Financial Development: The Role of GDP per Capita Dynamics in Low- & Middle-Income Economies

Saganga Mussa Kapaya
Department of Accounting and Finance, The Open University of Tanzania
**Corresponding Email: kapaya.saganga@gmail.com, saganga.kapaya@out.ac.tz*

Abstract
This study delves into the complex role of economic growth on financial development within low- and middle-income economies (LMIE). It analyzes a dataset spanning 85 countries from 1980 to 2020, collapsed into 9 periods, yielding 765 observations. Employing General Method of Moments (GMM), including two-step system GMM and forward-orthogonal deviations IV/GMM methods, the research uncovers intriguing dynamics. Positive shifts in GDP per capita are found to correspond with heightened financial development, whereas negative changes exhibit an adverse relationship. Government consumption yields mixed results, and inflation negatively impacts financial development, while trade openness and favorable terms of trade exhibit positive associations. These findings underscore the significance of economic development, price stability, trade openness, and financial sector stability in nurturing financial development in LMIE. Therefore, policymakers are encouraged to prioritize strategies aimed at fostering economic growth, income augmentation, and economic resilience, particularly in times of economic turmoil. This research offers a unique contribution by dissecting economic growth into positive and negative changes, providing insights into their distinct impacts on financial development using GMM estimation. It empowers policymakers to leverage economic growth shifts and trade reforms for inclusive financial development.

Keywords: *Non-Linear Dynamics, Financial Development, Low- and Middle-Income, GMM*

Introduction

The relationship between GDP per capita and financial development has been a topic of significant interest in the field of economics. However, understanding the non-linear dynamics of this relationship, particularly in the context of low- and middle -income economies (LMIE), is crucial for policymakers, researchers, and stakeholders. This section provides an overview of the background and significance of studying the non-linear dynamics of GDP per capita changes on financial development in LMIE. LMIE face distinct challenges and opportunities in their pursuit of sustainable

economic development. While the developing countries possess abundant natural resources and a growing population, limited access to finance, underdeveloped financial markets, and institutional constraints can hinder economic progress (Kapaya, 2020). Understanding the non-linear dynamics between GDP per capita changes and financial development in LMIE is essential for designing targeted policies and strategies to overcome these challenges and leverage the potential for inclusive and sustainable growth. Financial development plays a crucial role in promoting positive economic changes and development. It facilitates capital mobilization, efficient allocation of resources, and access to financial services, thereby fostering investment, entrepreneurship, and innovation (Levine, 2005). The non-linear dynamics of GDP per capita changes can have profound implications for the pace and sustainability of financial development stability in LMIE.

Empirical studies have highlighted the non-linear nature of the relationship between economic development and financial development. The existence of an inverted U-shaped relationship, indicating that financial development initially and positively impacts economic growth but reaches a point of diminishing returns, has been found in various contexts; (Rousseau & Wachtel, 2011). Studying the non-linear dynamics of this relationship in LMIE provides insights into the optimal level of both financial development andeconomic development. This study has crucial policy implications. Policymakers can utilize these insights to design effective strategies that promote inclusive economic development, financial inclusion, strengthen financial systems, and improve regulatory frameworks (Kou, et al., 2019). By fostering the optimal level of financial development, LMIE can stimulate investment and encourage entrepreneurship. While the relationship between GDP per capita growth and financial development has been extensively studied, there remains a research gap specific to LMIE. The majority of empirical studies have primarily focused on developed economies or emerging markets, with limited research dedicated to LMIE. Examining the non-linear dynamics of this relationship in this context fills this research gap and provides a deeper understanding of the unique dynamics, challenges, and opportunities within the financial systems of LMIE by focusing on the positive and negative changes in GDP per capita on financial development indicators.

The objective of this study was to investigate the non-linear dynamics of the relationship between GDP per capita changes and financial development in low- and middle-income economies (LMIE) using the General Method of Moments (GMM) estimation technique. The unanswered research question in

the academic literature is this: what are the non-linear dynamics of the relationship between GDP per capita changes and financial development in LMIE, and how can these insights inform policies and strategies for promoting financial development?

Literature Review

A. Theoretical Perspectives

Financial intermediation theory suggests that financial development plays a vital role in facilitating economic growth and enhancing GDP per capita. According to this perspective, as financial institutions become more developed, they efficiently allocate capital, mobilize savings, and provide funding for productive investments (Gurley & Shaw, 1960), this theory lead to the supply-leading hypothesis. The supply-leading hypothesis suggests that financial development drives economic growth, indicating a unidirectional causality from finance to economic growth. For instance, Tripathy and Mishra (2021) confirmed the supply leading hypothesis, showing unidirectional causality from financial development to economic growth in the Indian economy. The demand-following hypothesis presents an alternative viewpoint to the supply-leading hypothesis. Unlike the supply-leading hypothesis, which asserts that financial development fuels economic growth, the demand-following hypothesis suggests that financial development is a response to economic growth. Thus, "finance follows growth" means that financial development and expansion tend to occur as a result of economic growth. In other words, when an economy experiences growth and prosperity, there is an increased demand for financial services and products to support the expanding economic activities.

Ibrahim and Acquah (2021) opine that under the demand-following hypothesis, financial institutions and services expand in tandem with increased economic activities and a rising demand for financial services generated by economic growth. As businesses flourish and the economy prospers, the demand for financial products such as loans, investments, and insurance rises, prompting financial institutions to expand to meet these growing needs. Moreover, economic growth often leads to higher incomes and accumulated wealth for individuals and households, encouraging greater saving and investment activity, thus boosting the demand for financial services (Tripathy & Mishra, 2021). Furthermore, the improved economic climate can stimulate a heightened risk appetite, motivating people to seek investment opportunities and financial products that offer potentially higher returns. Additionally, governments may also respond to economic growth by

introducing policies that support and promote financial development to sustain and further accelerate economic expansion (Hyera & Mutasa, 2016).

Odhiambo (2009) and Ibrahim and Acquah (2021) support the views that in essence, the demand-following hypothesis posits that financial development follows the path of economic growth, reflecting the notion that a flourishing economy stimulates the demand for financial services and products, leading to their expansion and development. These contrasting perspectives on the relationship between financial development and economic growth have been extensively studied in economic literature to better understand the complex dynamics between the two phenomena. Comparable to these hypotheses is the feedback hypothesis, where each variable influences the other in a continuous cycle. In the context of finance and economic growth, it suggests that the development of economic growth and the financial sector can mutually reinforce each other (Kchikeche&Khallouk, 2021). As the financial sector develops, it provides better access to financial resources, supporting economic growth through increased entrepreneurship and investment. In turn, economic growth leads to higher demand for financial services, prompting further expansion of the financial sector. This positive feedback loop can enhance economic growth and stability, while negative feedback loops may occur during economic downturns. Understanding these mechanisms is crucial for policymakers and economists to develop effective strategies for sustainable growth and financial stability (Ibrahim & Acquah, 2021).

Former theorists indicate that, non-linear GDP per capita growth occurs with financial development, initially positively impacting economic growth, but reaching a threshold beyond which the impact diminishes. The institutional economics perspective emphasizes the role of legal and regulatory frameworks, property rights protection, and contract enforcement in promoting economic growth and financial development. Non-linear dynamics between GDP per capita growth and financial development may arise due to variations in institutional quality across countries and over time (Demetriades & Andrianova, 2004). Financial institutions facilitate fund flow to productive sectors, fostering entrepreneurship and the adoption of new technologies (Aghion & Howitt, 1992), resulting in non-linearities in GDP per capita growth and financial development across different stages of economic development (Rousseau & Wachtel, 2011).These theoretical perspectives provide insights into the relationship between non-linear GDP per capita growth and financial development, endogenous growth factors in driving economic growth,and underscoring the positive role of financial intermediation, financial deepening and institutional quality. Policymakers

must understand these non-linear dynamics to design effective strategies fostering sustainable financial development and inclusive economic growth.

B. Empirical Review

Empirical evidence suggests that the relationship between GDP per capita growth and financial development is non-linear. Traditional linear models may not capture the full picture, as the impact of GDP per capita growth on financial development varies across different stages of economic development. Non-linear effects reveal critical thresholds and turning points that significantly influence the relationship. Threshold effects signify critical points in the relationship between GDP per capita growth and financial development. Empirical studies identify specific thresholds where the impact of GDP per capita growth on financial development changes significantly. Below the threshold, financial development may have limited effects on economic growth, while above it, increasing GDP per capita can positively stimulate financial development, thus exhibiting non-linearities (Furceri et al., 2019). Non-linear effects between GDP per capita growth and financial development arise from various mechanisms. Some of these include; financial deepening, institutional quality, and absorptive capacity. Initially, as GDP per capita grows, financial deepening expands access to financial services, improving resource allocation and investment efficiency. However, beyond the threshold, further financial deepening may lead to potential risks and challenges that require careful management.

Factors that are important determinants of financial development are numerous. Some of the common ones are; institutional quality, which include the efficiency and effectiveness of legal and regulatory frameworks. Studies have found out that weaker institutions can hinder the positive impact of GDP per capita growth on financial development in LMIE (Huang, 2011). Strengthening institutions and improving governance are crucial for promoting financial development in the region. Many African countries have implemented financial sector reforms aimed at enhancing financial intermediation and inclusion. These reforms, such as liberalizing interest rates, expanding banking networks, and improving regulatory frameworks, have contributed to increased financial development and facilitated the positive impact of GDP per capita growth. (Naceur, et al., 2014). Inadequate infrastructure, limited banking penetration, and low levels of financial literacy pose challenges to financial development in many African countries (Huang, 2011). Enhancing physical and digital infrastructure, expanding branch networks, and promoting financial literacy are crucial for improving access to financial services. Macroeconomic stability, characterized by low

inflation and fiscal discipline, is vital for fostering financial development. High inflation and unstable macroeconomic conditions can undermine the positive impact of GDP per capita growth on financial development in LMIE. Sound macroeconomic policies and prudent fiscal management are essential for creating a conducive environment for financial development. (Kagochi, 2019).

Empirical studies investigating the non-linear dynamics of the relationship between GDP per capita growth and financial development have gained significant attention in recent years. These studies employ various methodologies to capture the non-linear dynamics between GDP per capita growth and financial development. The methodologies include most panel data analysis models, threshold regression models, and non-linear autoregressive distributed lag models (NARDL). These methodologies allow researchers to account for the non-linearity and dynamic nature of the relationship, capturing threshold effects, asymmetric effects, and potential feedback loops. Studies have explored non-linear relationships between GDP per capita and various factors(Ibrahim and Acquah, 2021). For example, research has examined the inverted U-shaped relationship between GDP per capita and financial development (Mujtaba & Jena, 2021), where an initial increase in financial development leads to faster economic growth but diminishing returns occur at higher levels of financial development. (Rousseau & Wachtel, 2011). Another area of study is the non-linear relationship between GDP per capita and income inequality. Research suggests that initially, as GDP per capita rises, income inequality may increase. However, beyond a certain threshold, further increases in GDP per capita can lead to a reduction in income inequality.

Empirical evidence suggests the presence of non-linear relationships between GDP per capita growth and financial development (Farouq, et al. (2020). Several studies have found evidence of threshold effects, indicating that the impact of financial development on GDP per capita growth changes once a certain threshold is reached. Beyond this threshold, further financial development may have diminishing returns or even negative effects on economic growth. Empirical studies have also explored asymmetric effects between GDP per capita growth and financial development. These studies examine whether the relationship between the two variables differs during periods of economic expansion versus contraction or during episodes of financial booms versus busts. (Ahmed, et al. 2021). Such asymmetries highlight the importance of considering both positive and negative shocks when assessing the impact of financial development on GDP per capita

growth (Conceição& Kim, 2010). Also, research has investigated the presence of feedback effects between GDP per capita growth and financial development. These studies examine how changes in GDP per capita growth influence financial development, and vice versa. The findings indicate the existence of a feedback mechanism, suggesting that financial development can both drive and be driven by GDP per capita growth. (Manta, et al., 2020).

In this current study, efforts are devoted to confirm non-linearity of economic growth (Figure 1, Table 1) and how it may impact financial development in LMIE. Financial inclusion and inclusive growth theoretical frameworks highlight the role of financial inclusion in shaping the relationship between non-linear GDP per capita growth and financial development. Financial inclusion, which involves providing access to financial services for all segments of society, is seen as a mechanism to foster inclusive growth and reduce income inequality (Demirgüç-Kunt&Klapper, 2012). By enhancing financial access and promoting entrepreneurship and investment opportunities, financial inclusion can contribute to non-linear patterns in GDP per capita and financial development. Using the current study LMIE sample, a closer analysis of GDP per capita values, starting with the smallest values (Table 1 and Figure 1), the 1st percentile corresponds to a GDP per capita of 321.2147, indicating that only 1% of the observations have a lower GDP per capita than this value. The 5th percentile is 431.7792, implying that 5% of the observations have a GDP per capita lower than this threshold. These values represent the lower end of the GDP per capita distribution. Moving to the largest values, the largest observation in the dataset is 13,857.34, representing the maximum GDP per capita recorded. Additionally, the 75th percentile indicates a GDP per capita of 3,961.508, meaning that 75% of the observations have a lower GDP per capita than this value. Finally, the 99th percentile is 11,871.88, suggesting that 99% of the observations have a lower GDP per capita than this threshold. These values represent the upper end of the GDP per capita distribution. This is typical of a non-normal distribution of GDP per capita in the sample, implying differential growth over time and space due to possible factors highlighted before.

Table 1: GDP Per Capita - Original Measurement

Percentiles		*Smallest*		
1%	321.2147	262.1902	*Obs*	765
5%	431.7792	278.9129	*Sum of wgt.*	765
10%	501.6931	298.2266	*Mean*	2880.99
25%	993.4154	301.2698	*Std. dev.*	2553.394
			Variance	6519821
50%	2053.01		*Skewness*	1.544704
		Largest	*Kurtosis*	5.351598
75%	3961.508	12707.02		
90%	6245.537	13115.1		
95%	8565.426	13313.19		
99%	11871.88	13857.34		

Source: Author's computation.

In Table 1 and Figure 1, considering the measures of skewness and kurtosis, the skewness value is 1.544704. Positive skewness suggests that the distribution of GDP per capita is skewed to the right, with a longer tail on the right side. The kurtosis value is 5.351598, indicating that the distribution has heavy tails and is more peaked than a normal distribution. These statistics offer a comprehensive evidence for possible differential changes in the variable over time and space which cements the inspiration for non-linear dynamic analysis of GDP per capita (INV) against financial development (FIN) variables. Some studies have already conformed the non-linear behavior of GDP per capita on other variables. For example, Mujtaba and Jena (2021) results show that increase in economic growth would decrease carbon dioxide emissions, while a reduction in economic growth would increase carbon dioxide emissions which implies an inverted U-shaped link between economic growth and carbon dioxide emissions. Ampofo, et al. (2021) results show long-run asymmetric effect outcomes indicate a definite boom in economic growth, significantly increases carbon emission in Turkey, and a decline in Vietnam.Conceição and Kim (2010) study reveals that periods of decelerating economic growth are associated with poorer health and education outcomes, while growth accelerations are linked to improvements in these indicators globally. However, the effects are asymmetric, as the benefits during good times are not as significant as the drawbacks during bad times. They note that, developing countries, particularly least developed countries (LDCs), experience severe negative consequences during growth collapses and minimal improvements during favorable periods. De Neve, et al. (2018) findings show that, individuals exhibit greater sensitivity to losses compared to gains in terms of economic growth. Subjective well-being measures are more than twice as responsive to negative economic growth as they are to positive economic growth.

Numerous studies have documented the linear effect of economic growth on financial development. For example Song, et al. (2021) estimations show a positive impact of economic growth on financial development. The policy implication is that fostering economic growth in developing countries can contribute to promoting financial development. Akinci, et al. (2014) shows that economic output has positive impacts on domestic credits, broad money, total bank deposits, financial system deposits, and Fetai (2018) shows that economic output has positive impacts on market capitalization, private sector credit and liquid liabilities. However, the work of Farouq, et al. (2020) confirms an asymmetric impact of economic growth on financial development, they support a uni-directional non-linear causality effect of the variables. Since evidence support an impact of economic outputs on financial development indicators and non-linear effects of growth indicators are important in these other related economic areas, understanding the non-linear effects of GDP per capita growth on financial development is essential for policymakers and researchers seeking to grasp the complexities of this relationship. Traditional linear models may oversimplify the dynamics at play, making it crucial to explore the potential non-linearities. Interestingly, Ahmed, et al. (2021) demonstrate that the asymmetric model presents a totally different picture, indicating that the results of symmetric models can be unreliable in the presence of asymmetries.

Several studies have documented kinds of demand-following symmetrical impacts of economic growth on financial development or the mutual feedback impacts on either variable. There are numerous studies supporting either the demand following hypothesis or feedback hypothesis. Nasreen, et al. (2020) studying European economies found a positive impact of growth on financial development. Rajan and Zingales (1998) found a positive relationship with mutual re-enforcements between economic growth and financial system development. Their analysis suggests that economic growth fosters the expansion and strengthening of the financial system, encouraging increased household savings and investment in the banking sector. As a result, credit creation policies lead to enhanced credit supply for businesses, ultimately contributing to further economic growth. Odhiambo (2009) found a causal link between economic growth and financial depth in South Africa. Wolde-Rufael (2009) discovered bidirectional causality between economic growth and financial development in Kenya. And, Lawal, et al. (2016) results show that a two-way cointegration exists between economic growth and financial development in Nigeria.

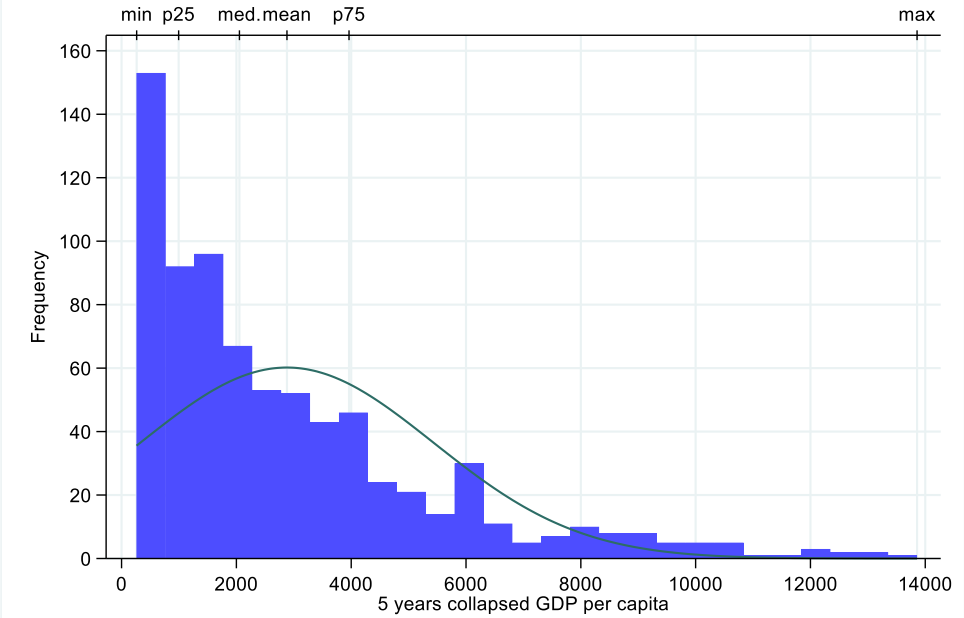

Figure 1: GDP per capita
Source: Author's computation.

Furthermore, Demetriades and Hussein (1996) observed a bidirectional causal relationship between economic growth and financial development in 16 developing countries. Abu-Badar and Abu-Qarn (2008) identified a feedback effect between economic growth and financial development in Egypt. Calderón and Liu (2003) support a bidirectional granger causality between economic growth and financial development among 109 developing and industrial economies. Ibrahim and Acquah (2021) in their study, used panel data from 45 African countries. They found out a feedback causality between financial sector development and economic growth, which held true regardless of the proxy used to measure finance and economic growth. Kchikeche and Khallouk (2021) explore the causal relationship between bank-based financial development and economic growth in Morocco. The findings indicate that in the long run, economic growth is the driving force behind bank-based financial development. Manta, et al. (2020) conducted a study on ten central and eastern European countries to examine economic growth and financial development. They found bidirectional causality between economic growth and financial development indicators, indicating that increasing economic growth leads to rising financial development. It is

reasonable to expect that the negative and positive changes in these variables may lead to effects of different magnitude or direction (Ahmed, et al., 2021).

C. Channels of Influence and Hypotheses

Asymmetric growth impacts on financial development through diverse channels. Geographical variation, sectoral disparities, and income inequality contribute to uneven economic development changes among economies, leading to imbalanced financial development across regions, sectors and over time. In urban areas experiencing faster growth, financial infrastructure and services tend to develop at a quicker pace, while rural regions may face limited financial access. Moreover, concentrated growth in specific sectors, such as technology and finance, can direct investment and capital flows, affecting the development of financial markets and institutions. Furthermore, asymmetric economic changes influence on financial development extends to financial inclusion and the emergence of asset bubbles and risks. Higher-income individuals benefit more from positive economic changes, widening income disparities and hindering financial inclusion for vulnerable populations. As a result, certain segments of the population may lack access to essential financial services. Additionally, disproportionate growth in specific sectors can lead to asset bubbles and increased financial risks, posing challenges to the stability and efficiency of the financial system. Therefore, since these influences are possibly dominant in LMIE, the approach adopted is to decompose GDP per capita into positive and negative changes, mimicking expansion and contraction separately but simultaneously. Thus, the following two testable hypotheses are posed:

H1: Positive changes in GDP per capita have positive effects on financial development indicators
H2: Negative changes in GDP per capita have negative effects on financial development indicators

Methodology

A. Data Sources and Variables

The World Bank is a reliable, widely recognized and reputable data source for various economic indicators. All data was sourced from it (World Bank, 2023). The data covers 16 lower income, 42 lower middle-income and 27 upper middle-income countries (LMIE), making a total of 85 countries, for a time period ranging from 1980 to 2020. The panels are collapsed to make 9 periods, of 5 years each, and produced 765 number of observations. (Table 1). Collapsing panels in GMM estimation allows for the exploitation of the full information potential from a larger dataset, leading to more efficient

parameter estimation (Arellano & Bond, 1991). This technique significantly improves estimation efficiency, particularly in the presence of heteroscedasticity (Hansen, Heaton, & Yaron, 1996). Larger panel sizes also amplify the benefits of the finite sample correction, enhancing the precision of GMM estimation (Windmeijer, 2005). Moreover, collapsing panels facilitates better instrument selection and strengthens tests for overidentifying restrictions (Blundell & Bond, 1998). The utilization of larger panel sizes empowers GMM overidentification tests to better discern weak instruments and identify potential misspecifications. Collapsing panels enhances the robustness of GMM estimates, particularly when dealing with datasets characterized by limited time-series observations or significant missing data.

The variables used are summarized in Table 2, are log transformed and briefly expanded as follows: comprehensive alternative measures of financial institutions based financial development are used. FIN(1) represents domestic credit provided to the private sector by banks as the percentage of a country's GDP. It indicates the level of financial intermediation and the availability of credit for private sector activities. Higher values of FIN(1) suggest a greater degree of access to bank financing for businesses and individuals. Similar to FIN(1), FIN(2) represents the domestic credit provided to the private sector, expressed as a percentage of the country's GDP. However, unlike FIN(1), FIN(2) includes credit from both banks and non-bank financial institutions. It provides a broader measure of the availability of credit to support private sector activities. FIN(3) specifically refers to the credit provided by the monetary sector, including the central bank and other monetary authorities, to the private sector. It is expressed as a percentage of the country's GDP. It captures the role of monetary policy in influencing the credit availability and financial conditions for private sector borrowers. FIN(4) measures the broad money supply as a percentage of the country's GDP. It includes currency in circulation, demand deposits, and other liquid assets. A higher value of FIN(4) indicates a larger money supply relative to the size of the economy and reflects the availability of money for transactions and economic activities. FIN(5) represents the domestic debt of a country as a percentage of its GDP. It includes government debt, corporate debt, and household debt held domestically. It provides an indication of the level of debt burden on the domestic economy and its potential impact on economic stability and sustainability.

The following are sets of independent variables. INC represents the gross domestic product (GDP) per capita adjusted for inflation, denominated in constant 2015 US dollars. It serves as a measure of average economic output

per person and provides insights into the standard of living and economic well-being of individuals within a country. INC(+) refers to positive changes in GDP per capita over time. It signifies an increase in economic output per person and suggests positive economic changes and improvement in living standards. INC(-) represents negative changes in GDP per capita, indicating a decline in economic output per person. It suggests economic contraction or a decrease in living standards. GOV measures the proportion of GDP that is accounted for by government final consumption expenditure. It reflects the share of economic output utilized by the government for providing public goods and services, such as; healthcare, education, and infrastructure development. POG indicates the annual percentage change in a country's population. It reflects the rate at which the population is growing or shrinking and provides insights into demographic trends and challenges, such as workforce dynamics and resource allocation. INF measures the annual percentage change in the GDP deflator, which is an indicator of overall price levels within an economy. It captures the rate of inflation and reflects changes in the general price level. TRA represents the total value of a country's exports and imports of goods and services, expressed as a percentage of its GDP. It provides an indication of the degree of openness and integration of an economy with global markets. Trade related variables are included for model stability as follows; TER represents term of trade, the ratio of a country's export prices to its import prices. It measures the relative strength of a country's export sector compared to its import sector and reflects changes in trade competitiveness. Finally, SDE refers to the standard deviations of the variable TRA, which represents the total value of exports and imports as a percentage of GDP. SDE provides insights into the volatility/stability and variability of a country's trade activities over time, indicating the fluctuations in the value of international trade. The following general model is estimated:

$$y_{i,t} = \alpha + \beta^{+} * INC_{i,t}^{+} + \beta^{-} * INC_{i,t}^{-} + X_{i,t} * \beta + Z_{i,t} * \gamma + \mu_{i,t} \quad ----------(1)$$

where $INC_{i,t}^{+}$ is equal to positive GDP per capitachanges in country-years, 0 otherwise; and $INC_{i,t}^{-}$ is equal to the negative GDP per capita changes, 0 otherwise. $X_{i,t}$ represents the set of exogenous variables, $Z_{i,t}$ represent the set of instrumental variables.$INC_{i,t}^{+}$ and $INC_{i,t}^{-}$ are decomposed from $INC_{i,t} = INC_0 + INC_{i,t}^{+} + INC_{i,t}^{-}$ where $INC_{i,t}^{+}$ and $INC_{i,t}^{-}$ are partial sum processes of positive and negative changes in $INC_{i,t}$. This decomposition approach has been used by many researchers such as Ngoc (2020) on asymmetric effects of inflation on growth and Asandului, et al. (2021)on

fiscal policy on inflation and economic activities. The decomposition issummarized in equation 2.

$$INC_{i,t}^{+} = \sum_{n=1,j=1}^{q+} \Delta INC_{n,j}^{+} = \sum_{n=1,j=1}^{q+} max(\Delta INC_{n,j}, 0); \; INC_{i,t}^{-} = \sum_{n=1,j=1}^{q-} \Delta INC_{n,j}^{-}$$
$$= \sum_{n=1,j=1}^{q-} min(\Delta INC_{n,j}, 0) \quad (2)$$

B. The General Method of Moments

The General Method of Moments (GMM) is an econometric estimation technique widely used in empirical research to estimate parameters in models with moment conditions (Hansen & Singleton, 1982). It provides a flexible framework for estimating models when assumptions about functional form and distributional properties are not precisely known (Windmeijer, 2005). It is suitable for studying the non-linear dynamics. GMM estimation is a powerful approach based on moment matching. It equates sample moments with theoretical moments from the economic model, providing flexibility and efficiency in parameter estimation. GMM is particularly suitable for addressing endogeneity, measurement error, heteroscedasticity, and serial correlation issues. (Hansen, 1982). Endogeneity, or the potential mutual relationship as is the case for the analysis between GDP per capita growth and financial development, can bias estimation results. GMM addresses this concern by incorporating instrumental variables that are correlated with the explanatory variables but not with the error term. (Arellano & Bond, 1991). These instrumental variables help identify the causal relationship between GDP per capita growth and financial development.

The GMM estimation technique offers several advantages. First, it provides flexibility by allowing estimation of models without imposing strict assumptions about functional forms or distributional properties (Arellano &Bover, 1995). This flexibility makes GMM suitable for a wide range of economic applications. Second, GMM estimators can be more efficient than traditional estimators, such as ordinary least squares (OLS), by using moment conditions efficiently and accounting for potential endogeneity, heteroscedasticity, and serial correlation in the errors (Hansen, et al. 1996). Third, under appropriate assumptions, GMM estimators are consistent and asymptotically normal, allowing for valid statistical inference (Hansen, 1982). The GMM estimation technique has been extended and applied in various econometric models. For example, the system GMM estimator has been developed for dynamic panel data models (Arellano & Bond, 1991), and can be adapted into a non-linear GMM estimation.

As stated earlier, the GMM estimation technique is based on the method of moments principle, which aims to match theoretical moments of a model with their sample counterparts. Moment conditions are derived from the theoretical model and serve as the building blocks for estimation. These conditions capture the relationships between the model's variables and parameters (Hansen & Singleton, 1982). The GMM estimation process involves two stages: the moment estimation stage and the efficient estimation stage. In the moment estimation stage, moment conditions are constructed using the model's assumptions. These moment conditions typically take the form of sample averages of functions of observed variables and model parameters. The objective is to choose parameters that minimize the distance between the sample moments and the population moments implied by the model. (Hansen, 1982). In the efficient estimation stage, the estimated moments from the first stage are used to construct a criterion function that measures the discrepancy between the sample moments and the model's implied moments. (Hansen, et al. 1996). This criterion function is minimized to obtain efficient estimates of the model's parameters. The optimization process involves weighting the moment conditions to improve efficiency and account for potential heteroscedasticity or correlation in the errors.

The GMM estimator seeks to find the values of θ that minimize the criterion function J(θ), indicating the best fit between the sample moments and the theoretical moments implied by the model. This estimation technique allows for consistent and efficient estimation of parameters in models where assumptions about functional form and distributional properties are not precisely known. The estimator’s equation can be represented as follows:

$$\hat{\theta} = \arg\_min\left(J(\theta)\right) \text{-----------------------------} (3)$$

where: $\hat{\theta}$represents the estimated parameters. $J(\theta)$ is the criterion function that measures the discrepancy between the sample moments and the model's implied moments.

The criterion function $J(\theta)$ is defined as:

$$J(\theta) = n * g(\theta)' * W * g(\theta) \text{--------------------------} (4)$$

where: n is the sample size. g(θ) is a vector of moment conditions, which are functions of the observed variables and parameters of the model. W is a positive definite weighting matrix that accounts for the heteroscedasticity and potential correlation in the errors.

C. Justification for Using GMM in Capturing the Non-linear Dynamics

GMM estimation is well-suited for capturing non-linear dynamics relationship. By specifying appropriate moment conditions that reflect the non-linear relationship, GMM allows for the examination of the shape and magnitude of the effects across different levels of a variable. (Roodman, 2009). GMM is particularly useful for analyzing panel data, which combines cross-sectional and time series observations. Panel data analysis allows for the exploration of both within-country and between-country variations in the relationship. (Arellano &Bover, 1995; Windmeijer, 2005).

For robustness check purposes the two-step system GMM of Blundell and Bond (1998) is applied in comparative analysis with the forward-orthogonal deviations (FOD) IV/GMM estimation method of Hayakawa, Qi, and Breitung (2019).The first estimation is based on Blundell and Bond (1998) who introduced the concept of two-step system GMM estimators with collapsed instruments and robust standard errors. This approach addresses the issue of weak instrument bias and provides more efficient and robust estimates in dynamic panel data models. It addresses the endogeneity problem in panel data models by utilizing a set of moment conditions based on the first-difference transformation of the variables. This approach accounts for both the contemporaneous and dynamic relationships between the variables.In their study, Blundell and Bond (1998) demonstrated that the collapsed instruments in the GMM framework, where predetermined variables are used as instruments, lead to more efficient estimation compared to traditional GMM methods. Furthermore, they provided a robust variance estimator to account for potential heteroscedasticity and autocorrelation in the error terms, ensuring valid statistical inference. The two-step system GMM estimator with collapsed instruments and robust standard errors proposed by Blundell and Bond (1998) has several advantages. First, it addresses the weak instrument problem commonly encountered in dynamic panel data models, improving the efficiency of parameter estimates. Second, it allows for valid statistical inference by considering potential heteroscedasticity and autocorrelation in the errors. Third, it accommodates a wide range of dynamic panel data specifications, making it applicable to various economic applications. In short, by incorporating collapsed instruments and robust standard errors, this technique improves the accuracy and reliability of parameter estimation in empirical research. (Blundell and Bond, 1998).

The two-step system GMM estimator has two steps. The first step uses instrumental variables to estimate the parameters of the model, while the

second step employs the differenced form of the endogenous variable to account for the dynamic nature of the panel data. This two-step process allows for consistent and efficient estimation, particularly in the presence of endogeneity and autocorrelation.

Step 1: First-Stage Equation

$$y_{i,t} = X_{i,t} * \beta + Z_{i,t} * \gamma + \mu_{i,t} \quad ----------(5)$$

In the first step, a dynamic panel data model is estimated using instrumental variables (IV). The dependent variable $y_{i,t}$ represents the endogenous variable of interest, $X_{i,t}$ represents the set of exogenous variables, $Z_{i,t}$ represents the set of instrumental variables, βrepresents the coefficients of the exogenous variables, γ represents the coefficients of the instrumental variables, and $\mu_{i,t}$ represents the error term.

Step 2: Second-Stage Equation

$$\Delta y_{i,t} = \Pi * \Delta y_{i,t-1} + X_{i,t} * \theta + v_{i,t} \quad ----------(6)$$

In the second step, the differenced form of the endogenous variable, $\Delta y_{i,t}$, is regressed on its lagged difference, $\Delta y_{i,t-1}$, the set of exogenous variables $X_{i,t}$, and the estimated coefficients θ. Πrepresents the coefficient matrix capturing the dynamic relationship between the endogenous variable and its lagged difference, and $v_{i,t}$represents the error term.Blundell and Bond (1998) proposed this two-step system GMM estimator to address the potential bias arising from endogeneity in dynamic panel data models. By incorporating lagged differences and instrumental variables, their estimator provides a robust approach to estimating parameters and controlling for endogeneity concerns in panel data settings.It is argued by Krifpganz (2019) that in dynamic models incorporating unobserved group-specific effects, the lagged dependent variable inherently acts as an endogenous regressor. In cases such as of this study, the traditional fixed-effects estimator, when analyzed under fixed-T asymptotics, is prone to bias and inconsistency. To address this issue, reliance on the system GMM estimators is prevalent among practitioners. In this study, inspiration is drawn from Blundell and Bond's (1998) system GMM estimator, which effectively tackles the aforementioned problem in practical applications.

The second estimation is based on Hayakawa, Qi, and Breitung (2019) who

introduced the forward-orthogonal deviations (FOD) IV/GMM estimation method, which combines instrumental variable (IV) estimation with GMM estimation. The approach addresses the endogeneity issue in econometric models by utilizing forward-orthogonal deviations as instruments. In the estimation, the first step involves generating forward-orthogonal deviations by regressing the endogenous variables on predetermined instruments. These forward-orthogonal deviations capture the exogenous component of the endogenous variables, allowing for consistent estimation of the model parameters (Hayakawa, et al. 2019). The second step involves constructing moment conditions based on the FODs and estimating the model parameters using the GMM framework. The moment conditions are formed by taking the orthogonality conditions between the FODs and the instruments, as well as between the FODs and the model errors (Hayakawa, et al. 2019). The estimation method provides several advantages. First, it addresses endogeneity concerns by using forward-orthogonal deviations as instruments, which helps alleviate bias in parameter estimation. Second, it combines the strengths of both IV and GMM estimation methods, leading to efficient and consistent parameter estimates. Third, theapproach accommodates various econometric models and can handle different forms of endogeneity. Hayakawa, et al. (2019) demonstrated the effectiveness of themethod through simulations and empirical applications. Their results showed that the approach outperformed other estimation methods in terms of bias reduction and efficiency improvement.

Therefore, the final implemented model follows the following form:

$$\Delta y_{i,t} = \sum_{j=1}^{q_y} \delta_j \Delta y_{i,t-j} + \sum_{j=0}^{q_x} \Delta X'_{i,t-j} \beta_j + [\Delta \mu_{i,t} = \Delta \varepsilon_{i,t}] - - - - - - - - - - - - - - - - (7)$$

Where $\Delta y_{i,t}$ represents the alternative financial development differenced measures, and $\Delta X'_{i,t-j}$ represent all differenced regressors which can be exogenous, weakly exogenous (predetermined) or endogenous.

Finally, the analysis followed a sequential implementation procedure, as adopted from Krifpganz (2019), which helps in the identification of the models their optimal lags that best fit the data based on different information criteria. It includes steps such as; the specification of an initial candidate statistical model and the computation of one-step estimation. During this estimation, tests for serial correlation (up to order two) and overidentification are examined. If any of these tests are not satisfied, the procedure is repeated

using the initial candidate model. Additionally, the model undergoes the removal of lags with the highest p-values, followed by model re-estimation. Ultimately, the model with the lowest values of the Akaike information criterion (AIC), Bayesian information criterion (BIC), and Hannan–Quinn information criterion (HQC) is selected.

IV. Empirical Analysis and Results

A. Presentation and Interpretation of the Empirical Findings

In this analysis, several economic indicators were examined. (Table 2). The mean values for the domestic credit variables, FIN(1) and FIN(2), are relatively close, with FIN(2) slightly higher at 30.4215 compared to FIN(1) at 28.5622. Higher values indicate greater credit availability to support private sector activities. Additionally, FIN(3) shows a mean value of 28.9123. This aligns closely with the domestic credit variables, signifying the significant role played by the monetary sector in extending credit to the private sector. Secondly,FIN(4) has a relatively higher mean value of 43.6737, indicating a larger money supply relative to the size of the economies. On the other hand, FIN(5) with a mean value of 9.5939, suggests a smaller debt burden relative to the size of the economies, encompassing government, corporate, and household debt.Thirdly, INC, the mean value of 2880.9900, reflects the standard of living and economic well-being of individuals within the sample which is within the LMIE. Examining INC(+), and INC(-), we gain insights into economic changes. INC(+) has a mean value of 236.3099, this suggests economic expansions and improved living standards. Conversely, INC(-) has a mean value of -72.7318, reflects less economic contraction or a decrease in living standards.

Fourthly, macroeconomic indicators, GOV with a mean value of 14.4076, reflects a low share of economic output used by the government for providing public goods and services. POG with a mean value of 1.9873 which is high, shedding light on demographic trends and challenges, such as workforce dynamics and resource allocation. INF with a mean value of 40.5314. It portrays high changes in the general price level within the economies. Lastly, trade-related variables: TRA, TER, and SDE. TRA represents the total of exports and imports, with a mean value of 67.3455. This indicates a significant degree of openness and integration of the economy with global markets. TER, the terms of trade, has a mean value of 0.8229. It provides insights into the relative strength of the country's export sector compared to its import sector, which in this case low with more imports than exports. Lastly, SDE, with a mean value of 6.3805reflects high volatility and variability of the countries' trade activities over time.

Table 2: Descriptive Statistics

Variable	Variable Definition	Obs.	Mean	SD	Min	Max
FIN(1)	Domestic credit to private sector by banks (% of GDP)	765	28.56	22.58	0.697	157.4
FIN(2)	Domestic credit to private sector (% of GDP)	765	30.42	23.47	0.740	157.4
FIN(3)	Monetary sector credit to private sector (% of GDP)	765	28.91	22.63	0.740	157.4
FIN(4)	Broad money (% of GDP)	765	43.67	29.76	3.484	239.8
FIN(5)	Domestic debt (% of GDP)	765	9.59	18.94	-83.24	240.5
INC	GDP per capita (constant 2015 US$)	765	2881	2553	262.2	13857
INC(+)	Positive changes of INC	765	236.3	456.6	0.000	6609
INC(-)	Negative changes of INC	765	-72.73	234.4	-2785	0.000
GOV	Government final consumption expenditure (% of GDP)	765	14.40	5.586	0.000	42.94
POG	Population growth (annual %)	765	1.98	1.060	-1.676	5.125
INF	Inflation, GDP deflator: linked series (annual %)	765	40.53	284.0	-5.902	6945
TRA	Total of exports and imports (% of GDP)	765	67.34	32.92	1.387	221.5
TER	Terms of trade, ratio of export to imports	765	0.82	0.307	0.150	2.709
SDE	Standard deviations of TRA	765	6.38	5.960	0.000	56.68

Source: Author's computation.

In terms of domestic credit variables variability, FIN(1), FIN(2), and FIN(3) show consistent levels of credit to the private sector as a percentage of GDP, with standard deviations of 22.5806, 23.4729, and 22.6342, respectively. But, financial indicators, FIN(4) indicates a higher level of variability in the money supply (29.7608), while FIN(5) suggests relatively smaller variability in domestic debt (18.9441). INC shows significant variability (2553.3940), with INC(+) indicating higher variability in positive changes (456.6103) and INC(-) showing slightly lower variability in negative changes (234.4985). Government expenditure (GOV) demonstrates a more stable level (5.5869), while population growth (POG) and inflation (INF) have relatively lower (1.0604) and higher (284.0167) variability, respectively. Trade-related variables, TRA (32.9254) and TER (0.3079), suggest moderate and lower variability in openness to global markets and export-to-import price ratio, respectively. Finally, SDE (5.9604) indicates a moderate level of variability in the countries' trade activities.

First, the domestic credit variables (FIN), strong positive correlations between FIN(1), FIN(2), and FIN(3) with correlation coefficients ranging from 0.933 to 0.988 are evidenced. (Table 3). This indicates a high degree of association between these variables, suggesting that they capture similar aspects of credit provision to the private sector. Furthermore, FIN(4) shows moderate to strong positive correlations with FIN(1), FIN(2), and FIN(3), ranging from 0.775 to 0.824. This indicates a positive relationship between broad money and domestic credit provided by banks and financial institutions.

Table 3: Correlation Matrix

Log(Var.)	FIN(1)	FIN(2)	FIN(3)	FIN(4)	FIN(5)	INC	INC(+)	INC(-)	GOV	POG	INF	TRA	TER	SDE
FIN(1)	1.0000													
FIN(2)	0.933***	1.0000												
FIN(3)	0.988***	0.946***	1.0000											
FIN(4)	0.820***	0.775***	0.824***	1.0000										
FIN(5)	0.204***	0.231***	0.202***	0.343***	1.0000									
INC	0.538***	0.552***	0.528***	0.486***	0.198***	1.0000								
INC(+)	0.268***	0.243***	0.268***	0.283***	0.0120	0.197***	1.0000							
INC(-)	0.138***	0.088**	0.115***	0.106***	-0.0260	0.121***	0.220***	1.0000						
GOV	0.237***	0.247***	0.238***	0.301***	0.116***	0.213***	-0.066*	-0.0190	1.0000					
POG	-0.26***	-0.26***	-0.26***	-0.28***	-0.14***	-0.29***	-0.131***	0.0520	-0.077**	1.0000				
INF	-0.25***	-0.19***	-0.24***	-0.23***	0.085**	-0.10***	-0.240***	-0.212***	-0.046	0.067*	1.0000			
TRA	0.295***	0.283***	0.293***	0.334***	0.0050	0.241***	0.168***	0.0470	0.315***	-0.14***	-0.18***	1.0000		
TER	0.137***	0.131***	0.118***	0.078**	-0.0030	0.474***	0.112***	0.0180	-0.0450	0.0210	0.0270	0.134***	1.0000	
SDE	-0.0330	-0.0300	-0.0350	0.063*	0.089**	0.0060	0.0300	-0.104***	0.112***	-0.11***	0.122***	0.371***	0.0280	1.0000

**** p<0.01, ** p<0.05, * p<0.1*

Source: Author's Computation

However, FIN(5) shows weak positive correlations with the other financial variables, suggesting a relatively weaker association with domestic debt. Second, INC, which represents GDP per capita, moderate positive correlations with the domestic credit variables FIN(1), FIN(2), and FIN(3), ranging from 0.528 to 0.552 were observed.

This suggests a positive relationship between GDP per capita and credit provision to the private sector. Importantly, INC showed weak positive correlations with FIN(4) and FIN(5), indicating a potential association between GDP per capita and broad money and domestic debt. The positive correlations of INC(+) with the financial variables further highlights the relationship between positive changes in GDP per capita and credit provision. However, INC(-) shows weaker positive correlations, suggesting a weaker relationship with negative changes in GDP per capita. This implied that during periods of economic expansion and increased GDP per capita, there is a higher likelihood of credit being extended to the private sector. However, it is worth noting that the weaker positive correlations seen with INC(-) suggest a less pronounced relationship with negative changes in GDP per capita, indicating that economic downturns may not have as strong of an impact on credit provision.

Third, GOV, representing government final consumption expenditure, weak positive correlations with the financial variables, ranging from 0.237 to 0.301 was observed (Table 3). This suggests a positive association between government expenditure and credit provision, broad money, and domestic debt. However, GOV showed negative correlations with POG and INF, indicating a potential trade-off between government spending and population growth and inflation. POG, reflecting population growth, showed negative correlations with the financial variables, ranging from -0.263 to -0.287. This suggested an inverse relationship between population growth and credit provision, broad money, and domestic debt. Similarly, INF, representing inflation, shows negative correlations with the financial variables, indicating a potential inverse relationship between inflation and credit provision, broad money, and domestic debt.

Fourth, examining the trade-related variables, the study observed positive correlations between TRA (total of exports and imports) and the financial variables FIN(1), FIN(2), FIN(3), and FIN(4), ranging from 0.283 to 0.334. This indicated a positive relationship between trade and credit provision, broad money, and domestic debt. TER, representing the terms of trade, showed weak positive correlations with some financial variables, suggesting

a potential association between export-to-import price ratios and credit provision and domestic debt. Lastly, SDE, representing the standard deviations of total exports and imports, suggested a relatively weaker association with the financial variables.

Table 4: Fod/Iv Gmm Estimations

	Model 1a	Model 2a	Model 3a	Model 4a	Model 5a	Model 1b	Model 2b	Model 3b	Model 4b	Model 5b
D.INC(+)	1.0229***	0.6359*	1.2680***	0.9497***	0.0716	2.5023***	1.4312***	1.8254***	1.4364*	0.0297
	[0.3260]	[0.3263]	[0.3755]	[0.2762]	[1.2898]	[0.5185]	[0.3226]	[0.4391]	[0.7785]	[0.8635]
D.INC(-)	-0.5309*	-0.6078	-0.7016**	-0.9127**	-5.7533*	-1.3298***	-1.3164*	-1.6911***	-4.4040**	-9.6036***
	[0.3176]	[0.3847]	[0.3250]	[0.4337]	[3.4913]	[0.4834]	[0.6773]	[0.6049]	[1.7403]	[2.9378]
D.GOV	0.2466	0.0071	0.1587	0.4745**	-0.5929	-0.1842	0.9509***	0.5796***	-0.3978	0.3340
	[0.2761]	[0.2544]	[0.2441]	[0.1941]	[0.8603]	[0.3092]	[0.2271]	[0.1891]	[0.2971]	[0.5492]
D.POG	0.0189	-0.0137	0.0274	0.0661	0.2206	-0.1682	-0.0023	-0.0239	-0.0392	0.6185*
	[0.0754]	[0.0593]	[0.1016]	[0.0763]	[0.3618]	[0.1290]	[0.0326]	[0.0487]	[0.1373]	[0.3461]
D.INF	-0.0818	-0.1092	-0.1075	-0.1431	-0.7678***	-0.6788***	-0.0435	-0.4156***	-0.8012***	-0.9207***
	[0.1334]	[0.1172]	[0.1441]	[0.1385]	[0.2516]	[0.1569]	[0.0911]	[0.1156]	[0.2575]	[0.2289]
D.TRA	0.5364***	0.5400***	0.4648***	0.0654	-0.0875	1.8454***	1.3694***	0.4638***	-0.1252	0.2121
	[0.1764]	[0.1850]	[0.1629]	[0.1797]	[0.3424]	[0.3671]	[0.2998]	[0.1449]	[0.2822]	[0.3443]
D.TER	-0.0290	-0.0474	0.0914	0.8470***	1.3214	0.7927**	0.0394	1.0186***	3.3094***	2.1060***
	[0.3371]	[0.3158]	[0.4001]	[0.2867]	[0.8235]	[0.3464]	[0.2420]	[0.3225]	[0.9631]	[0.6622]
D.SDE	-0.0079**	-0.0051**	-0.0081***	-0.0027	0.0082	-0.0193***	0.0040	-0.0165***	-0.0045	0.0128
	[0.0032]	[0.0026]	[0.0030]	[0.0031]	[0.0103]	[0.0072]	[0.0056]	[0.0062]	[0.0064]	[0.0079]
Constant	-0.2437***	-0.1681**	-0.2684***	-0.1610*	-0.3775*	-0.6827***	-0.4225***	-0.4925***	-0.4809**	-0.4057*
	[0.0799]	[0.0738]	[0.0958]	[0.0905]	[0.2013]	[0.1345]	[0.1348]	[0.0958]	[0.1989]	[0.2214]
LD.FIN(1)	0.0136					0.1134				
	[0.0923]					[0.0724]				
LD.FIN(2)		0.0454					0.6114***			
		[0.1096]					[0.1138]			
LD.FIN(3)			0.0522					0.0966		
			[0.1258]					[0.0695]		
LD.FIN(4)				-0.0636					0.2010	
				[0.1263]					[0.1918]	
LD.FIN(5)					-0.4262***					-0.3817***
					[0.0579]					[0.0653]
Observations	425	425	425	425	425	425	510	425	425	425

	Model 1a	Model 2a	Model 3a	Model 4a	Model 5a	Model 1b	Model 2b	Model 3b	Model 4b	Model 5b
No. of groups	85	85	85	85	85	85	85	85	85	85
No. of instruments	58	58	58	58	58	58	59	58	58	58
Wald Chi2	129.03***	84.95***	265.09***	164.37***	315.72***	134.46***	159.23***	290.78***	33.79*	309.38***
S-H.	44.7785	40.9338	42.0381	42.1147	21.6542	29.1448	43.9446	22.3322	27.3313	19.2506
A-B Ar(1)	-2.1787*	-2.6699***	-2.4293	-2.8674***	-1.9528	-3.8199***	-1.4150	-4.3139***	-2.5821***	-2.2228*
A-B Ar(2)	-1.7111	-0.0683	-0.0649	-0.5566	0.6527	-1.0398	0.1082	-0.5631	-0.0829	1.2538
Estimator	twostep	twostep	twostep	twostep	twostep	cugmm	cugmm	cugmm	cugmm	cugmm
VCE Type	WC-Robust	WC-Robust	WC-Robust	WC-Robust	WC-Robust	Robust	Robust	Robust	Robust	Robust

Standard errors in brackets, $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$.

Source: Author's computation.

Notes: Presentation of Hayakawa, Qi, and Breitung (2019)-forward-orthogonal deviations (FOD) IV / GMM estimation results. The following are models and their respective dependent variables: Models 1a & 1b, FIN(1); Models 2a & 2b, FIN(2); Models 3a & 3b, FIN(3); Models 4a & 4b, FIN(4); Models 5a & 5b, FIN(5). A-B Ar(1) and Ar(2) are Arellano-Bond tests for autocorrelation for order 1 and 2 respectively of the first-differenced residuals, under H0: no autocorrelation of order 1 and 2. S-H is Sargan-Hansen test of the overidentifying restrictions, under H0: overidentifying restrictions are valid. WC-Robust refers to Windmeijer-corrected standard errors.

A. Regression Results and Discussion

The regression results for Models 1a to 5a and Models 1b to 5b provide estimates of the coefficients for each independent variable, along with their standard errors in square brackets. (Table 4 and Table 5). In the regression models, the coefficient for D.INC(+) consistently showed a positive relationship with the dependent variables, indicating that an increase in positive changes in GDP per capita is associated with increases in the corresponding financial development indicators. However, the statistical significance of the coefficient varies across the models and financial development indicators. In some cases, such as FIN(1), FIN(3), and FIN(4), the coefficient for D.INC(+) is statistically significant at the 1% level, indicating a robust relationship. For FIN(2) and FIN(5), the coefficient was statistically significant in some models only.

The magnitude of the coefficients and the significance levels also differed across the models. In Model 3a, for example, the coefficients are larger compared to Models 1a and 2a, suggesting a stronger relationship between positive changes in GDP per capita and the financial development indicators. The results for Models 1b to 5b generally aligned with the patterns observed in Models 1a to 5a, but with some variations in the significance levels and coefficient magnitudes. Overall, the findings highlighted the importance of positive changes in GDP per capita in relation to the financial development indicators, though the specific impact and statistical significance can vary depending on the model and financial development indicator under consideration.

The findings from Models 1b to 5b generally aligned with Models 1a to 5a, indicating a positive relationship between D.INC(+) and the financial development indicators.(Table 4 and Table 5). However, there were variations in the significance levels and coefficient magnitudes across models. The relationship is consistent for FIN(1), FIN(3), and FIN(4) supporting robustness of the results in these models, but not as strong or statistically significant for FIN(2) and FIN(5).In Model 1a, the coefficient for D.INC(+) is estimated to be 1.02, indicating a positive relationship with the financial development indicators. The 95% confidence interval [0.38, 1.66] suggested that the true population coefficient is likely to fall within this range with 95% confidence. Similarly, in Model 2a, the coefficient for D.INC(+) is estimated to be 0.64, which indicated a positive relationship. The comparable confidence interval [0.00, 1.28] indicated robustness in estimating the true population coefficient. (Table 6). These interpretations and comparisons can be extended to the remaining models (Model 3a to Model 5a) and their

corresponding confidence intervals for D. INC(+).

The regression results from Models 1a to 5a and Models 1b to 5b provided estimates for the coefficient of D.INC(-). In general, the results indicated some models significant relationship for D.INC(-) and financial development indicators. However, in Model 1a, a negative relationship is found for FIN(1) and FIN(3), while in Model 5a, a negative relationship is observed for FIN(5) with statistical significance at the 1% level thus supporting the robustness of the results. For robustness comparison purposes Models 1c to 5c, and 1d to 5d estimates and confidence intervals are included for both variables are included in Table 7.

In Model 2a, only FIN(2) exhibits a significant positive relationship with LD.FIN(2). Model 4a reveals a significant negative relationship between FIN(4) and LD.FIN(4). The results for Models 1b to 5b follow a similar pattern but with variations in the significance levels and coefficient magnitudes for the lagged independent variables. Overall, the impact of the lagged independent variables on the financial development indicators was not consistently statistically significant across the models. While some models and financial development indicators showed significant relationships, the significance levels and magnitudes differed. These findings should be interpreted considering the specific financial development indicator.

The regression results provided significant findings on the relationships between various economic indicators and the dependent variables related to domestic credit (FIN(1), FIN(2), and FIN(3)), broad money (FIN(4)), and domestic debt (FIN(5)). For the domestic credit variables, the regression coefficients indicate that changes in government final consumption expenditure (D.GOV), trade activities (D.TRA), and the terms of trade (D.TER) are positively associated with changes in credit provided by banks to the private sector. Additionally, inflation (D.INF) exhibits a negative relationship with these domestic credit variables, indicating that higher inflation is associated with decreased credit provision.

Table 5: System Gmm Estimations

	Model 1c	Model 2c	Model 3c	Model 4c	Model 5c	Model 1d	Model 2d	Model 3d	Model 4d	Model 5d
D.INC(+)	0.7447***	0.6943***	0.7527***	0.2510**	0.1070	0.9234***	0.3799*	1.3516***	1.6853***	1.0060***
	[0.1668]	[0.1914]	[0.2282]	[0.1220]	[0.4946]	[0.2545]	[0.2266]	[0.1916]	[0.3596]	[0.3701]
D.INC(-)	-0.4224	-0.1699	-0.0597	-0.3269	-2.2436**	-2.1063***	-1.8518***	-2.1327***	-0.3426	-3.1059***
	[0.3214]	[0.3853]	[0.4536]	[0.2871]	[0.9877]	[0.3261]	[0.3456]	[0.4595]	[0.3986]	[0.7545]
D.GOV	0.1564	0.2840**	0.2282	0.1515*	-0.0903	0.4387***	0.6874***	0.4381***	-0.2736**	-0.0790
	[0.1307]	[0.1345]	[0.1552]	[0.0855]	[0.2165]	[0.0686]	[0.1233]	[0.0822]	[0.1255]	[0.1615]
D.POG	-0.0398	-0.0077	-0.0154	-0.0190	-0.0055	-0.0418***	-0.1473***	-0.0218	-0.0992***	0.8688***
	[0.0253]	[0.0239]	[0.0315]	[0.0158]	[0.0920]	[0.0101]	[0.0242]	[0.0214]	[0.0342]	[0.2694]
D.INF	-0.1707**	-0.0424	-0.1029	-0.1115**	-0.0130	-0.2373***	-0.4502***	-0.2188***	0.0466	0.1703*
	[0.0757]	[0.0666]	[0.1042]	[0.0463]	[0.1097]	[0.0658]	[0.1005]	[0.0601]	[0.0998]	[0.0949]
D.TRA	0.3921***	0.2523**	0.3816**	0.3323***	-0.1380	0.5726***	0.1088	0.4663***	1.1462***	-0.4489***
	[0.1046]	[0.1080]	[0.1608]	[0.0963]	[0.2025]	[0.1198]	[0.1162]	[0.0800]	[0.1596]	[0.1461]
D.TER	-0.2218	-0.0699	-0.2746	0.0519	0.6918**	0.1380	1.4135***	0.1781	-0.2155	0.2895
	[0.2740]	[0.2292]	[0.2924]	[0.1122]	[0.3177]	[0.1385]	[0.3283]	[0.1359]	[0.2339]	[0.1979]
D.SDE	-0.0093***	-0.0067*	-0.0074**	-0.0041**	-0.0087	-0.0086***	-0.0083***	-0.0108***	-0.0199***	0.0122***
	[0.0023]	[0.0036]	[0.0037]	[0.0017]	[0.0072]	[0.0022]	[0.0025]	[0.0016]	[0.0060]	[0.0046]
Constant	-0.2392***	-0.0892	-0.1709	-0.1092**	-0.0677	-0.1816***	-0.1691***	-0.4072***	-0.4585***	0.1271
	[0.0665]	[0.1166]	[0.1598]	[0.0512]	[0.1425]	[0.0587]	[0.0596]	[0.0864]	[0.1309]	[0.1249]
LD.FIN(1)	-0.1343*					-0.2105***				
	[0.0709]					[0.0723]				
LD.FIN(2)		-0.0739					0.1876*			
		[0.1685]					[0.1096]			
LD.FIN(3)			-0.0773					0.0301		
			[0.1609]					[0.0758]		
LD.FIN(4)				-0.1634*					-1.0003***	
				[0.0951]					[0.2357]	
LD.FIN(5)					-0.7292***					-1.2831***
					[0.0871]					[0.1057]
Observations	425	510	510	425	425	425	425	425	425	425
No. of groups	85	85	85	85	85	85	85	85	85	85
No. of	67	68	68	67	67	67	67	67	67	67

	Model 1c	Model 2c	Model 3c	Model 4c	Model 5c	Model 1d	Model 2d	Model 3d	Model 4d	Model 5d
instruments										
Wald Chi2	218.03***	92.92***	165.35***	141.38***	186.36***	865.37***	284.60***	832.96***	173.79***	709.03***
S-H.	67.5305	59.9317	60.7216	65.5214	52.4988	48.4916	45.1504	43.9159	37.0356	47.4313
A-B Ar(1)	-2.2355*	-1.0290	-0.9911	-1.2383	-1.1780	-0.6963	-4.5999***	-10.5591***	-9.6668***	-1.1861
A-B Ar(2)	-1.5663	-0.2287	0.2915	-0.1087	0.4600	-1.6592	-1.3193	-0.4461	1.2631	-1.5493
Estimator	twostep	twostep	twostep	twostep	twostep	cugmm	cugmm	cugmm	cugmm	cugmm
VCE Type	WC-Robust	WC-Robust	WC-Robust	WC-Robust	WC-Robust	Robust	Robust	Robust	Robust	Robust

Standard errors in brackets $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$
Source: Author's computation.

Notes: Presentation of Blundell and Bond (1998) two-step system GMM estimators with collapsed instruments and robust standard errors. The following are models and their respective dependent variables: Models 1c & 1d, FIN(1); Models 2c & 2d, FIN(2); Models 3c & 3d, FIN(3); Models 4c & 4d, FIN(4); Models 5c & 5d, FIN(5). A-B Ar(1) and Ar(2) are Arellano-Bond tests for autocorrelation for order 1 and 2 respectively of the first-differenced residuals, under H0: no autocorrelation of order 1 and 2. S-H is Sargan-Hansen test of the overidentifying restrictions, under H0: overidentifying restrictions are valid. WC-Robust refers to Windmeijer-corrected standard errors

However, population growth and the standard deviation of exports and imports show no robust relationship with domestic credit variables. Regarding broad money, the regression results suggest that changes in government expenditure and the terms of trade positively impact changes in broad money. Conversely, inflation shows a negative relationship with broad money, indicating that higher inflation leads to decreased broad money. Population growth and the standard deviation of exports and imports are statistically insignificant in their association with broad money. For domestic debt, the regression coefficients reveal that changes in government final consumption expenditure, population growth, and the terms of trade are positively associated with changes in domestic debt. In contrast, inflation shows a negative relationship with domestic debt, implying that higher inflation is associated with decreased domestic debt. The standard deviation of exports and imports does not significantly influence domestic debt.

Table 6: Confidence Intervals: Fod Iv/Gmm Estimations

	Model 1a	Model 2a	Model 3a	Model 4a	Model 5a	Model 1b	Model 2b	Model 3b	Model 4b	Model 5b
D.INC(+)	1.02***	0.64*	1.27***	0.95***	0.07	2.50***	1.43***	1.83***	1.44*	0.03
	[0.38,1.66]	[0.00,1.28]	[0.53,2.00]	[0.41,1.49]	[-2.46,2.60]	[1.49,3.52]	[0.80,2.06]	[0.96,2.69]	[-0.09,2.96]	[-1.66,1.72]
D.INC(-)	-0.53*	-0.61	-0.70**	-0.91**	-5.75*	-1.33***	-1.32*	-1.69***	-4.40**	-9.60***
	[-1.15,0.09]	[-1.36,0.15]	[-1.34,-0.06]	[-1.76,-0.06]	[-12.60,1.09]	[-2.28,-0.38]	[-2.64,0.01]	[-2.88,-0.51]	[-7.81,-0.99]	[-15.36,-3.85]
Obs.	425	425	425	425	425	425	510	425	425	425

95% confidence intervals in brackets. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$
Source: Author's computation.
Notes: Presentation of Hayakawa, Qi, and Breitung (2019)-forward-orthogonal deviations (FOD) IV / GMM estimators.

Table 7: Confidence Intervals: System Gmm Estimations

	Model 1c	Model 2c	Model 3c	Model 4c	Model 5c	Model 1d	Model 2d	Model 3d	Model 4d	Model 5d
D.INC(+)	0.74***	0.69***	0.75***	0.25**	0.11	0.92***	0.38*	1.35***	1.69***	1.01***
	[0.42,1.07]	[0.32,1.07]	[0.31,1.20]	[0.01,0.49]	[-0.86,1.08]	[0.42,1.42]	[-0.06,0.82]	[0.98,1.73]	[0.98,2.39]	[0.28,1.73]
D.INC(-)	-0.42	-0.17	-0.06	-0.33	-2.24**	-2.11***	-1.85***	-2.13***	-0.34	-3.11***
	[-1.05,0.21]	[-0.92,0.59]	[-0.95,0.83]	[-0.89,0.24]	[-4.18,-0.31]	[-2.75,-1.47]	[-2.53,-1.17]	[-3.03,-1.23]	[-1.12,0.44]	[-4.58,-1.63]
Observations	425	510	510	425	425	425	425	425	425	425

95% confidence intervals in brackets. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.
Source: Author's computation
Notes: Presentation of Blundell and Bond (1998) two-step system GMM estimators.

V. Conclusion and Recommendations

The empirical analysis revealed several key findings. Positive changes in GDP per capita consistently showed a positive association with financial development indicators, while negative changes in GDP per capita exhibit a negative relationship, although the later exhibits lesser magnitudes across models. Government final consumption expenditure displays mixed results, while inflation demonstrates a negative relationship with financial development indicators. Trade openness and favorable terms of trade are generally associated with higher levels of financial development. Moreover, lagged values of financial development indicators have a positive impact on current values. These findings emphasized the significance of positive economic changes, stable prices, trade openness, and financial sector stability for fostering financial development. However, further research is needed to validate and expand upon these results, considering specific country contexts and potential limitations of the analysis. There are several areas for future research based on the findings of this empirical analysis. Firstly, it would be beneficial to explore the causal relationships between the independent variables and financial development indicators using alternative research designs such as non-linear autoregressive distributed lag approach. Additionally, conducting country-specific studies and considering regional variations could help capture the heterogeneity in the relationship between economic factors and financial development. Finally, investigating the role of institutional factors, such as regulatory frameworks and governance structures, could provide valuable insights into the mechanisms through which economic variables affect financial development.

Based on the implications of the results obtained from the analysis, policymakers have several potential actions and considerations to undertake. First, they should focus on strengthening credit access to support private sector activities, considering the relatively close mean values of domestic credit. This may involve enhancing lending mechanisms and facilitating credit access for businesses and individuals. Second, they need to monitor money supply and debt levels, as indicated by the higher mean valueto maintain economic stability. Prudent fiscal management is crucial to avoid unsustainable levels of debt, highlighted by the relatively smaller debt burden. Third, with a positive mean value for GDP per capita growth, policymakers should continue to stimulate positive economic changes through investments in infrastructure, education, and research and development to improve living standards. Fourth, they must address economic contraction, reflected in the negative mean value of GDP per capita growth, with targeted measures such as fiscal stimulus or structural reforms.

Fifth, to manage inflationary pressures indicated by the high mean value of inflation, appropriate measures like monetary policy adjustments and supply-side interventions should be taken to ensure stable and sustainable price levels. Sixth, governments should continue to promote trade openness and explore opportunities for diversifying trade partners and products, as shown by the relatively high mean value of total exports and imports. Additionally, policymakers need to address trade volatility, considering the high mean value of the variability in trade activities, by promoting economic diversification and implementing policies to manage trade-related shocks. Seventh, to achieve a more balanced trade position and improve the competitiveness of the export sector, policymakers should address trade imbalance, represented by the mean value of the terms of trade being less than one. Finally, policymakers may consider targeted investments in public goods and services, such as healthcare, education, and infrastructure, to enhance overall well-being and productivity, given the relatively low mean value of government expenditure. To ensure effective implementation, specific strategies must be tailored to each economy's unique characteristics and challenges, and consultation with relevant stakeholders is essential to foster sustainable positive economic changes and development.

Based on the variability observed in the domestic credit variables, financial indicators, GDP per capita, government expenditure, population growth, inflation, and trade-related variables (i.e. TRA, TER and SDE), several policy recommendations can be considered. First, to maintain credit market stability, policymakers should monitor and regulate lending practices and financial institutions. Second, central banks should implement effective monetary policies to manage fluctuations in the money supply and control inflationary pressures. Third, prudent fiscal management is crucial to avoid unsustainable debt levels. Fourth, policymakers should focus on measures that stimulate positive economic changes and enhance the well-being of citizens, such as investments in education, healthcare, infrastructure, and research and development. Fifth, fiscal discipline is essential to ensure stable and sustainable public finances. Sixth, addressing demographic challenges through targeted policies can support population management and workforce development. Seventh, central banks should implement effective inflation targeting measures to maintain stable inflation rates. Eighth, policymakers should work to enhance trade resilience by diversifying trade partners and products, promoting export competitiveness, and managing trade-related risks effectively. Lastly, strengthening trade activities and supporting trade facilitation measures can contribute to more stable and thriving trade. These policy recommendations aim to promote economic stability, sustainable

growth, and enhanced resilience to economic fluctuations, requiring careful implementation and continuous monitoring for their effectiveness and adaptability to changing economic conditions.

Empirical studies provide valuable insights into the non-linear dynamics of the relationship between GDP per capita growth and financial development. The presence of asymmetric effects highlights the complexity and interdependence of these variables. Policymakers should consider the non-linear nature of this relationship when formulating strategies for sustainable positive economic changes and financial stability. Economic, institutional, and cultural factors influence the non-linear dynamics in different contexts. The following policy recommendations applicable to developing countries are based on regression findings in this work. Promoting positive changes in GDP per capita: The coefficient estimates consistently show a positive relationship between positive changes in GDP per capita and various financial development indicators across different models. Therefore, policymakers should focus on implementing policies and initiatives that stimulate positive economic changes and increase income levels in the country. This can be achieved through strategies such as promoting entrepreneurship, attracting foreign direct investment, fostering innovation and technological advancement, and providing support to small and medium-sized enterprises. By creating an enabling environment for positive economic changes, countries can enhance their financial development and create opportunities for wealth creation and poverty reduction.

Addressing negative changes in GDP per capita: The negative coefficient estimates for negative changes in GDP per capita suggest a detrimental effect on financial development indicators. Policymakers should prioritize measures aimed at mitigating negative shocks to the economy and ensuring stability during economic downturns. Implementing countercyclical fiscal and monetary policies, such as targeted fiscal stimulus programs, interest rate adjustments, and social safety nets, can help buffer the impact of negative economic shocks. Additionally, diversifying the economy, improving resilience to external shocks, and investing in human capital development can help countries better withstand adverse economic conditions and support financial development. Government expenditure and financial development: coefficients in some models indicate that increased government spending can have a positive impact on financial development. Policymakers should focus on optimizing government expenditure by allocating resources towards investments that promote financial sector development, such as infrastructure projects, financial inclusion initiatives, and capacity-building programs. It is

important to ensure that government spending is transparent, efficient, and aligned with the objectives of financial sector development.

In case of inflationary pressures, the negative coefficient estimates for inflation, suggest a negative relationship with financial development indicators. Policymakers should prioritize maintaining price stability and implementing effective inflation control measures. This can include adopting prudent monetary policies, such as; inflation targeting frameworks, enhancing central bank independence, and implementing sound macroeconomic policies. Controlling inflation can help maintain a stable economic environment, foster investor confidence, and promote financial sector development. Enhancing trade and economic openness: The coefficient estimates for total exports and imports and terms of trade, ratio of export to imports, indicate positive relationships with financial development indicators in some models. Policymakers should prioritize policies that promote trade openness, improve export competitiveness, and attract foreign direct investment. This can be achieved through trade facilitation measures, reducing trade barriers, improving logistics and infrastructure, and fostering a favorable business environment. Enhancing trade agreements, partnerships with other nations and promote economic openness, boost financial flows, and support the development of the financial sector. Strengthening financial sector stability and resilience: The regression results also indicate that lagged values of financial development indicators have a positive relationship with the corresponding current values in some models. Policymakers should prioritize policies that promote financial sector stability and resilience. This includes implementing robust regulatory frameworks, conducting regular assessments of financial institutions' health, and strengthening risk management practices. Enhancing the quality and transparency of financial reporting, improving corporate governance standards, and promoting financial literacy among individuals can also contribute to a stable and resilient financial sector.

Sustainable fiscal management is essential, considering the negative effect between broad money and standard deviations of trade variables. Aligning trade policy reforms with financial development goals can further strengthen the financial sector by supporting export-oriented industries and negotiating favorable trade agreements. Policymakers should prioritize strengthening financial institutions and allocating trade-related revenue towards increased lending to the private sector. Diversifying the economy is also vital to enhance resilience against external shocks. By encouraging the development of multiple export industries, risks can be spread, and overall economic

stability can be strengthened. Focusing on trade policy reforms, particularly for trade variables, can help reduce uncertainties and improve terms of trade. Simultaneously, monitoring and managing exchange rate risks can contribute to financial stability and investor confidence, ensuring the efficient utilization of trade variables for the benefit of financial development in developing nations. Trade policy reforms are crucial as positive effects of term of trade on financial development indicators indicate. Governments should negotiate favorable trade agreements, reduce barriers, and support export-oriented industries. Developing countries can leverage the positive impact of trade variables on financial development indicators to foster inclusive and sustainable positive economic changes. Simultaneously, they can use trade gains to promote financial inclusion by providing better access to formal financial services, stimulating savings, investments, and overall economic development.

Reference

Abu-Badar, M., & Abu-Qarn, A. S. (2008). Financial development and economic growth: The Egyptian experience. *Journal of Policy* Modeling, 30(5), 887-898.

Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The colonial origins of comparative development: An empirical investigation. *American Economic Review*, 91(5), 1369-1401.

Aghion, P., & Howitt, P. (1992). A model of growth through creative destruction. *Econometrica*, 60(2), 323-351.

Ahmed, Z., Zhang, B., & Cary, M. (2021). Linking economic globalization, economic growth, financial development, and ecological footprint: Evidence from symmetric and asymmetric ARDL. *Ecological indicators*, *121*, 107060.

Akinci, G.Y., Akinci, M., Yilmaz, €O., 2014. Financial development-economic growth nexus: a panel data analysis upon OECD countries. *Hitotsubashi J. Econ*. 55 (1), 33–50.

Ampofo, G.K.M., Cheng, J., Ayimadu, E.T., & Asante, D.A. (2021). Investigating the Asymmetric Effect of Economic Growth on Environmental Quality in the Next 11 Countries. *Energies*, 14, 491. Retrieved from https://doi.org/10.3390/en14020491

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277-297.

Arellano, M., &Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1), 29-51.

Asandului, M., Lupu, D., Maha, L. G., &Viorică, D. (2021). The asymmetric effects of fiscal policy on inflation and economic activity in post-communist European countries. *Post-Communist Economies*,33(7), 899-919.

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2000). A new database on financial development and structure. *World Bank Economic Review*, 14(3), 597-605.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115-143.

Calderón, C., & Liu, L. (2003). The direction of causality between financial development and economic growth. *Journal of development economics*, *72*(1), 321-334.

Conceição, P., & Kim, N. (2010). The asymmetric impact of growth fluctuation on human development: evidence from correlates of growth decelerations and accelerations. Available at SSRN 2001534.

De Neve, J.-E., Ward, G., De Keulenaer, F., Van Landeghem, B., Kavetsos, G., & Norton, M. I. (2018). The Asymmetric Experience of Positive and Negative Economic Growth: Global Evidence Using Subjective Well-Being Data. *Review of Economics and Statistics*, 100(2), 362–375. doi:10.1162/REST_a_00697.

Demetriades, P. O., &Andrianova, S. (2004). Finance and growth: What we know and what we need to know. *The World Economy*, 27(9), 1475-1499.

Demetriades, P. O., & Hussein, K. A. (1996). Does financial development cause economic growth? Time-series evidence from 16 countries. *Journal of Development Economics*, 51(2), 387-411.

Demirgüç-Kunt, A., &Klapper, L. (2012). Financial inclusion in Africa: An overview. *World Bank Policy Research Working Paper* No. 6088.

Farouq, I. S., Sulong, Z., Ahmad, A. U., Jakada, A. H., & Sambo, N. U. (2020). The effects of economic growth on financial development in Nigeria: Interacting role of foreign direct investment: An application of NARDL. *Int J Sci Technol Res*, *9*, 6321-6328.

Fetai, B.T. (2018). Does financial development accelerate economic growth? An empirical analysis of European countries in transition. *J. Finan. Econ.* Pol. 10 (3), 426–435.

Furceri, D., Loungani, P., &Ostry, J. D. (2019). The aggregate and distributional effects of financial globalization: Evidence from macroeconomic data. *Journal of Development Economics*, 139, 1-16.

Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica: Journal of the Econometric Society*, 50(4), 1029-1054.

Hansen, L. P., & Singleton, K. J. (1982). Generalized instrumental variables estimation of nonlinear rational expectations models. *Econometrica*, 50(5), 1269-1286.

Hansen, L. P., Heaton, J., &Yaron, A. (1996). Finite-sample properties of some alternative GMM estimators. *Journal of Business & Economic Statistics*, 14(3), 262-280.

Hayakawa, K., Qi, M., &Breitung, J. (2019). Double filter instrumental variable estimation of panel data models with weakly exogenous variables. *Econometric Reviews*, 38(9), 1055-1088.

Huang, Y. (2011). *Determinants of Financial Development.* New York: Palgrave Macmillan. doi:10.1057/9780230302495

Hyera, E., & Mutasa, F. (2016). The Direction of Causality between Financial Development and Economic Growth in Tanzania: An Empirical Analysis. *SSRN Electronic Journal*. doi:10.2139/ssrn. 2829378.

Ibrahim, M., & Acquah, A. M. (2021). Re-examining the causal relationships among FDI, economic growth and financial sector development in Africa. *International Review of Applied Economics, 35*(1), 45-63.

Kagochi, J. (2019). Inflation and financial sector development in Sub-Saharan African countries. *Journal of Economic Studies, 46*(4), 798-811. doi:10.1108/JES-10-2017-0310

Kapaya, S. M. (2020). Stock market development and economic growth in Tanzania: an ARDL and bound testing approach. *Review of Economics and Political Science, 5*(3), 187-206. doi:10.1108/REPS-11-2019-0150

Kapaya, S. M. (2021). Financial development and economic growth in Tanzania: an ARDL and bound testing approach. *Asian Journal of Economics and Banking, 5*(1), 46-65. doi:10.1108/AJEB-09-2020-0063

Kchikeche, A., &Khallouk, O. (2021). On the nexus between economic growth and bank-based financial development: evidence from Morocco. *Middle East Development Journal*, *13*(2), 245-264.

King, R. G., & Levine, R. (1993). Finance, entrepreneurship, and growth: Theory and evidence. *Journal of Monetary Economics*, 32(3), 513-542.

Kou, G., Yang, P., Alsaadi, F. E., & Herrera-Viedma, E. (2019). Machine learning methods for systemic risk analysis in financial sectors. *Technological and Economic Development of Economy*, 25(5), 901-924.

Kripfganz, S. (2019). Generalized method of moments estimation of linear dynamic panel data models. Proceedings of the 2019 London Stata Conference.

Levine, R. (2005). *Finance and growth: Theory and evidence*. Handbook of Economic Growth, 1, 865-934.

Manta, A. G., Florea, N. M., Bădîrcea, R. M., Popescu, J., Cîrciumaru, D., & Doran, M. D. (2020). The nexus between carbon emissions, energy use, economic growth and financial development: Evidence from central and eastern European countries. *Sustainability*, *12*(18), 7747.

Mujtaba, A., & Jena, P. K. (2021). Analyzing asymmetric impact of economic growth, energy use, FDI inflows, and oil prices on CO2 emissions through NARDL approach. *Environmental Science and Pollution Research*. Retrieved from https://doi.org/10.1007/s11356-021-12660-z

Naceur, S. B., Cherif, M., &Kandil, M. (2014). What drives the development of the MENA financial sector? *Borsa _Istanbul Review, 14*(4), 212-223. doi: 10.1016/j.bir.2014.09.002

Nasreen, S., Mahalik, M. K., Shahbaz, M., & Abbas, Q. (2020). How do financial globalization, institutions and economic growth impact financial sector development in European countries? *Research in International Business and Finance*, 54, 101247.

Ngoc, B. H. (2020). The asymmetric effect of inflation on economic growth in Vietnam: Evidence by nonlinear ARDL approach. *The Journal of Asian Finance, Economics and Business*, 7(2), 143-149.

Odhiambo, N. M. (2009). Financial depth, savings and economic growth in Kenya: A dynamic causal linkage. *Economic Modelling*, 26(4), 641-647.

Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, 71(1), 135-158.

Rousseau, P. L., & Wachtel, P. (2011). What is happening to the impact of financial deepening on economic growth? *Economic Inquiry*, 49(1), 276-288.

Song, C. Q., Chang, C. P., & Gong, Q. (2021). Economic growth, corruption, and financial development: Global evidence. *Economic Modelling*, *94*, 822-830.

Tripathy, N., & Mishra, S. (2021). The dynamics of cointegration between economic growth and financial development in emerging Asian economy: Evidence from India. *Vision*, 09722629211011811.

Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics*, 126(1), 25-51.

Wolde-Rufael, Y., (2009). Re-examining the financial development and economic growth nexus. in Kenya. *Economic Modelling* 26, 1140-1146.

World Bank. (2019). Global Financial Development Report 2019/2020: Bank Regulation and Supervision a Decade after the Global Financial Crisis.

World Bank Publications.

World Bank. (2023). World Development Indicators (WDI) database. Retrieved from https://databank.worldbank.org/source/world-development-indicators