bring extreme poverty to 3 per cent, by sub-region and level of development, respectively. In both cases, we keep inequality constant. Also reported are the headcount in 2014 and the target headcount in 2030 and the average population growth rate.

It is evident that if Africa pursues the target of reducing extreme poverty to 3 per cent, while keeping inequality constant, it needs a per capita income growth rate of 14 per cent per annum between 2015 and 2030 (i.e. column 6 of Table 7). Assuming a yearly 2.47 per cent population growth rate during this period, the required growth in real GDP will be 16.6 per cent per annum

(i.e. column 8). The required growth rates varies widely across sub-regions and levels of development. At the sub-regional level, North Africa whose extreme poverty headcount is very low at 5.6 per cent and the highest income elasticity of poverty will require the lowest growth effort of only 2.7 per cent, to achieve the 3 per cent headcount by the target date of 2030. On the other hand, East Africa needs the largest growth effort of 25 per cent per annum between 2015 and 2030 if it were to end poverty. West Africa, Southern Africa, and Central Africa also require high growth efforts of 18 per cent, 15.9 per cent and 11.9 per cent per annum, respectively. When results are disaggregated by level of development, upper-middle income, lower middle income and lower income countries will require an annual growth rate of 2.4 per cent, 13.8 per cent and 22.6 per cent, respectively. As seen from the experience of the MDGs, the battle ground for the achievement of poverty reduction/elimination will be low income countries where extreme poverty is concentrated. Therefore, policy makers need to focus on this particular group of countries to make progress in the next 15 years and beyond.

Table 7: Required GDP growth rates to eradicate extreme poverty in the 2030 by sub-region

Region	Headcount 2014	Headcount 2030	$(1-\varepsilon)\eta$	$\nu\kappa$	Required income per capita growth (%)	Avg Pop growth	Required GDP growth rate (%)
Central Africa	27.11	3.00	-1.57	0.01	9.16	2.74	11.90
East Africa	49.18	3.00	-1.24	0.02	22.19	2.84	25.03
Northern Africa	5.63	2.29	-7.59	-0.82	1.03	1.68	2.71
Southern Africa	35.34	3.00	-1.93	-0.82	13.58	2.31	15.89
West Africa	49.38	3.00	-1.10	0.02	15.38	2.67	18.04
Africa	37.65	2.86	-2.58	-0.26	14.06	2.47	16.54

Source: ECA's calculations

Table 8: Required GDP growth rates to end extreme poverty in the 2030 by level of development

Economies by per capita	Headcount 2014	Headcount 2030	$(1-\varepsilon)\eta$	$\nu\kappa$	Required income per capita growth (%)	Avg Pop growth	Required GDP growth rate (%)
Upper-middle income	5.96	2.77	-3.60	-0.49	0.80	1.54	2.34
Lower-middle income	33.83	2.73	-3.72	-0.31	11.46	2.31	13.77
Low income	48.72	3.00	-1.23	0.02	19.69	2.86	22.55

Source: ECA's calculations

The results also show that although Africa needs considerably high growth efforts to meet the 3 per cent poverty headcount by 2030, the required growth efforts are subject to great divergence across sub-regions and level of development. The main driving factor behind this divergence are initial poverty headcount and the magnitude of the elasticities of poverty with respect to various variables (e.g. income or inequality). We conduct further analysis to examine the role of poverty

headcount ration in driving the required growth rate. To that effect, we categorise the sample of African countries into two groups, (i) countries above the median headcount, and (ii) countries below the median headcount. We choose to work with median because it is less susceptible to outlying observation than mean. According to Table 9, countries below the median poverty headcount will require a growth rate of 6.7 per cent per annum (or 4.5 per cent growth of per capita income) between 2015 and 2030 to bring extreme poverty headcount to 3 per cent by 2030, while those above the median will require a growth rate of 26.5 per cent (or 23.8 per cent growth of per capita income). These results demonstrate that countries above the median (i.e. with high rate of poverty) tend to have weaker elasticities of poverty with respect to income and inequality. This is mainly due to the absence of strong mechanisms/institutions in place that can guarantee the distribution of the benefits of growth. From a policy perspective, this result implies that achieving high growth is not a sufficient condition for eradicating poverty, unless it is augmented by some social protection and redistribution policies to lift those below the poverty line out of extreme poverty.

Table 9: Required GDP growth rates to eradicate extreme poverty in the 2030 by country above or below the median

	Headcount 2014	Headcount 2030	$(1-\varepsilon)\eta$	$-vm*$	Required income per capita growth (%)	Avg Pop growth	Required GDP growth rate (%)
Countries with poverty Headcount above the median	56.79	3.00	-0.89	0.01	23.76	2.73	**26.49**
Countries with poverty Headcount below the median	18.74	2.72	-4.25	-0.53	4.49	2.22	**6.71**

Median=37.17
Source: ECA's calculations

We now discuss the results on the ***financing gap*** to be filled to achieve the poverty reduction goal as in scenario 1 (i.e. ending extreme poverty by 2030). Tables 9 and 10 report the results by sub-region and level of development. Assuming that the various elasticities of poverty will remain constant between 2015 and 2030, Africa will require a staggering investment to GDP ratio of approximately 87.5 per cent per annum to achieve the growth rate required to reduce extreme poverty headcount to the minimum possible level i.e. 3 per cent. If the current level of financial resources (i.e. both from domestic and external sources) remain constant, this will imply a *financial gap* of approximately 65.5 per cent of GDP a year. North Africa needs to raise the lowest investment to GDP ratio of 25.3 per cent per annum between 2015 and 2030, and will not need any additional resource to bring extreme poverty headcount to below 3 per cent. On the

contrary, East Africa will require an investment to GDP ratio of 96 per cent per annum during the same period, and this implies additional resources of approximately 83 per cent of GDP per annum. However, with increasing future trend of FDI, savings mobilization, remittances and international reserves, the financing gap is expected to be lower (ECA and AUC, 2015b).

Disaggregation by level of development shows that upper-middle income countries will not need any additional resources to bring the extreme poverty headcount to below 3 per cent, while lower-middle income and low income countries will need additional resources of approximately, 55.9 per cent and 76.4 per cent of GDP, respectively. When we divide the countries into two groups depending on the extreme poverty level in relation to the median headcount ratio, we find that countries below the median will require 6.7 per cent of GDP, while countries below the median will require 26.5 per cent of GDP (see Figure 2). This corresponds to a *financing gap* of 17.7 per cent of GDP and 90 per cent of GDP, respectively. It is important to note that the result for countries above the median is driven by countries such as Burundi, DRC, Malawi, Nigeria, Rwanda and Zambia, whose poverty headcount is in excess of 60 per cent by 2014.

Table 10: Residual finance ($ billion) to eradicate extreme poverty by 2030 and by region

Region	Required GDP growth rate (%)	ICOR	Domestic Savings rate (%)	Required investment/GDP rate (%)	Required External Finance (% of GDP)	Current ODA Flows (% of GDP)	Current FDI net inflows(%of GDP)	Residual Finance (% of GDP)
Central Africa	11.90	5.04	21.80	59.93	38.13	1.97	6.68	29.48
East Africa	25.03	3.84	7.15	96.11	88.96	3.31	2.64	83.01
Northern Africa	2.71	9.33	22.70	25.28	2.58	0.91	5.33	-3.67
Southern Africa	15.89	4.62	13.65	73.36	59.70	3.09	7.25	49.37
West Africa	18.04	4.89	12.41	88.22	75.80	3.02	4.14	68.65
Africa	**16.54**	**5.29**	**14.46**	**87.53**	**73.07**	**2.64**	**4.98**	**65.46**

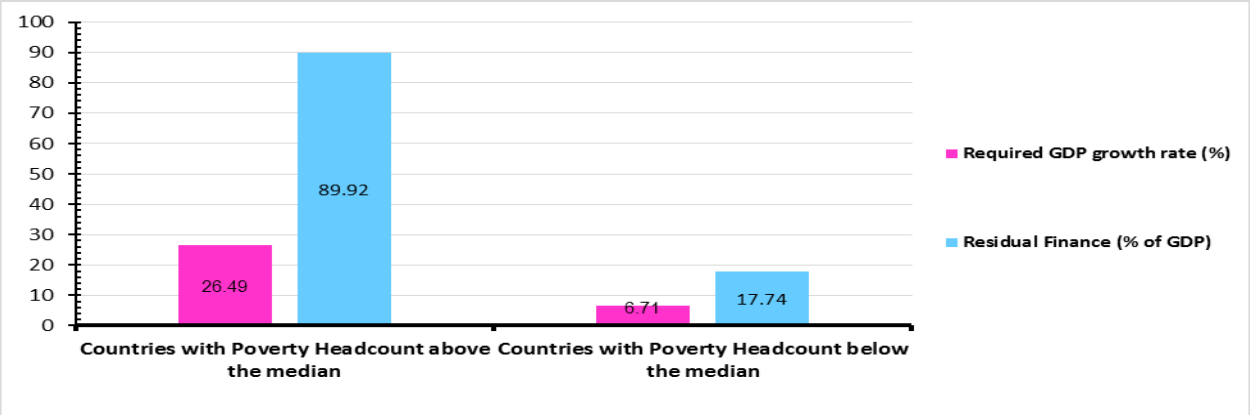
Source: ECA's calculations

Table 11: Residual finance to eradicate extreme poverty by 2030 and by country group

Economies by per capita	Required GDP growth rate (%)	ICOR	Domestic Savings rate (%)	Required investment/GDP rate (%)	Required External Finance (% of GDP)	Current ODA Flows (% of GDP)	Current FDI net inflows(%of GDP)	Residual Finance (% of GDP)
Upper-middle income	2.34	8.04	23.67	18.77	-4.89	0.36	2.86	-8.11
Lower middle income	13.77	6.04	19.77	83.18	63.41	1.71	5.85	55.85
Low income	22.55	4.16	8.74	93.76	85.02	3.79	4.86	76.37

Source: ECA's calculations

Figure 2: Growth rate and Residual finance to eradicate extreme poverty by 2030: Above versus below median



Source: ECA's calculations

4.2.2 Halving poverty by 2030 keeping inequality constant

The goal of ending poverty by 2030 is very ambitious but a worthy aspirational goal to hold onto. Therefore, we considered the alternative goal of halving poverty which is more plausible and feasible. The poverty lines estimated under section 3.1 serve as a basis of our computations. The results in relation to the required growth rate for this scenario are reported in Tables 12 to 15 under two alternative poverty lines.

It is notable that Africa needs to grow by 6.22 per year to halve poverty under the international poverty lines respectively by 2030 (see tables 12). If this growth is disaggregated at sub-regional level, it is notable that East Africa will require the highest growth of 8.3 per cent, followed by West Africa (6.7 per cent), South Africa (5.9 per cent), Central Africa (5.7 per cent), and North Africa (2.7 per cent). The fact that North Africa requires the lowest growth rate is closely linked to the prevailing level of development which is relatively higher than the rest of Africa. With regard to results summarized based countries' level of development (i.e. table 13), low income countries, lower-middle income countries and upper-middle countries need to grow at 7.7, 5.6 and 2.5 per cent respectively. Clearly low income countries have a more challenging task of tackling poverty than middle income countries.

Table 12: Required growth rate to half poverty in the year 2030 by *sub-region* (based on the 1.25$ poverty line)

Region	$(1-\varepsilon)\eta$	$\nu\kappa$	Required income per capita growth (%)	Avg Pop growth (%)	Required GDP growth rate (%)
Central Africa	-1.57	0.01	2.93	2.74	5.67

East Africa	-1.24	0.02	5.45	2.84	8.28
Northern Africa	-7.59	-0.82	1.01	1.68	2.69
Southern Africa	-1.93	-0.82	3.63	2.31	5.93
West Africa	-1.10	0.02	4.01	2.67	6.68
Africa	-2.58	-0.26	3.75	2.47	6.22

Table 13: Required growth rates to reduce poverty by half in the 2030 by *level of development* (based on the 1.25$ poverty line)

Economies by per Capita	$(1-\varepsilon)\eta$	$v\kappa$	Required income per capita growth (%)	Avg Pop growth (%)	Required GDP growth rate (%)
Upper middle income	-3.54	-0.49	1.03	1.51	2.55
Lower middle income	-3.72	-0.31	3.25	2.31	5.55
Low income	-1.23	0.02	4.91	2.86	7.77

The corresponding investment and *financing gap* that are required to fulfil the required growth rate for Africa are reported in Tables 14 and 15 disaggregated by sub-region and level of development respectively. By looking at the results by sub-region, it is evident that Africa needs an investment to GDP ratio of 32.9 per cent of GDP and this implies a corresponding *financing gap* to GDP ratio of 10.9 per cent per annum. However, North Africa and Central Africa show a negative financing gap to GDP ratio suggesting that these two regions will satisfy their financing requirements for halving poverty before the target date of 2030. Disaggregation of results by level of development shows that low income, lower middle income and upper middle income countries require an investment to GDP ratio of 32.2 per cent, 33.6 per cent and 20.5 percent per annum respectively. Correspondingly their respective residual finance to GDP ratios stand at 14.9 per cent, 6.2 per cent and -6.4 per cent. Lower income countries have the highest ratios (i.e. both for investment to GDP as well as financing gap to GDP ratios) due to their initial high level of poverty while upper middle income countries have the next highest ratio due to their initial high level of inequality.

Table 14: Financing gap to halve poverty by sub-region (based on 1.25$ USD poverty line)

Region	Required GDP growth rate (%)	ICOR	Domestic Savings rate (%)	Required investment/GDP rate (%)	Required External Finance (% of GDP)	Current ODA Flows (% of GDP)	Current FDI net inflows(%of GDP)	Residual Finance (% of GDP)
Central Africa	5.67	5.04	21.80	28.56	6.76	1.97	6.68	-1.88

East Africa	8.28	3.84	7.15	31.81	24.65	3.31	2.64	18.70
Northern Africa	2.69	9.33	22.70	25.10	2.40	0.91	5.33	-3.84
Southern Africa	5.93	4.62	13.65	27.39	13.73	3.09	7.25	3.40
West Africa	6.68	4.89	12.41	32.66	20.25	3.02	4.14	13.09
Africa	6.22	5.29	14.46	32.94	18.48	2.64	4.98	10.87

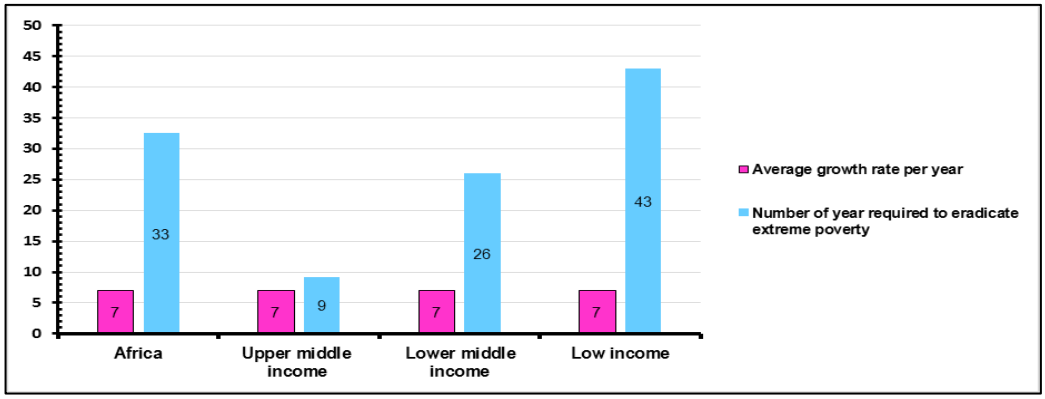
Table 15: Financing gap to halve poverty by level of development (based on 1.25$ USD poverty line)

Economies by per Capita	Required GDP growth rate (%)	ICOR	Domestic Savings rate (%)	Required investment/ GDP rate (%)	Required External Finance (% of GDP)	Current ODA Flows (% of GDP)	Current FDI net inflows(%of GDP)	Residual Finance (% of GDP)
Upper middle income	2.55	8.04	23.67	20.47	-3.19	0.36	2.86	-6.41
Lower middle income	5.55	6.04	19.77	33.56	13.78	1.71	5.85	6.23
Low income	7.77	4.16	8.74	32.23	23.56	3.79	4.86	14.91

4.2.3 Number of years required to eradicate extreme poverty if African countries grow at 7 per cent

We computed the number of years that it will take the continent to eradicate extreme poverty if it continues to growth at the rate of 7 per cent per annum. The results are presented in Figure 3. With 7 per cent real GDP growth per year, it will take Africa 33 years to eradicate extreme poverty. Upper-middle income countries will take a much shorter time period of 9 years while lower-middle income countries will have to wait for 26 years. Low income countries have to wait for 43 years getting them closer to the final years of the Agenda 2063 which articulates the transformation vision of the continent in the next 48 years. .

Figure 3: Number of years required to eradicate extreme poverty by 2030 with 7 per cent real GDP growth per year



Source: Authors' calculation

5. CONCLUSIONS AND POLICY IMPLICATIONS

In this study, an attempt is made to estimate the growth, additional investment, and additional financial resources that will be required to address some of the goals of the post-2015 development agenda under two main scenarios relating to reducing poverty and inequality. These scenarios are as follows: (i) ending extreme poverty by 2030 the level of inequality constant and (ii) simultaneously halving poverty and inequality by 2030. Another scenario which can be considered more realistic is to compute the number of years that it will take for Africa to end extreme poverty if it sustains a growth rate of 7 per cent. Before we summarise our findings, it is important to reiterate that estimating the financial gap is a complex exercise. Therefore we do not claim that our estimates are exact, but rather they are approximations/indicative figures to financial resources required if our assumptions about the incremental capital ratio, level of internal and external resources, and the responsiveness of poverty and inequality to income will remain constant.

The results show that the required growth, investment, and additional financial resource, vary across the scenarios. Addressing the goal of ending poverty seems to be daunting task as seen from the required historically unpresented high growth rates and the *financing gap*. More particularly, Africa needs to grow by 16.6 per cent per annum between 2015 and 2030 to achieve a poverty headcount ratio of less than 3 per cent in 2030. This translates into a large *financing gap* of 65.5 per cent of GDP per year between 2015 and 2030. Certainly, these requirements are nearly impossible to achieve even if there are huge differences across countries depending on their levels of development and the sub-region they are located in. Thus, the target is a possibility in some countries with low level of initial poverty but not all. Therefore, to facilitate future progress in battling extreme poverty, initiatives especially in low income countries in the form of social protection, investment in education, and redistribution, need to be pursued with sustained political commitment and at a scale never seen before.

Pursuing the goal of halving poverty and halving inequality simultaneously shows that the growth required will be 8.8 per cent per annum, and this translate to a financing gap of 24.4 per cent of GDP per annum. Finally, we find that it will take an average 33 years for Africa to eradicate extreme poverty if African countries were to sustain a growth rate of 7 per cent per

annum. Unsurprisingly, the low income countries have the longest to wait while the upper middle income countries can eradicate extreme poverty by 2024 with a mere waiting period of 9 years.

A number of possible policy implications can be drawn from our findings. The first policy implication relates to strengthening ways of mobilizing resources for investment given the estimated large financing needs either to eradicate extreme poverty or halving both poverty and inequality simultaneously. It is notable that if remittances are taken into account, Africa's financing gap will decrease by a significant amount. This requires channelling remittances effectively towards growth-enhancing investment. There are at least two main reasons why remittances were not able to play a significant role in the development of Africa to date. The cost of receiving remittances in Africa is much higher than in other regions in the world. In addition, many African countries do not have suitable incentives to attract remittances towards investments. However, countries like Ethiopia have, for example, successfully attracted remittances toward investment in sectors such as real estate and investment in public infrastructure (e.g. a bond for the Renaissance Dam). Other African countries can draw lessons from such success stories.

Africa also needs to address the problem of illicit financial flows to increase the available pot of domestic resources for productive purposes. Conservative estimates suggest that Africa is losing between $ 50 and $ 60 billion a year in illicit financial flows (ECA, 2015a). These flows are mainly through trade mispricing, tax avoidance, tax evasion, money laundering, and drug trafficking. These resources can make a significant contribution in bridging Africa's financing gap. It is important to note that African leaders have acknowledged the problem of illicit financial flows at their 24th African Union heads of state summer in January 2015, and high level efforts are under way to address this issue.

Africa also needs to strengthen mobilization of other domestic financial resources via savings and tax revenue collection via aggressive spatial banking sector expansion to bring the unbanked to the financial system and through robust tax reforms and tax administration efficiency to improve public revenue collection. The drive to strengthen capacity for collection and administration of tax should go hand in hand with improving service delivery and minimize

corruption to ensure that citizens are not discouraged from paying taxes. Technological advancement in payment systems (e.g. internet banking, mobile money transfers, etc) can play an important role.

We argue that the large additional financing needs is reflection of the fact that poverty and inequality are not very sensitive to the African growth experienced so far over the 15 years. This is especially evident in the case of North Africa. Despite relatively lower rates of initial poverty and very high levels of savings in these oil-exporting economies, the financing gap under scenario 2 (i.e. halving poverty and inequality simultaneously) is very high mainly due to the fact that inequality is quite insensitive to growth. In this case, effort needs to go towards tackling inequality effectively. This can be done through redistribution through social safety net programs such as conditional-cash transfers, investing in education and ensuring that educational curriculum is aligned to the skills needed in industries. This is one effective way of using proceeds from sales of natural resources or oil exports. More important, low growth-elasticity of poverty in many Africa countries is due to overreliance on resource-sectors which are very capital intensive, and thus have limited capacity to generate jobs and improve household welfare for the majority of the population. There is ample evidence that industrialization and manufacturing sector development has the potential to generate decent jobs and improve linkages between the sectors of the economy, thereby improving the responsiveness of poverty and inequality to growth. This could in turn reduce the growth, investment, and additional financial resources needed to address the developmental goals of the post-2015 development agenda. Therefore, in addition to accelerating growth and mobilizing financial resources, complex and age-old fundamental development problems such as poverty and inequality should be approached in the context of well-planned and executive development policies that focus on creating employment opportunities and improving the welfare of households.

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