Journal of African Economies, 2023, **32**, ii164–ii182
https://doi.org/10.1093/jae/ejac047
Supplement Paper

OXFORD

Progress on Poverty in Africa: The Importance of Growth and Inequality

Augustin Kwasi Fosu*[a,b,c]

[a]Institute of Statistical, Social, and Economic Research (ISSER), University of Ghana, Legon, Ghana
[b]College of Business and Economics, University of Johannesburg, Johannesburg, South Africa
[c]Faculty of Economic and Management Sciences, University of Pretoria, Pretoria, South Africa
*Corresponding author: Augustin Kwasi Fosu. E-mail: afosu@ug.edu.gh; afosu@isser.edu.gh

Abstract

Employing World Bank data, this paper, first, historically examines Africa's record on poverty incidence, spread and severity, as compared with other regions of the world, at the US$1.90 and US$3.20 per day (2011 PPP) poverty standards. Second, it evaluates country-specific progress on growth, poverty and inequality, and compares the 'poverty transformation efficiency vector' (PTEV) among African countries. Third, the study analyses the relative roles of income growth and inequality changes in explaining African countries' poverty records, through a decomposition of poverty changes using 'optimal' income and inequality elasticity estimates from the 'identity' model. The study finds that following the dismal record on poverty during the 1980s, progress on poverty has been appreciable since Africa's growth resurgence starting in the mid-1990s, and that this progress was driven mainly by income growth, consistent with the global evidence. Nonetheless, inequality often played a complementary role in most of the countries and, in a small number of cases, it was the primary driver of changes in poverty. Thus, the present study sheds light on country-specific differences in the relative roles of growth and inequality in poverty reduction on the continent, based on both qualitative and quantitative evidence. The study should, therefore, provide a useful compass to those who seek to understand country-specific situations within the African context.

Keywords: growth, income, inequality, poverty, Africa, poverty transformation efficiency vector (PTEV)

JEL classification: D31, I32, O11, O49, O55

1. Introduction

Reducing poverty has been at the heart of global public policy; it was indeed the Millennium Development Goal 1 (MDG1) and is currently designated as the Social Development Indicators Goal 1 (SDG1). In general, African countries have registered appreciable reductions in poverty since the mid-1990s, contrary to the 'lost decade' of the 1980s. This progress coincides with the region's growth resurgence.

The extant literature suggests that countries' initial characteristics, growth and redistributive policies are the underlining factors behind poverty reduction. Focusing on sub-Saharan Africa (SSA), Fosu (2015) argues that Africa's[1] relatively recent progress on poverty may

[1] I employ 'SSA' and 'Africa' interchangeably herein.

be attributable primarily to its growth resurgence. However, that study also emphasises the importance of inequality. Thus, it would be desirable to identify those countries where inequality and/or growth constitute significant constraints on poverty reduction.

This paper attempts to answer the following research questions:

- How has Africa generally performed historically on poverty reduction, absolutely and relatively to other regions of the world?
- What is the distribution of African countries on poverty-reduction performance, especially since the early-mid-1990s when Africa has generally experienced growth resurgence?
- How has poverty responded to African economic growth generally and how does this responsiveness differ across countries?
- Specifically, what role has inequality played, relative to income growth, in the poverty-reduction process, generally and by country?
- For each country, how might the results provide a compass for crafting appropriate policies to most effectively reduce poverty?

To effectively address the above research questions, this paper proceeds as follows. First, a brief review of the literature is presented. Second, poverty trends for Africa, comparatively with other global regions, are provided. Third, the study sheds light on the progress on poverty for African countries, depending on data availability, separately and comparatively among them, since about the mid-1990s when Africa has experienced growth resurgence generally.

Fourth, the paper presents qualitative evidence on the growth-poverty-inequality nexus in African countries, using the 'poverty transformation efficiency vector' first developed in Fosu (2017a) and applied to a global sample. This presumably innovative approach should help us discern qualitatively the cross-country relationships between growth and changes in poverty, with inequality serving as an intermediating factor. Specifically, the methodology is expected to provide a better understanding of countries' performance in transforming per capita GDP growth into income growth at the household level, and then from income growth into poverty reduction, conditional on changes in income distribution. Also reflected, therefore, is the importance of the relationship between per capita GDP growth and income growth, in order to elicit the extent to which the former may be translated into poverty reduction, for a given income distribution.

Fifth, the poverty-growth-inequality 'identity' model is presented and estimated, in order to provide a quantitative relationship between the progress on poverty, on the one hand, and income growth and the changes in inequality, on the other. Based on the estimates, income and inequality elasticities are generated for each country, and are then employed to decompose changes in poverty into the respective contributions by income growth and changes in inequality. The quantitative results should complement the qualitative ones in providing guidance for country-specific policy with respect to the relevant levers for efficient poverty reduction: income growth versus income distribution.

2. Brief literature review and theoretical considerations

Traditionally, neoclassical economics has considered Income growth as the primary route for poverty reduction (Deininger and Squire, 1998; Dollar and Kraay, 2002; Dollar et al., 2016). The importance of income distribution for poverty reduction has also received increasing attention, that is, in addition to such factors as the level of development and other initial characteristics (see Ravallion, 2012; Dabla-Norris et al., 2015). In this vein, there has been

a special focus on African countries more recently (Fosu, 2008, 2009, 2010a, 2010b, 2010c, 2015, 2018; Thorbecke, 2013).

Income inequality may influence poverty reduction via two main channels: the 'growth channel' (Alesina and Rodrik, 1994; Ravallion, 1997) and the 'growth elasticity' channel (Ravallion, 1997; Easterly, 2000; Adams, 2004). The 'growth channel' is rather controversial. On the one hand, a school of thought, consistent with the Kuznets' hypothesis, is that high levels of inequality would be associated with greater economic growth, at least at the early stages of development (Kuznets, 1955). On the other hand, others stipulate that income inequality hinders economic growth by fuelling social discontent or weakening existing institutions (see, Thorbecke and Charumilind, 2002).

I focus here on the 'growth elasticity channel', that is, given its level, how is economic growth translated into poverty reduction? Many studies, both cross-country and country-specific, find that a high level of inequality tends to result in low growth elasticity of poverty, thus limiting the extent to which income growth is transformed into poverty reduction (Bourguignon, 2003; Kalwij and Verschoor, 2007). Similarly, for African countries, the translation of income into poverty reduction tends to be hampered by higher levels of inequality (Fosu, 2008, 2010a, 2010b, 2010c). Furthermore, based on the 'identity' model of Bourguignon (2003) and Epaulard (2003), Fosu (2015, 2017a, 2017b, 2018) find that both income and inequality elasticities of poverty decline with initial inequality. Hence, for purposes of poverty reduction, not only might higher levels of inequality hamper the effectiveness of income growth, but they could also attenuate the ability of improvements in income distribution to reduce poverty.

The direct effect of a redistribution of resources from the rich to the poor segment of society should, therefore, reduce poverty, even with negligible income growth (Bourguignon, 2003). In very poor countries, however, a reduction in inequality could actually perversely lead to a rise in poverty (Fosu, 2008, 2010a, 2010b, 2010c, 2009, 2015, 2017a, 2017b). Nonetheless, these and other studies find that *on average*, attenuating inequality would help to lower poverty directly, or indirectly via increasing the poverty elasticity with respect to growth.

In sum, Fosu (2015, p. 56) writes: 'On average, income growth has constituted the main engine for poverty reduction in SSA. In several African countries, however, inequality has been crucial. This role has had two parts: (1) declining inequality tended to decrease poverty (though not necessarily in very low-income countries), and (2) lower initial inequality raised the rate at which growth was transformed into poverty reduction. The former role may be impeded, however, by low incomes as well as by high levels of initial inequality. High levels of inequality have indeed constrained poverty reduction in many African countries. Thus, it appears that according greater attention to reducing inequality constitutes a desirable objective, especially in certain African countries.'

Nor is inequality the only variable that intermediates the relationships between income growth and changes in income, on the one hand, and poverty reduction, on the other. Indeed, based on analysis-of-covariance models (Fosu, 2010a, 2010b, 2010c), a lower level of income is found to decrease the rate at which greater income distribution reduces poverty, while a higher level of inequality tends to attenuate the ability of income increases to reduce poverty. Similarly, on the basis of the 'identity' poverty equation (Fosu, 2009, 2015, 2017a, 2017b, 2018), it is observed, similarly to high initial inequality, that a low-income level, as apparent in many African countries, would likely decrease the poverty-reduction potency of both growth and improvements in income distribution.

Yet, growth itself may raise the level of income and, hence, the respective abilities of income increases and/or decreases in inequality to further reduce poverty. In effect, countries that succeed in initially improving both income and income distribution should have an easier time reducing poverty even further.

3. Progress on poverty

3.1. Progress on poverty: regional trends

Using poverty data from the World Bank PovcalNet, Appendix Figures A1-A6 present the 1981–2018 trends in the progress on poverty across the developing world generally and for the sub-regions: East Asia and Pacific (EAP), Middle East and North Africa (MENA), Latin America and Caribbean (LAC), South Asia (SA) and sub-Saharan Africa (SSA). Employed are the three Foster-Green-Thorbecke (FGT) measures: the headcount ratio, poverty gap (spread) and squared poverty gap (severity) at the US$1.90 per-day and US$3.20 per-day poverty standards.[2]

These appendix graphs show considerable declines in poverty for the developing world as a whole. The progress is observed for all the three FGT measures. Furthermore, the regional disaggregation reveals, among the initially high poverty regions, that while EAP and SA have enjoyed substantial and consistent declines in all the FGT measures since 1981, poverty increased in SSA during the 1980s and until the mid-1990s, corresponding to the period of dismal economic growth performance for the region. However, SSA's growth resurgence since then has been accompanied by appreciable poverty reduction.

Nonetheless, despite the apparent decline in poverty in SSA during the latter period, the pace has been slow compared to other regions, leading to a widening gap between the region and the rest of the developing world (DW). Indeed, for the $1.90 standard, the SSA/DW poverty incidence ratio increased from 1.47 in 1993 to 3.63 in 2015. Similar observations are made for the $3.20 standard, and for the poverty gap and squared poverty gap as well.

3.2. Progress on poverty and inequality: trends among African countries

Beyond the average global and regional pictures, poverty progress across African countries is quite heterogeneous. Tables 1A and B provide evidence for a sample of African countries with the available data. Presented are (logarithmic) changes in per capita GDP, inequality and the three FGT poverty measures—poverty incidence or headcount (P_0), poverty gap (P_1) and squared poverty gap (P_2)—from the early-mid-1990s to the latest year for which data were available (2000s). The GDP data come from the World Bank's online World Development Indicators (WDI), while the rest are derived from the World Bank PovcalNet. Because the poverty and related data are based on household surveys that are generally conducted at different country years, the statistics in the tables are annualised for comparability across countries.

3.3. The poverty transformation efficiency vector

For better comparability, and following Fosu (2017a), Tables 1A and B are translated into quintile ranks in order to provide a more compact qualitative representation of the growth-inequality-poverty relationship. The resulting vector, the poverty transformation efficiency vector (PTEV), is presented in Tables 2A and B for the US$1.90 and US$3.20, respectively, for each country: with the first five coordinates representing the quintile ranks for per capita GDP growth, income growth, as well as changes in poverty incidence, poverty gap, and squared poverty gap, respectively, where the highest rank 5 represents the worst performance while rank 1 is assigned to the best performers. The sixth coordinate following the semi-colon is the quintile rank for inequality.

With a vector of (3, 5, 5, 5, 4; 4) from Table 2A, Zambia for instance is among the worst performers on nearly all the variables, except on per capita GDP growth, on which it performed moderately well. Hence, Zambia's outturn on per capita GDP growth was not transformed into progress on poverty, regardless of the FGT measure used, mainly because it considerably overstated the country's actual income growth at the household level. A

[2] These standards are based on 2011 PPP international dollars.

Table 1A. Annualised Growths (%) of Poverty Measures (*Poverty line: US$1.90 a day in 2011 PPP)*, Per Capita GDP, Income and Inequality (Gini index), Early-mid-1990s—'present'*

Country	Period	Sub-region	Per capita GDP growth	Income growth	Head-count poverty (P_0) growth	Poverty gap (P_1) growth	Squared Pov. gap (P_2) growth	Inequality (Gini) growth
Algeria	1995–2011	NA	2.10	1.61	−15.63	−12.32	−7.50	−1.52
Botswana	1993–2016	SA	2.58	1.28	−3.69	−5.23	−6.18	−0.58
Burkina Faso	1994–2014	WA	2.85	3.65	−3.25	−7.43	−10.59	−1.56
Burundi	1992–2014	EA	−1.30	1.11	−0.55	−0.88	−1.07	0.69
Cameroon	1996–2014	CA	1.51	3.08	−3.77	−3.89	−3.81	0.27
CAR	1992–2008	CA	−0.33	4.68	−1.57	−3.73	−5.20	−0.56
Cote d'Ivoire	1993–2015	WA	0.31	−0.44	1.02	1.33	1.62	0.23
Egypt	1991–2018	NA	2.27	0.47	−3.01	−2.57	−2.32	−0.05
Eswatini	1995–2016	SA	2.26	6.26	−4.85	−7.80	−9.89	−0.48
Ethiopia	1995–2016	EA	5.02	2.12	−3.93	−5.80	−6.83	−1.19
Gambia	1998–2015	WA	−0.14	5.61	−11.14	−16.03	−19.51	−1.74
Ghana	1992–2017	WA	2.89	3.86	−5.33	−5.30	−4.99	0.50
Guinea	1991–2012	WA	1.31	6.18	−4.45	−8.42	−11.23	−1.56
Guinea-Bissau	1993–2010	WA	−0.48	0.59	0.16	0.41	0.60	0.88
Kenya	1992–2016	EA	0.94	−2.14	0.67	−0.06	−0.64	−1.45
Lesotho	1994–2017	SA	2.86	0.29	−2.64	−4.83	−6.44	−1.51
Madagascar	1993–2012	EA	−0.27	−1.27	0.54	1.23	1.59	−0.32
Malawi	1998–2016	EA	1.40	−3.32	0.56	0.95	1.20	−2.09
Mali	1994–2010	WA	2.13	4.17	−3.32	−7.55	−10.66	−2.66
Mauritania	1993–2014	WA	0.52	2.16	−9.19	−10.78	−11.92	−2.04
Morocco	1991–2014	NA	2.58	1.23	−4.55	−3.64	−2.56	0.04
Mozambique	1996–2014	SA	5.17	3.28	−1.40	−3.00	−4.06	0.05
Niger	1993–2014	WA	0.29	2.41	−2.59	−4.36	−5.61	−0.24
Nigeria	1992–2019	WA	1.78	0.95	−1.53	−3.14	−4.47	−0.92
Senegal	1991–2011	WA	0.81	1.97	−2.86	−5.10	−6.70	−1.47
South Africa	1993–2015	SA	1.34	2.12	−2.39	−2.59	−2.21	0.28
Tanzania	1992–2018	EA	2.39	1.89	−1.47	−2.55	−3.40	0.53
Tunisia	1990–2015	NA	2.81	2.38	−14.79	−17.70	−18.35	−0.80
Uganda	1992–2017	EA	3.18	1.75	−1.77	−2.78	−3.58	0.13
Zambia	1991–2015	SA	1.90	−0.12	0.26	−0.61	−1.41	−0.24
Mean			1.69	1.93	−3.55	−4.81	−5.54	−0.65
Median			1.84	1.93	−2.75	−3.81	−4.73	−0.52
Max			5.17 (Mozam-bique)	6.26 (Eswa-tini)	1.02 (Cote d'Ivoire)	1.33 (Cote d'Ivoire)	1.62 (Cote d'Ivoire)	0.88 (Guinea-Bissau)
Min			−1.30 (Burundi)	−3.32 (Malawi)	−15.63 (Alge-ria)	−17.70 (Tunisia)	−19.51 (Gam-bia)	−2.66 (Mali)

Notes: The annualised growth rates are obtained by taking the (logarithmic) difference in the latest-year and the beginning-year values, dividing by the number of years between the periods, and multiplying by 100. The data on per capita GDP are obtained from the World Bank Development Indicators (WDI), World Bank (2020a). The data on income, headcount ratio, poverty gap, squared poverty gap and Gini index are obtained from PovcalNet, World Bank (2020b). For all the poverty measures, the poverty line is US$1.90 per day in 2011 PPP. *The latest year for which data were available at the time of the study.

similar observation is made of Lesotho's (1,5,3,3,2;2) PTEV, which shows that per capita GDP growth grossly overstated income growth, thus leading generally to moderate progress on poverty, despite the relatively stellar performance on inequality.

Table 1B. Annualised Growths (%) of Poverty Measures (*Poverty line: US$3.20 a day in 2011 PPP)*, Per Capita GDP, Income and Inequality (Gini index), Early-mid-1990s—'present'

Country	Period	Sub-region	Per capita GDP growth	Income growth	Head-count poverty (P_0) growth	Poverty gap (P_1) growth	Squared Pov. gap (P_2) growth	Inequal-ity (Gini) growth
Algeria	1995–2011	NA	2.10	1.61	−11.36	−13.37	−13.35	−1.52
Botswana	1993–2016	SA	2.58	1.28	−1.77	−3.06	−4.01	−0.58
Burkina Faso	1994–2014	WA	2.85	3.65	−0.97	−3.54	−5.57	−1.56
Burundi	1992–2014	EA	−1.30	1.11	−0.27	−0.57	−0.75	0.69
Cameroon	1996–2014	CA	1.51	3.08	−2.63	−3.36	−3.63	0.27
CAR	1992–2008	CA	−0.33	4.68	−0.68	−2.21	−3.33	−0.56
Cote d'Ivoire	1993–2015	WA	0.31	−0.44	0.63	0.92	1.12	0.23
Egypt	1991–2018	NA	2.27	0.47	−1.24	−1.90	−2.13	−0.05
Eswatini	1995–2016	SA	2.26	6.26	−2.67	−5.00	−6.68	−0.48
Ethiopia	1995–2016	EA	5.02	2.12	−1.21	−3.26	−4.49	−1.19
Gambia	1998–2015	WA	−0.14	5.61	−4.72	−9.20	−12.35	−1.74
Ghana	1992–2017	WA	2.89	3.86	−3.82	−4.64	−4.95	0.50
Guinea	1991–2012	WA	1.31	6.18	−1.56	−4.60	−6.81	−1.56
Guinea-Bissau	1993–2010	WA	−0.48	0.59	−0.12	0.15	0.32	0.88
Kenya	1992–2016	EA	0.94	−2.14	0.85	0.59	0.28	−1.45
Lesotho	1994–2017	SA	2.86	0.29	−1.10	−2.73	−3.97	−1.51
Madagascar	1993–2012	EA	−0.27	−1.27	0.13	0.63	0.98	−0.32
Malawi	1998–2016	EA	1.40	−3.32	0.28	0.58	0.78	−2.09
Mali	1994–2010	WA	2.13	4.17	−1.00	−3.87	−6.03	−2.66
Mauritania	1993–2014	WA	0.52	2.16	−5.06	−7.38	−8.87	−2.04
Morocco	1991–2014	NA	2.58	1.23	−4.04	−4.43	−4.42	0.04
Mozambique	1996–2014	SA	5.17	3.28	−0.57	−1.75	−2.57	0.05
Niger	1993–2014	WA	0.29	2.41	−0.93	−2.41	−3.40	−0.24
Nigeria	1992–2019	WA	1.78	0.95	−0.40	−1.51	−2.41	−0.92
Senegal	1991–2011	WA	0.81	1.97	−1.06	−2.85	−4.13	−1.47
South Africa	1993–2015	SA	1.34	2.12	−1.33	−1.98	−2.22	0.28
Tanzania	1992–2018	EA	2.39	1.89	−0.67	−1.42	−2.01	0.53
Tunisia	1990–2015	NA	2.81	2.38	−9.09	−11.26	−13.14	−0.80
Uganda	1992–2017	EA	3.18	1.75	−0.90	−1.67	−2.24	0.13
Zambia	1991–2015	SA	1.90	−0.12	0.30	−0.10	−0.53	−0.24
Mean			1.69	1.93	−1.90	−3.17	−4.02	−0.65
Median			1.84	1.93	−1.03	−2.57	−3.52	−0.52
Max			5.17 (Mozam-bique)	6.26 (Eswa-tini)	0.85 (Kenya)	0.92 (Cote d'Ivoire)	1.12 (Cote d'Ivoire)	0.88 (Guinea-Bissau)
Min			−1.30 (Burundi)	−3.32 (Malawi)	−11.36 (Alge-ria)	−13.37 (Alge-ria)	−13.35 (Alge-ria)	−2.66 (Mali)

Notes: See Table 1A.

With respect to the role of inequality, many of the countries experienced limited progress on poverty, thanks to the relatively poor performance on income distribution during the periods of observation. For example, with a PTEV of (2,3,4,4,4;5), the relatively good performance on per capita GDP and income growth in Tanzania was only transformed into at most average progress on poverty, due to the dismal performance on income distribution. Similarly, exhibiting a PTEV of (3,2,2,3,3;5), Cameroon performed well on income growth, which was then translated into strong progress on poverty incidence; however, the country's poor performance on inequality has led to relatively weak progress on the poverty gap and

Table 2A. Poverty Transformation Efficiency Vector (*Poverty line: US$1.90 a day in 2011 PPP)*

Country	Efficiency vector	Country	Efficiency vector
Algeria	(3,3,1,1,2;2)	Lesotho	(1,5,3,3,2;2)
Botswana	(2,4,2,2,2;3)	Madagascar	(5,5,5,5,5;3)
Burkina Faso	(1,2,3,2,1;1)	Malawi	(3,5,5,5,5;1)
Burundi	(5,4,4,4,5;5)	Mali	(3,1,2,2,1;1)
Cameroon	(3,2,2,3,3;5)	Mauritania	(4,2,1,1,1;1)
CAR	(5,1,4,3,3;3)	Morocco	(2,4,2,3,4;4)
Cote d'Ivoire	(4,5,5,5,5;4)	Mozambique	(1,2,4,4,3;4)
Egypt	(2,4,3,4,4;4)	Niger	(5,2,3,3,3;3)
Eswatini	(2,1,1,1,2;3)	Nigeria	(3,4,4,3,3;2)
Ethiopia	(1,3,2,2,2;2)	Senegal	(4,3,3,2,2;2)
Gambia	(5,1,1,1,1;1)	South Africa	(4,3,3,4,4;5)
Ghana	(1,1,1,2,3;5)	Tanzania	(2,3,4,4,4;5)
Guinea	(4,1,2,1,1;1)	Tunisia	(2,2,1,1,1;3)
Guinea-Bissau	(5,4,5,5,5;5)	Uganda	(1,3,4,4,4;4)
Kenya	(4,5,5,5,5;2)	Zambia	(3,5,5,5,4;4)

Notes: Each vector has as coordinates the quintile ranks using data from Table 1A: per capita GDP growth, income growth, P_0 growth, P_1 growth, P_2 growth, and inequality (Gini) growth, respectively. Note that a lower rank indicates a more favourable outcome.

Table 2B. Poverty Transformation Efficiency Vector (*Poverty line: US$3.20 a day in 2011 PPP)*

Country	Efficiency vector	Country	Efficiency vector
Algeria	(3,3,1,1,1;2)	Lesotho	(1,5,3,3,3;2)
Botswana	(2,4,2,3,3;3)	Madagascar	(5,5,5,5,5;3)
Burkina Faso	(1,2,3,2,2;1)	Malawi	(3,5,5,5,5;1)
Burundi	(5,4,4,4,4;5)	Mali	(3,1,3,2,2;1)
Cameroon	(3,2,2,2,3;5)	Mauritania	(4,2,1,1,1;1)
CAR	(5,1,4,3,3;3)	Morocco	(2,4,1,2,2;4)
Cote d'Ivoire	(4,5,5,5,5;4)	Mozambique	(1,2,4,4,3;4)
Egypt	(2,4,2,4,4;4)	Niger	(5,2,3,3,3;3)
Eswatini	(2,1,2,1,1;3)	Nigeria	(3,4,4,4,4;2)
Ethiopia	(1,3,3,2,2;2)	Senegal	(4,3,3,3,2;2)
Gambia	(5,1,1,1,1;1)	South Africa	(4,3,2,3,4;5)
Ghana	(1,1,1,1,2;5)	Tanzania	(2,3,4,4,4;5)
Guinea	(4,1,2,2,1;1)	Tunisia	(2,2,1,1,1;3)
Guinea-Bissau	(5,4,5,5,5;5)	Uganda	(1,3,4,4,4;4)
Kenya	(4,5,5,5,5;2)	Zambia	(3,5,5,5,5;4)

Notes: See Table 2A.

squared poverty gap. A similar observation is made of Ghana, which displays a PTEV of (1,1,1,2,3;5).

In contrast, strong records on income distribution actually supported progress on poverty in several countries, including Burkina Faso, Gambia, Guinea, Malawi, Mali and Mauritania. For example, with respective PTEVs of (5,1,1,1,1;1) and (4,1,2,1,1;1), even though Gambia and Guinea performed poorly on per capita GDP growth, their income growth was stellar and was indeed transformed into strong poverty reduction, thanks to the high complementarity from improvements in income distribution.

With respect to the bottom performers on poverty reduction, the transformation vectors presented in Tables 2A and B show that the weak progress of Burundi, Cote d'Ivoire and Guinea-Bissau on poverty alleviation is a combination of the lack of income growth, mainly reflecting the countries' poor performance on per capita GDP, as well as the

worsening income distribution. In this regard, Cote d'Ivoire, for example, exhibits a vector of (4,5,5,5,5;4) at both US$1.90 and US$3.20 poverty standards. Indeed, based on PTEV, one could judge for each country, the 'pro-poor' nature of economic growth, as well as the implications of growth for the progress on poverty, as mediated by changes in inequality.

4. Estimating model

This section provides a quantitative analysis of the importance of growth and inequality for poverty reduction in Africa, based on the decomposition of poverty changes into the contributions by income growth and by changes in income distribution (see Fosu, 2015, 2017b, 2018). First, the following 'identity' model is estimated:[3]

$$p = b_1 + b_2 y + b_3 y G^I + b_4 y\,(Z/Y) + b_5 g + b_6 g G^I + b_7 g\,(Z/Y) + b_8 G^I + b_9 Z/Y \quad (1)$$

where p is the growth of the poverty rate, y is income growth, g is growth in the Gini coefficient as a measure of the level of inequality, G^I is the initial Gini coefficient (expressed in natural logarithm), Z/Y is the ratio of the poverty line Z to income Y (expressed in natural logarithm), and b_j ($j = 1, 2, \ldots, 9$) are the respective coefficients to be estimated.

The sign of b_2 is anticipated to be negative, since an increase in income growth would decrease poverty growth, ceteris paribus.[4] In contrast, b_3 is expected to be positive; a higher level of initial inequality would reduce the rate at which growth acceleration is translated into poverty reduction. The sign of b_4 should also be positive, consistent with the notion, based on the lognormal income distribution, that a larger income (relative to the poverty line) would have associated with it a higher income elasticity.[5]

The sign of b_5 is expected to be positive, as a worsening income distribution should increase poverty, ceteris paribus. In contrast, the sign of b_6 is likely to be negative for a diminishing poverty-increasing effect of rising inequality. The sign of b_7 would be negative as well, for in a relatively low-income economy (high Z/Y) improving income distribution (lowering g) might worsen poverty by raising the likelihood that more people would fall into poverty. Finally, b_8 and b_9 are likely to be positive: rising initial inequality or increasing poverty line relative to income should, ceteris paribus, exacerbate poverty, respectively; however, these coefficients do not affect the income or inequality elasticity of poverty.

From Equation (1), the respective income and inequality elasticities are obtainable as:

$$E_y = b_2 + b_3 G^I + b_4 Z/Y \quad (2)$$

$$E_g = b_5 + b_6 G^I + b_7 Z/Y \quad (3)$$

Therefore, given the above expected signs of the regression coefficients, E_y and E_g are generally anticipated to be negative and positive, respectively, so that raising income growth should reduce the growth of poverty, while worsening inequality changes would exacerbate poverty increases. It is conceivable, though, that perverse signs of the elasticities could occur. For example, in a highly unequal (high G^I) and low-income (high Z/Y) economy, the magnitude of the combined positive-signed b_3 and b_4 could actually overwhelm the magnitude of the negative-signed b_2, thus rendering E_y positive. Similarly, in such an

[3] This 'identity' model, first derived by Bourguignon (2003), is based on an approximation to an assumed lognormal income distribution, and allows one to explain the heterogeneity of the nexus across countries and time periods. For details of the application of the Bourguignon model see, for example, Fosu (2009, 2011) and Kalwij and Verschoor (2007); see also Epaulard (2003) for a version of this model.

[4] For details on the expected signs of the coefficients see, for instance, Bourguignon (2003) and Epaulard (2003).

[5] I ignore the sign and adopt the convention of referring to the income elasticity by its magnitude.

economy, E_g could be negative. These two elasticities are critical for determining what happens to poverty reduction over time in a given economy.

Thus, poverty would decline faster as: (1) income growth is higher, (2) the decline in inequality is larger, (3) initial inequality is smaller or (4) as income relative to the poverty line is higher. Furthermore, the income growth and inequality-lowering effects on poverty would be, respectively, larger as: (a) initial inequality is lower and (b) income relative to the poverty line is higher. These last two effects, therefore, work via the income and inequality elasticities of poverty. That is, both elasticities would decrease with initial inequality but increase with income relative to the poverty line. Hence, initial inequality plays only a part of this growth-to-poverty transformation process; the level of income also matters.

5. Data and estimation

The above model is estimated using a panel of at least 49 African countries over the period 1985-present, conditional on data availability at the time of the analysis. The World Bank (2020a) PovcalNet database provides the main data source for the present analysis. The panel derived from this database is extremely unbalanced, as it is based on available country surveys, which may be conducted in different years across countries. Thus, considerable adjustments are required in order to obtain reasonably reliable regional estimates for the time series (Chen and Ravallion, 2008). The data are therefore revised by the World Bank as necessary, with implications for regional comparability over time. For example, Fosu (2015) finds less-than-stellar performance for SSA compared with South Asia since the mid-1990s, when 2014 rather than 2009 PovcalNet data are used. This revelation suggests that as the data are revised and improved, updated studies are called for.

The estimation is conducted with the fixed effects (FE), random effects (RE) and two-step system GMM (SGMM) techniques. Estimates of E_y and E_g are then obtained using Equations (2) and (3), respectively. Following Fosu (2018), the 'optimal' elasticity estimates selected for the final poverty decomposition are those that minimise the prediction error, r, in the decomposition formula:

$$p = yE_y + gE_g + r; \tag{4}$$

where, as already defined, p, y, and g are growth rates of poverty, income and inequality (the Gini coefficient), respectively, and E_y and E_g are the respective income and inequality elasticities; r is the residual term.

Using the two selection criteria proposed by Fosu (2018), namely, the root mean squared (RMSE) and mean absolute error (MAE), the estimation procedure with the best predictive power is identified as that with the minimum RMSE and MAE. Ideally, there would be no conflict between these two criteria, but where there is, a judgment call must be made. The results for both criteria are provided in Tables 3A and B for the US$1.90 and US$3.20 poverty lines, respectively.

Focusing, first, on the US$1.90 poverty levels, RE clearly dominates; it is 'optimal' for P_0, P_1, and P_2 as it minimises both RMSE and MAE. Incidentally, SGMM predicts quite poorly in each case, consistent with the observation in Fosu (2018), except for the squared poverty gap where the results are mixed. In the case of the US$3.20 standard, RE is 'optimal' for P_1 and P_2, but FE dominates in P_0. The values of both RMSE and MAE, however, differ quite marginally between FE and RE for P_0 and P_1. Thus, both techniques are equally reliable in predicting the headcount ratio and the poverty gap. And, once again, SGMM predicts quite poorly, despite its ability to account for potential endogeneity (Fosu, 2018).[6]

[6] Note that the SGMM results suggest that the usual condition of the appropriateness of instruments is satisfied (see Fosu, 2018).

Table 3A. Root RMSE and MAE, *Poverty line: US$1.90 a day in 2011 PPP*

	Headcount ratio (P_0)		Poverty gap (P_1)		Squared poverty gap (P_2)	
	RMSE	MAE	RMSE	MAE	RMSE	MAE
Fixed effects	4.04	2.87	4.77	3.27	6.54	4.09
Random effects	3.82	2.74	4.43	3.05	5.95	3.61
Two-step system GMM	5.29	3.84	6.33	4.74	6.33	6.79

Notes: RMSE and MAE are computed based on Equation (4) of the text, using the observed and predicted values of the poverty growth rate for all sample countries.

Table 3B. RMSE and MAE, *Poverty line: US$3.20 a day in 2011 PPP*

	Headcount ratio (P_0)		Poverty gap (P_1)		Squared poverty gap (P_2)	
	RMSE	MAE	RMSE	MAE	RMSE	MAE
Fixed effects	2.13	1.44	2.99	1.86	3.55	2.22
Random effects	2.14	1.45	2.95	1.83	3.38	2.10
Two-step system GMM	2.33	1.61	3.57	2.28	4.72	3.29

Notes: See Table 3A.

5.1. Income and inequality elasticities

Figure 1, based on estimates from the 'optimal' RE model, illustrates for P_0 at the US$1.90 standard a negative relationship between the income elasticity E_y (in absolute value) and initial inequality. It shows a distribution about 'Africa', which is based on Equation (2), with the (Africa) sample mean income relative to the poverty line employed, while the country estimates are derived using the country values. Note that the Central African Republic (CAR), for instance, has the lowest E_y estimate, while Algeria (ALG) enjoys the highest. CAR's lowest elasticity status derives from having the highest initial inequality combined with the lowest income; Algeria (ALG) enjoys the highest income with relatively low initial inequality, however. Meanwhile, South Africa's E_y estimate is large despite its high initial inequality, thanks to its large income.

Figure 2 similarly depicts a negative relationship between the inequality elasticity E_g, and initial inequality for the US$1.90 standard, also based on Equation (3), using the RE 'optimal' estimates. It is noteworthy that E_g appears to be less sensitive to initial inequality than E_y was, suggesting that disparities of inequality across African countries matter less for the effect of income distribution to influence the pattern of poverty progress, than for the impact of income growth.

With respect to differences across countries, Tunisia (TUN) enjoys the highest E_g value, thanks mainly to the country's very high income and moderate initial inequality. South Africa also enjoys a very large E_g estimate due entirely to the country's very high income, even though its initial inequality is quite large. Again, CAR exhibits the lowest E_g estimate due to the country's extremely low income and very high initial inequality levels. Interestingly, note that several countries register negative E_g values; these are countries with very low incomes. As argued in Fosu (2010c, 2015, 2017a, 2017b), for instance, such negative values are indeed permissible, thanks to the likelihood that in such low countries, reducing inequality that might likely entail transferring income from the near-poor to the poor might actually render greater poverty prevalence overall.

5.2. Contributions of growth and inequality changes to poverty reduction

Assessed next are the relative roles of income and inequality in the performance of African countries on poverty since the early-mid-1990s to the present when the continent has

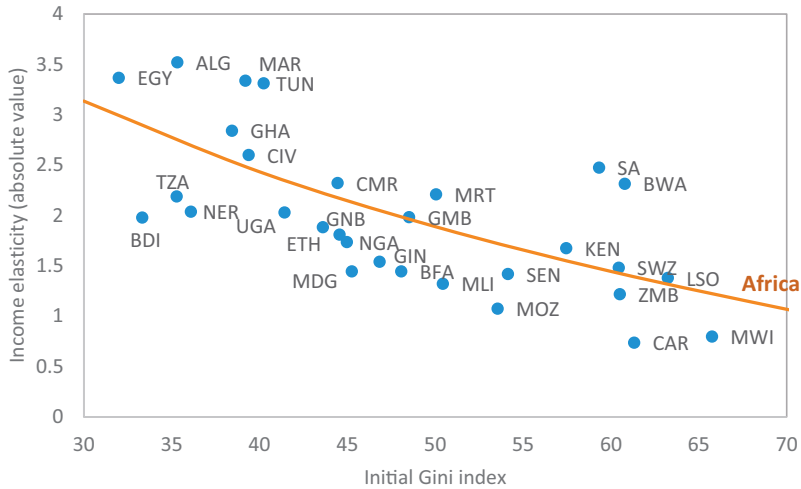

Figure 1. Income Elasticity (absolute valued) versus Initial Inequality—Based on the Optimally Selected RE Results [*US$1.90 a day in 2011 PPP*, Headcount Ratio]. Notes: The income elasticities are obtained based on Equation (2). The straight line is the Africa line. The countries above the line have higher levels of income relative to the average, while those below the line have relatively low incomes.

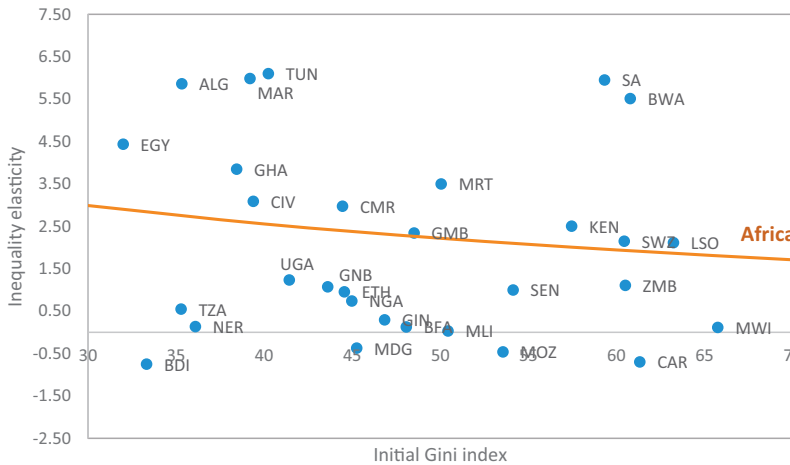

Figure 2. Inequality Elasticity versus Initial Inequality—Based on the Optimally Selected RE Results [*US$1.90 a day in 2011 PPP*, Headcount Ratio]. Notes: The inequality elasticities are obtained based on Equation (3). See Figure 1 for further details.

generally experienced growth resurgence. Based on Equation (4), changes in poverty during the period are decomposed into the relative contribution of income growth and changes in inequality. The results are reported in Tables 4A-C for the three measures of poverty at the US$1.90 poverty standard, and in Tables 5A-C for the US$3.20 poverty standard.

On average, growth has been critical for poverty reduction in Africa, according to Tables 4A-C and Tables 5A-C. The decomposition results show greater relative contributions by income growth to poverty changes compared to inequality. For instance, the decomposition of the headcount ratio at the US$1.90 poverty line (see Table 4A) shows that although the contributions of growth and inequality have been largely complementary, of

Table 4A. Decomposition of Poverty Growth into the Contributions of Inequality and Income Growth—Based on the Optimally Selected RE Results [*US$1.90 a day in 2011 PPP*, **Headcount Ratio**], Early-mid-1990s—'present'

Countries experiencing poverty reduction

Country	Period	Sub-region	Headcount poverty (P_0) growth	A Ey∗dlnY	B Eg∗dlnG	A + B Predicted headcount poverty (P_0) growth
Algeria	1995–2011	NA	−15.63	−5.66	−8.92	−14.58
Botswana	1993–2016	SA	−3.69	−2.97	−3.20	−6.17
Burkina Faso	1994–2014	WA	−3.25	−5.26	−0.19	−5.46
Burundi	1992–2014	EA	−0.55	−2.2	−0.52	−2.71
Cameroon	1996–2014	CA	−3.77	−7.14	0.79	−6.35
CAR	1992–2008	CA	−1.57	−3.44	0.39	−3.05
Egypt	1991–2018	NA	−3.01	−1.59	−0.24	−1.83
Eswatini	1995–2016	SA	−4.85	−9.26	−1.03	−10.28
Ethiopia	1995–2016	EA	−3.93	−3.84	−1.14	−4.98
Gambia	1998–2015	WA	−11.14	−11.12	−4.06	−15.19
Ghana	1992–2017	WA	−5.33	−10.95	1.91	−9.04
Guinea	1991–2012	WA	−4.45	−9.51	−0.46	−9.97
Lesotho	1994–2017	SA	−2.64	−0.4	−3.19	−3.59
Mali	1994–2010	WA	−3.32	−5.51	−0.07	−5.58
Mauritania	1993–2014	WA	−9.19	−4.77	−7.13	−11.9
Morocco	1991–2014	NA	−4.55	−4.11	0.23	−3.88
Mozambique	1996–2014	SA	−1.40	−3.52	−0.02	−3.54
Niger	1993–2014	WA	−2.59	−4.90	−0.03	−4.94
Nigeria	1992–2019	WA	−1.53	−1.65	−0.68	−2.33
Senegal	1991–2011	WA	−2.86	−2.79	−1.47	−4.26
South Africa	1993–2015	SA	−2.39	−5.26	1.65	−3.61
Tanzania	1992–2018	EA	−1.47	−4.14	0.29	−3.85
Tunisia	1990–2015	NA	−14.79	−7.89	−4.89	−12.78
Uganda	1992–2017	EA	−1.77	−3.56	0.16	−3.40
Mean			−4.57	−5.06	−1.33	−6.39

Countries experiencing poverty increases

Country	Period	Sub-region	Headcount poverty (P_0) growth	A Ey∗dlnY	B Eg∗dlnG	A + B Predicted headcount poverty (P_0) growth
Cote d'Ivoire	1993–2015	WA	1.02	1.13	0.71	1.84
Guinea-Bissau	1993–2010	WA	0.16	−1.11	0.94	−0.17
Kenya	1992–2016	EA	0.67	3.59	−3.62	−0.03
Madagascar	1993–2012	EA	0.54	1.83	0.12	1.95
Malawi	1998–2016	EA	0.56	2.64	−0.24	2.4
Zambia	1991–2015	SA	0.26	0.14	−0.26	−0.12
Mean			0.54	1.37	−0.39	0.98

Notes: A: Predicted poverty growth due to income growth, B: predicted poverty growth due to changes in inequality; A + B: total predicted poverty growth due to A and B. *Most recent year for which data are available.

the twenty-four African countries that experienced poverty reduction, twenty have reduced poverty owing primarily to their positive performance on income growth. In the four remaining countries, namely, Algeria, Botswana, Lesotho and Mauritania, however, the fall in poverty was driven mainly by the reduction in inequality. Overall, these results are consistent across the FGT poverty measures.

Table 4B. Decomposition of Poverty Growth into the Contributions of Inequality and Income Growth—Based on the Optimally Selected RE Results [*US$1.90 a day in 2011 PPP*, **Poverty Gap**], Early-mid-1990s—'present'

Countries experiencing poverty reduction

Country	Period	Sub-region	Pov. gap (P_1) growth	A Ey∗dlnY	B Eg∗dlnG	A + B Predicted Pov. gap (P_1) growth
Algeria	1995–2011	NA	−12.32	−6.23	−11.54	−17.78
Botswana	1993–2016	SA	−5.23	−3.31	−4.07	−7.38
Burkina Faso	1994–2014	WA	−7.43	−6.66	−1.41	−8.07
Burundi	1992–2014	EA	−0.88	−2.71	0.01	−2.69
Cameroon	1996–2014	CA	−3.89	−8.24	1.12	−7.12
CAR	1992–2008	CA	−3.73	−5.09	0.07	−5.01
Egypt	1991–2018	NA	−2.57	−1.78	−0.32	−2.10
Eswatini	1995–2016	SA	−7.80	−11.23	−1.50	−12.73
Ethiopia	1995–2016	EA	−5.80	−4.65	−2.24	−6.89
Gambia, The	1998–2015	WA	−16.03	−13.09	−5.97	−19.06
Ghana	1992–2017	WA	−5.30	−12.37	2.60	−9.77
Guinea	1991–2012	WA	−8.42	−11.89	−1.72	−13.61
Kenya	1992–2016	EA	−0.06	4.27	−5.17	−0.90
Lesotho	1994–2017	SA	−4.83	−0.49	−4.67	−5.15
Mali	1994–2010	WA	−7.55	−7.08	−2.06	−9.14
Mauritania	1993–2014	WA	−10.78	−5.48	−9.69	−15.18
Morocco	1991–2014	NA	−3.64	−4.52	0.30	−4.22
Mozambique	1996–2014	SA	−3.00	−4.74	0.01	−4.73
Niger	1993–2014	WA	−4.36	−5.94	−0.25	−6.19
Nigeria	1992–2019	WA	−3.14	−2.01	−1.50	−3.52
Senegal	1991–2011	WA	−5.10	−3.48	−2.74	−6.22
South Africa	1993–2015	SA	−2.59	−5.82	2.08	−3.74
Tanzania	1992–2018	EA	−2.55	−4.95	0.79	−4.16
Tunisia	1990–2015	NA	−17.70	−8.67	−6.27	−14.94
Uganda	1992–2017	EA	−2.78	−4.25	0.29	−3.96
Zambia	1991–2015	SA	−0.61	0.18	−0.47	−0.29
Mean			−5.70	−5.39	−2.09	−7.48

Countries experiencing poverty increases

Country	Period	Sub-region	Pov. Gap (P_1) growth	A Ey∗dlnY	B Eg∗dlnG	A + B Predicted Pov. Gap (P_1) growth
Cote d'Ivoire	1993–2015	WA	1.33	1.30	1.00	2.30
Guinea-Bissau	1993–2010	WA	0.41	−1.34	1.78	0.44
Madagascar	1993–2012	EA	1.23	2.34	−0.11	2.23
Malawi	1998–2016	EA	0.95	3.73	−1.64	2.09
Mean			0.98	1.51	0.26	1.77

Notes: See Table 4A.

As suggested earlier by the qualitative analysis, among the top performers on poverty reduction, Algeria, Botswana, Eswatini, Ethiopia, Gambia, Ghana, Guinea, Mali, Mauritania and Tunisia have achieved considerable progress on all the poverty measures as a result of the joint contributions of growth and inequality reductions. Meanwhile, in countries like Cameroon and Ghana, greater progress might have been achieved if inequality had not increased.

In countries where poverty increased, the findings are quite mixed. In Cote d'Ivoire and Madagascar, for example, the increase in poverty can be attributed to the complementary

Table 4C. Decomposition of Poverty Growth into the Contributions of Inequality and Income Growth — Based on the Optimally Selected RE Results [*US$1.90 a day in 2011 PPP*, **Squared Poverty Gap**], Early-mid-1990s – 'present'

Countries experiencing poverty reduction

Country	Period	Sub-region	Squared Pov. gap (P_2) growth	A Ey∗dlnY	B Eg∗dlnG	A + B Predicted squared Pov. gap (P_2) growth
Algeria	1995–2011	NA	−7.50	−6.25	−14.22	−20.47
Botswana	1993–2016	SA	−6.18	−3.56	−4.94	−8.50
Burkina Faso	1994–2014	WA	−10.59	−7.65	−2.17	−9.81
Burundi	1992–2014	EA	−1.07	−2.91	0.31	−2.60
Cameroon	1996–2014	CA	−3.81	−8.75	1.41	−7.34
CAR	1992–2008	CA	−5.20	−6.83	−0.06	−6.88
Egypt	1991–2018	NA	−2.32	−1.78	−0.41	−2.19
Eswatini	1995–2016	SA	−9.89	−13.02	−1.90	−14.91
Ethiopia	1995–2016	EA	−6.83	−5.13	−3.05	−8.18
Gambia, The	1998–2015	WA	−19.51	−14.27	−7.59	−21.87
Ghana	1992–2017	WA	−4.99	−12.73	3.26	−9.48
Guinea	1991–2012	WA	−11.23	−13.48	−2.55	−16.03
Kenya	1992–2016	EA	−0.64	4.83	−6.48	−1.65
Lesotho	1994–2017	SA	−6.44	−0.57	−5.87	−6.44
Mali	1994–2010	WA	−10.66	−8.28	−3.26	−11.54
Mauritania	1993–2014	WA	−11.92	−5.89	−12.05	−17.94
Morocco	1991–2014	NA	−2.56	−4.57	0.36	−4.20
Mozambique	1996–2014	SA	−4.06	−5.79	0.02	−5.77
Niger	1993–2014	WA	−5.61	−6.38	−0.39	−6.77
Nigeria	1992–2019	WA	−4.47	−2.23	−2.09	−4.32
Senegal	1991–2011	WA	−6.70	−4.04	−3.66	−7.70
South Africa	1993–2015	SA	−2.21	−6.18	2.52	−3.66
Tanzania	1992–2018	EA	−3.40	−5.26	1.15	−4.11
Tunisia	1990–2015	NA	−18.35	−8.78	−7.68	−16.46
Uganda	1992–2017	EA	−3.58	−4.58	0.39	−4.20
Zambia	1991–2015	SA	−1.41	0.22	−0.61	−0.40
Mean			−6.58	−5.92	−2.68	−8.59

Countries experiencing poverty increases

Country	Period	Sub-region	Squared Pov. gap (P_2) growth	A Ey∗dlnY	B Eg∗dlnG	A + B Predicted squared Pov. gap (P_2) growth
Cote d'Ivoire	1993–2015	WA	1.62	1.35	1.27	2.62
Guinea-Bissau	1993–2010	WA	0.60	−1.47	2.41	0.94
Madagascar	1993–2012	EA	1.59	2.68	−0.24	2.44
Malawi	1998–2016	EA	1.20	4.96	−2.42	2.54
Mean			1.25	1.88	0.26	2.14

Notes: See Table 4A.

effect of a fall in household income and an increase in inequality over the period. In Kenya, Malawi and Zambia, the rise in poverty is solely driven by the reduction in income, while in Guinea-Bissau, an increase in inequality has been the primary determinant of worsening poverty.

The dominant role of growth in African countries' progress on poverty from the early-mid-1990s to the 2000s is also confirmed at the US$3.20 poverty standard, and for

Table 5A. Decomposition of Poverty Growth into the Contributions of Inequality and Income Growth — Based on the Optimally Selected FE Results [*US3.20 a day in 2011 PPP*, **Headcount Ratio**], Early-mid-1990s – 'present'

Countries experiencing poverty reduction						
Country	**Sub-region**	**Period**	**Headcount poverty (P_0) growth**	**A Ey∗dlnY**	**B Eg∗dlnG**	**A + B Predicted headcount poverty (P_0) growth**
Algeria	1995–2011	NA	−11.36	−2.97	−2.29	−5.26
Botswana	1993–2016	SA	−1.77	−1.58	−0.95	−2.53
Burkina Faso	1994–2014	WA	−0.97	−2.59	−0.03	−2.62
Burundi	1992–2014	EA	−0.27	−1.07	−0.26	−1.34
Cameroon	1996–2014	CA	−2.63	−3.68	0.21	−3.47
CAR	1992–2008	CA	−0.68	−1.60	0.06	−1.53
Egypt	1991–2018	NA	−1.24	−0.82	−0.06	−0.88
Eswatini	1995–2016	SA	−2.67	−4.76	−0.33	−5.09
Ethiopia	1995–2016	EA	−1.21	−1.92	−0.26	−2.19
Gambia, The	1998–2015	WA	−4.72	−5.70	−1.12	−6.83
Ghana	1992–2017	WA	−3.82	−5.67	0.48	−5.19
Guinea	1991–2012	WA	−1.56	−4.70	−0.08	−4.79
Guinea-Bissau	1993–2010	WA	−0.12	−0.56	0.21	−0.35
Lesotho	1994–2017	SA	−1.10	−0.20	−1.05	−1.25
Mali	1994–2010	WA	−1.00	−2.70	−0.03	−2.73
Mauritania	1993–2014	WA	−5.06	−2.48	−2.01	−4.49
Morocco	1991–2014	NA	−4.04	−2.16	0.06	−2.10
Mozambique	1996–2014	SA	−0.57	−1.69	0.00	−1.69
Niger	1993–2014	WA	−0.93	−2.43	0.02	−2.40
Nigeria	1992–2019	WA	−0.40	−0.82	−0.15	−0.97
Senegal	1991–2011	WA	−1.06	−1.40	−0.46	−1.86
South Africa	1993–2015	SA	−1.33	−2.81	0.48	−2.32
Tanzania	1992–2018	EA	−0.67	−2.06	0.00	−2.06
Tunisia	1990–2015	NA	−9.09	−4.09	−1.26	−5.36
Uganda	1992–2017	EA	−0.90	−1.79	0.03	−1.76
Mean			−2.37	−2.49	−0.35	−2.84
Countries experiencing poverty increases						
Country	**Sub-region**	**Period**	**Headcount poverty (P_0) growth**	**A Ey∗dlnY**	**B Eg∗dlnG**	**A + B Predicted headcount poverty (P_0) growth**
Cote d'Ivoire	1993–2015	WA	0.63	0.58	0.18	0.76
Kenya	1992–2016	EA	0.85	1.85	−1.11	0.75
Madagascar	1993–2012	EA	0.13	0.89	0.05	0.94
Malawi	1998–2016	EA	0.28	1.28	−0.31	0.97
Zambia	1991–2015	SA	0.30	0.07	−0.09	−0.02
Mean			0.44	0.93	−0.26	0.68

Notes: See Table 4A.

the poverty gap and squared poverty gap. Yet, the contribution of inequality cannot be overlooked, since in most of the countries, it played a complementary role in determining the rate of poverty changes; indeed, in a small number of countries, its role was actually dominant.

Table 5B. Decomposition of Poverty Growth into the Contributions of Inequality and Income Growth — Based on the Optimally Selected RE Results [*US$3.20 a day in 2011 PPP*, **Poverty Gap**], Early-mid-1990s – 'present'

Countries experiencing poverty reduction

Country	Period	Sub-region	Pov. gap (P_1) growth	A Ey∗dlnY	B Eg∗dlnG	A + B Predicted Pov. gap (P_1) growth
Algeria	1995–2011	NA	−13.37	−4.12	−5.26	−9.38
Botswana	1993–2016	SA	−3.06	−2.27	−2.03	−4.30
Burkina Faso	1994–2014	WA	−3.54	−4.35	−0.76	−5.11
Burundi	1992–2014	EA	−0.57	−1.71	−0.10	−1.81
Cameroon	1996–2014	CA	−3.36	−5.45	0.53	−4.92
CAR	1992–2008	CA	−2.21	−3.40	−0.08	−3.48
Egypt	1991–2018	NA	−1.90	−1.16	−0.14	−1.30
Eswatini	1995–2016	SA	−5.00	−7.63	−0.80	−8.43
Ethiopia	1995–2016	EA	−3.26	−3.04	−1.08	−4.12
Gambia, The	1998–2015	WA	−9.20	−8.69	−2.93	−11.62
Ghana	1992–2017	WA	−4.64	−8.15	1.19	−6.96
Guinea	1991–2012	WA	−4.60	−7.76	−0.88	−8.64
Lesotho	1994–2017	SA	−2.73	−0.33	−2.53	−2.87
Mali	1994–2010	WA	−3.87	−4.64	−1.21	−5.85
Mauritania	1993–2014	WA	−7.38	−3.67	−4.74	−8.41
Morocco	1991–2014	NA	−4.43	−3.01	0.14	−2.87
Mozambique	1996–2014	SA	−1.75	−3.11	0.01	−3.10
Niger	1993–2014	WA	−2.41	−3.81	−0.09	−3.90
Nigeria	1992–2019	WA	−1.51	−1.32	−0.73	−2.04
Senegal	1991–2011	WA	−2.85	−2.32	−1.48	−3.80
South Africa	1993–2015	SA	−1.98	−3.99	1.03	−2.95
Tanzania	1992–2018	EA	−1.42	−3.18	0.31	−2.87
Tunisia	1990–2015	NA	−11.26	−5.70	−2.84	−8.54
Uganda	1992–2017	EA	−1.67	−2.77	0.13	−2.64
Zambia	1991–2015	SA	−0.10	0.12	−0.27	−0.15
Mean			−3.92	−3.82	−0.98	−4.80

Countries experiencing poverty increases

Country	Period	Sub-region	Pov. gap ($P_{1)}$ growth	A Ey∗dlnY	B Eg∗dlnG	A + B Predicted Pov. gap ($P_{1)}$ growth
Cote d'Ivoire	1993–2015	WA	0.92	0.85	0.46	1.31
Guinea-Bissau	1993–2010	WA	0.15	−0.88	0.84	−0.03
Kenya	1992–2016	EA	0.59	2.89	−2.67	0.22
Madagascar	1993–2012	EA	0.63	1.52	−0.06	1.46
Malawi	1998–2016	EA	0.58	2.55	−1.28	1.27
Mean			0.57	1.39	−0.54	0.85

Notes: See Table 4A.

6. Conclusion and implications

Using World Bank data, this paper, first, examined Africa's historical record, compared with the other regions of the world, on poverty incidence, spread and severity since the early-mid 1990s at the US$1.90 and US$3.20 per day poverty standards. Second, it evaluated country-specific progress on growth, poverty and inequality, and compared the 'poverty transformation efficiency vector' (PTEV) among African countries. This arguably innovative approach allowed comparisons across African countries even prior to the application of regression methods. Third, the study analysed the relative roles of income growth and

Table 5C. Decomposition of Poverty Growth into the Contributions of Inequality and Income Growth — Based on the Optimally Selected RE Results [*US$3.20 a day in 2011 PPP*, **Squared Poverty Gap**], Early-mid-1990s – 'present'

Countries experiencing poverty reduction

Country	Period	Sub-region	Squared Pov. gap (P_2) growth	A Ey∗dlnY	B Eg∗dlnG	A + B Predicted squared Pov. gap (P_2) growth
Algeria	1995–2011	NA	−13.35	−4.77	−7.56	−12.33
Botswana	1993–2016	SA	−4.01	−2.65	−2.82	−5.47
Burkina Faso	1994–2014	WA	−5.57	−5.36	−1.26	−6.62
Burundi	1992–2014	EA	−0.75	−2.09	0.04	−2.05
Cameroon	1996–2014	CA	−3.63	−6.45	0.77	−5.68
CAR	1992–2008	CA	−3.33	−4.43	−0.15	−4.58
Egypt	1991–2018	NA	−2.13	−1.35	−0.21	−1.56
Eswatini	1995–2016	SA	−6.68	−9.23	−1.13	−10.36
Ethiopia	1995–2016	EA	−4.49	−3.68	−1.67	−5.35
Gambia, The	1998–2015	WA	−12.35	−10.38	−4.25	−14.63
Ghana	1992–2017	WA	−4.95	−9.55	1.74	−7.81
Guinea	1991–2012	WA	−6.81	−9.51	−1.44	−10.95
Lesotho	1994–2017	SA	−3.97	−0.40	−3.55	−3.95
Mali	1994–2010	WA	−6.03	−5.75	−1.99	−7.74
Mauritania	1993–2014	WA	−8.87	−4.34	−6.75	−11.08
Morocco	1991–2014	NA	−4.42	−3.48	0.20	−3.28
Mozambique	1996–2014	SA	−2.57	−3.93	0.02	−3.91
Niger	1993–2014	WA	−3.40	−4.61	−0.18	−4.79
Nigeria	1992–2019	WA	−2.41	−1.60	−1.15	−2.74
Senegal	1991–2011	WA	−4.13	−2.84	−2.18	−5.02
South Africa	1993–2015	SA	−2.22	−4.63	1.43	−3.20
Tanzania	1992–2018	EA	−2.01	−3.82	0.55	−3.28
Tunisia	1990–2015	NA	−13.14	−6.61	−4.04	−10.65
Uganda	1992–2017	EA	−2.24	−3.32	0.20	−3.12
Zambia	1991–2015	SA	−0.53	0.15	−0.38	−0.23
Mean			−4.96	−4.59	−1.43	−6.02

Countries experiencing poverty increases

Country	Period	Sub-region	Squared Pov. gap (P_2) Growth	A Ey∗dlnY	B Eg∗dlnG	A + B Predicted squared Pov. gap (P_2) growth
Cote d'Ivoire	1993–2015	WA	1.12	1.01	0.68	1.68
Guinea-Bissau	1993–2010	WA	0.32	−1.06	1.3	0.25
Kenya	1992–2016	EA	0.28	3.47	−3.78	−0.31
Madagascar	1993–2012	EA	0.98	1.87	−0.13	1.74
Malawi	1998–2016	EA	0.78	3.27	−1.84	1.42
Mean			0.70	1.71	−0.75	0.96

Notes: See Table 4A.

inequality changes in explaining African countries' poverty record, through a decomposition of poverty changes, using 'optimal' income and inequality elasticity estimates from the 'identity' model.

The study finds that while the African poverty record was dismal in the 1980s, poverty reduction on the continent has been appreciable since the continent's growth resurgence starting in the 1990s, and that this progress was driven mainly by income growth, consistent

with the global evidence. Nonetheless, inequality often played a complementary role in most of the countries and, in a small number of cases, it was the primary driver of changes in poverty. Thus, the present study sheds light on country-specific differences in the relative roles of growth and inequality in poverty reduction on the continent, based on both qualitative and quantitative evidence. The study should, therefore, provide a useful compass to those who seek to understand country-specific situations within the African context.

Based on the present study, one could elicit the relative roles of growth and income distribution in generating a particular country's poverty progress outcomes. On the one hand, where the poverty record is weak, one might craft income growth and/or income distribution policies required to turn things around. On the other hand, where the poverty record is favourable, growth and inequality-related factors responsible for the outcome may be elicited. Such an analysis would not only provide a guidepost for what a country's policy makers might wish to continue with, but could also serve as a positive lesson for other African countries.

Acknowledgements

I am grateful for useful comments from participants in the AERC Collaborative Research Workshop held in Nairobi during November 2019, to an anonymous reviewer, and to Dede Gafa for valuable research assistance. I also thank the AERC, as well as the National Research Foundation (NRF) of South Africa, for grant support.

Supplementary material

Supplementary material is available at *Journal of African Economies* online.

Data availability

The data underlying this article will be shared on reasonable request to the corresponding author

References

Adams R. H. (2004) 'Economic Growth, Inequality and Poverty: Estimating the Growth Elasticity of Poverty', *World Development*, 32(12): 1989–2014.

Alesina A., Rodrik D. (1994) 'Distributive Politics and Economic Growth', *The Quarterly Journal of Economics*, 109(2): 465–90.

Bourguignon F. (2003) 'The Growth Elasticity of Poverty reduction: Explaining Heterogeneity across Countries and Time Periods', in T.S. Eicher and S.J. Turnovsky (eds), *Inequality and Growth: Theory and Policy Implications*, vol. 1. Boston, MA: MIT Press.

Chen S., Ravallion M. (2008) *The Developing world is Poorer than We Thought, But No Less Successful in the Fight against Poverty. Poverty Research Paper No. 4703*. Washington, DC: World Bank.

Dabla-Norris E., Kochhar K., Ricka F., Suphaphiphat N., Tsounta E. (2015) *Causes and Consequences of Income Inequality: A Global–> Perspective*, IMF Discussion Note, DN/15/13. Washington, DC: IMF.

Deininger K., Squire L. (1998) 'New Ways of Looking at Old Issues: Inequality and Growth', *Journal of Development Economics*, 57(2): 259–87.

Dollar D., Kraay A. (2002) 'Growth Is Good for the Poor', *Journal of Economic Growth*, 3: 195–225.

Dollar D., Kleineberg T., Kraay A. (2016) 'Growth Still Is Good for the Poor', *European Economic Review*, 81: 68–85.

Easterly W. (2000) *The Effect of IMF and World Bank Programs on Poverty*. Washington, DC: World Bank, mimeo.

Epaulard A. (2003) *Macroeconomic Performance and Poverty Reduction*, IMF Working Paper No. 03/72. Washington, DC: IMF.

Fosu A. K. (2008) 'Inequality and the Growth–Poverty Nexus: Specification Empirics Using African Data', *Applied Economics Letters*, 15(7–9): 563–6.
Fosu A. K. (2009) 'Inequality and the Impact of Growth on Poverty: Comparative Evidence for Sub-Saharan Africa', *Journal of Development Studies*, 45(5): 726–45.
Fosu A. K. (2010a) 'The Effect of Income Distribution on the Ability of Growth to Reduce Poverty: Evidence from Rural and Urban African Economies', *American Journal of Economics and Sociology*, 69(3): 1034–53.
Fosu A. K. (2010b) 'Does Inequality Constrain Poverty Reduction Programs? Evidence from Africa', *Journal of Policy Modeling*, 32(6): 818–27.
Fosu A. K. (2010c) 'Inequality, Income, and Poverty: Comparative Global Evidence', *Social Science Quarterly*, 91(5): 1432–46.
Fosu A. K. (2015) 'Growth, Inequality and Poverty in Sub-Saharan Africa: Recent Progress in a Global Context', *Oxford Development Studies*, 43(1): 44–59.
Fosu A. K. (2017a) 'Growth, Inequality, and Poverty Reduction in Developing Countries: Recent Global Evidence', *Research in Economics*, 71(2): 306–36.
Fosu A. K. (2017b) 'Growth, Inequality, and Poverty Reduction: Africa in a Global Setting', in M. Nissanke and M. Ndulo (eds), *Poverty Reduction in the Course of African Development*, vol. 2017. Oxford, UK: Oxford University Press, pp. 57–76.
Fosu A. K. (2018) 'The Recent Growth Resurgence in Africa and Poverty Reduction: The Context and Evidence', *Journal of African Economies*, 27(1): 92–107.
Kalwij A. Verschoor A. (2007) 'Not by Growth Alone: The Role of the Distribution of Income in Regional Diversity in Poverty Production', *European Economic Review*, 51(4): 805–829.
Kuznets S. (1955) 'Economic Growth and Income Inequality', *The American Economic Review*, 45(1): 1–28.
Ravallion M. (1997) 'Can High Inequality Developing Countries Escape Absolute Poverty?' *Economics Letters*, 56(1): 51–7.
Ravallion M. (2012) 'Why Don't we See Poverty Convergence?' *American Economic Review*, 102(1): 504–23.
Thorbecke E. (2013) 'The Interrelationship Linking Growth, Inequality and Poverty in Sub-Saharan Africa', *Journal of African Economies*, 22(suppl 1): i15–48.
Thorbecke E., Charumilind C. (2002) 'Economic Inequality and its Socioeconomic Impact', *World Development*, 30(9): 1477–95.
World Bank (2020a) *POVCALNET 2020*. http://iresearch.worldbank.org/PovcalNet/index.htm.
World Bank (2020b) *World Development Indicators Online 2020*. http://data.worldbank.org/data-catalog/world-development-indicators