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Evaluating the impact of microcredit on poverty prevalence in Sub-Saharan Africa

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ABSTRACT

This study investigates the impact of microcredit on poverty prevalence in SSA. The study adopts a panel regression framework assisted by the generalized method of moments to analyze data across 20 SSA countries from 2009 to 2019. The results show that microcredit effectively diminishes headcount poverty, primarily due to its long-term sustainability when embedded within a wider socioeconomic environment. Income, educational levels, loan terms, and the level of agricultural involvement were found to determine the success rate of microcredit programs. Poverty is persistent, indicating the presence of structural hindrances that significantly affect what microcredit can achieve in poverty alleviation through transformation. Although microcredit helps facilitate financial inclusion in the short term, its long-term effectiveness is hampered by a lack of financial literacy and high interest rates relative to access to markets. Addressing poverty in SSA requires more than just microcredit; it must be part of a comprehensive framework that includes education and economic growth. Enhancing financial literacy, modifying loan terms, increasing structural investments in agriculture, improving service delivery through technology, and fostering public-private partnerships will enhance the sustainability and impact of microcredit.

Contribution/ Originality: This study uniquely investigates the implications of microcredit, a specialized branch of microfinance, on a global issue using multiple country cases, which enhances the generalizability of the results. The study further contributes by providing multiple econometric evidence through pooled OLS, fixed effects, random effects, and the generalized method of moments. This strengthens the robustness of the results and also increases the efficiency of the estimates. Moreover, it guards against possible endogeneity.

1. INTRODUCTION

Poverty continues to be one of the most important issues in the world today (Addae-Korankye, 2019; Al-Azzam & Charfeddine, 2022; Smith & Jones, 2023). The problem of poverty in Sub-Saharan Africa (SSA) is particularly grave as the region has the highest poverty rate in the world (Félix & Belo, 2019; Jennings & Oldiges, 2020; Matjasko, D'inverno, Marshall, & Kearns, 2020). For instance, in 2021, about 689 million people, representing 9% of the world's population, lived below the poverty line of $1.90 (measured at 2011 purchasing power parity) per day. The data further indicates that out of this figure, 490 million people, representing 71.12%, are in Africa, and an average of 66% lived below the poverty line in SSA (World Bank, 2021), making it the poorest sub-region in the world. Poverty still exists due to a myriad of factors, including social structures that tend to widen the income gap, lack of access to capital or finance, and inadequate infrastructure for effective economic engagement (Debrah, 2013; Scott, 2021). It is this situation that has generated interest in the use of microcredit as a strategy for poverty

alleviation and financial inclusion. Microcredit was introduced by pioneers such as Muhammad Yunus and his Grameen Bank model (Yunus, 2020) to provide lower-income earners with small loans, enabling them to be self-employed, engage in business activities, and promote self-sufficiency and strong financial standing (Yunus, 2020).

Governments, development agencies, and international organizations have made the effort to end this menace of poverty by 2030 (Sustainable Development Goal-1) (Bank, 2021; Hassan, Alshater, Banna, & Alam, 2023). Microcredit has emerged as the solution (Yunus, 2020). Studies conducted in SSA regarding the effects of microcredits on poverty alleviation have produced divergent views. Some of these studies argue that microcredit expands access to these households' earnings, enables them to accumulate assets and allows them to cope with economic shocks (Félix & Belo, 2019; Subramaniam, Masron, Wahab, & Mia, 2021; World Bank, 2021); however, other studies (Al-shami, Al Mamun, Rashid, & Al-shami, 2021; Boateng, Boateng, & Bampoe, 2015; Cull, Demirgüç-Kunt, & Morduch, 2021; Khan & Malik, 2020) conclude that microcredit has very limited effectiveness in terms of addressing poverty in the long run and when the beneficiaries are charged exorbitant interest rates with no additional economic literacy.

The multiple dimensions of poverty, such as education, healthcare, and other essential services in SSA, add another layer of complexity to evaluating the success of microcredit. Additionally, many studies Aragón, Karaivanov, and Krishnaswamy (2020), Boateng et al. (2015), and Damoah (2021), are mostly based on a single countries, limiting the applicability of their findings across SSA. This highlights the need to evaluate the impacts of microcredit on poverty prevalence across various countries in SSA to enable stakeholders and policymakers to better understand the true value of microcredit interventions in the region.

Studies on evaluating microcredit in SSA (Aragón et al., 2020; Boateng et al., 2015; Damoah, 2021) face the problem of the methodological issue of endogeneity, whereby unilateral observed factors such as borrower motivation, skills among entrepreneurs influence both the decision to borrow microcredit and what such borrowing would achieve.

This makes it impossible to ascertain the effect microcredit has on poverty levels. Additionally, there have been insufficient longitudinal studies in the SSA region to assess the long-term effects of microcredit on poverty levels. The absence of systematic, region-wide longitudinal studies on microcredit has made it impossible to draw dependable, evidence-based conclusions regarding its contributions to poverty alleviation (Gupta, Kumar, & Rao, 2023; Zhang, Huntsinger, Li, & Li, 2018).

Microcredit effects and evaluation gaps are addressed in this study, which examines the impact of microcredit on poverty prevalence in 20 countries in Sub-Saharan Africa (SSA) using multi-country econometric models, including panel data regression and GMM procedures. By employing these methodologies, the study aims to address some of the measurement and endogeneity issues that have persisted in most previous studies. This research not only seeks to determine whether microcredit programs reduce poverty in SSA but also aims to identify specific conditions under which microcredit programs are most or least effective.

Its goal is to provide knowledge that informs the development of more robust empirical microcredit policies and broader poverty eradication strategies in SSA. In summary, this study contributes by uniquely investigating the implications of microcredit, a specific branch of microfinance, on a global issue through multiple country case studies, thereby enhancing the generalizability of the results. Additionally, the study provides multiple econometric evidence using pooled OLS, fixed effects, random effects, and the generalized method of moments, which strengthens the robustness of the results and increases the efficiency of estimates. This approach also helps to mitigate potential endogeneity.

The primary objective of this study is to analyze the role of microcredit in influencing poverty levels in SSA. Specifically, it aims to examine whether microcredit affects poverty rates in 20 Sub-Saharan countries and to assess how income levels, education, and agricultural productivity influence the impact of microcredit programs on poverty.

2. LITERATURE EMPIRICAL

2.1. Empirical Literature

Research within regions outside Sub-Saharan Africa describes encouraging microcredit impacts on poverty levels in particular. To illustrate, Aktar and Bakshi (2023) and Chen and Ravallion (2010) focused on microcredit in Southeast countries, stating that low-income households' access to financial institutions enabled them to lessen the headcount index and the poverty gap among others metrics of poverty (Al-Azzam & Charfeddine, 2022; Pham et al., 2023; Smith & Jones, 2023). For instance, Dao (2020) conducted research for the microcredit schemes in Vietnam and found that households with access to credit had improvements in their income levels and that children's education was also positively affected, although this impact was not very strong across indicators (Nguyen, Lee, & Singh, 2022; Patel & Singh, 2022). These research works, however, also note that the empowerment of the program participants is very likely to be mediated by social norms on borrowing and credit availability, and this makes it inappropriate to expect the same findings across different research sites (Liu, 2016; Rahman & Hussain, 2023; Zhou, Huang, Shen, & Tian, 2023).

The impact of microcredit on poverty reduction in Sub-Saharan Africa (SSA) has received considerable attention, with both encouraging and discouraging findings. As Mondal (2009) analyzed the performance of microcredit in SSA, he has concluded that although microcredit has the potential to increase household income and savings, the financial benefit is undermined by high borrowing rates and tight loan repayment terms which impose a heavy burden on borrowers (Kofi, Baafi, & Sarkodie, 2022; Ofori & Kashiwagi, 2022; Zhang et al., 2018). In a similar vein, De Haan and Lakwo (2010) analyzed microfinancing in Uganda and found that although the provision of credit led to social empowerment, the economy suffered from a weak market structure where micro-enterprises were not adequately facilitated (Dlamini & Mandla, 2022; Owusu, Grace, & Peter, 2023). Microcredit is believed to decrease poverty, however, Al-shami et al. (2021) suggest that its success in SSA is very much affected by the structure of the related loans and whether borrowers receive complementary inputs of financial literacy and skills training (Arbolino, Carlucci, Cirà, Yigitcanlar, & Ioppolo, 2018; Hieu & Thanh, 2017; Stewart et al., 2012).

Numerous studies focusing on women emphasize the complex aspects of microcredit in alleviating poverty, including being tolerant of women's increased operationalization in poverty-affected areas in Sub-Saharan Africa. In this regard, and because women are the most prominent microcredit clients in SSA, it has been noted that some scholars highlight the fact that microcredit empowers women economically (AKhan & Malik, 2020; Kofi et al., 2022). Particularly, it has been noted that women borrowers in rural areas have increased their decision-making ability and have access to better educational opportunities for their children (Khan & Malik, 2020). However, these benefits may be offset by the stress brought about by repayment and high interest rates as women have to juggle between family and business responsibilities (Chen & Zhang, 2022; Khan & Khalil, 2023). Gupta et al. (2023) further argue that microcredit serves the purpose of generating women entrepreneurs but the profit from the business is not enough to enhance the household's standard of living due to lack of adequate market to grow the business in the first place (Mohammed, Alsaif, Abdelhalee, & Farah, 2024; Nishimura & Joshi, 2021).

As for the analysis of the effects of microcredit on urban and rural poverty, rural areas certainly reap the most benefits because of other non-financial services (Basak & Chowdhury, 2024). In a similar context, Hieu and Thanh (2017) and D'Espallier, Hudon, and Szafarz (2013) found that microfinance practices such as microcredit leads to household income and assets ownership in rural regions of SSA where there is little of formal banking service provision (Ofori & Kashiwagi, 2022; Qiu, Luo, & Li, 2024). There are urban areas, on the other hand, where the availability of various credit sources can minimize the worth of microcredit services; in some cases, more aggressive competition promotes selection biases and leads to over-indebted situations (Bhuiyan & Ivlevs, 2019; Ding, Wang, de Brauw, & Qiu, 2024). It is assumed, however, that in rural areas, the impact of microcredit is also mediated by the literacy of borrowers and the degree of commercialization of products or services provided by businesses financed through microcredit facilities (Kuuwill et al., 2024).

Many researchers have treated the evaluation of microcredit's contribution to poverty reduction, especially in SSA, as a researchable or empirical problem, to which appropriate methodologies and tools based on principles of economics can be applied. Several recent studies use panel data regression models and GMM techniques to address endogeneity problems, which arise when unobserved variables affect access to credit as well as poverty outcomes (Akpoghome & Joseph-Asoh, 2022; Olaosebikan, Egbon, & Olayemi, 2022). Endogenous factors are also responsible for the differences in microcredit programs' effectiveness. Nakano and Magezi (2020), for instance, conducted RCTs in Tanzania to determine the effects of microcredit on agricultural performance and established that microcredit improved output under certain conditions and was ineffective in areas with poor infrastructure and underdeveloped agricultural markets (Mensah, 2023). While this methodological stringency enhances the understanding of microcredit's impact, it does not eliminate the existing problems with how microcredit's lasting effects are comprehensively addressed and its influence is disentangled from other national and global economies (Liu, 2016; Zhang et al., 2018).

Some insights have been gained, including the role of training for financial literacy and the provision of more flexible loan conditions, which are often cited as vital for harnessing the potential of microcredit (Mensah & Baidoo, 2023). It has also been observed that if these additional measures are not taken, the microcredit debt created by microfinance institutions, particularly during periods of high interest rates, can cause more harm rather than provide value and may increase borrowers' vulnerability (Ansah & Darko, 2022; Bawa, Ibrahim, & Yaro, 2023; Doumbia & Traore, 2023). According to Zongo and Kouadio (2023), microcredit combined with the skills and training of borrowers has been associated with a more enduring reduction of poverty, since borrowers can use the funds effectively and secure dependable income-generating ventures (Asamoah & Oppong, 2022; Nyarko & Boateng, 2023). This observation emphasizes the need for a more comprehensive approach to the issue of microcredit and its implementation in SSA, where a myriad of socio-economic aspects influence access to finance (Boahene & Adomako, 2023; Esenam & Ofori, 2023).

To conclude, microcredit has been shown through anecdotal evidence to boost the living standards of certain households in SSA; however, its effectiveness is very specific to each case (Anani & Opoku, 2023). Interest rates, established repayment patterns, the degree of education of its borrowers, and the economic standing of the regions are core factors that shape outcomes respectively (Amoh & Owusu, 2022).

The variation of the findings within SSA relative to the other articles emphasizes the need for microcredit schemes to be customized to local environments in terms of repayment schedules, interest rates, and the provision of financial literacy training (Chen & Zhang, 2022). However, as the number of research studies increases, there is more and more evidence that microcredit cannot be solely responsible for alleviating poverty within SSA; rather, it should be viewed as part of a multi-layered approach to address the issue of poverty, where all measures are evidence-based and target the various sociocultural environments found in SSA (Agyei & Owusu, 2023).

2.2. Theoretical Basis

The Poverty Trap Theory emerges as a critical framework for assessing the role of microcredit in reducing the incidence of poverty in Sub-Saharan Africa (SSA). This theory elucidates the reasons why poverty can characterize certain communities or regions for a long period of time.

It is hypothesized that individuals or households that are trapped in poverty do not have the means and resources (Adeyemi, 2023; Zhang, Li, & Wang, 2022). For example, those people who are poor often face the issue of having to start with no or limited funds, which would prevent them from generating revenue initially. Therefore, these individuals can hardly expect to rise out of poverty (Kim & Park, 2022; Taylor & White, 2023).

3. DATA AND METHODOLOGY

3.1. Research Design

A quantitative study was conducted to explore the link between the level of microcredit and the level of poverty in 20 SSA countries from 2009 to 2019. Such an approach is useful for examining facts and causation, as the relevant information is based on credible data sources such as the World Bank and national statistical offices. Data were obtained from the World Development Indicators agency, PovcalNet for poverty estimates, and microcredit data acquired from the MIX Market dataset. For the sample, 20 countries in SSA were selected to encompass a broader regional scope by including countries and cases from different economic, social, and geographical backgrounds. The selected countries in SSA made it possible to generalize the findings across a significant area. The choice of countries and the study period was purely based on data availability. The panel design allows for examining variations and the time factor in the impact of microcredit on poverty reduction across different countries and over time. Data were collected from sources such as national statistics offices of the countries in the region and international organizations, including the World Bank. Figures from published studies were also collected from the literature. Variables used were chosen based on consumption theories and guided by the available literature.

3.2. Data and Sampling

World Development Indicators (WDI) offers comprehensive economic development indicators such as Gross Domestic Product, Trade, Education, Gross Capital Formation, Agriculture Value Added, and Population Growth (Araujo & Reinhart, 2022). PovcalNet provides detailed estimates of poverty prevalence (Ravallion & Chen, 2022). The Microcredit Information Exchange (MIX) Market offers specific microcredit-related data, including the gross loan portfolio of microcredit institutions and borrower retention rates across sub-Saharan African countries. MIX Market information has been extensively used in studies exploring the potential of microcredit to reduce poverty and foster economic development (Cull, Demirgüç-Kunt, & Morduch, 2022).

3.3. Model Specification

The study uses panel regression models, Poverty Trap Theory, and empirical works like Subramaniam et al. (2021) and Nsiah (2021) to analyze the impact of microcredit on the poverty prevalence level in SSA. A baseline model is given as

$$lnPov_{it} = \alpha_i + lnY_{it} + \varepsilon_{it} \quad (1)$$

Where lnPov is the Natural Log of Poverty Index for country i at time t; Y_{it} is Natural Log Gross Domestic Product per Capita (Income) for country i at time t; ε_{it} is the error term for country i at time t. According to Foster, Greer, and Thorbecke (1984) Head Count index is an appropriate measure of poverty. Now, microcredit and other control variables could be introduced into Equation 1 to give Equation 2.

$$lnHCI_{it} = \alpha_i + \beta_1 lnY_{it} + \beta_2 lnMC_{it} + \beta_3 lnTRD_{it} + \beta_4 lnEdu_{it} + \beta_5 lnGCF_{it} + \beta_6 lnBRR_{it} + \beta_7 lnAVA_{it} + \beta_8 lnPG_{it} + \varepsilon_{it} \quad (2)$$

Where headcount index that is represented by HCIit in country i at time t. Gross Loan Portfolio measures microcredit that is represented by MC_{it} in country i at time t. Trade in country i at time t is represented by $TRDi_t$. Edu_{it} indicates Education in country i at time t. While GCFit is Gross Capital Formation in country i at time t. BRR_{it} is Borrower Retention Rate in country i at time t; AVA_{it} shows Agric Value Added in country i at time t, and

PG_{it} represents Population Growth in country i at time t. α_i is the intercept and $\beta_1 to\ \beta_8$ represents the coefficients of the explanatory variables, respectively.

To avoid certain econometric modelling issues such as biased, inefficient and inconsistent results, estimating the above equations with the ordinary regression estimation may not be optimal. (Stock & Watson, 2007). It follows that the Random Effect and Fixed Effect models could therefore be adopted. Thus, the following random and fixed effect models regression that controls for unobserved specific effects are estimated by this study.

$$lnHCI_{it} = \alpha_i + \beta_1 lnY_{it} + \beta_2 lnMC_{it} + \beta_3 lnTRD_{it} + \beta_4 lnEdu_{it} + \beta_5 lnGCF_{it} + \beta_6 lnBRR_{it} + \beta_7 lnAVA_{it} + \beta_8 lnPG_{it} + Z_i + g_{it} \quad (3)$$

$$lnHCI_i = \alpha_i + \beta_1 lnY_i + \beta_2 lnMC_i + \beta_3 lnTRD_i + \beta_4 lnEdu_i + \beta_5 lnGCF_i + \beta_6 lnBRR_i + \beta_7 lnAVA_i + \beta_8 lnPG_i + g_i \quad (4)$$

Endogeneity could invalidate the estimates, thereby leading to biased results and inconsistent estimator values. Endogeneity occurs when there is a correlation between one or more explanatory variables and the error term, possibly due to omitted-variable bias, measurement errors, or simultaneity. To address this problem and avoid spurious results, the Generalized Method of Moments (GMM) has been used as an estimation technique. The GMM format becomes

$$lnHCI_{it} = \alpha_i + rHCI_{it-1} + \beta_1 lnY_{it} + \beta_2 lnMC_{it} + \beta_3 lnTRD_{it} + \beta_4 lnEdu_{it} + \beta_5 lnGCF_{it} + \beta_6 lnBRR_{it} + \beta_7 lnAVA_{it} + \beta_8 lnPG_{it} + g_{it} \quad (5)$$

Where HCI_{it-1} is the prior value of the index used as instrumental variables.

3.4. Model Tests

There are, however, several tests carried out to ascertain the reliability and validity of the model. Firstly, the Breusch and Pagan Lagrangian Multiplier Test serves to test whether the random effects model is an improvement over the basic ordinary least squares. Secondly, Pesaran's Test for Cross-Sectional Independence confirms the absence of cross-sectional relations across countries of the residuals; if such relations exist, robust standard errors are applied where heteroscedasticity is detected. Moreover, the Hausman test is used to determine the superiority of either Fixed Effects (FE) or Random Effects (RE) models.

4. RESULTS AND DISCUSSION

4.1. Descriptive Results

Table 1 provides the summary statistics in relation to means, standard deviation, and ranges. Each variable is assessed based on the number of observations, mean, standard deviation, minimum, and maximum values. These explanations help in understanding fundamental economic and social structures.

43.952% represents the mean headcount ratio with 220 observations. This implies that, on average, almost 44% of the population is trapped in poverty. 18.539% shows a standard deviation, indicating variability around the mean. This suggests a wide variation in poverty levels across the sampled records. The lowest figure of 9.223% indicates low levels of relative deprivation in some areas. The highest figure of 80.73% reflects high rates of deprivation in certain regions. Economically, high poverty signifies extended economic hardship and potential issues with welfare systems.

Table 1. Summary statistics.

Variables	Observation	Mean	Standard dev.	Minimum	Maximum
Poverty (Headcount)	220	43.952	18.539	9.223	80.73
Gross loan portfolio (US$)	220	24,660,944	33,103,529	161,782	181,543,009
Income (US$)	220	1487.07	1547.034	290.156	8737.041
Trade	220	89.327	61.215	1.000	197
Education (Secondary)	220	75.468	45.314	1.000	149
Gross capital formation	220	25.698	8.668	9.941	56.396
Borrower retention rate	209	70.163	14.106	37.780	113.15
Agric value added	220	22.541	11.672	1.927	60.61
Population growth	220	2.74	0.517	0.387	3.759

$24,660,944 indicates the average value of the gross loan portfolio. This suggests that financial institutions, on average, issue a significant amount of loans. $33,103,529, on the other hand, indicates a high standard deviation, reflecting considerable variation in the size of loans issued by various microcredit institutions across different regions. $161,782 is the minimum, showing that some organizations have few credits, while at their maximum, loans can reach as high as $181,543,009. This indicates the presence of very large microloans. Larger gross loan portfolios may imply more developed financial systems and higher economic activity. Large deviations signal variations in regional economic development across the studied areas. The average income per capita is $1,487.07, with a standard deviation of $1,547.034, indicating significant income inequality in SSA. Income levels vary greatly among countries, with a minimum recorded income of approximately $290,156, highlighting poverty in some nations. The maximum income recorded is $8,737,041, reflecting substantial income inequality within SSA.

220 observations were recorded for trade as a proportion of GDP. The trade percentage stands at 89.327%, indicating that trade constitutes a significant portion of the GDP. The standard deviation, at 61.215%, suggests considerable variability due to differences in trade among various countries. Additionally, there is a wide range from a minimum of 1.000 to a maximum of 197, implying that some regions have minimal trade activity while others have trade volumes nearly double their GDPs. Economically, a higher trading intensity relative to GDP reflects a more integrated country within the global economy, which can promote economic growth but also increase vulnerability to international market shocks.

Education also had 220 observations. This indicates the percentage of the population that has completed secondary education. The average is 75.468% across the 20 SSA countries included in the study. The standard deviation of 45.314% shows the variability in educational levels among these regions. The minimum value is 1%, and the maximum is 149%. This suggests significant disparities in educational achievement across regions, with some areas having little or no formal education, while others have extensive systems culminating in secondary school completion or higher.

The observations for the borrower retention rate are 209. This measure indicates how often a borrower continues to borrow from the same institution across 20 countries. The mean retention rate is 70.163%, suggesting that on average, 70% of borrowers return to the same institution for loans. The standard deviation of 14.106% shows variability in borrower loyalty among different institutions. The minimum retention rate is 37.780%, with a maximum of 113.15%. This highlights notable differences in lender behavior, with some banks exhibiting very high borrower retention rates. High borrower retention rates indicate customer satisfaction and trust in financial institutions, which positively impact financial stability and growth.

The mean value of agricultural value added is approximately 22%. This represents agriculture's percentage contribution to GDP. The standard deviation is 11.672%, indicating variability across different countries. Values range from a minimum of 1.927% to a maximum of 66.061%. This highlights divergent levels of agricultural significance, with some countries heavily dependent on agriculture while others are less so. Countries with higher agricultural value added are generally less industrialized and more vulnerable to climate change and fluctuations in agricultural markets.

4.2. Poverty Prevalence and Microcredit

The regression results in Table 2 are a pooled OLS, random effect, fixed effect, and GMM estimation on poverty headcount. All variables are expressed in logarithms (LN). For LNGLP (Gross Loan Portfolio), the coefficients across the models indicate that an increase in the gross loan portfolio is associated with a decrease in headcount poverty. Specifically, these are -0.033, -0.050, -0.059, -0.032, and -0.156 for Pooled OLS, RE, FE, and GMM Short-run, respectively, with varying levels of statistical significance. However, Fixed Effect and GMM demonstrate strong significance, suggesting a robust relationship between microcredit and poverty alleviation, particularly in the long term.

On LNY (Income), all model coefficients are negative, indicating that higher income is associated with lower levels of poverty incidence rates at the household level. The coefficients are -0.586 (Pooled OLS), -0.441 (RE), -0.299 (FE), -0.155 (GMM Short-run), and -0.757 (GMM Long-run), all significant at the 1% level. This strong inverse relationship highlights the importance of income growth in reducing poverty, as clearly demonstrated over a long period using the GMM model.

Table 2. Poverty (Headcount) and microcredit.

Variables	Pooled OLS	Random effect (RE)	Fixed effect (FE)	System GMM	
				Short-run	Long-run
LNGLP	-0.033*	-0.050**	-0.059***	-0.032***	-0.156***
	(0.018)	(0.019)	(0.022)	(0.008)	(0.035)
LNY	-0.586***	-0.441***	-0.299***	-0.155***	-0.757***
	(0.054)	(0.082)	(0.106)	(0.025)	(0.116)
LNTRD	-0.048***	-0.002	0.030	-0.013	-0.064
	(0.016)	(0.027)	(0.036)	(0.008)	(0.041)
LNEDU	-0.078***	-0.033	-0.016	-0.011	-0.054
	(0.024)	(0.030)	(0.034)	(0.008)	(0.038)
LNGCF	-0.200**	-0.242***	-0.284***	-0.133**	-0.649***
	(0.090)	(0.094)	(0.100)	(0.053)	(0.233)
LNBRR	-0.348***	-0.104	-0.065	-0.053*	-0.258**
	(0.101)	(0.129)	(0.141)	(0.026)	(0.135)
LNAGRIVA	-0.204***	-0.137	-0.160	-0.111***	-0.543***
	(0.063)	(0.091)	(0.127)	(0.018)	(0.083)
LNPG	-0.026	0.057	0.050	0.052*	0.254**
	(0.104)	(0.136)	(0.150)	(0.027)	(0.128)
LNHCP(-1)				0.795***	
				(0.016)	
Constant	11.522***	9.241***	8.249***	3.354***	
	(0.750)	(0.963)	(1.085)	(0.421)	
Observations	209	209	209	190	190
Probability>F	0.000	0.000	0.000	0.000	
R-Squared	0.5924				
Within R2		0.1734	0.1852		
Between R2		0.6754	0.4819		
Overall R2		0.5390	0.3929		
Hausman (Chi2)		10.00***	10.00		
Wald test (Chi2)			17687.59***		
AR(2) [Prob]				0.805	
Hansen [Prob]				0.241	

Note: The dependent variable is Headcount Poverty. Standard errors are in parentheses. *, ** and *** represent statistical significance at 10%, 5% and 1% respectively.

The impact of LNTRD (Trade) on poverty is ambiguous. The pooled OLS model shows a significant negative relationship (-0.048), whereas other models do not show significant effects. This suggests that the association between trade and poverty could be either positive or negative, depending on certain features that these models do not capture. Regarding LNEDU (Education), increased education is associated with a reduction in headcount poverty, with the Pooled OLS model (-0.078) being highly significant at the 1% level among all other selected

models. However, other models do not provide any significant findings, indicating that additional variables may influence the relationship between education and poverty.

LNGCF (Gross Capital Formation) reveals a negative coefficient in all the models, indicating that higher gross capital formation would reduce headcount poverty rates. These coefficients are -0.200 (Pooled OLS), -0.242 (RE), -0.284 (FE), -0.133 (GMM Short-run), and -0.649 (GMM Long-run), with mostly significant impacts across other models, apart from a few cases, affirming this argument in most instances under study but not all. This further supports its importance in reducing poverty, especially in the long term.

Negative coefficients in the case of LNBRR (Birth Rate) imply that a higher birth rate will lead to lower headcount poverty, although with varying levels of significance across different models applied hereon. The regression results using different estimation methods indicate that both high and low population growth rates can cause increases in headcount poverty in Africa. For example, high population growth rates have been found to worsen living standards, thereby increasing levels of headcount poverty. Some economists argue that rapid population growth has contributed to higher poverty levels, with more people experiencing poverty in developing countries. This suggests that population growth is an important factor in determining headcount poverty rates in Africa.

LNAGRIVA (Agricultural Value Added) shows that higher agricultural value added is associated with lower headcount poverty. The GMM models, particularly, have a strong significance with coefficients of -0.204 (Pooled OLS), -0.137 (RE), -0.160 (FE), -0.111 (GMM Short-run), and -0.543 (GMM Long-run). This implies that improvement in agricultural productivity can greatly reduce poverty, especially in the long run.

On LNPG, this is a very ambiguous variable regarding its impact on the poverty rate because different models give diverse results about it. In some cases, for instance, gross domestic product per capita may turn out to be high, but many people still live below the threshold level of $2 per day. However, other scholars argue that, due to an increase in population size, there has been an increase in child labor, which has negatively affected education levels and, consequently, led to an increase in the number of people living in poverty. Some studies have found a positive relationship between GDP growth rate and headcount poverty, while others have found a negative correlation. Additionally, some research indicates that higher GDP per capita does not necessarily translate into lower poverty rates, implying low efficiency and distributional weaknesses within the economy.

The coefficient for LNHCP (-1) (Lagged Headcount Poverty) in the GMM short-run model is 0.795, indicating the persistence of poverty over time. The coefficient estimates suggest that the lagged dependent variable significantly affects the current incidence of poverty, providing evidence of a poverty trap among SSA countries. The constant terms represent the intercept values for estimating headcount ratios when all variables used in this study are equal to zero. Statistically significant constants include 11.522 (Pooled OLS), 9.241 (RE), 8.249 (FE), and 3.354 (GMM). These values indicate high baseline poverty levels, highlighting the need for interventions that address the root causes of poverty.

The models are statistically significant, indicating that they are unlikely to have been created at random. Therefore, the probabilities that these observed relationships occurred by chance in the data are nearly zero. These R-Squared values show how much of the variance in headcount poverty can be explained by its independent variables. The pooled OLS model accounts for approximately 59.24% of the variation, while the fixed effect and random effect models provide different proportions for within, between, and total variance. Specifically, for the fixed effect model, the R-Squared values are as follows: overall R-Squared = 0.5390, within R-Squared = 0.1734, and between R-Squared = 0.6754. The random effect model has an overall R-Squared of 0.3929, with within R-Squared = 0.1852 and between R-Squared = 0.4819.

Hence, based on the Hausman test result with a significant Chi2 value of 10, it suggests that fixed effects rather than a random effects model would better explain that relationship (Baum, Schaffer, & Stillman, 2023). This means that country-specific characteristics are important in determining how microcredit affects income levels and poverty

rates (Baltagi & Wu, 1998). In other words, Wald test chi2 (17687) = prob>chi2=0000 indicates joint significance of all explanatory variables. Furthermore, AR (2) can also suggest no serial correlation among residuals since the p-value is greater than < 0.05 (Baltagi & Wu, 1998). Eventually, this implies that all instruments used in the GMM model are valid tools due to the Hansen test chi2 = (26) with prob> chi2 0.241.

Therefore, this regression analysis demonstrates significant relationships between microcredit as well as income plus other socio-economic factors with headcount poverty (Zeller, Sharma, & Choudhury, 2022). Thus, higher gross loan portfolios and income, education, and gross capital formation, but trade and agricultural value-added, show mixed effects on poverty. This is also evident in the lagged poverty variable of the GMM model, which indicates the persistence of poverty over time. Therefore, it is paramount to target economic policies and interventions for reducing poverty in such an analyzed setting.

From the findings of this research, it can be concluded that microcredit serves as a major tool against poverty in Sub-Saharan Africa (SSA), especially when complemented with broader socio-economic inputs. The results suggest that increased availability of microcredit, measured through gross loan portfolio, is significantly associated with reductions in headcount poverty rates, particularly in the long term. This impact further emphasizes the need for financial inclusion in poverty reduction strategies. However, the study also reveals that the effectiveness of microcredit varies depending on income level, educational background, loan characteristics, agricultural productivity, and socio-economic features of the target populations. While microcredit is a powerful instrument, it cannot fully address the complex socio-structural nature of poverty in SSA. A comprehensive approach is necessary, where microcredit is complemented by education policies, healthcare, infrastructure development, and economic growth initiatives. Policymakers must understand the interconnectedness of these factors and adopt synergistic strategies for poverty alleviation. Addressing structural issues alongside microcredit provision and a coherent development trajectory can foster economic growth and resilience in SSA. This integrated approach will not only enhance the short-term benefits of microcredit but also promote long-term socio-economic development across the region.

5. POLICY SUGGESTIONS

First, it is necessary to introduce financial education curricula as part of microcredit programs so that borrowers understand how to make proper use of loans and generate returns. Constraints of loan terms should also be revised downward concerning microcredit charges and ease of repayment policy conditions so that microcredit can be used effectively by low-income groups. Moreover, it is imperative to point out that microcredit schemes should be integrated within development strategies aimed at improving education, healthcare, and infrastructure, thereby enhancing sustainability. Agricultural productivity needs to be prioritized under microcredit schemes, especially in rural areas where value chain investments can facilitate economic development and reduce poverty.

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