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RESEARCH ARTICLE

EVOLUTION OF POVERTY, INEQUALITY AND ECONOMIC GROWTH IN WEST AFRICA: AN EMPIRICAL INVESTIGATION

James Francis Davis

Universitat I Rovira Virgili, Tarragona, Spain.

***Abstract*:** The effects of inequality and poverty on growth have been extensively debated in the literature with studies providing conflicting results. However, understanding the effects of inequality and poverty on economic growth is cardinal for informing development policies in West Africa where poverty and inequality present significant development challenges. Despite the decline in poverty, economic growth measured by GDP per capita is sharply declining in West Africa. Using recent yearly date covering 1980-2022 and applying multilevel modeling techniques (fixed effects and random effects models), this paper empirically investigates the effects of inequality and poverty on per capita growth in West Africa. The empirical estimates reveal that economic growth matters for both inequality and poverty reduction. Per capita growth reduces income inequality as well as the incidence and intensity of poverty in West Africa. Importantly, the regressions show that increases in crop production reduces poverty and inequality; hence, improvement in agricultural produce is critical for enhancing growth in West Africa. The findings suggest that inclusive policies and programs that reduce inequality and poverty are essential for boosting economic growth in West Africa.

Keywords: *Poverty, Inequality, Economic Growth, West Africa, GDP Per Capita, Development Challenges.*

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INTRODUCTION

There is an ongoing debate in the academic literature on the relationship between poverty and inequality. The development literature remains inconclusive as to whether poverty drives inequality or the vice versa. While the debate on the poverty and inequality nexus deepens, an essential variable, economic growth, has been added to the debate.

The inclusion of economic growth has deepened the controversies and discussions regarding the interrelationship between poverty, inequality and economic growth. Understanding the interplay between poverty, inequality and growth is even more critical for countries in Sub-Saharan Africa as poverty presents a huge challenge for their economic development.

The relationship between poverty and inequality is not straightforward (Beteille, 2003). While the concept of income inequality focuses on the distribution of monetary well-being, poverty only focuses on the lower end of the distributional spectrum (McKay, 2002). Inequality describes the differences in living standards and well-being of humans and affects development, democratic life, and social structures in societies (UNDP, 2013).

Economic inequality often correlates with social inequalities, such as inequality of ethnicity, religion, gender or language, and political inequality, creating mutually reinforcing forces of marginalization. Inequality can be viewed as two highly interrelated concepts: inequality of outcomes and inequality of opportunities (UNDP, 2013).

Inequality of opportunity stems from the background or conditions that shape an individual's ability to achieve matters, such as access to education. Inequality of outcomes is, on the other hand, measured as results, such as income earned.

The Kuznets hypothesis, coined after its author, was developed in 1955 in his article 'Economic Growth and Income Inequality' and has influenced economic research on inequality and growth over the years. Kuznets (1955) argued that as economies grow, inequality will initially rise and subsequently fall after a turning point, in line with the progress achieved through the stages of economic development.

This inverted U-shaped curve with inequality plotted against income per capita was reflected in the limited data available at that time. Subsequent studies have disputed Kuznets' empirical findings (Ravallion, 1995; Deininger and Squire, 1997), casting doubt on the inevitability of the inverted U-shaped relationship between income and inequality.

Bourguignon (2004) developed the poverty–growth–inequality triangle to highlight that the differences in absolute poverty in a country reflects the change in growth and inequality in that country.

In the poverty-inequality-growth triangle thesis, Bourguignon (2004) explains how the changes in absolute poverty can be attributed to changes in income growth and income inequality. Changes in poverty can be seen as a function of growth in the mean income and changes in the distribution of the relative income. Following the work of Bourguignon (2004), numerous theoretical and empirical studies have emerged examining the relationship between poverty, inequality and economic growth.

Three key results have emerged from studies on the poverty-inequality and growth nexus (Ravallion and Chen, 1997; Dollar and Kraay, 2002). The first result suggests that economic growth and changes in inequality are statistically uncorrelated. This leads to the rejection of the Kuznets hypothesis at least regarding the two decades preceding the 2000s. Despite inequality and economic growth appear to be uncorrelated on average, inequality seems to play a crucial role in the relationship between growth and poverty reduction.

The second result indicates that poverty declines as the economy grows. The level of inequality in a country determines the responsiveness of poverty reduction to economic growth and is a mediating factor in the relationship. The third result espoused by Ferreira (2010) indicates that the absolute value of the poverty–growth elasticity falls with inequality, meaning that the poverty reduction response to economic growth is stronger among low-inequality countries (Fosu, 2017; Kwasi, 2010). Accordingly, various studies find that there is large variation in the transformation of economic growth into poverty reduction across countries.

The poverty, inequality and growth nexus has been investigated in the literature with some studies indicating that economic growth can lead to higher incomes for people experiencing poverty through the "trickle-down" effect (Dollar and Kraay, 2002). However, when economic growth primarily benefits the wealthy, inequality can worsen, and poverty may persist (Nindi and Odhiambo, 2015).

While many developing countries have experienced economic growth, this has yet to translate into reducing poverty or inequality due to domestic policies and weak governance mechanisms (World Bank, 2022). Significant contributions to the debate include studies by Ali and Yao (2004) and Banerjee and Duflo (2011), who emphasized the importance of inclusiveness in reducing poverty and inequality.

The global financial crisis and the devastating economic and social impact of the COVID-19 pandemic have engendered renewed interest in investigating the relationship between poverty, inequality and economic growth. Although the empirical findings continue to inform ongoing discussions on poverty and inequality in the developing world, the empirics are complex and contentious. This has generated heated debates on effective strategies for addressing rising poverty and inequality in developing countries, especially those in Sub-Saharan Africa.

Although studies have been conducted to investigate the effect of inequality and poverty on growth, there is no research using recent data that analyses the effects of inequality and poverty on growth in West Africa. The graph below shows the trend of poverty and inequality in West Africa between 1985-2019. The graph reveals that the poverty ratio in West Africa is declining

in West Africa while inequality remains nearly constant and high relative to poverty ratio in the last 10 years.

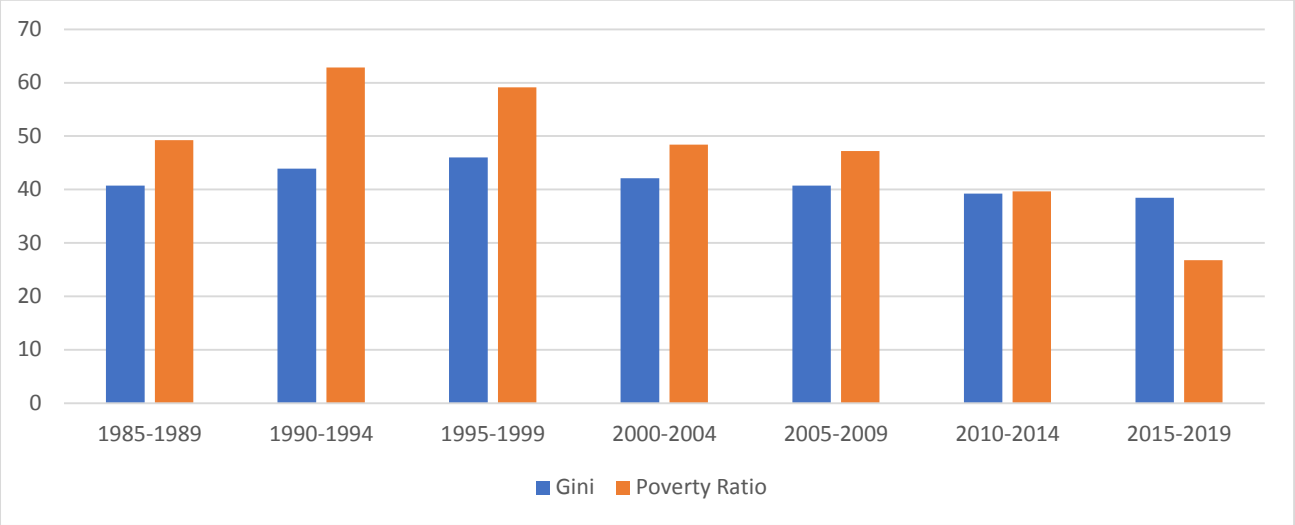

Figure 1: Trend of Poverty and Inequality in West Africa between 1985-2019
Source: Author's construction based on data obtained

Analyzing and understanding the relationship between poverty, inequality and growth in West Africa is of outmost importance. While figure 1 shows high inequality but modest decline in poverty in West Africa during the period 1985-2019, Figure 2 reveals sharp decline in GDP per capita in West Africa during the same period. The aforementioned data highlights the need for delving more into the interrelationship between poverty, inequality and economic growth in West Africa.

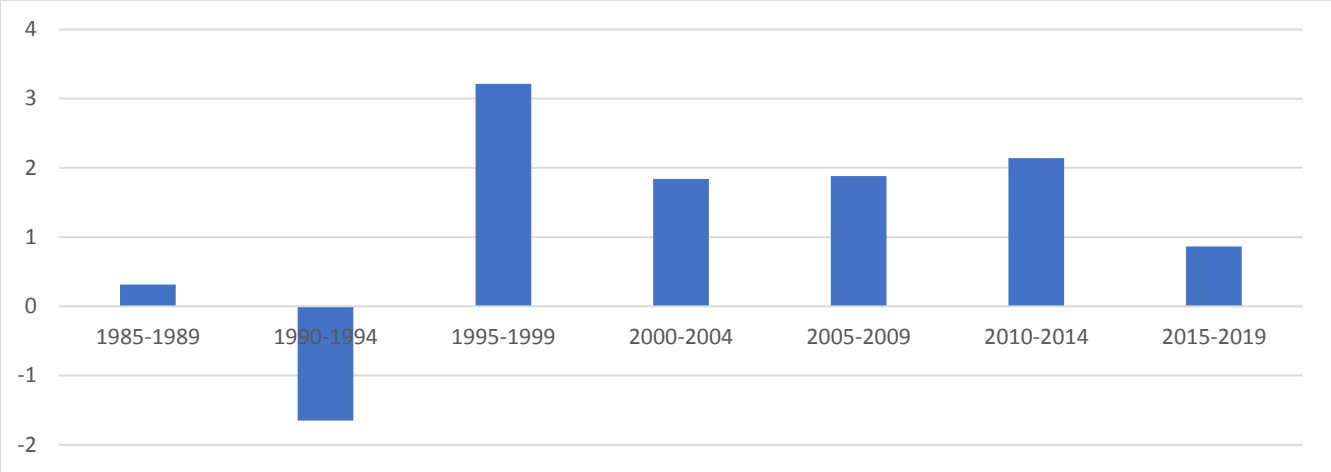

Figure 2: GDP per Capita trend in West Africa between 1985-2019
Source: Author's construction based on data obtained

Given the decline in GDP per capita in West Africa and the challenges inequality and poverty pose to growth, this study extends the existing literature by providing new empirical evidence on the effects of inequality and poverty on economic growth in West Africa.

Understanding these interrelationships are important. Despite decline in the poverty ratio, West Africa is experiencing sharp decline in GDP per capita. The literature reveals no recent study has investigated the effects of inequality and poverty on growth in West Africa under recent changing economic conditions. This paper therefore aims to close the aforementioned gaps in the literature.

LITERATURE REVIEW

Considering the plethora of theoretical models and empirical studies, the review of the literature discusses both the theoretical literature and the empirical literature. A review of both the theoretical and empirical literature in separate sub-sections will provide a comprehensive insight into the

academic literature on the poverty-inequality and economic growth relationship.

Review of the Theoretical Literature

The literature contains several theoretical models that discuss poverty, inequality and economic growth. Discussing the core theoretical frameworks and arguments will provide the basis and rationale behind the empirical literature. Hence, the key theoretical frameworks are briefly reviewed in this part of the paper.

Poverty Traps-Theoretical Models

Banerjee and Duflo (2011) argued that poverty traps exist whenever the scope for growing income or wealth at a very fast rate is limited for those who have too little to invest but expands dramatically for those who can invest a bit more. Poverty traps are characterized by the need for significant investment to escape poverty. When individuals lack this capital, they may also find it difficult to acquire it, creating a self-reinforcing cycle of poverty.

Studies (Banerjee and Duflo, 2011; Dutt and Tseling, 2019) identified a range of factors that drive poverty traps, including malnutrition, health, education, productivity, knowledge, and financial risk. Childhood malnutrition and health issues are essential challenges because of their long-term effects through educational attainment and future income through productivity. Spending priorities, lack of knowledge, under-utilized preventive care, and lagged outcomes are, however, some of the causes of why the issues are difficult to handle (Banerjee and Duflo, 2011).

Banerjee and Duflo (2011) indicated that the poor are generally more risk-averse due to the higher impact of losses on their lives. This is interconnected with the lack of available insurance and the inadequately adapted credit markets for the poor. Thus, the poor have to take the risk themselves to a higher degree and are therefore less likely to take larger risks.

The risk-averse behaviour, although often a safer choice, however, also diminishes their possibilities of achieving greater success. Not only does this lead to a lower chance of escaping the poverty trap, but it also contributes to a lower level of investments in the aggregate economy.

An essential avenue for escaping poverty is human capital, which has been argued by Lucas (1988) in his endogenous growth models. However, human capital development is often hindered by the quality of education, high drop-out rates and credit constraints (Galor and Zeira, 1993). Credit constraints also present additional hindrance to escaping poverty. Financial markets are incentivized to create credit constraints and unfavorable process for the poor because of the large, fixed costs and higher risk in financial services (Banerjee and Duflo, 2011).

Furthermore, a functioning socio-economic environment is essential for efficient educational attainment and productive use of the acquired human capital (Banerjee and Duflo, 2011). This includes better urban planning and the construction of safety nets that facilitate migration to urban employment. Credit constraints are a central growth-reducing mechanism recognized in both poverty and inequality theories.

Overall, Banerjee and Duflo (2011) emphasized the role of manpower and knowledge for economic growth, and hence advocate for education, security, and nutrition as a foundation for growth. Lack of knowledge and the responsibility to make the correct decisions for themselves are some of the reasons for the persistence of poverty amongst the poor.

The Neoclassical Growth Model

The standard theory that discusses economic growth is the neoclassical growth model (Solow 1956), in which output is a function of factors of production, including capital, labor, and total factor productivity. Investment leads to capital accumulation, which increases the marginal product of labor and the wage paid to workers. In addition, growth arising from increases in total factor production raises the marginal products of both capital and labor and therefore the income payments that they receive.

Higher investment and/or higher technological progress imply higher production and higher incomes for everyone in the economy. In addition, because of diminishing returns to capital, capital-poor countries are expected to grow faster and eventually converge to capital-rich countries.

Drawing on the neoclassical framework, Hausmann, Rodrik, and Velasco (2005) developed a general framework, "growth diagnostics," designed to inform policymakers on how to prioritize growth policies in a context of multiple distortions by targeting the most binding constraints. As in the neoclassical framework, with its emphasis on investment, economic growth depends on three elements: the returns to capital accumulation, their private appropriability, and the cost of financing capital investment.

Distortions that can lower the return on capital include high taxes or expropriation risk, large negative externalities, low productivity, or insufficient investment in infrastructure or human capital. Distortions that increase the cost of financing investment include underdeveloped domestic financial markets due to lack of banking competition or a poor regulatory framework, and impediments to international financing due to high country-risk premium, excessive regulation of the capital account, or external debt vulnerabilities.

However, the growth diagnostics analysis relies on a representative agent approach, which, like the Solow model, does not illuminate the distributional impacts of growth policies.

Savings and Incentives Theory

The effect of inequality on economic growth can be explained using the savings and investment analysis. According to this view, saving rates are increasing functions of wealth. Hence, rich people have a higher propensity to save than poorer people and accumulate larger savings. The larger savings of the rich allow for more investments in comparison to the poorer who can invest less.

Overall, this increases the aggregate savings and the capital accumulation in the economy. Income inequality will, therefore, through an increase in the rate of capital investment result in higher economic growth and development.

The model implies that the magnitude of the higher propensity to save of the rich is larger than the reduction in investments by the poor, which is identified as a hinder for growth in the models of credit constraints.

The differences in saving rate between rich and poor have effect of growth. Kaldor (1957) noted that since the richer save more of their income, higher income inequality can lead to a higher national savings rate, a higher investment rate, and greater accumulation of capital, and consequently, higher economic growth. Dynan, Skinner and Zeldes (2004) find evidence in the United States which supports the notion that both saving rates and the marginal propensity to save are positively correlated with the level of income, suggesting that higher income inequality can lead to a higher savings rate, consistent with Kaldor's hypothesis.

Inequality provides incentives to work, save, and invest—those who do will receive higher returns than those who do not. Differential returns incentivize good behaviors that promote growth. Milton Friedman based his opposition to redistributive policies aimed at reducing inequality of outcomes on the grounds of efficiency, arguing that they could distort incentives and induce an inefficient allocation of resources (Friedman, 1962; Friedman and Friedman, 1980). In a capitalist system, the distribution of income is consistent with the ethical principle, "To each according to what he and the instruments he owns produce."

This implies that in a free market economy, people should be rewarded according to their marginal productivity, resulting in some inequality of outcomes. Friedman emphasized that this inequality of outcomes could be necessary to provide incentives to perform certain types of tasks that could be risky or tedious (Friedman and Friedman, 1980). Moreover, compensation schemes that reward relative performance and thus generate inequality can provide incentives for workers to invest in skills and exert strong efforts (Lazear and Rosen, 1981).

Inequality and Growth-Imperfect Capital Market

The relationship between inequality and economic growth can be explained from using the imperfect capital market and political economy analysis. According to this theorem, inequality disincentivizes human capital investments and hence deters growth. This has been argued to take place through two mechanisms: imperfect capital markets

(Galor and Zeira, 1993) and political economy channels (Alesina and Rodrik, 1994; Persson and Tabellini, 1994). The first mechanism of imperfect capital markets focuses on human capital as a source of growth while the political model, alike the classical approach, views physical capital as a driving force of economic growth.

When the financing of physical and human capital requires credit, the existence of credit rationing will hinder growth (Galor and Zeira, 1993). This mechanism relies on the assumptions of credit market imperfections and indivisibilities in human capital investments. When information is costly and imperfect, credit rationing will take place because of the asymmetric information between the parties. The poor often have less credibility to prove their ability to reimburse, which is why individuals born into families with less assets are less likely to access credit (Stiglitz and Weiss, 1981).

Therefore, at a given level of per capita income, more unequal wealth distribution leads to a higher incidence of credit-constraint and lower growth (Galor and Zeira, 1993). The initial distribution of wealth is hence a decisive factor for the level of credit-constraint and consequently affects the aggregate level of investments in an economy. The level of credit-constraint not only has short-run but also long-run effects on investments and the skill level. The skill level is affected because of the indivisibility of human capital investments.

A higher incidence of credit-constraint diminishes the possibilities for education, causing a lower level of human capital accumulation. The low level of human capital accumulation can have intergenerational effects, as those with a lower skill level often earn less and can therefore not invest in their children's education. As human capital is an important source of growth, a lower aggregate level of human capital hinders economic growth.

The differences in growth rates and steady states between countries can, therefore, be explained with differences in wealth distribution, where the more unequal countries lag behind. The more unequal countries have a higher share credit-constraint and consequently lower human capital accumulation.

Inequality-Political Economy Analysis

Alesina and Rodrik (1994) and Persson and Tabellini (1994) presented an alternative channel for the negative relationship between inequality and economic growth. They argue that the distribution of wealth and income affects economic growth through political channels. Higher inequality causes conflict over the distributional assets, which can result in political instability and greater volatility in policies.

These consequently hinder economic growth. Furthermore, the level of inequality affects the relative position of the median voter. In a more unequal society, the median voter is poorer and, therefore, prefers a higher tax burden. Capital owners, on the other hand, favor a lower tax burden, which is optimal for economic growth (Alesina and Rodrik, 1994). The median voter's preference incentivizes the government to increase the tax rates, which in turn decreases the rate of return on private assets and constrains capital accumulation.

Thus, the median voter of an unequal society will make political decisions that hinder economic growth. Moreover, the level of inequality affects the possibilities for political lobbying and access to political markets. The rich have more political power through these channels and will take part in rent-seeking activities, which reduce the security of property rights (Persson and Tabellini, 1994). More unequal income distribution, therefore, causes slower economic growth.

Unemployment-Income Inequality

Economic recessions resulting from a variety of shocks, including financial distress and pandemics, can reduce long-term output and generate large spikes in unemployment and inequality and declines in capacity utilization (Heathcote, Perri, and Violante, 2020).

Unemployment creates income losses in the short term, especially for those in lower-income groups such as people with lower educational attainment, ethnic minorities, and women (Hoynes, Miller, and Schaller, 2012). Unemployment often results in scarring effects on incomes over the longer term. As shown by Von Wachter, Song, and Manchester (2009), 15 to 20 years after a layoff, earnings can be depressed by as much as 20 %, as workers' skill set becomes

outdated, and they lose skills that are specific to the jobs lost in a specific industry. As described in Okun's law (Cerra *et al*., 2021), unemployment varies inversely with cyclical growth. Higher growth generates employment, which improves inclusion. In general, economic volatility is associated with both lower growth and higher inequality (Cerra *et al*., 2021).

Empirical Literature

This paper organizes the empirical literature into two core groups. The first group of literature reviews studies that examined the relationship from poverty to inequality and economic growth. The second strand of literature reviews studies that investigate the relationship from inequality to poverty and economic growth.

Review of Studies Examining the Poverty-Economic Growth Relationship

The controversy about the relationship between poverty, inequality and economic growth have triggered a range of empirical studies exploring their linkages. Dollar and Kraay (2002) investigated the systematic relationship between economic growth and poverty reduction for a sample of 92 countries from 1950 to 1999. These authors found a robust pattern across countries where the share of income of the first quintile of the population varies proportionally to average incomes.

They uncovered a strong and positive relationship between these two variables, with a correlation coefficient that is not statistically different from one. Dollar and Kraay (2002) also evaluated the extent to which policies and institutions that have been identified in the literature as promoting growth can play a role in reducing poverty by increasing the share of income of the poorest quantile. The main conclusion of this analysis is that growth-enhancing policies and institutions do benefit the poor and the rest of the society in equal proportions.

Davis (1995) indicates that resource wealth – particularly mineral wealth –enhances the welfare of the poor. However, Ross (2003) finds that, after controlling for initial income, a state's dependence on mineral exports in 1970 is robustly associated with worsened conditions for the poor in the late 1990s. Other types of primary commodities are not linked to poverty.

While both oil and nonfuel minerals are associated with poverty, the causal mechanisms are different (Rose, 2003). The research shows that states in Nigeria that are dependent on nonfuel minerals experienced slow growth whereas oil-depended states experienced crowding-out of growth in the manufacturing sector and a lack of democracy.

Feldstein (1999) argues, with reference to the Pareto principle, that increased income of top earners does not make the poorer worse off and inequality is, therefore, not necessarily harmful. Increasing inequality is caused by returns to human capital, entrepreneurial activities, longer working hours, and capital, none of which harm the poorer. Policies should, therefore, shift towards a poverty reduction focus.

Feldstein (1999) discusses the three sources of poverty to be long-run unemployment, lack of earnings ability, and individual choice. These causes should be prioritized in policymaking instead of inequality reducing aims, as they are harmful to all parties.

Aigbokhan (2000) analyzed poverty profile and the polarization of income distribution in the face of structural policy reforms. Using 1985/1986, 1992/1993 and 1996/1997 national consumer survey data, the author found evidence of increased poverty and inequality, particularly in the rural and northern part of the Nigeria and among male-headed households. Bello and Roslan (2010) shows an increase in per capita GDP increases poverty by 0.6%. Ichoku *et al*. (2012) find that income growth was not pro-poor due to the unsuitable income redistribution.

Also, inequality increases GDP growth with consequential trickling down effect on poverty (Nkalu, 2015). Similarly, Edeme *et al*. (2017) examine the dynamic relationship between poverty and inequality using Nigeria microdata and find that present and past inequality levels significantly impact poverty.

Ravallion (2001) found empirical evidence to show that economic growth tends to 'trickle down' to people experiencing poverty, thus reducing poverty. In response, Bourguignon (2004) proposed a framework to test the poverty-growth-inequality triangle hypotheses empirically and found that

poverty is influenced by economic growth, distribution, and distributional changes. Notwithstanding, critics of the poverty-growth-inequality triangle argued that Bourguignon (2004) focused on aggregate concepts, which failed to capture the disaggregated nature of the interrelationships. Further, it is argued that economic growth and inequality are broad concepts that make tracing these relationships difficult.

Lopez and Servén (2009) research the role of poverty on economic growth using a sample of developing and developed countries between 1960 and 2000. They establish a negative impact of poverty on economic growth. The results are robust for various poverty line measurements, different sets of control variables, and estimation methods. High poverty levels are found to hamper growth through investments.

This mechanism is found at low levels of financial development, which is contradicting to the results by Iradian (2005). Lopez and Servén (2009) discuss the level of financial development as a key mechanism in poverty traps through credit rationing. The findings indicate a 10 % increase in poverty to cause a 0.8 to 1.1 % reduction in annual per capita growth. Inequality is included as a controlling variable to ensure that the effect is driven by the bottom share of the income distribution and is found to be insignificant. Therefore, the paper advocates for poverty reduction policies as a mechanism to aid economic growth.

Adeyemi, Ijaiya and Raheem (2009) analyzed the determinants of poverty in Sub-Sahara Africa by using cross country data of 48 countries and find that increase in population causes increase in the level of poverty in the sub-region. Klasen and Lawson (2007) find strong empirical evidence that the currently high population growth puts a considerable break on per capita growth prospects in Uganda.

Moreover, it contributes significantly to low achievement in poverty reduction and is associated with households being persistently poor and moving into poverty. At the micro-level, the literature is also full of evidence that large households are associated with poverty (Lanjouw and Ravallion, 1994; Szekely, 1998).

Gries and Redlin (2010) examined the short-run and long-run dynamics of growth, inequality and poverty on a panel of 114 developing countries and six regional sub-panels for 1981-2005 and finds that in nearly all cases the variables exhibit a short-run and long-run relationship.

The findings further reveal positive bi-directional causality between growth and inequality, inequality and poverty, and negative bi-directional causality between growth and poverty. Salvador and Diana's (2012) finding supports the assertion that growth causes unidirectional poverty reduction. Khan *et al.* (2014) examined growth-inequality-poverty triangle and found that poverty is increased by income inequality while growth reduces poverty.

Ormonde (2011) examines the question of whether mineral resource rents have helped to reduce poverty rates in countries with an extensive mineral base in a cross-country case study analysis involving Botswana, Nigeria, Zambia, Bolivia, Chile, and Venezuela. The results indicate that Chile and Botswana have managed to utilize mineral rents to propel strong economic growth and reduce poverty, but inequality levels remain high in both countries.

Levels of poverty are noticeably the lowest in Chile while Nigeria and Zambia, which have been unable to capitalize on their extensive mineral bases to poverty rates, have the highest poverty rates among the countries. On the other hand, Venezuela and Bolivia have experienced both volatile economic growth and varied levels of poverty. Recently, Ulriksen (2012), using natural resource dependence, measured as natural resource exports as percentage of GDP, find that natural resource dependence has a significant positive effect on poverty in selected developing countries, including Botswana.

Ravallion (2012) finds initial poverty to have a negative effect on growth in developing countries, but only conditional on the controlling of the initial mean income distribution. High levels of initial poverty both hamper subsequent growth as well as reduce the effect of growth on poverty reduction. Furthermore, the initial inequality is only found to affect growth when it includes a high incidence of poverty.

The results are, therefore, more applicable to developing countries where the poverty headcount ratio is likely larger than in developed countries.

McKay and Perge (2013) took a different approach in investigating the existence of poverty traps by measuring wellbeing with assets rather than consumption or income in order to achieve less volatile results. They aim to distinguish between the transient poor and chronic poor to understand the differing effects on growth. While they are unable to find evidence for multiple dynamic equilibria, the results cannot refute the existence of a static structural poverty trap at a low level of asset ownership.

The accumulation of income and assets may create multiple equilibria due to hinders that only allow for some to escape the traps (McKay and Perge, 2013). Similarly, Vijayakumar (2013) argues that the lack of social and economic participation can hamper economic growth, creating a cycle of poverty and deterioration. He finds a significant and positive relationship between the dependency ratio and poverty, and vice versa using cross-country data of Asia, Sub-Saharan Africa, and Latin America.

The dependency ratio is a demographic measure of the dependent population, under the age of 14 or over the age of 65, to the working-age population. Furthermore, economic growth is negatively and significantly associated with the dependency ratio. Vijayakumar (2013) thus argues that increasing poverty increases the dependency ratio, which causes a negative spiral of the poverty trap over generations. He mentions education, health, and awareness as key variables to reduce the dependency ratio and achieve growth.

Using panel data of 85 countries covering 1960 to 2000, López and Servén (2015) find that a 10 percentage-point increase in the poverty rate reduces the GDP per capita growth rate by 1 percentage point. In particular, an increase in the poverty rate reduces the investment rate for countries with low levels of financial development.

There is also evidence that the negative impact of poverty on growth depends on the initial level of poverty. In a sample of 156 countries covering 1960 to 2010, Marrero and Servén (2018) find that for low levels of poverty (below the median), poverty has an insignificant impact on growth. In contrast, when the poverty rate is high, a 10 percentage-point decrease in headcount poverty is associated with an increase in economic growth ranging from 1% to 2% per year.

Dutt and Tsetlin (2019) compared the explanatory power of poverty and inequality for economic development. They used various machine learning approaches to predict and compare the explanatory powers of different measures of income distribution. The results indicate the poverty headcount ratio to be of higher significance for predicting schooling, institutional quality, and income per capita than the Gini index.

The poverty headcount ratio is also more strongly correlated with the schooling and income per capita at the time, while neither poverty nor the Gini index are associated with the contemporary institutional quality. The results question the strong focus on inequality in the literature and suggest that more attention should be directed towards the bottom of the income distribution.

Studies Examining the Income Inequality-Economic Growth Nexus

Alesina and Rodrik (1994) and Persson and Tabellini (1994) presented similar theoretical models in which the distribution of wealth and income affects economic growth negatively through political channels. Alesina and Rodrik (1994) tested their theory empirically using a sample of countries at various levels of development between 1960 and 1985.

Their estimations indicate that both land inequality and the Gini index are significantly and negatively correlated with subsequent growth in the long run. Clarke (1995) confirms the findings for various measures of inequality and several regression specifications.

He uses a sample that consists of both developing and developed countries between 1970 and 1988. Despite the significance of the results, the size of the effect is small, as a one standard deviation decrease of inequality below the mean increases annual economic growth between 1.3% and 2.5%. Likewise, Persson and Tabellini (1994) confirm the

results using the initial relative position of the median income earner as a measure of inequality for both pre- and post-war data. The pre-war data consists of developed countries while the post-war sample includes both developed and developing countries. The negative effect of inequality is found to apply to both samples, but their findings are conditional on the presence of democracy in the countries. Inequality is only found to have a significant effect on economic growth in democratic countries.

Thus, they suggest that the mechanism through which inequality affects growth could be political. The finding is, however, disputed by Alesina and Rodrik (1994), Clarke (1995), and Deininger and Squire (1998), where the first two do not find a difference in the relationship regarding democracy and the latter find contradicting results.

Galor and Tsiddon (1997) find that a concentration of high-skilled workers in technologically advanced sectors allows a higher rate of technological innovation, promoting higher growth rates but also increasing inequality. Using fixed effects panel data techniques, Cingano (2014) finds a negative effect of inequality on growth for a sample of 30 OECD countries for the period between 1970 and 2010. Berg *et al.* (2018) find that net inequality has a negative effect on growth in a sample of advanced and developing countries, and moderate redistribution through taxes and transfers does not have statistically significant effects on growth.

Deininger and Squire (1998) find a negative relationship between initial asset inequality and long-term economic growth. The relationship is found to be robust for a sample of developing countries but becomes insignificant when only high-income countries are included in the sample. They discuss two possible theories for the negative relationship: credit rationing (Galor and Zeira, 1993) and political bargaining (Persson and Tabellini, 1994).

However, the insignificant results for democratic countries counterprove the idea of the growth effects of political bargaining and voting mechanisms. More credible reasoning, according to Deininger and Squire (1998), is that credit rationing of indivisible investments excludes those with limited or no assets from making profitable investments. This is supported by the finding that initial inequality is found to be more harmful to the poor than the rich. Thus, their results challenge the political theories presented by Alesina and Rodrik (1994) and Persson and Tabellini (1994). Instead, the mechanism might operate at a lower level of inequality, suggesting that more focus should be placed on poverty.

Deininger and Squire (1998) also tested the effect of initial income inequality on subsequent growth but did not find it to be significant. Furthermore, the significance of the initial asset inequality ceases when regional dummies are introduced, which causes the authors to question the robustness and validity of the results. These results suggest that regional-specific characteristics may instead be driving the relationship between initial asset inequality and economic growth.

Forbes (2000) and Iradian (2005) find a positive relationship between inequality and growth in the short to medium-term by using average three to seven-year panels. Forbes (2000) studies a data set of 45 countries between 1966 to 1995, limited to mainly developed countries. Both studies use the Gini index as a measure of inequality. The researcher finds a 10% increase in the Gini index to cause a 1.3% increase in average annual growth.

The data is skewed towards developed countries due to data quality issues, which questions the applicability and robustness of the results for developing countries. The sample used by Iradian (2005), however, includes a higher share of developing countries between 1965 and 2003, and confirms the positive relationship also for developing countries. The positive relationship between inequality and growth is weaker in countries with more financially developed markets, suggesting that inequality drives growth through credit market imperfections (Iradian, 2005).

Based on African data, Ali and Thorbecke (2000) find that poverty is more sensitive to income inequality than it is to income. At the country level, a number of studies have found positive effects of inequality and income on poverty (Datt and Ravallion, 1992; Kakwani,

1993). Adams (2004) provides elasticity estimates showing that the growth elasticity of poverty is larger for the group with the smaller Gini coefficient (less inequality). More recently, Fosu (2008; 2009; 2010a, b) make similar observations for the Africa region. For example, Fosu (2010b) finds that the responsiveness of poverty to income growth is a decreasing function of inequality, and that the income elasticity of poverty is actually smaller than the inequality elasticity.

The impact of inequality on growth can also depend on the initial level of development. Barro (2000) estimates the impact of inequality on growth by splitting a sample of 100 countries into high- and low-income samples. In that specification, there is a negative relationship between inequality and growth for poor countries, while the relationship is positive for richer countries.

The empirical results suggest that in the presence of credit constraints, inequality prevents low-income households from accumulating human and physical capital, resulting in lower growth in poor countries. On the other hand, the positive relationship observed in richer economies is consistent with the traditional growth-enhancing effects of inequality emphasized by Kaldor (1957).

Banerjee and Duflo (2003) find a nonlinear relationship between changes in inequality and growth. They argued that growth is an inverted U-shaped function of changes in inequality such that a change in the Gini coefficient in either direction is correlated with lower future growth. The outcome of their research rejects the standard linear specification of cross-country growth regressions and suggests an explanation for the seemingly contradictory results obtained in the literature.

However, the non-linear relationship could also reflect omitted variables in the empirical model. For instance, Aiyar and Ebeke (2020) show that the negative effect of inequality on growth largely depends on the degree of intergenerational mobility. In countries with higher intergenerational mobility, the negative impact of income inequality can be more easily reversed because the poor have more opportunities to improve their living standards. In particular, they show that in their specification, the nonlinear term proposed by Banerjee and Duflo (2003) is not statistically significant, suggesting that intergenerational mobility could be capturing the nonlinear relationship between inequality and growth.

The effects of inequality on output might also differ across economic sectors. Erman and Te Kaat (2019) identified the effect of inequality on industry-level value added growth. The authors used a data set that included 22 industries in 86 countries for the period between 1980 and 2012.

They find that higher income inequality increases the growth rates of industries that use physical capital intensively, while it decreases the growth rates of industries that use skilled labor intensively. Thus, the lower human capital stock associated with inequality drives its negative effect on growth. At the country level, these results are consistent with the theoretical predictions by Galor and Moav (2004).

Evidence from panel data studies also indicates that the effect of inequality on growth might depend crucially on the level of the development and the time horizon of the growth spells. Brueckner and Lederman (2018) find that income inequality may be beneficial for transitional growth in poor countries but becomes harmful for growth in economies with high average income, contradicting the results by Barro (2000).

Regarding the time horizon, Halter, Oechslin, and Zweimüller (2014) find that higher inequality is beneficial for economic performance in the short term, but in the long term the net effect of the relationship tends to be negative. Inequality reduces the duration of growth spells (Berg, Ostry, and Zettelmeyer, 2012; Berg and Ostry, 2017), with most of the results coming from cross-country differences rather than changes over time.

Poverty hinders people from participating in the economy, consequently preventing them from contributing to economic growth (Lopez and Servén, 2009). The limited economic contributions by the poor can create a poverty trap, possibly with multiple equilibria, where poverty is self-reinforcing. Quah (1993; 1996; 1997) establishes theoretical and empirical “emerging twin peaks”, where countries cluster at the two

ends of the income level spectrum. Thus, the evidence supports stratification and the convergence club theories instead of simple divergence or convergence theories. The stratification trends in the empirical evidence could be linked with the theory of social capabilities and conditional convergence by Abramovitz (1986), where the peaks represent different levels of social capabilities.

METHODOLOGY

To take into account the within and between effects of the different variables over time, the study adopted multilevel modelling techniques (fixed effects models and random effects models). The fixed effects model is essential for controlling for unobserved individual-level differences that may be correlated with the response variable. Further, the fixed-effect method produces consistent estimates of the coefficients even in the presence of correlation between the explanatory variables and the individual-specific effects.

Unlike Ordinary Least Squares (OLS) and other linear regressions methods, fixed-effect method limits the sources of bias to time-varying variables that correlate with the treatment as well as with the outcome over time (Brüderl and Ludwig, 2015). On the other hand, a random effects model is useful in estimating the effect of one or more categorical variables on a continuous outcome variable, while accounting for the fact that the categorical variables are a random sample from a larger population.

In a random effects model, the effect of the categorical variables is allowed to vary across the levels of the variable. The study contains yearly data covering the period 1980-2022 for West Africa. An increasing number of researchers (Angrist and Pischke, 2010; Mood, 2010; Breen et al., 2018) have endorsed and recommended the use of linear fixed-effect models even for binary dependent variables because these models can provide unbiased and consistent estimates of average effects (Wooldridge, 2010). Hence, this study adopts the below equation:

$$Y_{i.t} = x_{i.t}\,\beta + z_i\,y + u_{i.t} + c_i$$

In order to estimate the effect of inequality on growth, the following formula was used:

$$Gini_{i.t} = GDPpc_{i.t} + OIL_{i.t}\ DEBT_{i.t} + FDI_{i.t} + CP_{i.t} + UNE_{i.t} + \varepsilon_{i.t}$$

Where $Gini_{i.t}$ is the measure of inequality in country *i* in period t; $GDPpc_{i.t}$ is the GDP per capita in country i in period t; $OIL_{i.t}$ is the oil rent obtained in country i in period t; $DEBT_{i.t}$ is the total debt owed by country i in period t; $FDI_{i.t}$ is the total foreign direct investment in country i in period t; $CP_{i.t}$ is the total crops produced in country i in period t; and $UNE_{i.t}$ is the unemployment rate in country i in period t. Lastly, $\varepsilon_{i.t}$ represents the error term of the model, and the period t are applicable to all variables although not explicitly written in the model.

To capture the effects of poverty on growth, the study uses the following formula:

$$POV_{i.t} = GDPpc_{i.t} + OIL_{i.t}\ DEBT_{i.t} + FDI_{i.t} + CP_{i.t} + UNE_{i.t} + \varepsilon_{i.t}$$

Where poverty ratio is used as the dependable variable against a vector of variables including GDP per capital, oil rent, debt, FDI, crop production and unemployment.

While poverty headcount ratio provides information on the proportion of people in a population that are poor, it does not measure the depth and intensity of poverty within a population. Understanding the relationship between poverty gap and a range of predictable variables is vital. Therefore, the paper uses the below formula to investigate the aforementioned:

$$PG_{i.t} = GDPpc_{i.t} + OIL_{i.t}\ DEBT_{i.t} + FDI_{i.t} + CP_{i.t} + UNE_{i.t} + \varepsilon_{i.t}$$

Where PG is the poverty gap and is the response variable used against a list of predictable variables to include GDP per capita, oil rent, debt, FDI, crop production and unemployment rate.

Data Description

Yearly data for all the variables were obtained. The data covered the period 1980-2022 for countries in West Africa.

The study uses poverty headcount ratio at US$2.15 per day for measuring poverty rate in the population. It is expressed as a % of the population living below the US$2.15 per day.

The Gini index was used to represent inequality and it measures the extent to which the distribution of income or consumption among individuals or households within an economy deviates from a perfectly equal distribution. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.

Unlike the poverty headcount ratio, the poverty gap examines the depth of poverty within the population, and it is also set at US$2.15 per day. The poverty gap is the mean shortfall in income or consumption from the poverty line $2.15 a day (counting the nonpoor as having zero shortfall), expressed as a percentage of the poverty line. This measure reflects the depth of poverty as well as its incidence.

GDP per capita was used in the paper to represent economic growth and it is a measure of income per person in the population. FDI as a % of GDP was used and is defined as direct investment equity flows in an economy. Oil rents as a % of GDP was used and captures the difference between the value of crude oil production at regional prices and total costs of production. Debt was used in the study as a % of Gross National Income (GNI) which captures the total external shocks of gross national income.

Given the importance of agriculture to poverty reduction and economic growth, crop production index was used in the data. Crop production index shows agricultural production for each year relative to the base period 2014-2016. Unemployment is recorded as a % of total labor force and refers to the share of the labor force that is without work but available for and seeking employment. All the data were obtained from the World Bank Development Indicators database.

EMPIRICAL ESTIMATIONS AND RESULTS

The study uses both fixed effects models and random effects models to examine the effects of the interaction of the different variables discussed in the paper. The paragraphs that follow discuss the results obtained from fixed effects models and random effects models.

Fixed Effects Models

The study employed fixed effects model to consider the between and within effects. An essential benefit of this model is that it limits potential sources of biases in the estimations (Collischon and Eberl, 2020). Table 1 provides the estimation results for the variables considered in this study.

The first model examines the relationship between inequality and economic growth while controlling for other variables during the period 1980-2022 in West Africa. The result reveals an inverse relationship between growth and inequality suggesting that an increase in growth reduces inequality across the 18 countries in the study.

The results further show that inequality has negative relationship with crop production and unemployment thus indicating an increase in the number of crops produced reduces inequality by 3% while an increase in unemployment reduces inequality by 39%. On the other hand, inequality has positive relationship with FDI, the value of crude oil and debt across the 18 countries during the same period.

The second model shows the estimations results of the effects of poverty on growth while taking into account a range of other key variables. The relationship between poverty and per capita growth is negative and significant. The estimates show that increases in the value of crude oil, crop production and unemployment reduce poverty in West Africa during the period 1980-2022.

Furthermore, the estimations indicate that poverty has positive relationship with FDI and debt thus suggesting that an increase in FDI and the stock of external debt increases poverty in West Africa during the same period.

The third model examines the effects of a range of predictable variables on the depth of poverty in West Africa during the period 1980-2022. In this study, the depth of poverty is represented by the poverty gap. The estimations show that GDP per capita reduces poverty gap in West Africa and is significant. The results further indicate that increases in the value of crude oil produced, increase in the number of crops produced and

increase in unemployment reduce poverty gap. On the other hand, the stock of external debt and FDI has positive relationship with poverty gap.

Random Effects Models

The study employs random effects models to examine the random effects of the variables discussed in the paper. As noted by Allison (2009), random effects models assumed that the unobserved variables are correlated with or statistically independent of all the observed variables. While fixed effects captured the specific characteristics of variables that remain constant across observations, random effects account for variability between variables within a larger group.

Model four examines the between and within random effects of a number of predictable variables including GDP per capita, Oil rent, external debt, FDI, crop production and unemployment rate on income inequality in West Africa using yearly data from 1980-2022. The estimation reveals that GDP per capita has positive but insignificant effect on income inequality. Oil rent, external debt stock, FDI and unemployment also have positive and insignificant effect on income inequality while crop production has negative and significant relationship with income inequality in West Africa during the same period.

The fifth model investigates the relationship between poverty ratio and a number of important growth variables. The results indicate that GDP per capita has negative and significant relationship with poverty ratio. The estimations show that increases in external debt, crop production and unemployment rate reduce poverty ratio. On the other hand, increase in the value of crude oil produced and FDI increases poverty ratio in West Africa.

The last model empirically investigates the impacts of a range of variables on poverty gap in West Africa using yearly data covering the period 1980-2022. The estimations indicate that GDP per capita reduces poverty gap in West Africa. Additionally, the stock of external debt, increases in the number of crops produced and unemployment rate reduces the poverty gap by 2%, 23% and 49% respectively while increases in the value of crude oil produced and FDI deepens the poverty gap in West Africa during the same period.

Table 1: Estimation results

	Model 1 (FE)	Model 2 (FE)	Model 3 (FE)	Model 4 (RE)	Model 5 (RE)	Model 6 (RE)
Number of Observations	81	82	82	81	82	82
Number of Countries	18	18	18	18	18	18
F-Statistics	0.00	0.00	0.00			
R^2 Within	0.23	0.61	0.49	0.18	0.58	0.48
R^2 Between	0.13	0.59	0.63	0.01	0.79	0.74
R^2 Overall	0.00	0.56	0.52	0.11	0.68	0.58
	Inequality as Response Variable	Poverty Ratio as Response Variable	Poverty Gap as Response Variable	Inequality as Response Variable	Poverty Ratio as Response Variable	Poverty Gap as Response Variable
GDPpc	-0.00	-0.01***	-0.01**	0.00	-0.01***	-0.00***
	(0.13)	(0.01)	(0.04)	(0.92)	(0.00)	(0.00)
OIL	0.16	-1.17***	-0.46	0.11	0.11	0.11
	(0.61)	(0.00)	(0.12)	(0.43)	(0.73)	(0.64)
DEBT	0.01	0.00	0.00	0.01	-0.02	-0.02
	(0.24)	(0.97)	(0.87)	(0.61)	(0.22)	(0.18)

FDI	0.03	0.76***	0.39**	0.07	0.73***	0.37***
	(0.78)	(0.00)	(0.02)	(0.65)	(0.00)	(0.00)
CP	-0.03	-0.31***	-0.20***	-0.06***	-0.38***	-0.23***
	(0.19)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
UNE	-0.39	-0.37	-0.66	0.12	-0.89***	-0.49***
	(0.35)	(0.80)	(0.52)	(0.69)	(0.01)	(0.01)

*** Significant at 1% level; ** Significant at 5% level; *Significant at 10% level

DISCUSSION

The estimations reveal a negative relationship between inequality and economic growth. Although there is positive relationship shown between inequality and growth by the random effects models, the relationship is statistically insignificant, and the coefficient is zero. Overall, increases in per capita growth are associated with decline in inequality in West Africa over the period 1980-2022.

This result confirms the findings of Alesina and Rodrik (1994), Deininger and Squire (1998), Cingano (2014) and Berg *et al*. (2018) who examined the inequality-growth nexus and concluded that growth reduces inequality.

The empirical estimates indicate correlation between poverty and economic growth in West Africa. The results show that economic growth reduces the poverty headcount ratio. This result is constant across all estimations in the current study. This finding supports earlier conclusions of (Ravallion, 2001; Dollar and Kraay, 2002; López and Servén 2015) who found that high economic growth is associated with decline in the poverty ratio. This finding also supports the argument that inclusive growth is essential for poverty reduction.

Given that poverty is a complex phenomenon, using a single measure of poverty limits understanding of the poverty situation. Hence, to assess the degree of poverty, empirical investigations were conducted using the poverty gap index. The results suggest that per capita growth reduces the poverty gap and are consistent across all models used in this study.

The estimations show that economic growth reduces both the incidence of poverty as well as the intensity of poverty across West Africa. As economic growth increases the general income level and the quality of health and educational programs, it holds substantial poverty-reducing potentials as affirmed by the findings in this study.

The estimations show that inequality, poverty ratio and poverty gap have positive relationship with FDI and mixed relationship with debt and the value of crude oil production. This indicates that increases in FDI widens inequality and increases poverty in West Africa. The positive relationship between FDI and poverty contradicts earlier findings (Klein, Aaron and Hadjimichael, 2013; Magombeyi and Odhiambo, 2018) which indicate that FDI is necessary for poverty reduction through its ripple effects on employment and economic growth. However, if FDI is not properly managed and is deployed in economies with weak institutions, it might well be a recipe for increases in poverty and inequality.

Interestingly, the empirical estimates show that inequality, poverty ratio and poverty gap have inverse relationship with the level of unemployment in West Africa. The results indicate that higher level of unemployment reduces poverty and inequality. This finding runs contrary to a number of studies (Hinteregger, 2017; Sambo, 2019) that argue that higher unemployment is associated with high levels of poverty and inequality through income losses.

An essential dimension of the results is the effect of crop production on poverty and inequality. The estimations indicate that crop production has negative relationship with poverty and inequality in West Africa over the period 1980-2022. This suggests that increases in the number of crops produced in West Africa will minimize poverty ratio and reduces inequality. This finding is aligned with the conclusions of Mpundu and Biopape (2022) that concluded that food production is important for poverty reduction.

CONCLUSION

Per capita growth is essential for reducing higher inequality in West Africa. This finding can be explained from several dimensions. Increasing economic growth is

associated with financial development thus providing access to finance to low-income households.

Rising economic growth provides increased opportunities for human capital development which when properly exploited can yield reduction in inequality in an economy. Additional mechanisms through which growth reduces inequality include the provision of job opportunities for the poor thus enhancing their incomes and living standards.

Hence, growth-enhancing policies are cardinal avenues for reducing the rising inequality in West Africa. Additionally, pursuing inclusive policies that tend to reduce inequality will increase the development impacts of growth.

Similar to inequality, economic growth is pivotal to reducing both the incidence and intensity of poverty in West Africa. Given the high rate of poverty in West Africa, accelerating economic growth is imperative. However, with growth declining in West Africa, and poverty on the rise, achieving poverty reduction requires the removal of significant structural barriers that impede economic growth.

Additionally, increasing global economic uncertainties and weak institutions across West Africa present further economic recovery challenges. Therefore, structural reform programs that break the cycle of poverty and build strong institutions are essential for economic growth in West Africa.

Foreign direct investment deepens inequality and widens poverty in West Africa. Although West Africa's potentials to attract foreign direct investment are significant, the empirical evidence show that foreign direct investment adversely affect growth by increasing poverty and deepening inequality.

Given the political economy of West Africa, weak institutions could be the key factor militating the effects of foreign direct investment on inequality and poverty. The potential misuse of foreign direct investment which benefits only the elites increases inequality between the elites and the poor while pushing additional people into poverty.

Crop production matters for poverty reduction and inequality in West Africa. As revealed in the estimations, increase in the number of crops produced reduces poverty and inequality in West Africa during the period 1980-2022. This finding highlights the significance of the agriculture sector in West Africa to reduce poverty and boost economic growth. Given West Africa's vast arable land and good climate suitable for crop production, significant investment in crop production is expected to enhance growth in Africa and reduce poverty as well as strengthen food security in the wake of rising food prices in the global market.

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