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Article

The Effect of Digital Financial Inclusion on Inclusive Growth and Poverty in Emerging and Developing Economies: A System-Generalized Method of Moments Model

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Abstract

This study investigates the effect of digital financial inclusion on both inclusive growth and poverty in Emerging and Developing Economies (EMDEs). While previous research has explored the relationship between digital financial inclusion and either inclusive growth or poverty, there is a notable gap in the literature regarding the indirect effect of digital financial inclusion on poverty through the mediation of inclusive growth. Additionally, many existing studies have focused on specific countries, leaving a need for a cross-sectional analysis across various EMDEs, particularly in under-researched regions like Central Africa, Southern Africa, West Africa, Oceania, and South-Eastern Europe. To address these gaps, this research employs panel data and the System-Generalized Method of Moments (GMM) as the main estimation technique, which helps to provide robust and efficient estimates while addressing potential endogeneity. The study constructs a new digital financial inclusion index using the Principal Component Analysis (PCA) approach to enable consistent cross-country comparisons. The findings reveal that digital financial inclusion has a positive and significant effect on inclusive growth, indicating that as digital financial inclusion increases, so does inclusive growth. The results also demonstrate that inclusive growth has a negative and significant effect on poverty, suggesting that equitable economic expansion is a key driver of poverty reduction. These findings provide valuable insights for policymakers and governments in EMDEs, helping them to prioritize investments and strategies that leverage digital financial inclusion to foster inclusive growth and alleviate poverty.

Keywords: digital financial inclusion; system GMM; inclusive growth; poverty; EMDEs

JEL Classification Codes: C33, G00, G21, 053, 054, 055, I32

1. Introduction

Poverty continues to be one of the biggest challenges faced by developing countries as most of the people living in these countries do not have access to essential financial services. For the past 20 years, credit unions, savings cooperatives, and microfinance organizations have made significant strides, yet most of the world's impoverished communities still do not have access to formal financial institutions (Xu et al., 2024). Digital financial services can help alleviate poverty levels by providing impoverished populations with access to basic financial services and products. Through the adoption and use of technology, digital financial inclusion has the potential to end the poverty cycle by liberating previously disadvantaged groups and fostering inclusive growth, particularly in EMDEs.

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1.1. Digital Finance: Driving Inclusion and Growth

There is currently no consensus on how to define digital finance, however, there is a general agreement that it encompasses all technology and or infrastructure, products, and services that assist businesses and people in accessing credit facilities, payments, and savings through online channels (Ozili, 2018). Digital finance has attracted a lot of interest from scholars and policymakers as a means of alleviating poverty and increasing financial inclusion. All participants involved in the financial sector, including users of financial services, companies that supply digital financial services (such as application programming interfaces, web, machine learning, and mobile devices), regulators, decision-makers, and the economy benefit greatly from digital finance.

Global dialogues emphasize that EMDEs should strive for inclusive growth that goes beyond economic growth (Kouton, 2019) as economic growth alone is not sufficient to achieve equitable growth. Digital financial inclusion can play a crucial role in fostering inclusive growth in EMDEs by providing access to financial services and products to financially excluded individuals and businesses.

1.2. Digital Inclusion, Growth, and Poverty: A Research Gap

Most prior research has focused on either the impact of digital financial inclusion on inclusive growth (Khera et al., 2021; Ozturk & Ullah, 2022; Thaddeus et al., 2020; Xun et al., 2020) or the impact of financial inclusion on poverty (Lyons et al., 2020; Koomson et al., 2020; Peng & Mao, 2022; Polloni-Silva et al., 2021). These studies have demonstrated that digital finance does reduce poverty and is closely related to the advancement and expansion of inclusive economic growth. Furthermore, research has revealed that a potent instrument for combating poverty is financial inclusion. However, the existing literature lacks explicit studies examining the effect of digital financial inclusion on both inclusive growth and poverty simultaneously. Put differently, the effect of digital financial inclusion on poverty through the intervention of inclusive growth is not available in the existing literature. Therefore, it is essential to examine how digital financial inclusion impacts poverty through inclusive growth, as these two topics are closely interconnected and important for achieving equitable growth.

Moreover, there is insufficient research on the effect of digital financial inclusion on inclusive growth and poverty from EMDEs' perspective, as most studies have focused on specific countries as opposed to a cross-section with several countries. As a result, there has not been much attention on simultaneously investigating the effect of digital financial inclusion on inclusive growth and poverty in various EMDEs. Due to the higher prevalence of financial exclusion in EMDEs, they require a more thorough investigation as they have not been sufficiently covered in existing literature, thus providing a gap to explore. In the African region, most of the studies found that an increase in digital financial inclusion leads to a decrease in poverty (Kelikume, 2021; Koomson et al., 2020; Lyons et al., 2020; Wale-Awe & Evans, 2023). Similarly, in the Asian region, results from most studies suggest that digital financial inclusion can significantly lower poverty levels (Peng & Mao, 2022; Tay et al., 2022; Wang & He, 2020; Xie, 2023). Additionally, studies in the African and Asian regions also found that digital financial inclusion significantly and positively affects inclusive growth (Afolabi, 2020; Iddrisu et al., 2023; Sarpong & Nketiah-Amponsah; 2022; Wang & Yu, 2024; Xun et al., 2020; Yang et al., 2024;) which ultimately leads to poverty reduction. Other regions of interest in the current study, such as Oceania and South-Eastern Europe, have received limited to no scholarly attention from existing literature. Therefore, this research will contribute to the scarce literature in these regions. Examining several countries simultaneously can assist us in identifying trends that might not be apparent or too obvious in a single country. This may enable more broadly applicable conclusions regarding our specific topic for this Working Paper.

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1.3. Study Contributions: Digital Inclusion, Growth, and Poverty Analysis

The analytical techniques employed in this Working Paper seek to empirically establish the effect of digital financial inclusion on inclusive growth and poverty in EMDEs. Considering the shortcomings, this study adds to the body of knowledge in four ways.

a) *Methodology Contribution: System-GMM & PCA Index*

First, this study empirically examined the effect of digital financial inclusion on inclusive growth and poverty in EMDEs by employing the System- GMM as the main estimation technique. System GMM offers reliable and effective estimates, solves the endogeneity issue, and better fits panel studies. The study constructs a new digital financial inclusion index by employing the principal component analysis (PCA) approach. The index enables a cross-country comparison of the level of digital financial inclusion and thus provides a consistent method for monitoring progress across various countries.

b) *Contribution: Digital Finance and Poverty Through Inclusive Growth*

Second, the effect of digital financial inclusion on poverty through the intervention of inclusive growth is not available in the existing literature. Therefore, there is a need to examine digital financial inclusion's effect on poverty through the intervention of inclusive growth. Unlike economic growth, inclusive growth ensures that the benefits of the growth of the economy are allocated equitably, thus reducing poverty.

c) *Regional Contribution: Digital Inclusion, Growth, Poverty Analysis*

Thirdly, this study investigates the effect of digital financial inclusion on inclusive growth and poverty in Central Africa, Southern Africa, West Africa, Oceania, West Asia, and South Asia, as there are scarce studies in these regions, and hence they require more consideration.

d) *Methodological Contribution: Justifying Panel Data Use*

Finally, this study employed panel data as it provides more insightful data, improves efficiency, provides more variability, and reduces variable collinearity (Greene, 2005; Gujarati, 2003; Woolridge, 2002). Furthermore, panel data provides a way of managing unobserved countries and or time-specific heterogeneity, which could be correlated with the explanatory variables included in the study (Akbar et al., 2011).

1.4. Study Findings: Digital Inclusion, Growth, and Poverty Links

The findings reveal that digital financial inclusion has a positive and significant effect on inclusive growth in EMDEs at a 10% significance level. The sign and magnitude indicate that when digital financial inclusion increases by a percentage point, inclusive growth will increase by 0.7428 units. Digital financial inclusion is crucial to accomplishing inclusive growth as the process and effort of developing a digital society continue to grow (Song et al., 2022).

Moreover, the findings also demonstrate that inclusive growth has a negative and significant effect on poverty in EMDEs at a 5% significance level. The sign and magnitude indicate that when inclusive growth increases by a percentage point, poverty will decrease by a magnitude of 0.0415 units. Concerns over rising inequality despite economic growth have culminated in an increasing awareness of the significance of inclusive growth and development in international development (Kuss et al., 2022).

Investigating the effects of digital financial inclusion on inclusive growth and poverty in EMDEs will enable policymakers and governments to identify relevant paths in which digital financial inclusion fosters inclusive growth and reduces poverty. Additionally, this study can help policymakers and governments to prioritise capital or investments in industries with the greatest prospects of increasing inclusive growth and alleviating poverty.

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2. Literature Review

2.1. Theoretical Literature

The theory of Financial Intermediation underpins this study (Goldsmith, 1969; McKinnon, 1973; Shaw, 1973). Financial intermediation is simply a process whereby financial institutions (such as mutual funds, banks, pension funds, and insurance companies) channel funds between those who save (depositors) and those who invest (investors) (Gorton & Winton, 2002). The agency theory and the theory of information asymmetry form the foundation of the financial intermediation theory (Andrieş, 2009). High transaction costs, regulation methods, and incomplete information are some of the factors that explain why financial intermediaries exist. Nonetheless, information asymmetry is the leading and most used approach in existing literature regarding financial intermediation theory. The information of asymmetry concept is whereby parties in a transaction have unequal amounts of information, which may result in problems such as adverse selection and moral hazard.

This study investigated the effect of digital financial inclusion on inclusive growth and poverty in EMDEs. The theory of financial intermediation is thus linked to this study as high transaction costs discourage individuals from participating in the formal financial sector, ultimately resulting in high financial exclusion, high poverty levels, and low inclusive growth. Moreover, when market information is not shared equally, this tends to discourage individuals from participating in the financial market, increasing financial exclusion. On the other hand, lower transaction costs tend to increase digital financial inclusion, reduce poverty levels, and increase inclusive growth. Furthermore, when financial institutions are well-regulated and less risky, it encourages households to participate in the financial sector. Therefore, this makes the theory of financial intermediation suitable for this study.

2.2. Review of Empirical Literature

Several studies have observed the relationship between either digital financial inclusion and inclusive growth or digital financial inclusion and poverty using different methodologies, data, and regions in the existing literature. Therefore, this section divides the empirical literature into studies that have examined 1) digital financial inclusion and poverty and 2) digital financial inclusion and inclusive growth.

2.2.1. Digital Financial Inclusion and Poverty

Kelikume (2021) investigated the nexus between poverty reduction, financial inclusion, mobile phones, the informal economy, and the internet. The system-GMM technique and a panel data set spanning 1995 to 2017 from 42 countries were employed in the study. The findings revealed a positive and significant relationship between the usage of the internet, mobile penetration, and poverty alleviation. Moreover, the study found that an increase in financial inclusion leads to a reduction in poverty.

Using a two-step system GMM, Toda causality test, and simultaneous-equations models, Wale-Awe and Evans (2023) examined the causal relationship between the growth-poverty-inequality triangle and digital financial inclusion from 1995 to 2018 in 42 African countries. The cited study found that an increase in digital financial inclusion leads to poverty alleviation and inequality reduction. The findings also revealed a bi-causality between digital financial inclusion and poverty. Therefore, Wale-Awe and Evans (2023) suggest that enhancing access to digital financial services throughout the African continent is crucial to improving income levels, reducing poverty, and fostering an equitable income distribution.

Focusing on South Asia and Sub-Saharan Africa, Lyons et al. (2020) examined the association between financial and digital inclusion and poverty across seven developing countries. The cited study discovered that considerable decreases in poverty levels are associated with increases in several

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measures of financial and digital inclusion. The study underscores the significance of digital financial services in assisting and maintaining efforts to reduce poverty in developing countries.

In China, Peng and Mao (2022) investigated the impact of digital financial inclusion on urban households' relative levels of poverty. The probit model, the mediating effect model, and the instrumental variable approach were used to perform empirical research. According to the findings, digital financial inclusion lowers the likelihood that urban households will experience poverty. Moreover, the study discovered that digital financial inclusion increases urban families' engagement in the financial sector and encourages entrepreneurship.

A study by Tay et al. (2022) yielded mixed results. Using a systematic literature review, the cited authors examined digital financial inclusion across countries. The study revealed that to combat poverty, developing countries, mostly those in Asia, embrace and enhance digital financial inclusion. However, the findings also showed that in terms of access to and use of digital financial services, disparity persists between gender, the wealthy and the poor, as well as between urban and rural areas in developing countries.

2.2.2. Digital Financial Inclusion and Inclusive Growth

In Sub-Saharan Africa, Sarpong and Nketiah-Amponsah (2022) employed the system-GMM estimation technique to empirically investigate the relationship between financial inclusion and inclusive growth. The study used a panel dataset of 46 countries spanning 2004 to 2018. The results indicate that when compared to other factors, financial services have a measurable and significant impact on inclusive growth. There is an improvement of 0.03 units in inclusive growth whenever there is an increase in the usage of financial services.

To establish whether digital financial inclusion promotes inclusive growth in China, Xun et al. (2020) compared the data from the China Family Panel Studies (CFPS), which provides representative household survey data in China, with the index of digital financial inclusion, which assesses the progress of digital finance in China. The authors found that digital finance increases household income in China, particularly in rural areas. As a result, digital finance helps China's inclusive growth by closing regional and urban-rural gaps. By distributing capital efficiently, decreasing information asymmetry and reducing risk, financial intermediation can contribute to increasing financial services access and fostering economic growth for underprivileged groups.

Yang et al. (2024) investigated the influence of digital financial inclusion on inclusive growth. The study used a panel dataset of 30 provinces in China covering a period from 2011 to 2021. The entropy weight method of the fixed-base range was used as an estimation technique for the study. The results indicate that inclusive growth is significantly influenced by digital financial inclusion. Further, the study found that inclusive growth can be achieved through digital financial inclusion by enhancing and increasing innovation and the human capital level.

2.3. Summary of the Empirical Review Findings

Financial inclusion is viewed as one of the key components to improving inclusive growth and reducing poverty in developing countries (Khan et al., 2020). Furthermore, financial inclusion is regarded as a strong basis for any country's financial infrastructure (Liagat et al., 2022). Most studies have demonstrated that digital finance does reduce poverty and is closely related to the advancement and expansion of inclusive economic growth. Furthermore, research has revealed that a potent instrument for combating poverty is financial inclusion, particularly in EMDEs.

However, the existing literature does not explicitly contain studies examining the effect of digital financial inclusion on both inclusive growth and poverty. It is essential to examine how digital financial inclusion impacts poverty and inclusive growth since these two topics are closely connected and important for equitable growth. Given how closely related inclusive growth and poverty are and how they are highly influential on each other, it is essential to investigate how digital financial inclusion affects both simultaneously, especially in EMDEs.

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Notably, the simultaneous assessment of the impact of digital financial inclusion on both inclusive growth and poverty remains under-researched, hence the rationale for this study. Put differently, the effect of digital financial inclusion on poverty through the intervention of inclusive growth is not available in the existing literature. Therefore, there is a need to investigate the effect of digital financial inclusion on poverty through the intervention of inclusive growth. Unlike economic growth, inclusive growth ensures that the benefits of the growth of the economy are allocated equitably, thus reducing poverty.

3. Methodology: Modelling Digital Inclusion's Impact on Growth & Poverty

3.1. Data Selection and Sources

This study was quantitative and used data generated from secondary sources. This study used panel data from 2013 to 2022 in 21 EMDEs due to the availability of data in these regions during this period. Given the prevalence of financial exclusion in EMDEs, research is essential in the region. The study period was selected due to the data availability for the chosen variables in EMDEs. Moreover, the starting year of this research was 2013 as some EMDEs chosen for this study did not have available data before 2013.

The following data sources were used: the Financial Access Survey of the IMF (FAS-IMF), and the World Development Indicators (WDI). The data spans 2013 to 2022. The FAS is a supply-side dataset on access to and use of financial products and services that was introduced in 2009 to help policymakers evaluate and monitor financial inclusion and compare progress to peers. The WDI represents the World Bank's main collection of development indicators, collated from various reputable and reliable international sources. It offers the most recent and reliable global data.

3.2. Data Selection, Description, and Measurement of Variables

Data were selected based on the various dimensions and indicators that the study used.

3.2.1. Dependent Variable (s):

a) *Inclusive Growth*

This study used GDP per capita as a proxy for inclusive growth. GDP per person employed (constant 2017 Purchasing Power Parity $) has been employed as a proxy for inclusive growth in several studies (Adeniyi et al., 2021; Kouton, 2019; Olanrewaju et al., 2020; Raheem et al., 2018). The focus of this measure is the people who work in the production process. Inclusive growth ensures that the growth of the economy is distributed equitably. Further information on inclusive growth is presented in section 4.2.2.

b) *Poverty*

The presented study employed household consumption expenditure as a proxy for poverty levels of the selected countries due to the lack of poverty data in these countries. Household consumption expenditure has been validated by Akanksha and Odhiambo (2010) and, more recently, by Musakwa and Ohdiambo (2021). The cited studies employed household consumption expenditure to reflect the income aspect of poverty. Quartey (2008) attests that household consumption expenditure data amongst the impoverished is typically more frequently and accurately reported than income data. Moreover, Nyasha et al. (2017) also justify using household consumption expenditure as a proxy for poverty as it is found to be a reliable variable. Existing literature has used household consumption expenditure as a proxy for poverty (Dhrifi, 2015; Kaidi et al., 2019; Musakwa & Odhiambo, 2019; Nsiah & Tweneboah, 2024; Quartey, 2005;). Data on household consumption expenditure were collected through a single cross-section survey for an adequately representative sample of the selected countries, employing households as the unit of observation.

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3.2.2. Explanatory Variables: Digital Financial Inclusion

The following dimensions and indicators were used to measure digital financial inclusion.

a) Access (Penetration of Basic Financial Services)

Mobile money agent outlets active (per 100,000 adults) and mobile money agent outlets active (per 1,000 km²) serve as indicators of the access dimension as part of the geographic or demographic penetration (Banna, 2020). These indicators are important and necessary for the internet, mobile money, and mobile banking to be used as new avenues for accessing financial services. Moreover, in several markets, the availability of mobile money agents in remote areas has significantly increased access to financial services (Khera et al., 2021). Data for these indicators was sourced from the FAS-IMF.

b) Usage

For the usage dimension, the number of active mobile money accounts (per 1,000 adults), number of mobile and internet banking transactions (during the reference year) per 1,000 adults, and value of mobile and internet banking transactions (during the reference year) (% of GDP) as indicators (Banik & Roy, 2023; Banna, 2020). Data for these indicators was sourced from the FAS-IMF. Digital financial inclusion can reach more households, thus providing financial access to individuals who were previously financially excluded, and this ultimately promotes inclusiveness.

This study further employed the following control variables: Age dependency Ratio, Gross National Income (GNI) per capita, Education , Inflation, General Government Final Consumption Expenditure (% of GDP) (GOVEXP), Broad money to GDP (Money Supply, Population Growth, Institutional Quality and GDP Growth.

3.3. Estimation Techniques

The first step of the investigation was to minimise the dimensions of the data using the principal component analysis (PCA) approach. This study contributes to the literature by using dynamic panel methods in the analysis. Dynamic panel methods can produce effective estimators even when heteroscedasticity is present and serial correlation and endogeneity are corrected. Considering that the current study used dynamic panel data to estimate the effect of digital financial inclusion on inclusive growth and poverty in EMDEs, the System-Generalized Method of Moments (GMM) is employed as the main technique. Moreover, for purposes of robustness checks and comparison, this study employs difference-GMM as an alternative estimation technique.

3.3.1. Principal Component Analysis

Using the approach of Camara and Tuesta (2014) adopted by Khera et al. (2021) and Ismael and Ali (2021), this study employs a two-stage Principal Component Analysis (PCA) to construct a new financial inclusion index. Constructing a financial inclusion index for EMDEs allows for the assessment of these countries' progress over time. This offers the possibility of comparing financial inclusion levels across countries. PCA is a useful technique to minimise information loss while reducing the number of variables that reflect the same concept (Datta and Singh, 2019).

The PCA technique can decrease data sets to smaller dimensions while retaining as much of the original data as possible. The PCA technique scientifically calculates the weights for each dimension instead of manually assigning them, and it also eliminates the correlated variables that do not contribute to any decision-making. Moreover, using a two-stage PCA reduces the likelihood of the PCA being skewed towards the weight of the indicators for a given dimension. The PCA method is demonstrated in what follows.

a) ***The first stage of PCA:*** *Estimate the dimensions (access and usage)*

This study uses indicators for access and usage dimensions (as per the approach of Khera et al., 2021). This essentially means that the two endogenous variables Y^a and Y^u are unobserved for each index and must be estimated using their corresponding parameters (τ and δ, in the equation below:

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$$DFI_i = w_1 Y_i^a + w_2 Y_i^u + e_i \quad (1)$$

where DFI is the digital financial inclusion index of a country i

e_i is the variation due to error

w_1, w_2, represent the weights of each dimension; and

Y_i^a, Y_i^u represent dimensions for access and usage. These dimensions are further computed as:

$$Y_i^a = \tau_1 \text{ Mobile Money Agent per 100000 Adults} + \tau_2 \text{ Mobile Money Agent per 1000 km}^2 + e_i \quad (2)$$

$$Y_i^u = \delta_1 \text{ Active Mobile Money} + \delta_2 \text{ No of Internet Banking Transactions} + \delta_3 \text{ Value of Internet Banking Transactions} + e_i \quad (3)$$

Significant differences exist between country-specific values of the various financial inclusion indicators. Therefore, to improve data comparability, the Min-Max approach is used to normalise the dataset. By subtracting the minimum value and dividing it by the range of the indicators' values, this procedure puts all the distinct indicators within an equal range between 0 and 1(Le et al., 2019). The normalisation formula is presented in equation (4) below:

$$X_{i,d} = \frac{(x_i - m_i)}{(M_i - m_i)} \quad (4)$$

where x_i indicates the value of indicator i, m_i is the minimum value of indicator i and M_i is the maximum value of dimension i. $X_{i,d}$ represents the standardised value of indicator i of dimension d.

The estimator of each dimension is represented by the following weighted averages.

$$Y_i^a = \frac{\sum_{j,k=1}^{p} \lambda_j^a PC_{ki}^a}{\sum_{j=1}^{p} \lambda_j^a} \quad (5)$$

$$Y_i^u = \frac{\sum_{j,k=1}^{p} \lambda_j^u PC_{ki}^u}{\sum_{j=1}^{p} \lambda_j^u} \quad (6)$$

The correlation matrix is defined as Rp (pxp) of the p standardised indicators for each dimension. λ_j (j =1,…,p) is described as the jth eigenvalue of each of the dimensions. j represents the number of principal components (PC). The first PC accounts for the greatest degree of variation in the explanatory variables. γj(px1) is the eigenvector of the correlation matrix. The assumption made is that λ1 >λ2 >···>λp and represents where P_k (k=1,…,p) as the *k-th PC* (weights)

The second stage of PCA: After getting the dimension indices, another PCA is conducted to determine the weights for financial inclusion.

The overall financial inclusion index is computed by combining all the separate indices into equation (1) to estimate the parameter (λ), that is:

$$TFI_i = \frac{\sum_{j,k=1}^{p} \lambda_j PC_{ki}}{\sum_{j=1}^{p} \lambda_j} \quad (7)$$

PC_{ki} (which represents each component) is expressed as a linear combination of the three dimensions and their respective eigenvectors of the correlation matrices as follows:

$$PC_{1i} = \pi_{11} Y_i^a + \pi_{12} Y_i^u \quad (8)$$

$$PC_{2i} = \pi_{21} Y_i^a + \pi_{22} Y_i^u \quad (9)$$

By replacing the PC_{ki} as written in equations (8) and (9), the financial inclusion index can therefore be expressed as

$$TFI_i = \frac{\sum_{j=1}^{3} \lambda_j (\pi_{j1} Y_i^a + \pi_{j2} Y_i^u)}{\sum_{j=1}^{3} \lambda_j} \quad (10)$$

Equation (10) can thus be written as a linear equation for the weighted average of the financial inclusion index:

$$DFI_i = w_1 Y_i^a + w_2 Y_i^u + e_i \quad (11)$$

The digital financial inclusion index is then used to classify the various countries into three groups.

$0.5 < DFI \leq 1$ illustrates high digital financial inclusion.

$0.3 \leq DFI < 0.5$ demonstrates medium digital financial inclusion.

$0 \leq DFI < 0.3$ shows low digital financial inclusion.

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3.3.2. Panel Estimation Techniques: System-Generalized Method of Moments (GMM)

This study employed system-GMM to estimate the effect of digital financial inclusion on inclusive growth and poverty in EMDEs. Hansen (1982) was the first to introduce GMM approaches. Holtz-Eakin, Newey, and Rosen further refined them (1988), while Arellano and Bond (1991) advocated for the difference-GMM. The difference-GMM estimator is designed for data with numerous individuals but few periods, that is, small T and large N panels.

The system-GMM was then outlined by Arellano and Bover (1995) and extensively developed by Blundell and Bond (1998). The system-GMM formulates supplementary orthogonality conditions that make more valid instruments accessible and achieve efficiency gains. System GMM addresses heteroscedasticity problems, bias of omitted variables, endogeneity between variables, and autocorrelation (Ali et al., 2022). Employing the panel data technique enables the endogeneity of the model or regressors to be addressed while addressing several periods and individual effects (Labra Lillo & Torrecillas, 2018). Furthermore, dynamic panel methods can produce estimators even when heteroscedasticity is present and serial correlation and endogeneity are corrected.

This study used the system-GMM instead of the difference-GMM estimator as the system GMM offers reliable and effective estimates, solves the endogeneity issue, and better fits panel studies. Like difference-GMM, the system-GMM estimator is developed for data with many individuals but few periods, that is, small T and large N panels. The system GMM produces more accurate estimates with a minimal bias relative to the difference of GMM (Blundell and Bond, 1998).

This study's period is from 2013 to 2022, while the number of EMDEs used is 21, and the system GMM is suitable, as alluded to earlier that N>T to avoid large instruments. The study uses a panel compiled annually. Another way to evaluate whether the estimation technique should be static or dynamic is to check whether the dependent variable is lagged and whether it is part of the regressors. If it lags, then the suitable approach is dynamic (Gujarati, 2012). The System-GMM is demonstrated below:

a) ***Model 1***

$$IG_{it} = IG_{it-1} + \alpha_0 + \alpha_1 \mathrm{DFI}_{it} + \alpha_2 \mathrm{INF}_{it} + \alpha_3 \mathrm{PG}_{it} + \alpha_4 \mathrm{GOVEXP}_{it} + \alpha_5 \mathrm{GNI}_{it} + \alpha_6 \mathrm{DPR}_{it} + \alpha_7 \mathrm{IQI}_{it} + u_{it} + \varepsilon_{it} \quad (12)$$

where; IG_{it} represents inclusive growth, IG_{it-1} is the inclusive growth lag, α is the coefficient of the estimated equation, INF_{it} denotes the inflation, PG_{it} is the Population growth (annual %), GOVEXP_{it} is the government expenditure, GNI_{it} is GNI per capita, DPR_{it} is the age dependency ratio, and IQI_{it} is the institutional quality.

u_{it} is the fixed effect by country, $\varepsilon_{i,t}$ is the error term, i is the country index, and t is the period (years).

b) ***Model 2***

$$POV_{it} = \mathrm{POV}_{it-1} + \beta_0 + \beta_1 \mathrm{IG}_{it} + \beta_2 \mathrm{INF}_{it} + \beta_3 \mathrm{BM} + \beta_4 \mathrm{IQI}_{it} + \beta_5 \mathrm{GDPGROWTH}_{it} + \beta_6 \mathrm{PG}_{it} + \beta_7 \mathrm{DFI}_{it} + u_{it} + \varepsilon_{it} \quad (13)$$

where; POV_{it} represents poverty, POV_{it-1} is the poverty lag, β is the coefficient of the estimated equation, IG_{it} represents inclusive growth, INF_{it} denotes the inflation, BM_{it} is the broad money to GDP, IQI_{it} is the institutional quality index, $\mathrm{GDPGROWTH}_{it}$ is Gross Domestic Product growth, PG_{it} is the population growth, and DFI_{it} is digital financial inclusion.

u_{it} is the fixed effect by country, $\varepsilon_{i,t}$ is the error term, i is the country index, and t is the period (years).

3.4. Diagnostic Tests

This section outlines the diagnostic tests conducted to ensure the robustness and validity of the empirical model. Specifically, it presents the results of the Sargan/Hansen test for overidentifying

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restrictions, the Arellano-Bond test for autocorrelation, and the Breusch-Pagan test for heteroskedasticity, each designed to assess different aspects of model integrity.

Table 1. Heteroskedasticity – Model 1.

Test	Chi-squared (1)	Prob>chi-squared
Breusch-Pagan	0.36	0.5506

Source: Calculated by the author using Stata 18.

Table 2. Heteroskedasticity – Model 2.

Test	Chi-squared (1)	Prob>chi-squared
Breusch-Pagan	2.20	0.1379

Source: Calculated by the author using Stata 18.

The *p*-values of the Breusch-Pagan test for both model 1 and model 2 are greater than 5%, indicating no problem of heteroskedasticity in the data. In other words, the null hypothesis could not be rejected as there was insufficient evidence against it.

Multicollinearity – Variance Inflation Factor

The VIF was employed to test for multicollinearity. The results show that the independent variables' VIFs are less than 10, indicating no multicollinearity (see Table 3, which follows).

Table 3. Variance Inflation Factor Test.

Variable	VIF	1/VIF
GNI	6.14	0.162779
BM	5.16	0.193663
PG	4.46	0.224053
TO	3.7	0.270285
IQI	2.65	0.377376
GOVEXP	2.65	0.377597
POV	1.9	0.526329
INF	1.46	0.682774
GDP Growth	1.44	0.692971
EDU	1.42	0.703686
DFII	1.29	0.77326
Mean VIF	**2.94**	

MS: Broad money to GDP (Money Supply); IG: Inclusive Growth; PG: Population growth (annual %); IQI: Institutional Quality Index; POV: Poverty; EDU: Education; GOVEXP: General government final consumption expenditure (% of GDP); GNI: GNI per capita (constant 2015 US$); INF: Inflation. Source. Calculated by the author using Stata 18.

4. Empirical Results and Discussion

This section presents the empirical findings of the study, beginning with descriptive statistics to characterise the data, followed by diagnostic tests including unit root and multicollinearity assessments, and culminating in an examination of pairwise correlations across the models employed.

Table 4 above depicts the outcomes of the Levin-Lin-Chu and Hadri LM unit root tests for investigating the effect of digital financial inclusion on inclusive growth and poverty in EMDEs.

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Table 4. Unit Root Test Results for Digital Financial Inclusion Dataset.

Variable	Levin-Lin-Chui		Hadri LM	
	Level		Level	
	Constant	Constant +Trend	Constant	Constant +Trend
DFII	-5.3821*** (0.0000)	-1.6054 ** (0.0542)	15.1448*** (0.0000)	1.4404 * (0.0749)
IG	-2.9160*** (0.0000)	-3.9809*** (0.0000)	15.1065*** (0.0000)	6.0057 **** (0.0000)
POV	-1.7285 ** (0.0420)	-6.2368*** (0.0000)	22.1750*** (0.0000)	1.3221* (0.0931)
DPR	9.2393 (1.0000)	-3.1925*** (0.0007)	22.4054*** (0.0000)	13.7787*** (0.0000)
IQI	-7.5343*** (0.0000)	-8.7303*** (0.0000)	8.6789*** (0.0000)	3.7162*** (0.0001)
INF	1.8300 (0.9664)	-4.0878*** (0.0000)	5.8073*** (0.0000)	-0.1282 (0.5510)
BM	-1.4876* (0.0684)	-4.9217*** (0.0000)	16.2548*** (0.0000)	2.0409** (0.0206)
GDP Growth	-5.8753*** (0.0000)	-8.6426 *** (0.0000)	-0.0757 (0.5302)	-0.0783 (0.5312)
EDU	-4.2329*** (0.0000)	-6.8878*** (0.0000)	15.9326*** (0.0000)	5.6781*** (0.0000)
GNI	7.2128 (1.0000)	9.8274 (1.0000)	3.6377*** (0.0001)	3.8019*** (0.0001)
PG	1.7091 (0.9563)	-3.1519*** (0.0008)	15.8107*** (0.0000)	10.9203*** (0.0000)
GOVEXP	-3.8951*** (0.0000)	-2.0130** (0.0221)	8.4703*** (0.0000)	3.1472*** (0.0008)

*DFII: Digital Financial Inclusion Index; IG: Inclusive Growth; POV: Poverty; DPR: Age Dependency Ratio; IQI: Institutional Quality Index; INF: Inflation; BM: Broad money to GDP; EDU: Education; GNI: GNI per capita (constant 2015 US$); PG: Population growth (annual %); GOVEXP: General government final consumption expenditure (% of GDP). ***, *** denote the significance at the 1%, 5% and 10% levels respectively. Note: () denote the p-values Source: Calculated by the author in Stata 18.*

Both tests indicate that digital financial inclusion, inclusive growth, poverty, age dependency ratio, institutional quality, inflation, broad money to GDP, GDP growth, primary enrolment as a percentage of gross enrolment trade (% of GDP), Gross National Income (GNI), population growth, trade (% GDP), and government expenditure are all stationary at level [I (0)], indicating that they are valid, reliable and appropriate for the study, and thus will not generate spurious results.

4.1. System GMM Results – Model 1

This section demonstrates the regression results on the effect of digital financial inclusion on inclusive growth in EMDEs.

Table 5 illustrates the results of the various panel methods employed by the study. Although system GMM is the primary estimation technique in this study, a difference-GMM was estimated for comparison and robustness checks. There are seven explanatory variables employed in GMM estimation techniques – digital financial inclusion, inflation, population growth, general government final consumption expenditure (% of GDP), GNI per capita (constant 2015 US$), age dependency ratio, and institutional quality. Table 5 further shows that four (digital financial inclusion, inflation, population growth, and age dependency ratio) of the seven explanatory variables were significant. The coefficient values suggest that explanatory variables vary in the degree of impact.

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Table 5. System-GMM and Difference-GMM Outcomes.

Model		
Variables	**System-GMM**	**Difference-GMM**
lnIG (-1)	0.7428***(0.1398)	0.7754*** (0.0845)
lnDFII	0.0227*(0.0128)	-0.00125392
INF	-0.0003***(0.0000)	-0.0001(0.0001)
PG	-0.0972***(0.0266)	-0.0698**(0.0001)
lnGOVEXP	-00630 (0.0491)	-0.1520(0.1026)
lnGNI	0.1621(0.1622)	0.2084 (0.2969)
lnDPR	0.3452 **(0.1543)	-1.2349 **(0.5498)
IQI	0.0286(0.0272)	-0.0285 (0.0322)
Intercept	-0.0000 (0.9428)	
Diagnostics		
R-squared		
Autocorrelation- Arrelano-Bond test (AR2)	0.96 [0.336]	0.67 [0.502
Sargan's test of overidentifying restrictions	6.78 [0.452]	0.48 [0.786]
Hansen's test of overidentifying restrictions	4.83 [0.681]	0.93 [0.628]
Friedman's test of cross-sectional independence	17.810 [0.5999]	17.810 [0.5999]

*IG: Inclusive Growth; DFII: Digital Financial Inclusion Index; INF: Inflation; PG: Population growth (annual %); GOVEXP: General government final consumption expenditure (% of GDP); GNI: GNI per capita (constant 2015 US$); DPR: Age dependency ratio; IQI: Institutional Quality Index. Note: Inclusive Growth is the dependent variable. The number of observations is 189. ***, **, * denote the significance at the 1%, 5%, and 10% levels respectively. () denote the robust standard errors. [] denote the probability values. Source: Calculated by the author in Stata 18.*

Digital financial inclusion is not significant under the difference-GMM estimation technique. However, other control variables such as population growth and age dependency ratio, are significant at 10%. Nonetheless, the difference-GMM has weaker instruments relative to system GMM, making it unsuitable for the present study. This is because it is claimed that the first difference GMM exhibits finite sample bias when the lags of the dependent variable have a weak correlation with the dependent variables' first difference in the subsequent period (Blundell and Bond, 1998).

Therefore, the system GMM estimation technique is the basis for interpreting the findings. This is because the system-GMM estimation technique provides the best outcome relative to the difference-GMM. Additional orthogonality restrictions provided by system-GMM increase the efficiency and reliability of instruments. This study employed the xtabond2 as suggested by Roodman (2009).

The main explanatory variable (digital financial inclusion) is significant under the system-GMM estimation technique. On the main independent variable, findings reveal that digital financial inclusion has a positive and significant effect on inclusive growth in EMDEs at a 10% significance level. The sign and magnitude indicate that when digital financial inclusion increases by a percentage point, inclusive growth will increase by 0.7428 units. Digital financial inclusion is regarded as one of the crucial elements to accomplishing inclusive growth as the process and effort of developing a digital society continues to grow (Song et al., 2022).

Financially excluded individuals can have the opportunity to participate in the formal financial sector by gaining access to essential financial services and products through available digital financial platforms. The digital finance sector is anticipated to grow, with increased financial access and inclusion, and inclusive growth due to the development and sharing of information and data through the internet (Xun et al.,2020). A stronger economy includes more people emerging from this increased participation in the financial sector. The findings are consistent with those of Xun et al. (2020) and Yang et al. (2024), who established that digital financial inclusion has a positive, significant effect on inclusive growth in their respective studies.

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Inflation as a control variable significantly and negatively affects inclusive growth in EMDEs at 1% significance level. This signifies that there is an inverse relationship between inflation and inclusive growth. Inclusive growth will decrease by 0.0003 for a percentage inflation increase. Inflation decreases the value of money. The purchasing power of the public is reduced by high and unsteady inflation, particularly individuals with occupations that pay poorly. Therefore, purchasing necessities may become difficult for individuals, hindering their ability to participate in the economy. Sajid and Ali (2018) argue that rising inflation makes it difficult for developing countries to achieve economic growth. The best monetary policies for inclusive growth are those geared toward maintaining low inflation and steady aggregate demand (Anand et al., 2014). Ahiadorme (2022) found a positive relationship between decreased income disparity, improved poverty alleviation, and increased inclusivity when low inflation and steady economic growth exist in a country. The research findings corroborate Ghouse et al. (2022), who found that inflation significantly and negatively impacts inclusive growth in low and middle-income countries.

Population growth was negative and significant at a 1% significance level. The sign and magnitude indicate that a percentage increase in population growth will lead to a 0.0972 decrease in inclusive growth. The global population is expected to grow to 9.7 billion by 2050 and 10.9 billion by 2100 (Gu et al.,2021). Increased demand for limited resources such as water, food, cloth, land, etc, can be under pressure due to a population increase. This may result in fewer individuals having access to necessities. The findings are consistent with Pham et al. (2024), who also showed that population growth has a negative, significant impact on inclusive growth. Tella and Alimi (2016) also found that population growth deteriorates inclusive growth.

The findings further reveal that the age dependency ratio positively and significantly affects inclusive growth at a 5% significance level. The sign and magnitude show that when the l age dependency ratio increases by a percentage point, inclusive growth will increase by 0.3452. This finding is surprising, as an increase in the age dependency ratio often results in economic difficulties, implying more dependent people than those who qualify to work or seek employment. Nonetheless, the findings are consistent with findings from Tella and Alimi (2016), who found that age dependency positively and significantly impacts inclusive growth. The rest of the variables – general government final consumption expenditure (% of GDP), GNI per capita (constant 2015 US$), and institutional quality were, however, found to be insignificant in both the system-GMM and difference-GMM estimation techniques.

4.2. System GMM Results – Model 2

This section presents the regression results of inclusive growth's effect on poverty in EMDEs.

Table 6 illustrates the results of the system-GMM and difference-GMM estimation techniques. Although System-GMM was the main estimation technique, the difference-GMM was employed for comparison and robustness checks. GMM estimation techniques and eight explanatory variables were used. These are: inclusive growth, inflation, broad money to GDP (Money Supply); institutional quality index, GDP Growth, digital financial inclusion index, general government final consumption expenditure (% of GDP), and population Growth. Table 6 further shows five (5) of the eight (8) explanatory variables are significant. The coefficient values show that the explanatory variables vary in the degree of impact.

Table 6. System-GMM and Difference-GMM Outcomes.

	Model	
Variables	**System-GMM**	**Difference-GMM**
lnPOV(-1)	1.0364***(0.0148)	1.0256***(0.0636)
lnIG	-0.0415 **(0.0206)	-0.0378 (0.1294)
INF	0.0001**(0.0000)	-2.58e-06 (0.0000)
lnBM	0.0240 (0.0233)	0.0576* (0.0333)
IQI	0.0209 (0.0190)	-0.0625*(0.0357)

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GDPGrowth	-0.0050 **(0.0018)	0.0059 **(0.0020)
lnDFII	-0.0240 * (0.0138)	0.0198 (0.0132)
lnGOVEXP	-0.0548**(0.0257)	-0.0751 (0.0631)
PG	0.0001 (0.00923)	0.1172***(0.0362)
Intercept	-0.7571**(0.3104)	
	Diagnostics	
Autocorrelation-Arrelano-Bond test (AR2)	0.47 [0.639]	0.67 [0.501]
Sargan test of overidentifying restrictions	8.15 [0.700]	4.69 [0.455]
Hansen test of overidentifying restrictions	7.58 [0.751]	4.73 [0.449]
Frees' test of cross-sectional independence (at 5% significance level)	3.489 [0.3429]	3.489 [0.3429]

*POV: Poverty; IG: Inclusive Growth; INF: Inflation; BM: Broad Money to GDP (Money Supply); IQI: Institutional Quality Index; GDP Growth: Gross Domestic Product growth; DFII: Digital Financial Inclusion Index; General government final consumption expenditure (% of GDP); PG: Population Growth. Note: Poverty is the dependent variable. The number of observations is 189. ***, **, * denote the significance at the 1%, 5%, and 10% levels respectively. () denote the robust standard errors. [] denote the probability values. Source: Calculated by the author in Stata 18.*

The system GMM estimation technique was the basis for interpreting Model 2 results for reasons already stated in the Model 1 results discussion section. The main explanatory variable (inclusive growth) is significant only under the system-GMM estimation technique. The findings reveal that inclusive growth has a negative, significant effect on poverty in EMDEs at a 5% significance level. The sign and magnitude indicate that when inclusive growth increases by a percentage point, poverty will decrease by 0.0415%.

Concerns over rising inequality despite economic growth have culminated in an increasing awareness of the significance of inclusive growth and development in international development (Kuss et al., 2022). This confirms that inclusive growth is critical in poverty alleviation, particularly in EMDEs where poverty is more prevalent. Effective and fair distribution of resources for the greater good of society is essential to advance an inclusive economy (Singh, 2017) and poverty reduction. The findings are consistent with Amponsah et al. (2023), who found that inclusive growth decreases the adverse effects of income disparity on poverty and can help in reducing it.

As a control variable, inflation significantly and positively affects poverty in EMDEs. For a percentage point increase in inflation, poverty will increase by a small magnitude of 0.0001. Inflation is one of the major concerns for policymakers in both advanced economies and EMDEs (Hassan et al., 2016). Basic goods and products become more expensive because of inflation, making it particularly difficult for households in EMDEs, especially for some of the selected countries in our data such as Zimbabwe, Pakistan, Senegal, Samoa, Rwanda, Mauritius, Guinea, Ghana, Burkina Faso and Botswana, which in 2022 each had annual inflation rates above 10%. Our results are consistent with findings from Omoniyi (2018), and Sehrawat et al. (2018). Baloch et al. (2020) also found that the purchasing power of individuals is reduced by inflation, thus forcing them to settle for products of lower quality that exacerbate poverty.

Gross domestic product (GDP) growth was found to be significant at a 5% significance level. The sign and magnitude suggest that a percentage point increase in GDP growth will lead to a marginal decrease of 0.0050 units in poverty. The United Nations aims to end extreme poverty – as measured by the proportion of individuals who live on less than USD1.25 a day. However, recent studies suggest that economic growth by itself is unlikely to reach this goal (Anderson et al., 2018). The findings corroborate those of Anyanwu et al. (2013), who found that an increase in real per capita GDP has a considerable negative impact on poverty levels, thus contributing positively to poverty alleviation. Although economic growth is essential, comprehensive policies that promote economic inclusion should be considered and implemented effectively and efficiently to ultimately experience poverty reduction through economic growth.

Digital financial inclusion negatively and significantly affects poverty in EMDEs at a 10% significance level. For a percentage point increase in digital financial inclusion, poverty will decrease

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by a magnitude of 0.0240. The World Bank deems individuals to be financially included if they have a bank account or a digital wallet (Ogbeide & Igbinigie, 2019). Most impoverished individuals are unable to access financial products and services such as loans through traditional financial institutions as physical branches are at times too far and it is expensive for individuals to reach them. Nonetheless, digital financial services make it possible for impoverished individuals to have access to essential financial products and services without visiting a branch. This provides individuals with the opportunity to manage their money more efficiently and effectively. The findings correspond with Lee et al. (2023) who demonstrated that the growth of digital financial inclusion considerably lowers and stabilises the overall level of poverty.

Government expenditure negatively and significantly affects poverty in the selected EMDEs of our study at a 5% significance level. The sign and magnitude suggest that a percentage point increase in government expenditure will lead to a decrease of 0.0548 units in poverty. Global economic growth and the fight against poverty are significantly facilitated by government expenditure (Chude et al., 2019). However, for government expenditure to be effective, it needs to be targeted at the right initiatives aimed at improving and empowering society. Nevertheless, in some cases, resources might be squandered and thus fail to reach the intended target market due to corruption. These findings align with those reported by Mehmood and Sadiq (2010). However, the rest of the variables; broad money to GDP, institutional quality, and population growth were found to be insignificant under the system-GMM estimation technique.

5. Concluding Remarks

This study sought to investigate how digital financial inclusion affects poverty through inclusive growth EMDEs. This was achieved through the application of panel estimation techniques.

This chapter has explored the theoretical foundations of the effect of digital financial inclusion on inclusive growth and poverty in EMDEs through the perspective of the theory of financial intermediation. Financial intermediation is also based on the transaction costs approach established by Benston and Smith (1976) and Fama (1980). High transaction costs deter people from taking part in the formal financial sector, which eventually leads to greater financial exclusion, high poverty levels, and low inclusive growth. Conversely, lower transaction costs typically lead to greater inclusive growth, poverty reduction, and increased digital financial inclusion.

The literature review demonstrates that in most regions with EMDEs, digital financial inclusion plays a role in increasing inclusive growth. Moreover, existing literature also shows that poverty can be reduced through inclusive growth. Additionally, financial inclusion is a solid foundation for the financial infrastructure of any country (Liagat et al., 2022). Most studies in our empirical literature demonstrated that digital finance does reduce poverty and is closely related to the advancement and expansion of inclusive economic growth. Furthermore, studies have shown that financial inclusion is a powerful tool for reducing poverty, particularly in EMDEs.

This study constructed a new multidimensional digital financial inclusion index for 21 EMDEs using weights derived from the PCA in aggregating indicators for two dimensions, that is, access and usage, following Camara and Tuesta (2014) and Khera et al., (2022). The index is a useful tool for evaluating the degree of digital financial inclusion in various EMDEs and tracking their development over time. In our analysis, using data spanning from 2013 to 2022, we found that none of the countries we selected demonstrated a high level of digital financial inclusion in the time frame we examined, applying the ranking systems developed by Camara and Tuesta (2014). Zimbabwe and Rwanda demonstrated a moderate level of digital financial inclusion, whereas Ghana showed a medium level of digital financial inclusion in 2020 and 2021. Moreover, the EMDEs selected for the study all fall under the low-level category since their average level of digital financial inclusion from 2013 to 2021 is less than 30%. Considering this, policymakers and governments should take it upon themselves to ensure that correct policies and programs are made available to meet the needs of the underserved and previously disadvantaged populations in EMDEs.

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The main objective of this study was to employ the system-GMM estimation technique to examine how digital financial inclusion affects poverty through inclusive growth EMDEs. This was achieved by first estimating the effect of digital financial inclusion on inclusive growth (scenario 1) and then estimating the effect of inclusive growth on poverty in EMDEs (scenario 2). Under the first scenario, the study found that digital financial inclusion (main explanatory variable) was significant under the system-GMM estimation technique. The results show that on the main independent variable (that is, inclusive growth), digital financial inclusion has a positive and significant effect on inclusive growth in EMDEs at a 10% significance level. The sign and magnitude indicate that when digital financial inclusion increases by a percentage point, inclusive growth will increase by a magnitude of 0.7428 units.

Some control variables also showed that they were significant to the dependent variable, digital financial inclusion. These control variables included inflation, population growth, and the age dependency ratio. Nonetheless, general government final consumption expenditure (% of GDP), GNI per capita (constant 2015 US$), and institutional quality were found to be insignificant to digital financial inclusion. Policymakers and governments should consider prioritising capital or investments in industries with the greatest prospects of increasing inclusive growth through digital financial inclusion. This can be made possible through increasing access to digital financial services and products, particularly in areas where financial exclusion is severe.

Under the second scenario, the study found that inclusive growth (the main explanatory variable) is significant under the system-GMM estimation technique. The findings demonstrate that inclusive growth has a negative and significant effect on poverty in EMDEs at a 5% significance level. The sign and magnitude indicate that when inclusive growth increases by a percentage point, poverty will decrease by a magnitude of 0.0415 units. Some control variables also demonstrated that they were significant to the dependent variable, poverty. These control variables included inflation, Gross domestic product (GDP) growth, digital financial inclusion, and general government final consumption expenditure (% of GDP). The rest of the variables, that is, broad money to GDP, institutional quality, and population growth were however found to be insignificant under the system-GMM estimation technique. By developing channels and policies that will aid in reducing income inequality, and increasing job opportunities for all, policymakers and governments can alleviate poverty through inclusive growth in EMDEs. When job opportunities are increased, participation in the workforce is also likely to increase, particularly amongst poor individuals who are often without work.

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