

THE NEXUS BETWEEN FINANCIAL INCLUSION, FINANCIAL STABILITY AND ECONOMIC GROWTH IN THE COMMON MARKET FOR EASTERN AND SOUTHERN AFRICA REGION: A CS-ARDL APPROACH

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Abstract

This study examines the long-run relationship among financial inclusion, financial stability and economic growth in the Common Market for Eastern and Southern Africa (COMESA) region, utilising panel data from 2007 to 2022. To account for the multidimensional nature of financial inclusion and financial stability, we constructed composite indices for each variable using Principal Component Analysis (PCA). We employed second-generation unit root tests to determine the order of integration of the variables and the Cross-Sectional Augmented Autoregressive Distributed Lag (CS-ARDL) model, which accounts for cross-sectional dependence and mixed levels of integration. The test results indicate the presence of slope heterogeneity and cross-sectional dependence in the panel dataset. The error-correction model confirms strong long-run cointegration among financial inclusion, financial stability, and economic growth in the COMESA region. The results indicate that financial stability and economic growth enhance financial inclusion in the long run. Specifically, we state that the COMESA region's economic growth increased by 1.7% for every 1% increase in financial inclusion. Overall, the findings confirm that enhancing financial inclusion improves financial sector stability and that a stable financial system increases economic growth. Therefore, since both are necessary to improve financial inclusion in COMESA, we advise policymakers to focus on policies and strategies that strengthen the financial system and enhance economic growth in the region.

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1. Introduction

Financial inclusion is considered a key catalyst for achieving the African Union's Agenda 2063 and eight of the seventeen Sustainable Development Goals (SDGs) by 2030. Thus, sustainable financial inclusion practices that serve deprived groups are an inexcusable task for developing countries to undertake to alleviate current economic development shortfalls. Moreover, the role of inclusive finance in achieving the Sustainable Development Goals has received due consideration in the research literature (Ozili, 2022). Likewise, an inclusive financial system will help developing countries to reduce poverty and income inequality; enhance the innovation and investment capacity of small and medium enterprises (Omar & Inaba, 2020). Additionally, an inclusive financial system has a profound ripple effect on the socio-economic aspects of developing countries, and it is reported in several empirical studies, which include women's empowerment, increased savings, starting up businesses, and supporting innovation (Swamy, 2014; Mishra et al., 2024).

There are two conflicting views in the literature on the link between inclusive finance and financial stability. The first view argues that financial inclusion enhances financial stability; for instance, increasing access to and use of financial services by small and medium enterprises (SMEs) will increase bank deposits, diversify credit and risk, and enhance social integrity. The other view holds that financial inclusion undermines financial stability, as it entails financial service costs and exposes financial institutions to the risk of credit default (Mehrotra & Yetman, 2015; Čihák et al., 2016). Likewise, financial stability could hamper financial inclusion by prioritising profit and avoiding risky customers. Conversely, financial stability can build confidence in the financial system, leading to increased use of financial services and products (Mehrotra & Yetman, 2015).

The relationship between financial inclusion and economic growth can be explained by the demand-following and supply-leading theories. A previous study showed a long-term relationship among economic growth, financial inclusion, and control factors in the full

panel, income-level, and regional-level economies using the panel cointegration test (Azimi, 2022). Using an empirical study, a positive long-run relationship between inclusive finance and economic growth has been reported (Sethi & Sethy, 2019; Singh & Stakic, 2020). Conversely, a negative linkage between financial inclusion and economic growth has been presented in other studies (Menyelim et al., 2021; Odame et al., 2024).

Lastly, the present study highlights the long-run association between financial inclusion, financial stability and economic growth in the COMESA region. The empirical estimation has been carried out employing a strong methodological approach. The presence of ambiguous findings and the lack of thorough regional and national studies examining the linkages among financial inclusion, financial stability, and economic growth are the main gaps identified for conducting this study in the COMESA region, where there are attempts at economic integration and varying levels of financial inclusion. The cross-sectionally augmented ARDL (CS-ARDL) approach, suggested by Chudik et al. (2016), has been employed to examine the long-run relationship between financial inclusion, financial stability and economic growth since it considers a) mixed order of integration, b) heterogeneity, and c) cross-sectional dependence.

The remainder of the paper is structured as follows: Section 2 reviews the literature; Section 3 outlines the methodological approaches; and Section 4 presents and discusses the findings. Section 5 concludes the paper with conclusions and recommendations.

2. Literature Review

To develop long-run, coordinated financial and economic policy in the COMESA region, it is essential to understand and examine how financial inclusion, financial stability, and economic growth interact and evolve on a theoretical foundation. Therefore, we use demand-following and supply-leading theory, endogenous growth theory, financial intermediation theory, and monetarist and cyclical theories as the theoretical foundation for this investigation.

The demand-following and supply-leading theories explain the relationship between financial inclusion and economic growth. On the one hand, the demand-following hypothesis argues that the financial system will be improved given that there is an economic expansion (Robinson, 1952). This means the need for financial services or products is realised during economic expansion. On the other hand,

the supply-leading theory hypothesises that financial development leads to economic expansion (Schumpeter, 1911; Patrick, 1966). Past studies also reaffirmed the concept of Schumpeter (Goldsmith, 1969; McKinnon, 1973; Shaw, 1973).

Previous studies have supported the widely accepted view that financial structure accelerates economic growth (Goldsmith, 1969; McKinnon, 1973; Shaw, 1973). In this view, financial intermediation plays a pivotal role in economic growth by efficiently allocating financial resources to boost economic activity, despite information asymmetry (Levine et al., 2000). The presence of effective financial intermediation allows access to financial services, especially for disadvantaged populations, thereby promoting inclusive economic growth. This means that by widening access to financial services for firms and individuals, it is possible to address their financial constraints and, consequently, enhance firm productivity and secure individual welfare.

Numerous studies have also shown the positive influence of financial inclusion on economic growth (Demirgüç-Kunt et al., 2017; Kim et al., 2018; Makina & Walle, 2019). In a related concept, access to financial services helps to minimise inequality and poverty (Omar & Inaba, 2020). Conversely, a lack of access to formal financial services creates obstacles to entrepreneurship, investment, and innovation in a given economy; consequently, firms facing financial constraints will experience limited growth and productivity, which, in turn, affects aggregate economic growth (Claessens & Perotti, 2007).

The positive role of financial inclusion on the economy has been discussed, considering the role of human capital (Boachie & Adu-Darko, 2024). Endogenous growth theory argues that financial inclusion supports long-run economic expansion by improving human capital, innovation, and entrepreneurship (Chirwa & Odhiambo, 2018).

Basically, financial inclusion contributes to economic expansion mainly in two ways:

(a) offering low-cost financial services to poor people, it helps improve their livelihoods. This means poor people can engage in small-scale businesses, become economically independent, and contribute to aggregate economic growth.

(b) promoting savings and insurance services, inclusive finance can increase funds available in the financial sector to be utilised for investment and reduce liquidity problems (Sethi & Sethy, 2019).

According to the financial intermediation theory, financial sectors play a significant role in mobilising savings, facilitating credit

and minimising information asymmetry. This intermediation role is reinforced by a stable financial system, which gives households and small businesses confidence and enables financial institutions to offer loans. Thus, this theory argues that financial stability promotes financial inclusion.

There are two theories which are usually recalled to explain financial instability. The first thought belongs to the monetarists' view, which emphasises that instability arises due to errors in monetary policy, which disrupt the money supply (Friedman & Schwartz, 1963). In order to get the desired outcome from implementing a given monetary policy, it is required to understand the ways (e.g. interest rate effects, exchange rate effects, and the credit channel) by which the policy influences the economy (Mishkin, 1995). The second school of thought is the cyclical theories, which state that financial instabilities come from the presence of information asymmetry, irrational behaviour and market imperfections (Minsky, 1977; Kindleberger, 1978/1996). Information asymmetry between borrowers and lenders can lead to adverse selection and moral hazard before and during financial market transactions. Moreover, aggressive financial inclusion practices may lead to adverse selection and moral hazard, which also explain behaviours that risk the interests of lenders in a given contract due to information asymmetry.

There are mixed findings on the relationship between financial inclusion and financial stability in the literature (Damane & Ho, 2024), while others showed that there is a synergy that requires the presence of strong institutions (Meyer & Rowan, 1977). Likewise, financial inclusion cannot be achieved in the presence of financial instability, and conversely, financial stability cannot be achieved in the presence of significant financial exclusion (Khan, 2011). Another study also discussed that synergies between financial inclusion and financial stability can be generated in the presence of an enabling regulatory framework, lower transaction costs and technological innovations (Khan, 2011). In the presence of high institutional quality, the practice of inclusive finance has a favourable effect on financial stability (Pham & Doan, 2020; Hakimi et al., 2022; Antwi et al., 2024). In a similar vein, enhanced financial inclusion practice requires regulatory and supervisory frameworks (Sethy & Goyari, 2022; Koudalo & Toure, 2023).

The negative influence of financial inclusion on financial stability mainly arises due to aggressive financial inclusion practices,

which result in information asymmetry, increased financial service costs, and risks of credit default during attempts to reach out to the deprived individuals and firms found in new and remote locations (Mehrotra & Yetman, 2015; Sahay, 2015; Čihák et al., 2016). Table 1 summarises recent empirical findings on the link between financial inclusion (FI) and financial stability (FS).

Table 1
Summary of empirical findings on FI and FS links

Authors	Sample	Financial stability proxy	Method	Effect of FI and FS
Pham & Doan (2020)	42 countries, Asian countries 2011, 2014, 2017	Bank Z-score	Fixed effects regression and random effects regression	+
Hakimi et al. (2022)	38 banks from 10 Middle East and North Africa (MENA) countries	Bank Z-score	Two-step system GMM	+
Antwi et al. (2024)	60 selected developing countries 2002-2019	ratio of capital, credit risk, and liquidity	System GMM	+ and -
Sethy & Goyari (2022)	Seven South Asian countries 2004-2018	Z-score	FMOLS and DOLS	+
Koudalo & Toure (2023)	54 African countries 2000-2020	Z-score	GMM	+

Note: FI stands for financial inclusion, and FS stands for financial stability

Source: authors' compilation

Schularick and Taylor (2012) reported that rapid credit expansions are often precursors to financial crises. In addition, the practice of excessive inclusive finance may cause adverse selection and moral hazard issues since the underserved portion of the population lacks credit history and collateral requirements (Kebede et al., 2024). On the other hand, financial stability can increase people's confidence in the financial system, which will improve financial inclusion (Mehrotra & Yetman, 2015) and the probability that people will utilise formal services. Past studies also remarked that the presence of long-run links between financial inclusion and financial stability (Anarfo et al., 2019; Jungo et al., 2024).

Table 2

Summary of empirical findings of FI and EG links

Authors	Sample	Financial inclusion proxy	Method	Effect of FI on EG
Kim et al. (2018)	51 Organisation of Islamic Cooperation (OIC) countries 1990–2013	Financial inclusion index	Panel VAR, IRFs	+
Ifediora et al. (2022)	22 Sub-Saharan Africa (SSA) countries 2012–2018	Composite index of financial inclusion	System GMM	+
Jima & Makoni (2023)	26 SSA countries 2000–2019	Financial inclusion index	System GMM and ARDL	+
Odame et al. (2024)	Ghana 2005–2016	Access, usage and penetration (depth)	FMOLS and DOLS	-
Mir et al. (2023)	53 Developing nations	FII using 10 variables	CS-ARDL	+
Hussain et al. (2024)	21 Asian countries 2004–2019	Five proxies (supply-side proxies) to construct the index		+
Singh & Stakic (2020)	8 countries from the South Asian Association for Regional Cooperation (SAARC) member states 2004–2013	FII (demographic, geographic and usage)	FMOLS and DOLS	+
Gebrehiwot & Makina (2019)	27 African countries	Financial inclusion index	GMM	+
Makina & Walle (2019)	42 African Countries 2004–2014	Number of commercial bank branches per 100,000 people	System GMM	+
Adedokun & Ağa (2021)	36 SSA countries 2004–2017	FI index considering penetration, availability and usage dimensions	GMM	+

Note: FI stands for financial inclusion, and EG stands for economic growth

Source: authors' compilation

There are two contrasting pieces of empirical evidence, with most scholars supporting a positive link, while a few studies showed the presence of a negative relationship between financial inclusion and

economic growth (Table 2). Previous findings showed that financial inclusion has a positive long-term effect on economic growth (Kim et al., 2018; Ifediora et al., 2022; Jima & Makoni, 2023). Negative links between financial inclusion and economic growth have been reported in previous studies (Menyelim et al., 2021; Odame et al., 2024). Previous studies applied the CS-ARDL model to examine the long-run links between financial inclusion and economic growth across various regions (Mir et al., 2023; Hussain et al., 2024).

3. Methodology

3.1. Research approach, data and data sources

To empirically examine the relationships among financial inclusion, financial stability, and economic growth, this study adopts a quantitative research approach. The approach supports reliable, broadly applicable results and enables objective hypothesis testing. The study uses panel data for 17 COMESA member countries from 2007 to 2022 to examine the cointegration among financial inclusion, financial stability, and economic growth. However, due to data unavailability in our study area, we decided to consider only 17 out of the 21 member countries of the COMESA region. The choice of the panel data set mainly depends on the availability of data in the study area. The data for the study variables are obtained mainly from the World Development Indicators (WDI), International Financial Statistics (IFS), Global Financial Development (GFD), and Financial Access Survey (FAS) databases of the International Monetary Fund (IMF).

Table 3

Variables and other abbreviations

Abbreviation	Full term	Type
FII	Financial inclusion index	Variable
FSI	Financial stability index	Variable
EG	Economic growth	Variable
CS-ARDL	Cross-Sectionally Augmented Autoregressive Distributed Lag	Methodology
MG	Mean group	Methodology
PMG	Pooled mean group	Methodology
CIPS	Cross-sectional Im, Pesaran, and Shin test	Methodology
CADF	Cross-sectional augmented Dickey-Fuller test	Methodology
PCA	Principal components analysis	Methodology

Source: authors' work

The main study variables are financial inclusion, financial stability, and economic growth. Economic growth is measured by GDP per capita (in constant 2015 US dollars). This study employed indices constructed through principal component analysis to measure financial inclusion and financial stability variables, as discussed in the following section.

3.2. Principal Component Analysis

Principal Component Analysis (PCA) has been employed to develop the indices for financial inclusion and financial stability. The method allows us to avoid multicollinearity and measurement errors and to obtain robustness in estimation (Sarma, 2016). In this study, the financial inclusion index has been constructed using a two-step PCA that accounts for geographic, demographic, and usage dimensions (Singh & Stakic, 2020). Thus, the study considers two indicators (number of ATMs per 1000 km² area and number of bank branches per 1000 km² area) for geographic penetration, three indicators (number of ATMs per 100,000 adults, number of bank branches per 100,000 adults, and number of bank accounts per 1000 adults) for demographic penetration, and two indicators (outstanding deposits as a percentage of GDP and outstanding loans as a percentage of GDP) for the bank usage dimension. Similarly, the index of financial stability has been determined based on bank Z-scores, bank credit-to-deposit ratios, liquid assets-to-deposits ratios, and short-term funding measures of stability.

3.3. Test for slope heterogeneity

The slope homogeneity test is a test used to verify whether the impact of the independent variable is identical or consistent across the panel. Thus, before estimating the long-term links between the study variables, it is essential to examine whether the slope coefficients are homogeneous or consistent across the COMESA member countries. Therefore, to assess slope homogeneity, this study has employed the Pesaran and Yamagata (2008) and Blomquist and Westerlund (2013) tests. Moreover, the slope homogeneity test employed herein was discussed in a previous study (Pesaran & Yamagata, 2008), which is essentially derived from the test developed by Swamy (1970). In both tests, the null hypothesis assumes that the slope coefficients are homogeneous across panel units, whereas the alternative hypothesis assumes they are heterogeneous.

3.4. Test for cross-sectional dependence

Strong cross-sectional dependence occurs when economic shocks affect multiple sectors in a panel dataset. Nowadays, due to the effect of globalisation, countries are highly dependent on each other, especially in regional economic groups like COMESA, characterised by regional economic, financial, and trade integration. Thus, it is appropriate to check for cross-sectional dependence in our panel data. Moreover, traditional econometric techniques yield biased results when cross-sectional dependence is not properly accounted for. Thus, it is crucial to evaluate the cross-sectional dependence of the panel data before proceeding to estimation techniques (Pesaran, 2015).

3.5. Panel unit root tests

Before evaluating cointegration and causality tests, it is essential to define the order of integration of the considered study variables. The time series behaviour of macroeconomic variables shows a trend that is attributed to non-stationary observations. Since there is cross-sectional dependency, the first-generation unit root test is not applicable. Thus, this study applied second-generation unit root tests such as cross-sectional Im, Pesaran, and Shin (CIPS) and cross-sectional augmented Dickey-Fuller (CADF) unit root tests to evaluate cross-sectional dependency (Im et al., 2003; Pesaran, 2007).

$$Y_{it} = a_i + b_i Y_{it-1} + c_i \bar{Y}_{t-1} \sum_{j=0}^s d_{ij} \Delta \bar{Y}_{t-j} + \sum_{j=1}^s \delta_{ij} \Delta \bar{Y}_{it-j} + \varepsilon_{it} \quad (1)$$

In addition, Pesaran (2007) suggests a cross-sectional augmented version of the IPS test, which is presented in the framework of Im, Pesaran and Shin (2003). The CADF regression model is used to calculate the CIPS in equation (2).

$$CIPS = N^{-1} \sum_{i=1}^N CADF_i \quad (2)$$

where CADF denotes the cross-sectionally augmented Dickey-Fuller statistic for the i^{th} cross-sectional unit given by the t-ratio of b_i in the CADF regression equation (2).

3.6. Empirical model specification

The panel cross-sectionally augmented ARDL model suggested in previous studies (Chudik et al., 2016) has been proposed herein after preliminary studies since it considers a) mixed order of integration, b) heterogeneity, and c) cross-sectional dependence. This

model has been employed to estimate both short- and long-run links among financial inclusion, financial stability, and economic growth in the COMESA region. The cross-sectionally augmented ARDL (CS-ARDL) approach estimates both the short-and long-run coefficients (Chudik et al., 2016).

Therefore, equation (3) shows the specification of the panel CS-ARDL model, which is stated based on a previous study by Chudik et al. (2016).

$$y_{i,t} = \sum_{l=1}^{k_y} \varphi_{i,l} y_{i,t-l} + \sum_{l=0}^{k_x} \beta'_{i,l} x_{i,t-l} + \sum_{l=0}^{k_w} \lambda'_{i,l} w_{i,t-l} + \sum_{l=0}^{k_z} \delta'_{i,l} \bar{z}_{t-l} + \alpha_i + \omega_i \tau + \varepsilon_{i,t} \quad (3)$$

By substituting $y = FI$; $x = FS$ and $w = EG$, we can rewrite equation (3) as:

$$FI_{i,t} = \sum_{l=1}^{k_y} \varphi_{i,l} FI_{i,t-l} + \sum_{l=0}^{k_x} \beta'_{i,l} FS_{i,t-l} + \sum_{l=0}^{k_w} \lambda'_{i,l} EG_{i,t-l} + \sum_{l=0}^{k_z} \delta'_{i,l} \bar{z}_{t-l} + \alpha_i + \omega_i \tau + \varepsilon_{i,t} \quad (3a)$$

$$FS_{i,t} = \sum_{l=1}^{k_y} \varphi_{i,l} FS_{i,t-l} + \sum_{l=0}^{k_x} \beta'_{i,l} FI_{i,t-l} + \sum_{l=0}^{k_w} \lambda'_{i,l} EG_{i,t-l} + \sum_{l=0}^{k_z} \delta'_{i,l} \bar{z}_{t-l} + \alpha_i + \omega_i \tau + \varepsilon_{i,t} \quad (3b)$$

$$EG_{i,t} = \sum_{l=1}^{k_y} \varphi_{i,l} EG_{i,t-l} + \sum_{l=0}^{k_x} \beta'_{i,l} FS_{i,t-l} + \sum_{l=0}^{k_w} \lambda'_{i,l} FI_{i,t-l} + \sum_{l=0}^{k_z} \delta'_{i,l} \bar{z}_{t-l} + \alpha_i + \omega_i \tau + \varepsilon_{i,t} \quad (3c)$$

where $\bar{z}_{t-l}$ refers to lagged cross-sectional averages given as $\left[\bar{z}_{t-l} = (\bar{y}_{i,t-l}, \bar{x}_{i,t-l}, \bar{w}_{i,t-l}) \right]$.

In addition, δ refers to the set of parameters related to country-specific factor loadings, α_i is the country-specific intercept, τ represents the linear time trend, and $\varepsilon_{i,t}$ is the idiosyncratic error term. Note that the parameters φ and ω , as well as the sets of parameters β , λ and δ are heterogeneous coefficients randomly distributed around a common mean with unit-specific noise. The lag term is selected based on the Akaike Information Criterion (AIC).

Moreover, the mean group and pooled mean group estimators are used directly to estimate the coefficients (Chudik et al., 2016). The Mean group (MG) estimator assumes heterogeneous slope coefficients by performing panel-level time-series regressions and then averaging the coefficients. Whereas a combination of pooled and

heterogeneous estimations has been assumed by the pooled mean group (PMG) estimator. This means the pooled mean group (PMG) estimator assumes heterogeneity in the short-run and homogeneity in the long-run; it is also the most widely used estimator (Pesaran et al., 1999).

The Hausman (1978) test can be used to test for the homogeneity of long-run coefficients. Additionally, a previous study found that the pooled mean group estimator outperforms the MG estimator under the null hypothesis of no systematic variation across coefficients. Moreover, the CS-ARDL model can be rewritten into an error correction model (ECM) version, keeping its inferential behaviours (Ditzen, 2021). Thus, equations (3a) to (3c) can be restated as in equations (4a) to (4c).

$$\begin{aligned} \Delta FI_{i,t} = & \xi_i [FI_{i,t-l} - \theta'_i FS_{i,t-1} - \phi'_i EG_{i,t-1}] + \sum_{l=1}^{k_y-1} \vartheta_{i,l} \Delta_l FI_{i,t-1} \\ & + \sum_{l=0}^{k_x-1} \beta'_{i,l} \Delta_l FS_{i,t} + \sum_{l=0}^{k_w-1} \lambda'_{i,l} \Delta_l EG_{i,t-1} + \sum_{l=0}^{k_z} \delta'_{il} \bar{z}_{t-1} + \omega_i \tau \\ & + u_{i,t} \end{aligned} \quad (4a)$$

$$\begin{aligned} \Delta FS_{i,t} = & \xi_i [FS_{i,t-l} - \theta'_i FI_{i,t-1} - \phi'_i EG_{i,t-1}] + \sum_{l=1}^{k_y-1} \vartheta_{i,l} \Delta_l FS_{i,t-1} \\ & + \sum_{l=0}^{k_x-1} \beta'_{i,l} \Delta_l FI_{i,t} + \sum_{l=0}^{k_w-1} \lambda'_{i,l} \Delta_l EG_{i,t-1} + \sum_{l=0}^{k_z} \delta'_{il} \bar{z}_{t-1} + \omega_i \tau \\ & + u_{i,t} \end{aligned} \quad (4b)$$

$$\begin{aligned} \Delta EG_{i,t} = & \xi_i [EG_{i,t-l} - \theta'_i FS_{i,t-1} - \phi'_i FI_{i,t-1}] + \sum_{l=1}^{k_y-1} \vartheta_{i,l} \Delta_l EG_{i,t-1} \\ & + \sum_{l=0}^{k_x-1} \beta'_{i,l} \Delta_l FS_{i,t} + \sum_{l=0}^{k_w-1} \lambda'_{i,l} \Delta_l FI_{i,t-1} + \sum_{l=0}^{k_z} \delta'_{il} \bar{z}_{t-1} + \omega_i \tau \\ & + u_{i,t} \end{aligned} \quad (4c)$$

The individual long-run coefficients are calculated as shown in the equation below.

$$\hat{\theta}_i = \frac{\sum_{l=0}^{k_x} \hat{\beta}_{i,l}}{1 - \sum_{l=1}^{k_y} \hat{\varphi}_{i,l}}, \quad \hat{\phi}_i = \frac{\sum_{l=0}^{k_w} \hat{\lambda}_{i,l}}{1 - \sum_{l=1}^{k_y} \hat{\varphi}_{i,l}}, \quad \text{and} \quad \hat{\theta}_{MG} = \frac{1}{N \sum_{i=1}^N \hat{\theta}_i} \quad (5)$$

where $\hat{\theta}_i$ denotes individual estimations of each cross-section. The parameter φ and the sets of parameters β and λ represent the short-run behaviour; Δ stands for the first difference operator; the square brackets have the error correction term; and i refers to the speed of

adjustment towards the long-run equilibrium. This means the parameter ξ_i indicates the speed at which the model converges to the long-run equilibrium state due to a shock. This requires that the estimated coefficient associated with the error correction term be negative.

Moreover, the CS-ARDL bound testing approach was selected mainly because it accounts for cross-sectional dependence, in addition to the following reasons (Carvelli, 2023): First, it allows the incorporation of lag terms for both the dependent and independent variables. Second, it applies to variables that are stationary at $I(0)$, $I(1)$, or any combination of the two. Third, CS-ARDL overcomes endogeneity difficulties and produces unbiased results. Fourth, this model is superior to other tests and yields consistent results even with small sample sizes.

3.7. Robustness check

To examine the robustness of the long-run estimates based on the CS-ARDL, this study employs the dynamic common correlated effects (DCCE) estimator, which is more robust because it accounts for cross-sectional dependence and heterogeneity across countries. The CS-ARDL has been employed to determine the ECM and to estimate short- and long-run relationships among the variables, and the DCCE estimator has been used to verify the consistency of the estimation. Thus, the DCCE estimator has been applied as a robustness check for the main estimator, CS-ARDL, and the results have been compared to evaluate the stability of the findings.

4. Data analysis and discussion

4.1. Summary of the descriptive statistics

Table 4 presents the summary of descriptive statistics (mean, standard deviation, minimum and maximum values) of each variable and it indicates that the maximum and minimum values of the two composite indices (i.e. FII and FSI) are between 0 and 1 since they are normalised using the min-max normalisation method. The summary statistics showed that financial stability and economic growth vary across countries, with financial stability ranging from 0 to 1 and economic growth from 5.57 to 9.73. This variation generally indicates that, in the COMESA region, economic and financial systems differ,

which may lead to varying levels of financial inclusion across the region.

Table 4

Summary of statistics

Variable	Obs	Mean	SD	Min.	Max.
Financial inclusion index	272	0.28	0.25	0	1
Financial stability index	272	0.43	0.21	0	1
Economic growth	272	7.39	1.16	5.57	9.73

Source: authors' computation

The results of both Pesaran and Yamagata (2008) and Blomquist and Westerlund (2013) slope homogeneity test reports are shown in Table 5 below. As it is confirmed by both Δ and adjusted Δ , the null hypothesis of slope homogeneity is rejected. This indicates that the relationships among financial inclusion, financial stability and economic growth are not uniform across the COMESA region.

4.2. Pre-diagnostic tests

Table 5

Slope homogeneity test

Homogeneity test	Pesaran & Yamagata (2008)	Blomquist & Westerlund (2013)
	<i>Statistic</i>	<i>Statistic</i>
Δ	4.220***	7.413***
Δ_{adjusted}	5.168***	9.079***

*Note: *** indicates significance at the 1% level*

Source: authors' computation

After slope heterogeneity has been confirmed, we proceed to test for cross-sectional dependence to examine whether the long-run relationship among financial inclusion, financial stability and economic growth is affected by common crises across COMESA member countries. The cross-sectional dependency test results presented in Table 6 below show that the null hypothesis of no cross-sectional dependence is rejected at the 1% significance level. This implies that financial inclusion, financial stability, and economic growth are affected by common shocks that have occurred in the region, indicating that second-generation panel estimators are advisable for unit root tests and for estimating long-run relationships among the study variables.

Table 6

Cross-sectional dependency test

No	List of variables	CD test	CDW+ test
1	Financial inclusion index	5.02***	165.54***
2	Financial stability index	4.79***	186.99***
3	Economic growth	13.62***	312.26***

NB: The cross-sectional dependency test results confirm cross-sectional dependency across the panels. Thus, we conclude that cross-sectional dependency is strong in the study area.

Source: authors' computation

Once the presence of cross-sectional dependency has been confirmed, the next step is to test the stationarity of the study variables using second-generation unit root tests. The order of integration is tested using two second-generation unit root tests: the Cross-sectionally Augmented Im-Pesaran-Shin (CIPS) and the Cross-sectionally Augmented CADF tests (Pesaran, 2015). The unit root tests are determined based on two specification assumptions, with (a) constant only, and (b) constant and trend term. The results include both the level and the first difference across the two specifications, along with a conclusion on the order of integration, clearly indicating whether the variable is $I(1)$ or $I(0)$. As presented in Table 7, the variables used in this study are stationary in levels and in first differences. A complementary estimation technique that accounts for cross-sectional dependence and mixed orders of integration is required to estimate the long-run relationship among the study variables.

Table 7

Unit root test

Variables	CIPS		CADF		CIPS		CADF		Remark
	Stationarity of variables in levels				Stationarity of variables in first difference				
	Intercept	Intercept and trend	Intercept	Intercept and trend	Intercept	Intercept and trend	Intercept	Intercept and trend	
FII	-1.371	-2.109	-1.108	-2.27	-3.75***	-4.02***	-2.52***	-2.89***	I(1)
L. FII	-0.95	-1.92	-1.41	-2.25	-3.57***	-3.72***	-3.57***	-3.72***	I(1)
FSI	-2.76***	-3.37***	-2.51***	-3.26***	-4.29***	-4.21***	-3.12***	-2.83**	I(0)
lnEG	-1.82	-2.25	-1.53	-2.00	-3.05***	-3.10***	-2.21**	-2.43	I(1)

NB: ***, **, * denote the levels of significance at 1%, 5% and 10%, respectively. Variable abbreviations are as in Table 3. Panel unit test statistics are: CIPS and CADF with a maximum lag of 1.

Source: authors' computation

Finally, the study must determine the optimal lag length for the model and variables before testing for cointegration among the variables. Thus, in this study, we determine the optimal lag length using the unrestricted error-correction model (UECM) and the Akaike Information Criterion (AIC). Accordingly, when financial inclusion is the dependent variable, we use a (1,0,0) lag length; when financial stability is the dependent variable, we use a (0,1,0) lag length; and when economic growth is the dependent variable, we use a (0,0,1) lag length.

4.3. Panel cointegration test: CS-ARDL model results

The cointegration among financial inclusion, financial stability, and economic growth has been examined using a cross-sectional augmented autoregressive distributed lag (CS-ARDL) model. This method has been selected for the following three reasons. First, the study variables have mixed orders of integration: $I(0)$ and $I(1)$. Second, the study period is 16 years. Third, there is strong cross-sectional dependence in the dataset. Noting the above justifications, the three standard panel cointegration tests, such as the Pedroni test (1999, 2004), the Kao test (1999), and the Westerlund test (2005), are not appropriate methods for testing cointegration among the study variables. Thus, the previously developed CS-ARDL model (Chudik et al., 2016) is the best approach for our examination of the long-term relationship among financial inclusion, financial stability, and economic growth in the study area because it is robust to cross-sectional dependence and mixed orders of integration in the data set.

The CS-ARDL model employs a dynamic panel structure, incorporating a lagged dependent variable and an error correction term (ECM) to assess the speed of adjustment and the presence of long-run relationships among the study variables. Both the mean group (MG) and pooled mean group (PMG) CS-ARDL estimators are employed, and a Hausman test is conducted to select between them.

Moreover, the findings from both the MG and PMG estimators have been presented, revealing a notable discrepancy in short-term estimates between the two specifications. This discrepancy arises from the PMG estimator limiting heterogeneity to the long run, whereas the MG estimator permits heterogeneity in both the short- and long-run estimations. Thus, the disparity in the short-term estimate suggested a heterogeneous response and country-specific adjustment.

Table 8 below presents the CS-ARDL results, considering financial inclusion as the dependent variable and financial stability and

economic growth as regressors. The model is estimated using both the mean-group and pooled-mean-group CS-ARDL.

Table 8
CS-ARDL estimation results for financial inclusion

Variables	Dependent variable-Financial inclusion	
	CS-ARDL (MG)	CS-ARDL (PMG)
Short-run		
ECM	-0.8245***	-0.630***
L.FII	0.176 (0.123)	0.370*** (0.108)
FSI	0.429** (0.1714)	0.12 (0.157)
lnEG	-0.127 (0.099)	0.019 (0.031)
ΔFSI	0.075 (0.0854)	0.260*** (0.069)
ΔlnEG	-0.055 (0.157)	0.015 (0.143)
Long-run		
FSI	0.684*** (0.219)	0.575** (0.238)
lnEG	-0.128 (0.128)	0.089** (0.037)
Number of observations	255	255
Number of Groups	17	17
Hausman	16.57	
P-value	(0.0204)	

*Note: The variables are measured on a yearly basis. ***, **, and * indicate a 1%, 5% and 10% significance level, respectively. The standard errors are in parentheses.*

Source: authors' computation

Based on the findings in Table 8 above, both the mean group and the pooled mean group estimators indicate a significant negative error-correction mechanism (ECM). This confirms the existence of long-run cointegration among the study variables. Additionally, the ECM is around -0.825 under the mean group estimator, which confirms that around 82% of disequilibrium is corrected within one year and also indicates a faster speed of adjustment than the PMG estimator, which is around 63%.

Moreover, the estimation depicts that financial stability has a positive and significant impact on financial inclusion in the short run. Particularly, under PMG CS-ARDL estimates, the coefficient of FSI (0.260) portrays that there is a strong impact on financial inclusion. This indicates that improvements in the financial system enhance financial inclusion. However, neither of the aforementioned models shows that economic growth has a substantial impact on financial inclusion, suggesting that economic growth does not immediately improve financial inclusion in the area. Moreover, the long-run estimates revealed that financial stability has a positive and significant influence on financial inclusion, emphasising the importance of a stable financial system for expanding financial inclusion in the study area. This can be justified as the stability of the financial system increases, the confidence among households in the financial system improves, and consequently it raises their demand towards various financial services or products. Additionally, this finding supports the endogenous growth theory, which emphasises the role of financial systems in mobilising savings, allocating resources efficiently, and reducing transaction costs, thereby promoting inclusive growth. Moreover, a stable financial system improves the efficiency and effectiveness of financial intermediaries by reducing the cost of financial products and services, which in turn broadens access to financial services. This finding is consistent with the previous empirical studies (Fungáčová & Weill, 2015; Anarfo et al., 2020). Contrary to this, other scholars argued that financial stability negatively affect financial inclusion due to tight financial regulation (Khan, 2011; Čihák et al., 2016).

Economic growth has an insignificant coefficient in the mean group, whereas a significant and positive coefficient under the PMG estimator. On the basis of these findings, economic growth enhances financial inclusion when pooling across countries. This supports the demand-following theory of financial inclusion and the endogenous theory. Moreover, this finding is aligned with the findings of previous scholars (Gebrehiwot & Makina, 2019). The Hausman test supports PMG estimates, suggesting that long-term homogeneity among COMESA nations is plausible for this relationship. In general, the above findings confirm the existence of long-run equilibrium relationships and support the hypothesis that financial stability and economic growth are essential determinants of long-term financial inclusion.

The result presented in Table 9 shows that the error correction mechanism (ECM) is negative and significant at 1% significant level, suggesting the existence of a long-run relationship between financial stability, financial inclusion and economic growth. The magnitude of speed of adjustment is -0.93 in the mean group and -0.78 under the pooled mean group, which is significant and negative.

Table 9

CS-ARDL estimation results for financial stability

Variables	Dependent variable-Financial Stability	
Short-run	CS-ARDL (MG)	CS-ARDL (PMG)
ECM	-0.925*** (0.100)	-0.783*** (0.081)
L. FSI	0.075 (0.100)	0.217*** (0.081)
FII	0.299*** (0.174)	0.105 (0.126)
lnEG	0.162 (0.251)	0.022 (0.078)
Δ FII	0.353 (0.236)	0.509** (0.237)
Δ lnEG	0.477*** (0.157)	0.261* (0.154)
Long-run		
FII	0.741* (0.381)	0.165*** (0.023)
lnEG	-0.069 (0.310)	0.035*** (0.005)
Number of observations	255	255
Number of Groups	17	17
Hausman test	3.13	
P-value	0.00	

*Note: The variables are measured on a yearly basis. ***, **, and * indicate a 1%, 5% and 10% significance level, respectively. The standard errors are in parentheses.*

Source: authors' computation

In the short run, financial inclusion and the differenced financial inclusion influence the stability of the financial system positively under the MG and PMG models, respectively. This supports expansion in access to and use of financial products and services, strengthening the

financial system by broadening the financial sector's deposit base, diversifying risk, and enhancing liquidity. Moreover, economic growth facilitates financial stability in the short run, supporting the idea that economic expansion reduces nonperforming loans by improving borrowers' repayment capacity. In the long run, financial inclusion enhances financial stability regardless of the estimator, suggesting that widening financial access and services improve financial stability by reducing systemic risk and promoting a diversified financial portfolio. This is consistent with previous findings (Čihák et al., 2016), which argue that financial inclusion is the best tool to expand financial institutions' deposit bases and thereby enhance their resilience during crises. Similarly, it is consistent with the concept of institutional theory (Meyer & Rowan, 1977). Based on this theory, stability of a system is achieved when it is implemented under an institutional framework and norms. Thus, financial inclusion plays a crucial role in reducing reliance on informal financial services and enhancing households' and firms' participation in the formal financial system. This finding also supported previous work by Pham and Doan (2020) who argued that financial inclusion facilitates financial stability by removing information asymmetry. Other studies suggested that financial stability is achieved by improving financial inclusion and minimising a substantial informal sector that hinders the implementation of monetary policy and the supervision of the financial sector (Anarfo et al., 2020). Contrary to this empirical finding, the financial sector may compromise on its regulatory framework, resulting in an increase in non-performing loans of the financial sector, which consequently causes the financial system to become unstable (Khan, 2011; Boachie et al., 2023).

On the other hand, the long-run impact of economic growth on financial stability is negative but insignificant under mean-group estimation, whereas it is positive and significant when we account for heterogeneity across countries. Thus, economic growth improves households' income level and firms' profitability, which leads to reduced credit risk, a stable funding base and capital formation and this ultimately creates a stable financial system. Generally, to create a stable financial system in COMESA, it is necessary to increase financial inclusion and maintain economic growth. The Hausman test supports the MG estimator, suggesting that policy variation within the region causes long-run effects to vary across countries.

As presented in the error correction mechanism (ECM), the coefficient under both MG and PMG estimation is negative and strongly significant, suggesting the existence of a strong long-run relationship among the study variables. Furthermore, under the short-run estimates, the coefficients of both financial inclusion and financial stability are statistically insignificant in either estimator, indicating that it takes time for financial inclusion and stability improvements to have any economic impact. On the other hand, the long-run coefficient of both financial inclusion and financial stability is positive and statistically significant only under PMG estimation, suggesting that financial inclusion creates a conducive environment for households and firms to invest in education, health, and the diversification of production through increasing access to financial services. Consequently, all of this leads to economic growth in the particular countries. This finding is consistent with previous studies conducted in SSA countries, which found a positive relationship between access to finance, measured by the number of commercial bank branches per 100,000 people, and economic growth (Makina & Walle, 2019). Similar studies also reported a positive relationship between financial inclusion and economic growth (Kim et al., 2018; Adedokun & Ağa, 2021). Furthermore, this finding aligns with the finance-growth theory (Patrick, 1966), which says that financial inclusion comes before and drives economic growth by getting households to save and invest. Financial stability has a positive and strong impact on economic growth in the long run, supporting the idea that a sustainable financial system is essential to improve economic growth. The Hausman test favours the PMG estimator, indicating the assumption of long-run homogeneity across the COMESA region.

Generally, the findings show that both financial inclusion and financial stability contribute more to economic growth in the long run than in the short run. This emphasises how crucial consistent and well-coordinated financial sector reforms are for achieving long-term growth in COMESA.

Table 10

CS-ARDL estimation results for economic growth

Variables	Dependent variable-Economic growth	
Short-run	CS-ARDL (MG)	CS-ARDL (PMG)
ECM	-0.639*** (0.102)	-0.456*** (0.054)
L. lnEG	0.3614 (0.102)	0.544*** (0.054)
FII	0.092 (0.349)	0.003 (0.410)
FSI	0.596 (0.525)	0.154 (0.348)
Δ FII	-0.039 (0.313)	-0.197 (0.454)
Δ FSI	-0.213 (0.271)	0.296 (0.284)
Long Run		
FII	-0.410 (0.387)	0.017** (0.008)
FSI	0.599 (0.669)	0.985** (0.484)
Number of observations	255	255
Number of Groups	17	17
Hausman	8.13	
P-value	0.13	

*Note: The variables are measured on a yearly basis. ***, **, and * indicate a 1%, 5% and 10% significance level, respectively. The standard errors are in parentheses.*

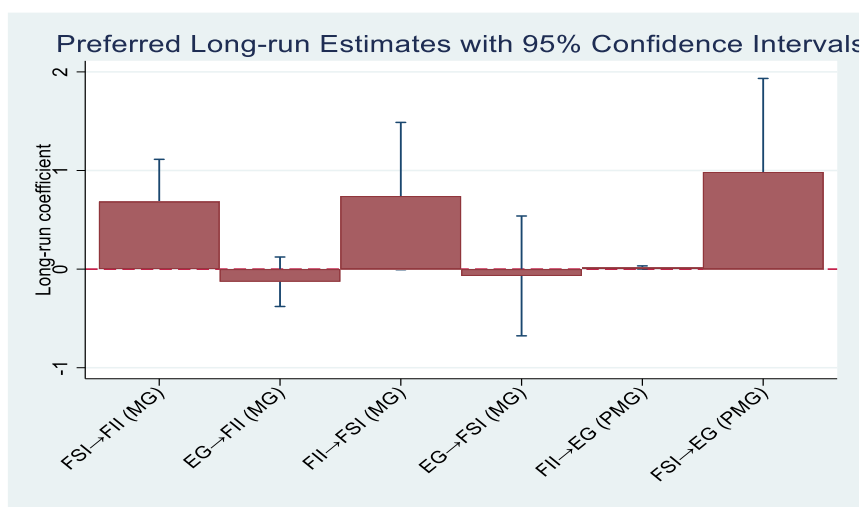
Source: authors' computation

To improve readability, the next graphical representation of the long-run relationship is presented below.

Figure 1 illustrates the long-run elasticity between financial inclusion, financial stability, and economic growth employing the selected CS-ARDL specification. The figure clearly indicates a strong long-run relationship between financial inclusion and financial stability. Similarly, financial stability has a strong and positive influence on economic growth. Generally, the graphical presentation confirms the

existence of the financial inclusion, financial stability, and economic growth nexus in COMESA member countries, and the finding strongly indicates that creating a stable financial system is important to enhance an inclusive financial system and economy in the COMESA region.

Figure 1
Graphical Representation of Long-Run Effects (CS-ARDL)



Source: authors' work

4.4. Dynamic common correlated effect findings for robustness

To verify the CS-ARDL estimation results, the DCCE estimator has been employed as a robustness check. The results of DCCE presented in Table 11 are consistent with the CS-ARDL results.

Table 11
Dynamic common correlated effect- mean group results

Variables	Financial inclusion	Financial stability	Economic growth
FII		0.4494*** (0.1504)	0.1755 (0.5083)
L. FII	0.2005** (0.1037)		
FSI	0.5798*** (0.1471)		0.4135 (0.3207)
L. FSI		-0.0190 (0.0749)	

Variables	Financial inclusion	Financial stability	Economic growth
LnEG	-0.0948 (0.1075)	0.1297 (0.1928)	
L .lnEG			0.3371*** (0.0889)
Number of observations	255	255	255
CD p-value	0.982	0.378	0.609

*Note: ***, **, and * indicate a 1%, 5% and 10% significance level, respectively. The standard errors are in parentheses.*

Source: authors' computation

First, the DCCE robustness results confirm the main CS-ARDL estimator findings when financial inclusion is the dependent variable. Specifically, financial stability has a positive and statistically significant coefficient across all estimators. The consistency in sign and coefficient strongly confirms that the long-run relationship between financial stability and financial inclusion is robust to alternative estimation techniques. Similarly, regarding the long-run relationship between financial inclusion and economic growth, using the CS-ARDL based on the MG estimator and the DCCE models yielded consistent results, confirming the robustness of the finding.

Second, the DCCE robustness results for the financial stability model are also consistent with the CS-ARDL findings. Specifically, in the DCCE results, financial inclusion has a positive, statistically significant coefficient, consistent with the CS-ARDL results under both the MG and PMG estimators. This suggests that the long-run positive contribution of financial inclusion to financial stability is robust to alternative estimation approaches. Regarding economic growth, the DCCE estimator yielded a positive but statistically insignificant coefficient, consistent with the CS-ARDL finding using the MG estimator.

Thirdly, the findings from the economic growth model using the DCCE estimator were partially consistent with those from the main estimator, the CS-ARDL estimator. The positive coefficients for both financial inclusion and financial stability based on DCCE are consistent with PMG's long-run estimates; however, neither coefficient is statistically significant under the DCCE specification. Thus, the direction of the relationships remains consistent, whereas the statistical significance is sensitive to the estimation technique used.

5. Conclusion and recommendations

This study explores the dynamic and long-run cointegration among financial inclusion, financial stability, and economic growth in 17 COMESA member countries for 2007-2022, using the CS-ARDL estimator. The testing procedures verified cross-sectional dependence, slope heterogeneity, and mixed orders of integration, supporting the use of a second-generation estimator.

The results revealed an error-correction mechanism (ECM) with a significant, negative coefficient in all models under each estimator. This consistent significance of ECM confirms the presence of strong and stable long-run equilibria. Moreover, financial stability increases both financial inclusion and long-run economic growth, while financial inclusion also enhances long-run economic growth and strengthens the region's financial system. Economic growth significantly contributes to enhancing financial inclusion in the long run, though it has a less pronounced impact in the short run.

The findings of this study reveal strong theoretical implications for the long-run interconnection among financial inclusion, financial stability and economic growth. The significant long-run impact observed across all estimated models confirms both the supply-leading and demand-following theories, demonstrating that increased financial participation enhances stability (i.e., stable financial systems encourage financial inclusion). Additionally, the study's findings align with endogenous growth theory, demonstrating that a stable and inclusive financial system increases long-run economic growth.

Based on the findings, we recommend the following for policymakers and government bodies in the COMESA region.

- It is advisable for policymakers to develop policies and strategies that support agricultural, industrial and other projects that foster economic growth while safeguarding the financial system in the region so as to enhance financial inclusion.
- The governments should consider financial inclusion as one of the main development goals, support financial technologies, and encourage cooperation among financial sectors.
- The government or central bank should revise and strengthen regulations, strengthen banking practices, support the crisis management framework and facilitate stress testing practices in the financial sectors.

The study period was restricted to 2007-2022 due to data availability constraints. Moreover, data for all variables were not available in all COMESA member countries; therefore, only 17 were selected for this study. Additionally, the long-run relationship among the study variables was examined using PCA-based indices for both financial inclusion and financial stability. Thus, we suggest that future researchers examine this long-run relationship using individual indicators of both financial inclusion and financial stability. Additionally, we did not account for structural breaks caused by the 2007 global financial crisis and the COVID-19 pandemic. Moreover, to better capture the dynamic structural changes in the financial inclusion, financial stability and economic growth nexus, we suggest that future researchers consider non-linear techniques, consider country-level heterogeneity among COMESA member countries and incorporate digital financial inclusion metrics.

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