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How the Adoption of Government Interventions has Affected Income Inequality and Poverty in Some African Countries

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Abstract

The majority of Sub-Saharan African (SSA) nations continue to have higher rates of poverty than other developing nations in comparable parts of the world. To reverse this situation, the World Bank established the seventeen Sustainable Development Goals (SDGs), which aim to reduce income inequality and end extreme poverty by 2030, while also increasing the shared prosperity of the lowest 40% of each nation's population. Hence, the governments of African countries have implemented several policies to achieve this goal. This paper examines how the implementation of these policies has impacted poverty and income inequality in six African countries: Nigeria, Cote d'Ivoire, South Africa, Mozambique, DR Congo, and Tanzania, comparable to Ghana. Machine Learning was applied to achieve this objective. The results showed that, while agriculture expenditure has a positive impact on income inequality in Nigeria, Mozambique, and DR Congo, as in Ghana, agriculture expenditure has a negative impact on income inequality in Cote d'Ivoire and Tanzania. Regarding poverty, agricultural expenditure has a positive relationship with poverty in Côte d'Ivoire, South Africa, Nigeria, Tanzania, and DR Congo, but a negative impact on poverty in Mozambique, as was the case in Ghana. Generally, there was a mixed relationship between government policies and both income inequality and poverty across the six countries, as was also the case in Ghana. In addition, the policies implemented have different impacts on poverty and income inequality in the various countries. This implies that policies that help reduce poverty are not necessarily the same as those that help reduce income inequality.

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Keywords: Income Inequality, Poverty, Government Interventions, Expenditure, Machine Learning

Introduction

In 2000, world leaders adopted the Millennium Development Goals (MDGs), with the primary goal of eliminating extreme poverty and hunger and narrowing the inequality gap by 2015 (United Nations Development Programme, 2015). The MDGs, which helped over a billion people out of extreme poverty [US $1.25 per day], were deemed by former UN Secretary General Ban Ki-Moon to be among the most significant initiatives for reducing poverty (United Nations Development Programme (UNDP), 2015). Despite these advancements, there was still widespread poverty and income inequality, particularly in developing nations. For instance, in 2013, 48% of people in Sub-Saharan Africa were still living in extreme poverty, defined as earning less than $1.25 a day (UNDP, 2015). According to the World Poverty Clock's June 2018 report, 86.9 million Nigerians were living on less than $1.90 per day (Aderounmu et al., 2021). By February 2019, over 3 million more people had fallen into poverty, bringing the total number of impoverished Nigerians to over 91 million. In comparison to certain other African nations, Nigeria had the highest number of people - 86.9 million - living in extreme poverty, followed by Tanzania, Kenya, South Africa, and Zambia, with respective numbers of 19.9 million, 14.7 million, 13.8 million, and 9.5 million (Aderounmu et al., 2021). The World Bank (2018) projected that by 2030, "nearly 9 of every 10 people in extreme poverty will be living in Sub-Saharan Africa," making the trend concerning. Global severe poverty is decreasing in all regions, but it is rising in Sub-Saharan Africa (Wadhwa, 2018). Furthermore, all developing nations have the highest levels of inequality in the world, and the majority of these nations are in Africa (Fofana et al., 2023). Extreme poverty, both relative and absolute, is concentrated in low- and middle-income countries (Cuesta et al., 2018).

According to Beegle and Christiaensen (2019), the majority of Sub-Saharan African (SSA) nations, especially most of the countries selected for the study have higher rates of poverty and inequality than other developing nations in comparable parts of the world. According to World Bank data (2022), South Africa recorded the highest income inequality with a Gini index of 57.7 in 2018, followed by DR Congo at 51.2 and Mozambique at 50.5, both in 2019. In Tanzania, inequality increased, with the Gini index rising from 38 in 2011/12 to 40 in 2018. Income inequality in Cote d'Ivoire and Nigeria was quite lower than the record in Ghana. The Gini index for Cote d'Ivoire and Nigeria were 37.2 and 35.1 respectively, while the Gini index in Ghana was 38.3 in 2018. In 2015, the poverty rate in Côte d'Ivoire was 46% of the

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population (World Bank, 2017), while Mozambique recorded a slightly higher rate of 48.4% in the same year. In 2022, nearly 62% of Congolese were living in poverty. In 2018, Tanzania's poverty rate - measured at $2.15 per day (2017 PPP) - was 44.9% of the population. It is astonishing that these Africa countries remain impoverished despite having abundant natural resources (agricultural, petroleum, gas, enormous untapped solid mineral deposits, and human capital) (Aderounmu et al., 2021).

While poverty and income inequality have long been issues in many nations, different governments have tried a variety of policies to address the issue (Afful, Nunoo & Arthur-Biney, 2019). Eliminating poverty has evolved into a new kind of world war rather than merely a problem for one nation. This is because poverty and income disparity have the capacity to undermine social welfare initiatives and erode earlier growth (Cuesta et al., 2018). A 2005 study on the Economic and Social World Situation highlighted the problems of inequality and argued that everyone would suffer if an inclusive, integrated growth strategy was not pursued. This illustrates how complicated inequality is and how urgently it needs to be addressed. Thus, the question of how these resource-rich countries can have a sizable portion of their populations living in extreme poverty remains unanswered. The failure of the Millennium Development Goals to reduce income inequality and halve the number of people living in poverty by 2015 is still difficult to comprehend. Without significant attention, it is estimated that these countries will not be able to meet the Sustainable Development Goals by 2030 (Yoshida et al., 2014; Lakner et al., 2014). The lacklustre achievement casts serious doubt on the policies and strategies used to reduce poverty and income inequality. These situations underscore the necessity of addressing the poverty issue and understanding its implications on a country's ability to develop. To achieve this, the World Bank established the seventeen Sustainable Development Goals (SDGs), which aim to reduce income inequality and end extreme poverty by 2030 while also increasing the shared prosperity of the lowest 40% of each nation's population (Abaidoo, 2021). Therefore, examining each competing factors will enhance informed policy intervention towards poverty and income inequality.

To achieve the objective of the study, six countries were selected: Nigeria, Côte d'Ivoire, South Africa, Mozambique, DR Congo, and Tanzania. They were chosen for several reasons, as explained below (pp. 4).

This study contributes to the body of research by examining major government policies implemented in these six African countries, which employed different methods and had varying levels of resource endowment, through some empirical exercises. To address the limitations posed by data deficiency, a common challenge in the studies of nature, the analysis also employed Machine Learning estimators, providing more robust and reliable results to address the data deficiency issue. These techniques may offer a better

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understanding of the impact of government initiatives on poverty and income disparity in Africa and help inform policy changes in the selected countries.
The remaining paper is structured as follows: Section 2 focuses on stylized facts; Section 3 provides a brief review of the main approaches and driving forces behind poverty and income inequality reduction; Section 4 presents the data, and the methods used; Section 5 examines and discusses the empirical findings; and Section 6 concludes.

Stylized Facts

General Overview

Six countries were selected for the study: Nigeria, Cote d'Ivoire, South Africa, Mozambique, DR Congo, and Tanzania. The focus on the selected countries was motivated by four reasons. Firstly, like Ghana, these countries rely on agriculture, were exposed to European colonization, have large rural populations, and experience high income inequality and extreme poverty. Secondly, like Ghana, they have a large informal sector, which operates beyond government taxation and oversight. Thirdly, there is generally a scarcity of data on this topic in Africa. However, these countries have comparatively more data available for the study. Fourthly, significant similarities can be anticipated in their social programs, given their strong economic, cultural, and social similarities. However, some countries implement social programs differently from Ghana, while others follow a similar pattern. In Tanzania, Nigeria, and Mozambique, the government has generally attempted to strengthen the informal social welfare systems of the extended family and community through a more decentralized social policy, similar to Ghana. In contrast, the governments of Côte d'Ivoire, South Africa, and DR Congo have sought to replace these informal social networks with the centralized bureaucracy. Various nations have implemented comparable changes differently, particularly in terms of the timing of the reforms and how vulnerable populations were addressed. Therefore, it will be interesting to examine how government interventions affect income disparity and poverty in nations where the implementation is similar to Ghana, compared to those where it is not.

Indicators of poverty and income growth for selected nations are displayed in Table 1, along with the Sub-Saharan African averages for the same indicators. Except for South Africa, Ghana, Tanzania, the Democratic Republic of Congo, and Cote d'Ivoire, whose annual GDP growth and GDP per capita growth rates exceed the SSA average of 4.2% and 1.5%, respectively, all other selected countries experienced low GDP growth during the chosen period. Growth in Africa was slower in 2021, compared to many other regions of the world. This supports Ibi-Ajayi's (2002) conclusion that "the growth performance of many African countries has been disappointing

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(or dismal) over several years, notwithstanding the isolated cases of Botswana, Mauritius, and Morocco". The Central African Republic, Namibia, and South Africa have the highest rates of income disparity. This also supports the International Monetary Fund's (IMF) assessment that, when measured by real GDP, the income disparity between Sub-Saharan Africa and the rest of the world is widening (Majekodunmi et al., 2023).

Table 1. Income Growth and Inequality Indicators for Selected Sub-Saharan Africa Countries[1]

S/N	Country	GDP Growth (Annual %) in 2021	GDP per Capita Growth (Annual %) in 2021	Income Share held by the highest 20% (a)	Income Share held by the lowest 20% (b)	Gini Index (c)
1	South Africa	4.9	3.9	68.2	2.4	63.0
2	Namibia	2.7	1.0	63.7	2.8	59.1
3	Central African Republic	0.9	-1.2	60.9	3.3	56.2
4	Mozambique	2.4	-0.5	56.1	4.4	50.5
5	DR Congo	6.2	2.8	48.4	5.5	42.1
6	Tanzania	4.3	1.2	48.1	6.9	40.5
7	Ghana	5.1	3.0	48.6	4.7	38.3
8	Cote d'Ivoire	7.0	4.4	44.7	7.0	37.2
9	Nigeria	3.6	1.2	42.4	7.1	35.1
10	Sub Saharan Africa	4.2	1.5	N/A	N/A	N/A

Source: World Bank's World Development Indicators (2022)

Human development and poverty indicators on the continent, including the six countries under study, have not improved as predicted, even though many African nations have had rapid economic growth over the last ten years (Asongu, Orim & Ntig, 2019; Shimeles & Nabassaga, 2018). Significantly, due to rapid population growth, the number of impoverished people in Africa has increased (from 278 million in 1990 to 413 million in 2015) (World Bank 2018).

Geographically, poverty in Africa is concentrated in two countries: Nigeria and the Democratic Republic of Congo. These two nations, which are commodity exporters, bear a major portion of the continent's poverty burden (Hamel et al., 2019). Around 12 percent of the global population living in extreme poverty in 2023 - where the poverty line was set at 1.90 US dollars per day - was based in Nigeria (see Figure 1). To make matters worse, approximately 10% of the world's population living in extreme poverty was in the Democratic Republic of Congo. Tanzania, South Africa, and Mozambique

[1] NOTE: The figures quoted in (a), (b), and (c) are for various years between 2010 – 2020

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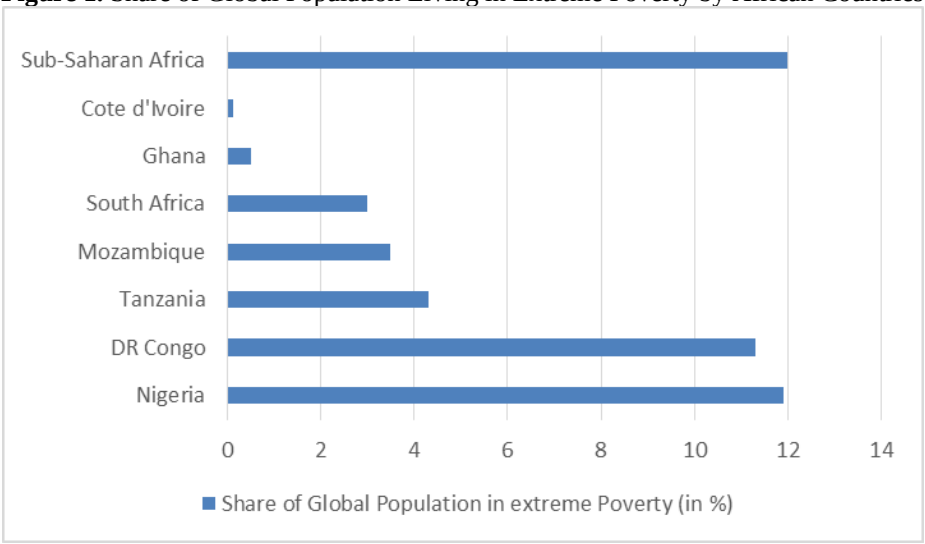
were also among the African countries with impoverished populations. Among the countries selected for the study, only Cote d'Ivoire had a lower rate of poverty than Ghana; all the other five countries recorded higher poverty rates.

Figure 1. Share of Global Population Living in Extreme Poverty by African Countries



Source: Statista (2023)

Africa is the second most unequal continent after Latin America, according to the Gini coefficient. In 2021, eight African nations ranked among the top ten most unequal globally, with South Africa and Namibia occupying the top two spots (Majekodunmi et al., 2023). This persistent trend presents a highly alarming picture of the state of inclusive growth on the continents and underscores the urgency with which policymakers must act to reduce poverty and income inequality, both of which are critical to advancing human welfare.

What Measures have been Undertaken to Limit Poverty and Income Inequality in Africa?

While a number of African nations have experienced robust economic growth over the past ten years, the continent's poverty and human development indicators have not improved as anticipated (Asongu, Orim & Ntig, 2019; Shimeles & Nabassaga, 2018). Nonetheless, several nations have made progress in reducing poverty and income inequality.

In the early decades following independence, the key determinants of income inequality and poverty included the structure of the economy, asset allocation, return on assets, and redistribution policies in both cash and kind (UNDP, 2017). Molini and Pierella (2015) identified structural reform, increased labour force skill, and spatial mobility as the main drivers of poverty reduction in Ghana between 1991 and 2012. South Africa, through the

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Reconstruction and Development Programme (RDP), introduced reforms similar to countries like Mozambique, Nigeria, DR Congo, and Tanzania to cater to the citizenry. Cote d'Ivoire, after undergoing a series of political instability, is implementing structural reforms in an effort to reduce poverty. Mozambique is transforming its agricultural sector by encouraging smallholder farmers to engage in market-base agriculture. According to Silva (2013), a vast majority of rural households earned higher incomes between 2002 and 2005, thereby improving living standard. A cornerstone of South Africa's social insurance system, and similarly for several countries under review, is unemployment insurance. This provides essential resources to individuals unable to work due to age, disability, or other reasons (Old Age Pension, Disability Grant, and Child Support Grant), or who need additional income to support their children (Leibbrandt et al., 2011). The Basic Income Grant (BIG) implemented in countries such as South Africa, Cote d'Ivoire, and DR Congo has also helped in mitigating the plight of the poor.

Efforts to promote social cohesion and conflict resolution are additional steps taken by African governments to address poverty and inequality (UNDP, 2015). Randomized controlled trials have shown increased social cohesion in targeted settings through interventions such as truth and reconciliation commissions and community-based development programmes (Casey, Glennerster & Miguel, 2016). According to M'Bayia (2015), the poverty and inequality situation in Cote d'Ivoire worsened during the period of military, social, and political crisis. However, following the return to economic stability in 2011 and the implementation of aggressive poverty reduction strategies, the poverty rate reduced drastically. According to World Bank (2016) reports, Mozambique's poverty rate also declined significantly following the end of the civil war, similar to the reduction in poverty and inequality observed in Ghana after the return to democracy. Abidoye and Calì (2021) attributed the unwavering change in poverty and inequality in Nigeria to intermittent conflicts brought by the Islamic militant groups. Leibbrandt et al. (2011) also cited apartheid and the inter-racial conflicts in South Africa as primary contributors to high inequality, noting that improvement in social cohesion has since led to a gradual decrease in the inequality gap. In the case of DR Congo, the slow pace of poverty and inequality reduction has been attributed to a long history of conflict, political upheaval, and instability.

According to Beegle and Christiaensen (2019), the cancellation of foreign debt in nations qualified for the Heavily Indebted Poor Countries (HIPC) Initiative resulted in a noticeable decrease in the Gini coefficient by creating more fiscal freedom. Inequality also declined in several countries, such as Tanzania, DR Congo, Mozambique, South Africa, and Ghana, due to increased targeted social investments and a rise in direct taxation as a share of

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total revenues (UNDP, 2015). Expanding such programmes could lead to significant benefits.

Poverty-related strategies embedded in development policy frameworks have also contributed to the reduction in poverty and inequality across Africa. Prior to the creation of Vision 2020, all districts and regions participated in the national development goal-setting exercise, preceded by the Human Development Strategy for Ghana (1991) and the National Development Policy Framework (1994) (Ofori-Boateng & Bab, 2015). Mozambique's Five-Year Development Plan (2000–2004) identified poverty reduction as a central objective (Government of Mozambique, 2000, 2001). In Kenya, an unconditional cash transfers programme significantly reduced the incidence of depression among young males (Kilburn et al., 2016). Qualitative evidence from Zimbabwe, Lesotho, and Ghana also suggests that cash transfers promote mental health (Attah et al., 2016). In Nigeria, various programmes, such as the Structural Adjustment Programme (SAP), the National Poverty Eradication Program (NAPEP), National Economic Empowerment and Development Strategy (NEEDS), Free and Compulsory essential Education (FCPE), Better Life Programme (BLP), and the Subsidy Reinvestment and Empowerment Programme (Sure-P) were introduced to combat poverty and inequality (Adamu & Inuwa, 2016; Hussaini, 2014). Accelerating the financial inclusion of the impoverished population who are not part of the formal financial system is one of the initiatives the administration has adopted in Cote d'Ivoire. Additionally, to reinforce the fundamental social security guarantees for the most disadvantaged people in Cote d'Ivoire, a national plan to encourage microfinance was launched in 2007, along with the gradual creation of a social protection system. All these programmes, in one way or another, helped reduce poverty and income inequality on the continent.

Methods

Methods for Evaluating Poverty and Income Inequality: A Synthesis

Numerous scholars from around the world have been tasked with finding solutions to the persistent and expanding income gap, policy mismatches in addressing income inequality, and the challenge of relative poverty (Heshmati & Kim, 2014). According to Stiglitz (2012), inequality undermines the foundations of the economy and fuels instability. Addressing these persistent economic issues will remain extremely difficult if income disparity and poverty are not properly understood.

Income Inequality: The concept of inequality often causes confusion in public deliberation, as it tends to mean different things to different people (Gallo, 2002). However, inequality refers to comparability between elements, typically assessed based on specific features that can be measured using

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appropriate indexes (Gallo, 2002). Income inequality can be measured across economic and social dimensions (Afful, Nunoo & Arthur-Biney, 2019).

There are several methods for measuring income inequality. However, the Gini coefficient has remained the most popular method for operationalizing income inequality in the literature (De Maio, 2007).

Poverty: Poverty is a multidimensional concept that captures various levels of deprivation encountered by a person, household, or community. Although much of the literature focuses on indicators such as income, food security, and access to housing, the selection of indicators to measure deprivation can be arbitrary. As a result, these measures may fail to fully reflect unmet basic needs in different social and cultural contexts. This discrepancy often leads to terms such as poverty, social exclusion, and vulnerability being used interchangeably in development discourse.

A Formal Framework

To address the missing values and the lack of a large data set, the study employed a machine learning regression model, such as the Elastic Net Regression. ELNET regression is a combination of two best techniques of shrinkage regression methods, namely, Ridge regression (*L*2 penalty) for dealing with high-multicollinearity problems and the LASSO regression (*L*1 penalty) for feature selection of regression coefficients (Wang et al. 2019; Buell et al. 2021). The formal model is as follows:

$$h_{it} = \alpha + \beta_i M_{it} + \sum_i \gamma_i G_{it} + \delta_{it} \quad (1)$$

Where $h_{it} h_{it}$ represents the dependent variable i (i=1,2) at time t, $M_{it} M_{it}$ represents the control variable i at time t, $G_{it} G_{it}$ represent the explanatory factor i at time t, $\beta_i \beta_i$ represents the coefficient of $M_i M_i$ and $\gamma_i \gamma_i$ represents the coefficient $G_i G_i$.

The Data

The empirical analysis was conducted on an annual basis over the period (1987–2019). All data were sourced from the World Bank's World Development Indicators. Due to significant gaps in the data, a simple interpolation method was employed to fill in the missing values. The revised dataset was then tested for stationary using the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1981). The results of the unit root test, which showed many missing values, are displayed in Appendix 1. All series were found to be stationary at the first difference.

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The descriptive statistics summarize the values of the variables over the study period (1987-2019). These statistics for Nigeria, Cote d'Ivoire, South Africa, Mozambique, Tanzania, and DR Congo are reported in Appendix 2. From the results, the mean value for AGRIC ranges from -0.17 to 1.5 across the six countries, with DR Congo recording the lowest mean (-0.17) and Tanzania the highest (1.5). This indicates that, although DR Congo has the largest arable land in Africa, it is not being effectively utilized. DR Congo also shows the highest variation in agricultural performance, with a standard deviation of 1.4, while the other countries (Nigeria, South Africa, Tanzania, Cote d'Ivoire, and Mozambique) all recorded standard deviations below 1.

Regarding education expenditure, DR Congo recorded the highest average (7.2) with a standard deviation of 6. Mozambique and Tanzania each recorded a mean of 3.6, with standard deviations of 1.9 and 0.8, respectively. South Africa recorded a mean of 5.1 (SD=0.5), Cote d'Ivoire 3.9 (SD1.5), while Nigeria had a negative mean value of -13 with a standard deviation of 11. This suggests that despite Nigeria's abundant resources, investment in the education sector remains insufficient. In the health sector, average expenditure ranged from 0.2 to 2.7, with South Africa having the highest mean investment (2.7) and DR Congo the lowest (0.2). It is therefore not surprising that South Africa is often considered the preferred destination for healthcare within the continent.

Social protection expenditure ranged between -12 and 52. South Africa had the highest mean investment (52), while Nigeria recorded the lowest (-12). Transport expenditure averaged between -14 and 14, with Mozambique having the lowest investment (mean = -14), and South Africa the highest. In addition, the mean value for the Gini index ranges from 37 to 60 across the six countries, with Tanzania recording the lowest mean (37) and South Africa the highest (60). This confirms that South Africa has the highest income inequality in Africa. Finally, Tanzania also recorded the highest mean poverty (69.8), followed by DR Congo (69.8), Mozambique (43.1), Nigeria (18.3), and South Africa (10.4)

Results and Discussion

The Benchmark Model

The independent variables are conceptualized as follows: Coverage of social protection and labour programs (% of population) (SOCIAL); Machinery and transport equipment (% of value added in manufacturing) (TRANS); Domestic general government health expenditure (% of GDP) (HEAL); Agricultural raw materials imports (% of merchandise imports) (AGRIC); and Government expenditure on education, total (% of government expenditure) (EDU), with GDP growth (annual %) (GDP) as a control

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variable. The dependent variables are poverty level, represented by the Poverty gap at $1.90 a day (2017 PPP) (%) (POV), and income inequality represented by the Gini Index (GINI). Equation 1 is thus transformed into its operational form as follows;

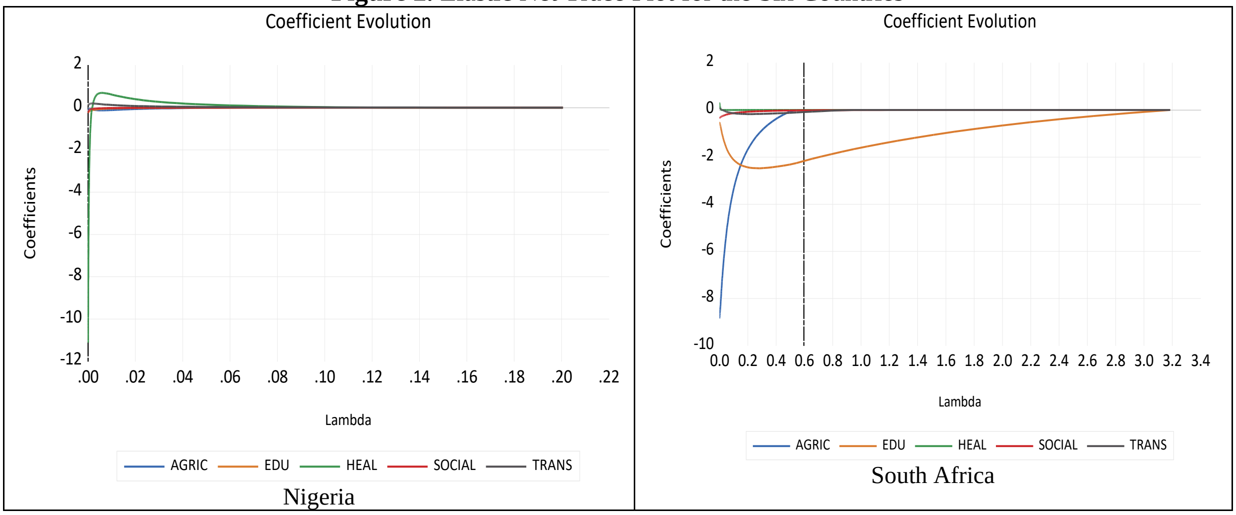
$$h_t = \alpha_0 + \alpha_1 AGRIC + \alpha_2 HEAL + \alpha_3 TRANS + \alpha_4 EDU + \alpha_5 SOCIAL + \delta_t \dots \dots \dots \dots \dots \dots (2)$$

The Estimate of the Benchmark Model of the Impact on Income Inequality

The study adopted a machine learning regression model, specifically the Elastic Net Regression. The results regarding the impact of government policies on income inequality are presented first.

Table 2 shows the impact of government expenditures used to implement various policy interventions on income inequality. Figure 2 presents the trace plot of the model. As illustrated in Figure 2, the Elastic Net algorithm shrinks the coefficients of the predictors to enhance the prediction power of the model. As the value of lambda increases, the coefficients shrink further, reducing variance and improving the model's suitability for out-of-sample prediction.

Figure 2. Elastic Net Trace Plot for the Six Countries



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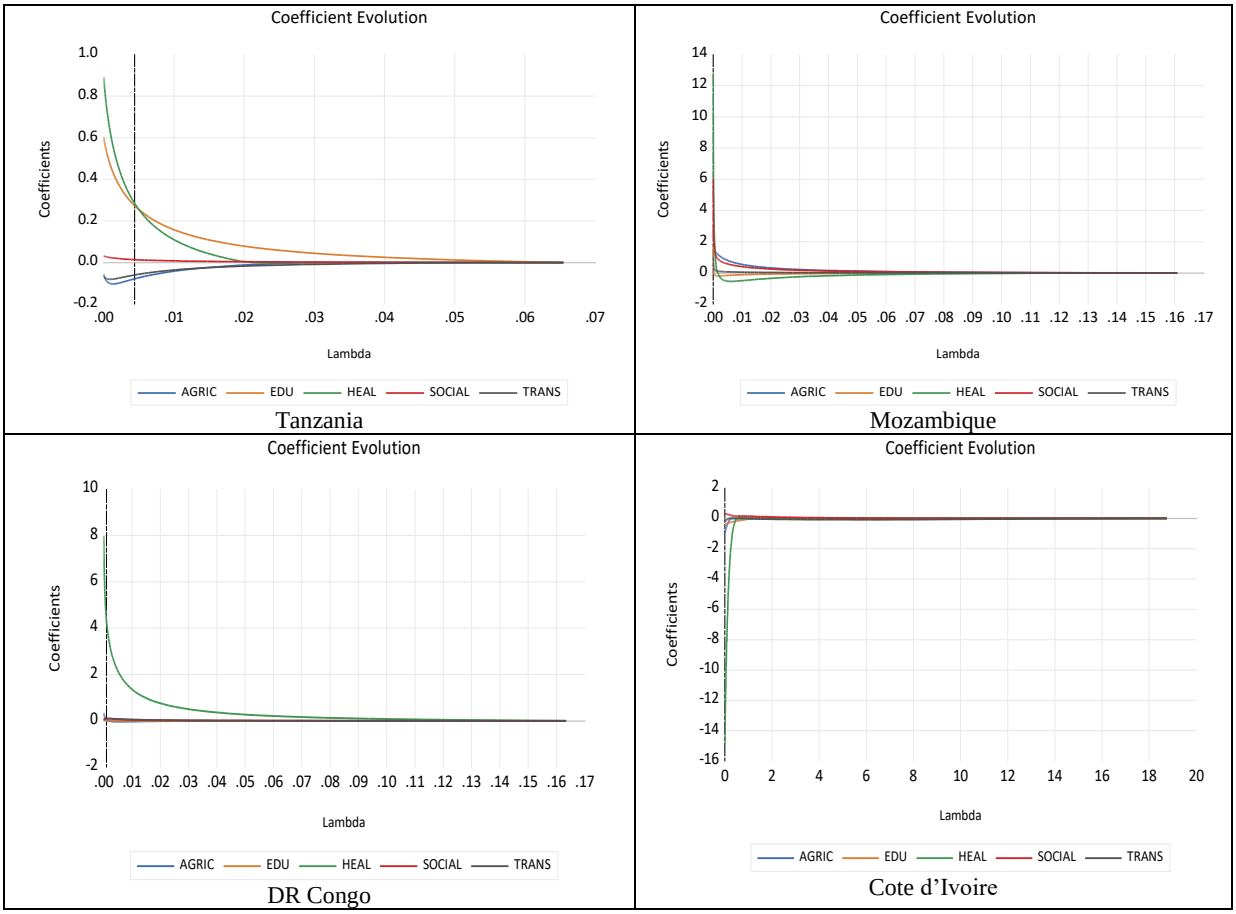

Source: Author's Calculation

Applying the "one standard error" rule to select the optimal tuning parameters appears overly aggressive in this model, as it suppresses nearly all the predictors.

The R squared, RMSE, Theil's inequality coefficient, and *MAPE* were used to evaluate the performance criteria of the prediction accuracy of the regression methods. As shown in Table 2, South Africa, Nigeria, and Tanzania recorded R squared of 10%, 45%, and 24% respectively, while Mozambique, Cote d'Ivoire, and DR Congo recorded R squared of 56%, 61%, and 71% respectively. Additionally, the results indicate that the Elastic Net model under the *minM* rule yielded the smallest error value across *RMSE*, Theil's inequality coefficient, and *MAPE* terms. Therefore, the Elastic NET method selects decomposition components that have more significant effect on the response variables with high prediction accuracy.

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Table 2. Empirical Results of the Effect of Government Intervention on Income Inequality

Independent Variables	Dependent Variable: GINI					
	Nigeria	**South Africa**	**Tanzania**	**Mozambique**	**DR Congo**	**Cote d'Ivoire**
AGRIC	-0.158	0.000	-0.078	1.690	0.039	-0.982
	(0.000)	(0.000)	(0.000)	(0.311)	(-0.026)	(0.000)
EDU	-0.244	-2.166	0.274	1.496	0.016	-0.409
	(0.000)	(0.000)	(0.000)	(-0.071)	(0.000)	(0.000)
HEAL	-10.855	0.000	0.284	12.134	4.302	-14.833
	(0.000)	(0.000)	(0.000)	(-0.334)	(1.174)	(0.000)
SOCIAL	-0.244	-0.016	0.014	5.783	0.111	0.302
	(0.000)	(0.000)	(0.000)	(0.240)	(0.040)	(0.000)
TRANS	0.054	-0.089	-0.060	0.908	0.088	-0.230
	(-0.065)	(0.000)	(0.000)	(0.030)	(0.049)	(-0.065)
C	44.252	73.348	35.860	-1.213	37.606	42.105
	(40.239)	(60.119)	(36.996)	(48.849)	(39.605)	(40.239)
d.f.	5	3	5	5	5	5
L1 Norm	55.806	75.619	36.570	23.224	42.162	58.861
R-squared	0.451	0.097	0.238	0.558	0.712	0.607
RMSE	4.172	4.813	1.631	2.560	1.473	1.227
MAE	3.505	2.873	1.109	1.895	0.747	0.908
MAPE	8.172	5.572	3.019	3.913	1.737	2.291
Theils	0.050	0.040	0.022	0.026	0.018	0.015

Note: minimum optimal tuning values were reported and one standard error reported in ()
Source: Author's Calculations

From Table 2, unlike in Ghana (as shown in Appendix 3), the relationship between education expenditure and income inequality yielded negative coefficients in Nigeria, South Africa, and Cote d'Ivoire, respectively. This means that when education expenditure increases by 1%, income inequality decreases by a margin of 0.2%, 0.41%, and 2.17% in Nigeria, South Africa, and Cote d'Ivoire, respectively. This implies that increase in education expenditure helps to reduce the income inequality gap. This confirms economic theory, which states that education reduces income inequality. A study by Leibbrandt et al. (2011) in South Africa identified wage inequality as the main contributor to growing income inequality. However, education expenditure makes access to education available to all, which ultimately improves skills and, consequently, increases wages. This helps close the wage inequality gap, thereby reducing income inequality. Sanogo (2019) found similar results in Cote d'Ivoire. Contrary to this study's findings in DR Congo, World Bank (2018) found that government policy which enables an additional year of schooling is associated with a decline in the unemployment rate among men and women and increases the chance of obtaining wage employment in DR Congo. This consequently reduces wage inequality, which translates into a reduction in income inequality, as found in Nigeria, South Africa, and Cote d'Ivoire. Most studies find a negative relationship between income inequality

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and a country's average or median educational attainment (Ospina, 2010; Sylwester, 2002; Anderson et al., 2017). On the other hand, the relationship between education expenditure and income inequality was positive in Tanzania, DR Congo, and Mozambique, as it was in Ghana (results in Chapter 1), contrary to economic theory. This indicates that when education expenditure increases by 1%, income inequality increases by a margin of 0.24%, 1.5%, and 0.02% in Tanzania, Mozambique, and DR Congo respectively. This indicates that education policies in Ghana, Tanzania, Mozambique, and DR Congo rather exacerbate the inequality gap. Heltberg et al. (2004), in explaining why education expenditure increases income inequality, indicated that there are inequalities in public spending at all levels of education and across regions in Mozambique. Hence, income inequality results from disparities in educational spending across regions. This is also the case in Ghana. There is evidence that educational inequality contributes to both intra-urban and rural-urban inequality (UNDP, 2017). Joumard and Vélez (2013) found similar results.

Health expenditure has no impact on income inequality in Nigeria and South Africa. This implies that, statistically, based on the results, health expenditure does not influence income inequality in Nigeria and South Africa. In Cote d'Ivoire, health expenditure has a negative impact on income inequality. This means that each 1% increase in health expenditure will consequently reduce income inequality by 14.83% in Cote d'Ivoire. These results confirm the findings in Cote d'Ivoire. Barofsky and Younger (2019) found that health expenditure significantly lowers income inequality in Ghana, as demonstrated by the aggregate-returns method, which also takes into account the value of prevented death and risk protection, even though the results in Appendix 3 indicated otherwise for Ghana. On the contrary, health expenditure has a positive impact on income inequality in Tanzania, Mozambique, and DR Congo, similar to the case of Ghana (see results in Appendix 3). This means that each 1% increase in health expenditure will consequently lead to a rise in income inequality by 0.28%, 12.13%, and 4.30% in Tanzania, Mozambique, and DR Congo, respectively. This result is in contrast with the two-period overlapping generation's growth theoretical model, which predicts an inverse relationship between health investment and income inequality. While Heltberg et al. (2004) blame the problem on imbalanced distribution across regions in Mozambique, the World Bank (2018) attributes the issue to low-quality health infrastructure and services provided at a higher cost in DR Congo, as well as many other African countries, including Ghana. Martinez-Vazquez et al. (2012) and Anderson et al. (2017) also found no relationship between health expenditure and income inequality, just as in the case of Nigeria and South Africa.

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In addition, social protection expenditure has a positive impact on income inequality in Cote d'Ivoire, Tanzania, Mozambique, and DR Congo, contrary to the results found in Ghana and the predictions of economic theory. According to the results, income inequality will rise by 0.30%, 0.01%, 5.78%, and 0.11% when social protection expenditure increases by 1% in Cote D'Ivoire, Tanzania, Mozambique, and DR Congo, respectively. The World Bank (2018) found that investment in the provision of good quality social services remains abysmally low, resulting in a significant impact on income inequality in DR Congo. The findings of Sanogo (2019) in Cote d'Ivoire indicated that public investment to reduce inequality is more effective through education than through social services. He contends that only when social transfers are broken down into different sources does a particular source show a negative impact on income inequality; otherwise, social transfers do not have a negative impact on income inequality. However, as in Ghana (see results in Appendix 3), social protection expenditure has a negative impact on income inequality in South Africa and Nigeria, consistent with economic theory. When social protection expenditure increases by 1%, income inequality will reduce by 0.02% and 0.24% in South Africa and Nigeria, respectively. This implies that social protection expenditure reduces the income inequality gap in Nigeria and South Africa. De la Fuente et al. (2017), in their study, also suggested that a more efficient way to deliver net benefits to poor and vulnerable households is through targeted cash transfers. After Apartheid, South Africa further developed its social assistance pillars, such as the provision of basic resources to those unable to work due to age (Old Age Pension), disability (Disability Grant), or the need for supplementary income to support children (Child Support Grant). These measures have helped reduce the income inequality gap in the country (Leibbrandt et al., 2011). Martinez-Vazquez et al. (2012) and Anderson et al. (2017) also found similar results.

Interestingly, while agriculture expenditure has no impact on income inequality in South Africa, it has a positive impact in Nigeria, Mozambique, and DR Congo. Similarly, agriculture expenditure has a positive impact on income inequality in Ghana (see results in Appendix 3). When agriculture expenditure increases by 1%, income inequality rises by 0.19%, 1.69%, and 0.04% in Nigeria, Mozambique, and DR Congo, respectively, contrary to economic theory prediction. This may be because increasing investment in an Agrarian economy, where the majority are employed, raises their employment income, which should close the income gap, but apparently does not. Anyiam et al. (2023) found similar results in Nigeria, Mozambique, and DR Congo, and asserted that income inequality among high income farmers was greater than among low-income farmers, indicating that the respondents do not operate at the same level and do not earn the same income in Nigeria. Similarly, Al-Hassan and Jatoe (2003) studied the role of agriculture in

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poverty reduction and found that investment in Ghana's agricultural sector led to disparities in incomes between export crop farmers and food crop farmers. This contrasts the findings of Horlu (2024), who demonstrated that increasing investment in crop diversities leads to a decrease in income inequality. Silva (2013) explained the situation in Mozambique, stating that agrarian policies following the post-1980s economic reform emphasized agricultural exports via policies such as agricultural extension programs that targeted export-producing farmers. However, these policies neglected the chronic shortages of farming inputs in rural areas and overlooked the rural population's dependence on wage labour to achieve food security. This ultimately led to increased income inequality in the country. On the other hand, agriculture expenditure has a negative impact on income inequality in Cote d'Ivoire and Tanzania. A 1% in agricultural expenditure reduces income inequality by 0.98% in Cote d'Ivoire and 0.08% in Tanzania. In DR Congo, Neema Ciza et al. (2022) found that increasing agricultural production boosts farm income, food supply, and job opportunities while also reducing income inequality.

Finally, transportation expenditure has a positive impact on income inequality in Nigeria, Mozambique, and DR Congo, but a negative impact in Cote d'Ivoire, South Africa, and Tanzania, similar to the results found in Ghana (see results in Appendix 3). When transport expenditure increases by 1%, income inequality increases by 0.91%, 0.05%, and 0.09% in Mozambique, Nigeria, and DR Congo, respectively. According to economic theory, government transport expenditure increases income inequality in the short run but decreases it in the long run, as it reduces transport poverty and enhances economic opportunities for the marginalized. Arndt et al. (2012), on the other hand, asserted that transport systems rather worsen the inequality gap in Mozambique, confirming this study's findings. Conversely, when transport expenditure increases by 1%, income inequality decreases by 0.23%, 0.09%, and 0.06% in Cote d'Ivoire, South Africa, and Tanzania, respectively. This is because improvements in transport infrastructure can enhance firm efficiency and affect firm location, thereby providing job opportunities to a broader population. Booth, Hanmer, and Lovell (2000), in their World Bank report, indicated the potential impact of transport expenditure in closing the income inequality gap in Nigeria and Madagascar, contrary to the findings in Nigeria. This finding is also in contrast to Calderón and Servén (2008), who claimed that transport expenditure is negatively correlated with income inequality.

The Estimate of the Benchmark Model of the Impact on Poverty

Table 3 presents the results of the impact of government expenditures used to implement various policy interventions on poverty across the six countries. Figure 3 shows the trace plot of the model, indicating that it is more suitable for out-of-sample prediction.

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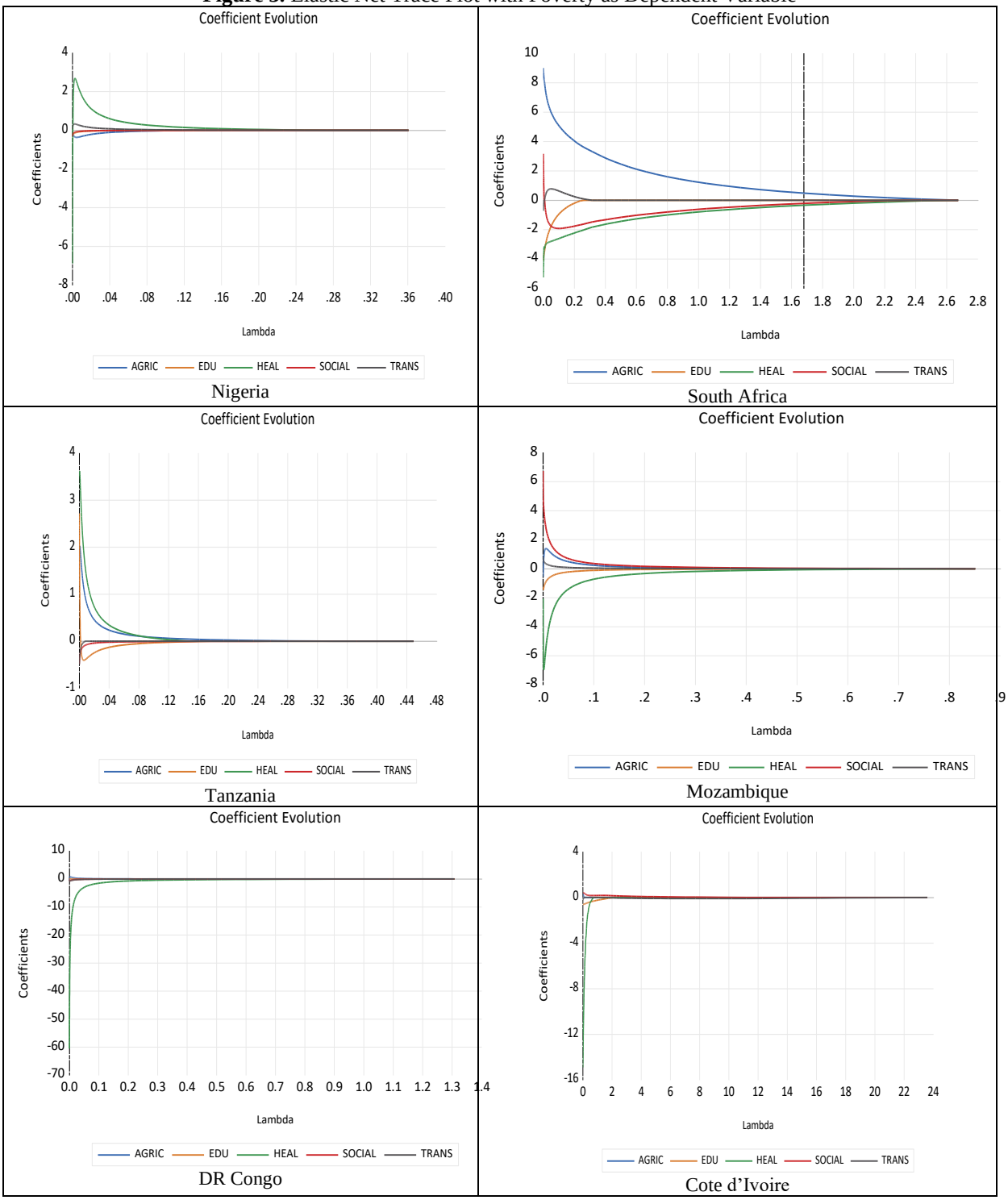
Figure 3. Elastic Net Trace Plot with Poverty as Dependent Variable



Source: Author's Calculation

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The usual validation statistics are reported in Table 3: R squared is 78% for Nigeria, 85% for South Africa, 78% for Tanzania, 99% for Mozambique, 94% for DR Congo, and 47% for Cote d'Ivoire. The results also show that the Elastic Net method, under the $minM$ rule has the smallest error value in the terms of $RMSE$, Theil's inequality coefficient, and $MAPE$. Therefore, the Elastic NET method selects decomposition components that have a more significant effect on the response variables, while achieving high predictive accuracy.

Table 3. Empirical Results of the effect of Government Intervention on Poverty

Independent Variables	**Dependent Variable:** POV					
	Nigeria	**South Africa**	**Tanzania**	**Mozambique**	**DR Congo**	**Cote D'Ivoire**
AGRIC	-0.277	0.486	1.788	-0.548	0.123	0.361
	(-0.214)	(0.486)	(2.008)	(0.076)	(0.766)	(0.000)
EDU	-0.282	0.000	2.723	-1.283	0.047	-0.610
	(-0.236)	(0.000)	(0.565)	(-1.434)	(0.080)	(0.000)
HEAL	-6.886	-0.339	3.518	-2.060	-49.172	-14.851
	(-0.356)	(-0.339)	(3.489)	(-6.202)	(-23.103)	(0.000)
SOCIAL	-0.319	-0.213	-0.485	6.737	-0.514	0.395
	(-0.200)	(-0.213)	(-0.289)	(4.933)	(-0.599)	(0.000)
TRANS	0.065	0.000	-0.499	0.816	-0.470	-0.205
	(0.218)	(0.000)	((-0.268)	(0.603)	(-0.701)	(0.000)
C	16.112	21.718	56.075	14.094	83.975	7.779
	(11.771)	(21.718)	(61.486)	(28.693)	(82.783)	(8.885)
d.f.	5	3	5	5	5	5
L1 Norm	23.942	22.756	65.088	25.537	134.301	24.202
R-squared	0.782	0.847	0.777	0.985	0.935	0.467
RMSE	3.103	1.698	3.855	1.498	4.875	1.995
MAE	2.598	1.255	2.941	1.111	3.745	1.391
MAPE	14.119	14.746	4.181	2.934	7.461	27.724
Theil's	0.080	0.076	0.027	0.017	0.036	0.109

Note: minimum optimal tuning values were reported and one standard error reported in ()
Source: Author's Calculations

The results in Table 3 show that, except for Mozambique and the case of Ghana (see results in Appendix 3), there is a positive relationship between agriculture expenditure and poverty in Cote d'Ivoire, South Africa, Nigeria, Tanzania, and DR Congo. This does not align with economic theory expectations, as agricultural expenditure was expected to reduce poverty. According to the results, when agriculture expenditure increases by 1%, poverty increases by a margin of 0.36%, 0.49%, 0.16%, 1.79%, and 0.12% in Cote d'Ivoire, South Africa, Nigeria, Tanzania and DR Congo, respectively. The largest reserve of arable land in Africa, with favourable climate and abundant water throughout the year, is found in DR Congo. Ofori-Boateng and Bab (2015) claim that poverty is primarily an agricultural phenomenon in most parts of Africa, including Ghana, and is largely concentrated in the informal

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sector. It is therefore surprising that agricultural expenditure contributes to more poverty in this country. The situation in Cote d'Ivoire has been attributed to trade and policy control that favoured imported goods over exported goods in the agricultural sector (Kone, 2007).

To explain, the World Bank (2018) suggests that urgent reforms should be implemented due to the intertwined factors, in order to create an enabling environment in the agricultural sector to achieve poverty reduction. It is quite difficult for a farmer to escape poverty because agriculture produces relatively little revenue (Neema Ciza et al., 2022). Therefore, it is critical to address the issue of farming household incomes and target low incomes from all sources of income by establishing an equitable and effective anti-poverty programme in rural areas. Anyiam et al. (2023) found contrary results for Nigeria. Agriculture expenditure has a negative impact on poverty in Mozambique. When agriculture expenditure increases by 1%, poverty decreases by 0.55% in Mozambique. Silva (2013) asserted that a number of variables that previously required the state to use force have been changed, encouraging smallholders to participate in market-based agriculture. The production of agricultural crops and livestock provided income for many households, highlighting the significance of the farm economy in rural Mozambique, thus contributing to the reduction in poverty. Al-Hassan and Jatoe (2003) conducted a study in Ghana and showed that the country's poorest groups, who are food crop farmers, have seen the least improvement in their levels of poverty since 1991. They suggested that strategies and policies encouraging the production of farm non-tradables are most likely to have the biggest impact on growth and the reduction of poverty. Horlu (2024) made similar remarks in his study in Ghana. Furthermore, the relationship between education expenditure and poverty yielded negative coefficients in Cote d'Ivoire, Nigeria, and Mozambique, in line with economic theory. This implies that increases in education expenditure help to reduce poverty. Contrary to the findings, policies targeted at improving educational attainment in DR Congo among household members had a negative impact on poverty (World Bank Group, 2018). Abaidoo (2021) used probit and logit models and two-stage least square estimation and found that, contrary to the results in Appendix 3, education has a significant negative relationship with poverty in Ghana. Similar findings were reported in Mozambique by Da Maia (2012). Joumard and Vélez (2013) also found a negative relationship between education expenditure and poverty. While there is no relationship between education expenditure and poverty in South Africa, there is a positive relationship between education expenditure and poverty in Tanzania and DR Congo. This means that when education expenditure increases by 1%, poverty increases by 2.72% and 0.05% in Tanzania and DR Congo, respectively. Ibale, Docquier, and Iftikhar (2024) posit that policies targeting education and public

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infrastructure have smaller effects due to the low mobility of unskilled workers across sectors, thus primarily impacting productivity in the formal sector and leaving the majority impoverished. In South Africa, there is evidence that students' abilities have declined rather than improved, with academic achievements showing significant inequality compared to international standards (Leibbrandt, Finn, & Woolard, 2010). These findings imply that increased spending has not translated into better educational quality or reduced poverty (Leibbrandt, Finn, & Woolard, 2010).

In addition, except for Tanzania, health expenditure has a negative impact on poverty in Cote d'Ivoire, Nigeria, South Africa, DR Congo, and Mozambique. This result aligns with economic theory. Specifically, a 1% increase in health expenditure leads to a reduction in poverty by 14.85%, 0.09%, 0.34%, 49.17%, and 2.06% in Cote d'Ivoire, Nigeria, South Africa, DR Congo, and Mozambique, respectively. These findings are consistent with the results in Ghana (see Appendix 3). The rationale is that government spending in the health sector reduces individuals' out-of-pocket health expenses, thereby lowering poverty levels. Heltberg et al. (2004) suggested that the decline in poverty due to public spending on healthcare and other sectors was influenced by the HIPC initiative, which many African countries adopted. In contrast, in Tanzania, a 1% increase in health expenditure results in a 3.52% in poverty. Martinez-Vazquez et al. (2012) and Anderson et al. (2017) reported similar findings in the case of Tanzania. In Ghana, Adjei-Mantey and Horioka (2023) showed that the availability of health facilities within one's community significantly reduces health care expenditures, thereby alleviating poverty - corroborating the findings in this article.

Furthermore, social protection expenditure has a positive impact on poverty in Cote d'Ivoire, Tanzania, and Mozambique, similar to the findings in Ghana (see results in Appendix 3). According to the results, when social protection expenditure increases by 1%, poverty rises by 0.40%, 0.49%, and 6.74% in Cote d'Ivoire, Tanzania, and Mozambique, respectively. Lucky and Sam (2018) confirmed this finding in Nigeria and concluded that social insurance policies, such as unemployment and pension insurance, tend to be more regressive than progressive. In contrast, Hodges et al. (2013) indicated that cash transfers reduce monetary poverty in Cote d'Ivoire and the Democratic Republic of Congo. Sackey (2019) explained the situation in Ghana by arguing that social protection programmes, such as the LEAP programme, are plagued by deficiencies in the amount of cash disbursed and challenges in accessing free services. Honorati (2015) also asserted that, although Ghana has many social assistance, social insurance, and labour market programmes, the system's reach remains limited, particularly for the country's poor. It is therefore not surprising that social protection programmes may inadvertently increase poverty in Ghana. Similar challenges are also

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faced in other African countries, such as Cote d'Ivoire and Tanzania. On the other hand, social protection expenditure has a negative impact on poverty in Nigeria, South Africa, and DR Congo. When social protection expenditure increases by 1%, poverty decreases by 0.09%, 0.21%, and 0.51% in Nigeria, South Africa, and DR Congo, respectively. This implies that social protection expenditure reduces poverty, which aligns with economic theory. Martinez-Vazquez et al. (2012) and Anderson et al. (2017) reported similar findings for Cote d'Ivoire, Tanzania, and Mozambique. The case of South Africa is not surprising. According to a UNDP (2017) report, despite the establishment of social protections across the board (except in Southern Africa, Ethiopia, and a few other nations), there was slowdown in progressive redistributions and in the number of transfer programmes implemented due to a lack of fiscal space.

Finally, transportation expenditure has a negative impact on poverty in Cote d'Ivoire, Nigeria, Tanzania, and DR Congo, unlike in Ghana (see results in Appendix 3), which aligns with economic theory. From Table 3, when transport expenditure increases by 1%, poverty decreases by 0.21%, 0.09%, 0.5%, and 0.47% in Cote d'Ivoire, Nigeria, Tanzania, and DR Congo, respectively. Government policies that promote free public transportation and reduce reliance on private vehicle use help citizens save more and alleviate travel-related poverty. According to Booth, Hanmer, and Lovell (2000), improving access to transport services, increasing ownership of means of transport, and upgrading infrastructure most used by the poor are all essential to reducing poverty. However, while transportation expenditure has no significant impact on poverty in South Africa, it has a positive impact in Mozambique. A 1% increase in transport expenditure results in a 0.82% increase in poverty in Mozambique. According to the World Bank (2018), poor transport performance, which affects mobility and accessibility in both urban and rural areas, hinders business activities and is a key contributor to persistent poverty in Africa. Sutherland and Kerr (2021) also found no significant impact of transport expenditure on poverty in post-apartheid South Africa, which aligns with the findings of this study. The results from Cote d'Ivoire, Nigeria, Tanzania, and DR Congo are consistent with those of Calderón and Servén (2008). As showed by Arndt et al. (2012), trade and transport systems are among the most severe structural constraints to poverty reduction in Mozambique. In Nigeria, Oladipo and Olomola (2016) found a negative relationship between transport expenditure and poverty, while Osundina et al. (2014) reported contrary findings.

Conclusion

This paper examined the extent to which government-implemented policies have contributed to reducing poverty and income inequality in six African countries - Nigeria, South Africa, Mozambique, Cote d'Ivoire, DR

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Congo and Tanzania - compared to Ghana. The Elastic Net Regression, a machine learning technique, was employed to estimate the baseline model.
The main findings revealed that, unlike Ghana, education expenditure had a negative relationship with income inequality in Nigeria, South Africa, and Cote d'Ivoire, but a positive relationship in Tanzania, DR Congo, and Mozambique. Regarding its impact on poverty, education expenditure showed a negative relationship in Cote d'Ivoire, Nigeria, and Mozambique, but a positive relationship in Tanzania and DR Congo consistent with the findings for Ghana.

In Cote d'Ivoire, health expenditure had a negative impact on income inequality. In contrast, it had a positive impact in Tanzania, Mozambique, and DR Congo, similar to Ghana. Except for Tanzania, health expenditure had a negative effect on poverty in Cote d'Ivoire, Nigeria, South Africa, DR Congo, and Mozambique - once again, consistent with Ghana.

Furthermore, social protection expenditure reduced income inequality in South Africa and Nigeria, as it did in Ghana. However, in Cote d'Ivoire, Tanzania, Mozambique, and DR Congo, it had the opposite effect. Regarding poverty, social protection expenditure had a positive impact in Cote d'Ivoire, Tanzania, and Mozambique, as in Ghana, but a negative impact in Nigeria, South Africa, and DR Congo.

Interestingly, agriculture expenditure increased income inequality in Nigeria, Mozambique, and DR Congo, similar to Ghana, but had a reducing effect in Cote d'Ivoire and Tanzania. Regarding poverty, agriculture expenditure showed a positive relationship in Cote d'Ivoire, South Africa, Nigeria, Tanzania, and DR Congo, but a negative relationship in Mozambique, consistent with Ghana.

Finally, transportation expenditure increased income inequality in Nigeria, Mozambique, and DR Congo, but reduced it in Cote d'Ivoire, South Africa, and Tanzania - similar to Ghana. In terms of poverty, transportation expenditure had a negative effect in Cote d'Ivoire, Nigeria, Tanzania, and DR Congo, whereas in Mozambique, it had a positive impact, in line with Ghana's results.

The main policy implications are as follows:

i. Policies that reduce poverty do not always lead to reductions in income inequality;
ii. Each policy has a unique and country-specific impact on both income inequality and poverty;
iii. To reverse the current trends of diverging inequality, each country must implement complementary policies that simultaneously address both poverty and income inequality.

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Appendix 1: ADF Unit Root Tests Results for Variables under Study

VARIABLES	Nigeria	Cote D'Ivoire	South Africa	Tanzania	Mozambique	DR Congo
AGRIC	-11.616	-5.415	-4.217	-4.700	-10.848	-4.925
EDU	-5.433	-4.252	-4.774	-5.212	-6.310	-5.493
HEAL	-6.972	-8.564	-7.485	-6.008	-6.925	-4.209
SOCIAL	-5.073	-5.867	-6.381	-7.545	-4.847	-6.533
TRANS	-7.643	-27.739	-5.025	-5.723	-0.048	-4.906
TAXREV	-4.884	-6.137	-5.580	-5.583	-3.176	-24.871
POV	-5.041	-6.130	-5.249	-5.479	-7.365	-9.067
GINI	-6.512	-7.031	-2.241	-9.415	-5.857	1.940

NB: All coefficients are measured at first difference.

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Appendix 2: Descriptive Statistics for the Variables (1987 – 2019)

DR Congo							
	AGRIC	EDU	HEAL	SOCIAL	TRANS	GINI	POV
Mean	-0.171	7.232	0.170	13.752	9.526	40.819	64.389
Maximum	1.904	19.117	0.662	26.552	16.445	51.200	96.030
Minimum	-2.631	0.815	-0.273	1.512	2.897	36.718	32.700
Std. Dev.	1.431	6.040	0.273	6.768	3.093	2.787	19.374
Observations	33	33	33	33	33	33	33
Mozambique							
	AGRIC	EDU	HEAL	SOCIAL	TRANS	GINI	POV
Mean	1.395	3.633	1.199	7.133	-13.709	49.925	43.065
Maximum	3.286	6.876	1.841	8.246	-4.609	54.000	63.217
Minimum	0.669	0.501	0.632	6.021	-22.809	39.900	22.913
Std. Dev.	0.509	1.955	0.361	0.672	5.499	3.911	12.271
Observations	33	33	33	33	33	33	33
Tanzania							
	AGRIC	EDU	HEAL	SOCIAL	TRANS	GINI	POV
Mean	1.500	3.363	1.563	4.536	2.906	36.996	69.764
Maximum	4.072	5.359	2.380	30.104	11.176	40.500	80.483
Minimum	-0.849	2.138	0.746	-21.032	-0.142	31.700	58.000
Std. Dev.	1.038	0.834	0.335	15.644	2.882	1.897	8.282
Observations	33	33	33	33	33	33	33
South Africa							
	AGRIC	EDU	HEAL	SOCIAL	TRANS	GINI	POV
Mean	1.453	5.134	2.770	52.090	14.438	60.119	10.392
Maximum	2.307	5.918	4.817	79.869	16.530	64.800	17.231
Minimum	0.871	4.352	0.564	26.229	9.245	34.600	3.552
Std. Dev.	0.536	0.459	1.341	15.790	1.232	5.144	4.408
Observations	33	33	33	33	33	33	33
Cote d'Ivoire							
	AGRIC	EDU	HEAL	SOCIAL	TRANS	GINI	POV
Mean	0.907	3.919	0.524	25.781	-3.753	40.481	8.885
Maximum	2.376	6.781	0.994	37.217	9.091	43.200	12.400
Minimum	0.458	2.400	0.142	14.345	-17.239	36.900	2.200
Std. Dev.	0.419	1.571	0.236	6.978	8.162	1.987	2.775
Observations	33	33	33	33	33	33	33
Nigeria							
	AGRIC	EDU	HEAL	SOCIAL	TRANS	GINI	POV
Mean	0.983	-12.951	0.813	-12.275	6.833	41.807	18.264
Maximum	4.213	0.6354	1.202	20.482	14.822	51.900	27.900
Minimum	-0.674	-30.553	0.446	-40.850	2.726	35.100	8.879
Std. Dev.	0.879	10.859	0.272	17.325	2.535	5.729	6.745
Observations	33	33	33	33	33	33	33

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Appendix 3: Empirical results of the effect of Government Intervention on Income Inequality and Poverty in Ghana

	(minimum)	(+ 1 SE)	(minimum)	(+ 1 SE)
Lambda	0.0001385	0.002984	0.0005502	0.002221
Variable	INCOME INEQUALITY		POVERTY	
AGRIC	0.783	0.428	-0.171	-0.137
EDU	0.185	0.192	0.756	0.229
HEAL	3.032	1.393	-7.610	-4.630
SOCIAL	-0.008	-0.001	0.030	0.014
TRANS	-0.177	-0.203	0.914	0.648
C	35.304	37.440	21.662	21.502
d.f.	5	5	5	5
L1 Norm	39.490	39.656	31.143	27.161
R-squared	0.638	0.496	0.612	0.471
RMSE	1.457		3.733	
MAE	1.173		2.937	
MAPE	2.923		22.189	
Theils	0.018		0.100	