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FINANCIAL DEVELOPMENT, INTEGRATION, INCLUSION, AND ECONOMIC GROWTH: CO-INTEGRATING RELATIONSHIPS AND THRESHOLD ANALYSIS

Oscar Chiwira 🆔
BA ISAGO University, Botswana
Email: oscar.chiwira@baisago.ac.bw

Abstract

This study examines the short and long-run relationships between financial development, integration, inclusion, and economic growth in SADC, as well as the corresponding threshold levels. Covering the period 1995 to 2020, the ARDL technique was used to test for co-integrating relationships, and the GLS was utilized for the determination of the respective threshold levels. The study establishes that bank credit to the private sector negatively affects economic growth in the long run. Most SADC countries were still operating below their respective minimum financial development threshold levels. It is observed that there are no threshold levels for financial integration in SADC, although the result, compared with the threshold levels of financial development seems to suggest that the financial domestic system and some level of economic development are a prerequisite for financial integration decisions. The financial inclusion threshold level for poor SADC countries is low. Yet most of these countries had the highest mobile banking facilities in the region. One possible indication can be that these countries may be operating at financial inclusion levels detrimental to economic growth. Financial development, along with its facets of financial integration and financial inclusion, is found to be the driver of economic growth in SADC. SADC countries, therefore, need to establish a strategic mix of these facets of financial development for the realization of significant economic growth.

Keywords: Economic Growth, Financial Development, Financial Integration, Financial Inclusion, SADC, ARDL

JEL Classifications: B26, G18, G21

1. Introduction

The nature and condition of financial development necessary to achieve economic growth have been a subject of academic and policy debate. It has been argued that financial development plays a critical role in promoting economic development (Choe and Moosa, 1999; Sanogo and Moussa, 2017) as collecting savings and channeling them into the most productive investment projects in the real sector speeds up the economic growth (Atje and Jovanovic, 1993). Likewise, Schumpeter (1911), Gurley and Shaw (1955), Goldsmith (1969), and King and Levine (1994) share the same observations.

The current study goes beyond a general analysis of financial development and economic growth in the South African Development Community (SADC) by considering the interconnectedness or integration of financial markets as well as the inclusive participation of economic agents as it relates to inclusive economic growth. As financial integration and financial inclusion become a reality for an increasing number of developing countries, it is important to empirically examine how they affect economic growth as well as how domestic financial sector development influences this process. The main contribution of the current study is the incorporation of different facets of financial development that take into account the peculiarities of developing economies in the SADC region. It also contributes to existing knowledge by identifying the inconsistency and inability of most empirical studies (e.g., Goetz and Gozzi, 2022; Asongu and Odhiambo, 2019; Tchamyou *et al.* 2019; Ahmad *et al.* 2018; Naceur *et al.* 2017; Batuo *et al.* 2018; Fang and Jiang, 2016; Phakedi, 2014) that have not categorically differentiated between the effects of financial development, financial integration, and financial inclusion on macroeconomic variables. Unlike other studies discussed in this section and the subsequent sections, the current study considers the income effect of financial development, integration, and inclusion on economic growth by adopting the segmentation approach based on the level of the economic performance of the SADC countries.

The need to incorporate financial integration is attached to the affirmation that modern national economic structures are becoming more open and integrated with neighboring, regional, and international economies. Therefore, an economic analysis that excludes the integrating forces of financial markets on the international front may not portray a complete picture of the extent to which a financial sector of a country is developing (Lawal *et al.* 2016; Malefane and Odhiambo, 2021).

A significant proportion of the population in developing countries has been excluded from the financial market activities and products (Kpodar and Andrianaivo, 2011; Andrianaivo and Kpodar, 2012; Onaolapo, 2015; Singh and Stakic, 2020; Ratnawati, 2020). This compromises meaningful analysis of the role of financial development in promoting economic growth (Naceur *et al.* 2017; Lenka and Sharma, 2017). Financial inclusion generally entails the provision of financial products at affordable costs or prices (Gregory and Laurence, 2011).

The overarching objective of this study is to test whether economic growth and financial development embrace the inevitable effects of financial integration and financial inclusion in SADC. The specific objectives are to examine the relationship between financial development, integration, inclusion, and economic growth as well as to explore the respective conditional threshold levels.

The study consists of five sections. Section 1 provides the background and motivation of the study. Section 2 covers the review of related literature, whereas Section 3 outlines the methodology. Section 4 presents the empirical findings and the analysis of the results. Section 5 concludes the main findings of the study and provides recommendations and policy implications.

2. Literature review

Aziakpono (2007), considering the Southern African Customs Union (SACU) in the period 1970-2004, concluded that different sources of integration have different impacts on economic growth. The mixed effect of financial integration on financial development was discovered. The study further established that financial development plays a pivotal role for integration to have a positive impact on economic growth by utilizing the vector error correction model (VECM), with the real GDP per capita being the proxy of economic growth. The studies by Selvarajan and Ab-Rahim (2020) and Bong and Premaratne (2019) on Asia supported these findings.

Ahmed (2010), investigating 15 sub-Saharan African countries in the period 1976-2005, postulated that there exists a long equilibrium between financial development and economic growth. Limited evidence from the study supports the hypothesis that financial integration causes economic growth. However, it was established that financial integration indirectly impacts economic growth through financial development. The study further concluded that financial development causes economic growth. According to the findings, there is a strong linkage between financial liberalization and financial development. The study utilized the VECM, with the

real GDP, CHIIN-ITO, private sector credit, and share of domestic credit as proxies for economic growth, financial integration, and financial development, respectively. The findings were supported by Goetz and Gozzi (2022), whose study focused on financial integration through banks across states of the United States.

Chen and Quang (2014) repudiated the findings of Ahmed (2010), Aziakpono (2007), and Bailliu (2000) by concluding that financial development is not a precondition for financial integration to affect economic growth. The study considered 80 countries, including 23 industrial countries, 20 emerging countries, and 37 other developing countries, between 1984 and 2007 and used the panel threshold regression (PTR) model.

Altaee and Al-Jafari (2015) observed a one-way causality from financial development and financial integration to economic growth. The study covered the Kingdom of Bahrain from 1980 to 2012. The study postulated that investment efficiency has more effect on economic growth compared to investment volume.

Batuo *et al.* (2018), however, maintained that financial development and financial liberalization positively affect financial instability. The study further revealed that economic growth reduces financial stability, and the effect is higher during pre-liberalization compared to post-liberalization. Using the system generalized method of moments (GMM) and the principal component analysis (PCA), the study covered 41 African countries from 1985 to 2010. The findings are in line with the study of Naceur *et al.* (2017), who focused on the period 1960-2011 for 145 countries in the Middle East and North America, Caucasus, and Central Asia.

The realization that financial exclusion, especially to financial facilities such as savings, credit, risk management, insurance, and pensions, has a detrimental impact on poverty and income inequality made financial inclusion to be a topical issue around the 2000s (Jack and Suri, 2014; Joshi, 2011). Furthermore, it has been observed that financial inclusion, through the vehicles of financial development and financial integration, can contribute toward savings mobilization and broaden productive investments in the presents of effective risk management and insurance vehicles (Thathsarani *et al.* 2021; Sahay *et al.* 2015; Han and Melecky, 2013; Gardeva and Rhyne, 2011).

Considering 53 African countries over the period 2004-2011, Asongu and Odhiambo (2019) found that financial inclusion enhances the formal financial sector and reduces the informal financial sector. Mobile phones, through information sharing, enhance formal financial development. The information-sharing channels include private credit bureaus and private credit registries.

3. Methodology

This study uses a panel regression method. Fisher panel unit root test by Maddala and Wu (1999) is utilized to examine the null hypothesis of non-stationarity against alternative hypothesis that the series is stationary. The autoregressive-distributed lag (ARDL) technique is used to test for co-integrating relationships, and the generalized least squares (GLS) is used for the determination of the respective threshold levels.

3.1. ARDL bounds testing method

The ARDL bounds technique, promulgated by Pesaran and Shin (1999) and extended by Pesaran *et al.* (2001), is used due to its numerous advantages compared to other co-integration techniques like Johansen and Juselius (1992) and Engle and Granger (1987). Some of the advantages of the ARDL bounds technique are that it is relatively more efficient in either small or large sample sizes, and even in the presence of endogeneity, it yields unbiased results (Harris and Sollis, 2003). The ARDL bounds testing for financial development (FD), financial integration (FI), financial inclusion (FIC), and economic growth (Y) is specified as in Equations (1), (2), (3), and (4).

$$\Delta lnFD_{it} = \hat{a}_0 + \hat{a}_1 lnFD_{i,t-1} + \hat{a}_2 lnFIC_{i,t-1} + \hat{a}_3 lnFI_{i,t-1} + \hat{a}_4 lnY_{i,t-1} + \sum_{j=1}^{p} \ddot{a}_{1j} \Delta lnFD_{i,t-j}$$
$$+ \sum_{j=0}^{q_1} \ddot{a}_{2j} \Delta lnFIC_{i,t-j} + \sum_{j=0}^{q_2} \ddot{a}_{3j} \Delta lnFI_{i,t-j} + \sum_{j=0}^{q_3} \ddot{a}_{4j} \Delta lnY_{i,t-j}$$
$$+ \mathring{a}_{it}$$
(1)

$$\Delta lnFIC_{it} = \acute{a}_0 + \acute{a}_1 lnFIC_{i,t-1} + \acute{a}_2 lnFD_{i,t-1} + \acute{a}_3 lnFI_{i,t-1} + \acute{a}_4 lnY_{i,t-1} + \sum_{j=1}^{p} \ddot{o}_{1j} \Delta lnFIC_{i,t-j}$$
$$+ \sum_{j=0}^{q_1} \ddot{o}_{2j} \Delta lnFD_{i,t-j} + \sum_{j=0}^{q_2} \ddot{o}_{3j} \Delta lnFI_{i,t-j} + \sum_{j=0}^{q_3} \ddot{o}_{4j} \Delta lnY_{i,t-j} + \check{d}_{it}$$
(2)

$$\Delta lnFI_{it} = \grave{e}_0 + \grave{e}_1 lnFI_{i,t-1} + \grave{e}_2 lnFD_{i,t-1} + \grave{e}_3 lnFIC_{i,t-1} + \grave{e}_4 lnY_{i,t-1} + \sum_{j=1}^{p} \grave{\imath}_{1j} \Delta lnFI_{i,t-j}$$
$$+ \sum_{j=0}^{q_1} \grave{\imath}_{2j} \Delta lnFD_{i,t-j} + \sum_{i=0}^{q_2} \grave{\imath}_{3j} \Delta lnFIC_{i,t-j} + \sum_{j=0}^{q_3} \grave{\imath}_{4j} \Delta lnY_{i,t-j} + \grave{\imath}_{it}$$
(3)

$$\Delta lnY_{it} = \acute{o}_0 + \acute{o}_1 lnY_{i,t-1} + \acute{o}_2 lnFD_{i,t-1} + \acute{o}_3 lnFI_{i,t-1} + \acute{o}_4 lnFIC_{i,t-1} + \sum_{j=1}^{p} \hat{o}_{1j} \Delta lnY_{i,t-j}$$
$$+ \sum_{j=0}^{q_1} \hat{o}_{2j} \Delta lnFD_{i,t-j} + \sum_{j=0}^{q_2} \hat{o}_{3j} \Delta lnFI_{i,t-j} + \sum_{j=0}^{q_3} \hat{o}_{4j} \Delta lnFIC_{i,t-j} + \vartheta_{it}$$
(4)

, where $\hat{a}_0, \acute{a}_0, \grave{e}_0,$ and $\acute{o}_0$ are intercepts in equations, and $\mathring{a}_t$, $\check{d}_t, \grave{\imath}_t,$ and ϑ_t are the error terms for $\hat{a}_1$, $\hat{a}_2$, $\hat{a}_3, \hat{a}_4$, $\acute{a}_1, \acute{a}_2, \acute{a}_3$, $\acute{a}_4, \grave{e}_1, \grave{e}_2, \grave{e}_3, \grave{e}_4$, $\acute{o}_1, \acute{o}_2, \acute{o}_3,$ and $\acute{o}_4$ which are related to the long-run coefficients. Δ is the first-difference operator and p and q are optimal lag length. Next sub-section presents the threshold effect using the GLS.

3.2. The threshold effect using the GLS

The GLS technique is used to study the non-linear effects of financial development, integration, and inclusion on economic growth. One of the benefits of this approach is that it avoids heteroscedasticity complications. The non-linear effect relationship is examined by adding quadratic terms of financial development, integration, and inclusion to the economic growth model (Sarel, 1996; Khan and Senhadji (2001). The non-linear model for financial development, financial inclusion, financial integration, and economic growth is specified as in Equation (5).

$$\Delta lnY_{it} = c_0 + c_1 FD_{i,t} + c_2 FD_{i,t}^2 + c_3 FI_{i,t} + c_4 FI_{i,t}^2 + c_5 FIC_{i,t} + c_6 FIC_{i,t}^2 + +c_7 Z_{i,t} + \mathring{a}_{it}$$
(5)

, where ΔlnY_{it} is the growth rate of real GDP, Δ is the first-difference operator, c_0 is the intercept, $c_0, c_0, c_0, c_0, c_0, c_0$ are coefficients, $FD_{i,t}, FI_{i,t}, FIC_{i,t}$, and $FD_{i,t}^2, FI_{i,t}^2, FIC_{i,t}^2$ are linear and non-linear terms of financial development, financial integration, and financial inclusion, respectively. Finally, $\mathring{a}_{it}$ is the error term. $Z_{i,t}$ are control variables represented by gross fixed capital formation (GFCF), labour force participation rate (LFPR), population growth rate (POPG), education (EDU) and real interest rate (RIR). Finally, $\mathring{a}_{it}$ is the error term.

The threshold level of financial development is the derivative of Equation 5 with respect to $FD_{i,t}$ that is set equal to zero as shown in Equation (6).

$$lnFD_{i,t}^* = \frac{c_1}{2c_2}$$
(6)

The threshold level of financial integration is the derivative of Equation 5 with respect to $FI_{i,t}$ that is set equal to zero as shown in Equation (7).

$$lnFI^*_{i,t} = \frac{c_3}{2c_4} \tag{7}$$

The threshold level of financial inclusion is the derivative of Equation of 5 with respect to $FIC_{i,t}$ that is set equal to zero as indicated in Equation (8).

$$lnFIC^*_{i,t} = \frac{c_5}{2c_6} \tag{8}$$

The next sub-section presents data, data source and variable description.

3.3. Data

This study covers 15 SADC member states from 1995 to 2020. The sample period is limited to 1995 to 2020 primarily due to financial inclusion data availability. The real gross domestic product (RGDP) growth rate was used to proxy economic growth in order to control for inflation and also to obtain superior estimations (Taivan and Gibson, 2016; Altaee and Al-Jafari, 2015; Arac and Ozcan, 2014).

Financial development (FD) is proxied by domestic credit to the private sector (DCPS), and financial integration (FI) is proxied by foreign direct investment net inflow (FDINI), whilst financial inclusion (FIC) is proxied by mobile penetration rate (MPR). DCPS represents resources provided to the private sector. Credit granted to the private sector is essential for financial investment projects (McKinnon, 1973). FDINI is assumed to aid in overcoming the capital shortage, transfer of productive technologies, and building of human capital in host countries (Solow, 1956; Romer, 1993; Ahmad *et al.* 2018). MPR, mobile payment systems enhance financial intermediation, both in breadth and depth, culminating in reduced transaction costs, smooth consumption, increased savings, and building working capital (Masha, 2016). Mobile payment also allows for faster, more effective, and more efficient government transfers and enables cross-border linkages (Sahay *et al.* 2015).

Data are obtained from the World Bank's World Development Indicators (WDI), International Monetary Fund's International Financial Statistics (IFS): Indicators of Financial Development, and the Financial Structure Database: World Bank Financial Sector Development Indicators.

4. Empirical results and analysis
4.1. ADF-Fisher panel unit root test

The results show mixed order of integration, I(0) and I(1), for economic growth, financial inclusion, financial integration, and financial development. The mixed order of integration justifies the use of the ARDL model.

The next sub-section presents the ARDL test for co-integration to check for both the long-run and short-run relationships.

4.2. ARDL bounds test for co-integration approach

Table 1 gives the empirical results of the ARDL bounds test for co-integration, while Table 2 presents the estimated short-run and long-run coefficients. The respective diagnostic tests are presented in both tables. There are four models estimated: Model 1, Model 2, Model 3, and Model 4, with dependent variables of economic growth, financial development, financial integration, and financial inclusion, respectively. All four models consider all SADC countries.

The computed F-statistics are greater than the upper critical bound at a 1% level of significance, tabulated by Pesaran *et al.* (2001), for all the models, confirming the existence of co-integration between the series over the study period. Thus, there is evidence of the existence of a long-run relationship between economic growth, financial development, financial integration, and financial inclusion.

Table 1. ARDL bound test results

Models	Model 1		Model 2		Model 3		Model 4	
Functions	F(EG| FD, FI, FIC)		F(FD| EG, FI, FIC)		F(FI| EG, FD, FIC		F(FIC| EG, FD, FI)	
Optimal Lag Structure	(1,1,1,1)		(1,1,1,1)		(2,1,1,1)		(2,1,1,1)	
F-statistics	14.79727***		10.15424***		9.141893***		33.36590***	
Significant level	Pesaran *et al.* (2001, p. 300), critical values: intercept and no trend, k = 3		Pesaran *et al.* (2001, p. 300), critical values: intercept and no trend, k = 3		Pesaran *et al.* (2001, p. 300), critical values: intercept and no trend, k = 3		Pesaran *et al.* (2001, p. 300), critical values: intercept and no trend, k = 3	
	Lower bounds I(0)	Upper bounds I(1)	Lower bounds I(0)	Upper bounds I(1)	Lower bounds I(0)	Upper bounds I(1)	Lower bounds I(0)	Upper bounds I(1)
1% level	3.65	4.66	3.65	4.66	3.65	4.66	3.65	4.66
5% level	2.79	3.67	2.79	3.67	2.79	3.67	2.79	3.67
10% level	2.37	3.20	2.37	3.20	2.37	3.20	2.37	3.20

Note: The 1%, 5% and 10% significant are represented as ***, ** and *, respectively.

Table 2. Estimated long-run and short-run coefficients

	Model 1 ARDL(1,1,1,1) based on AIC	Model 2 ARDL(1,1,1,1) based on AIC	Model 3 ARDL(2,1,1,1) based on AIC	Model 4 ARDL(2,1,1,1) based on AIC
Panel A: Long-run coefficients				
Regressors				
Functions	F(EG| FD, FI, FIC)	F(FD| EG, FI, FIC)	F(FI| EG, FD, FIC)	F(FIC| EG, FD, FI)
LNEG	-	0.195569***	0.251589**	0.062542*
LNFD	0.077773**	-	0.047414	0.034597*
LNFI	0.095703**	-0.402932***	-	0.025282
LNFIC	0.026568	0.232745***	-0.044410	-
CONSTANT	1.081439***	0.512768**	0.284261	0.271151***
Panel B: Short-run coefficient				
ΔLNEG	-	-0.133423	0.015695	0.013700
ΔLNFD	0.335286	-	0.397895	0.068459
ΔLNFI	-0.106396**	0.063634*	-	-0.031572*
ΔLNFI(-1)	-	-	-0.302181***	-
ΔLNFIC	0.316936***	0.194375	-0.054408	-
ΔLNFIC(-1)	-	-	-	0.101171**
ΔT	-	-	-	-
ECM(-1)	-0.380470***	-0.223056**	-0.279624***	-0.089139***
Diagnostic tests	**Statistics**	**Statistics**	**Statistics**	**Statistics**
R-squared	0.221639	0.195240	0.282735	0.554926
Adjusted R-squared	0.194644	0.162297	0.252305	0.533857
F-statistics	9.351446***	5.926547***	8.232103***	26.33900***
DW Statistic	1.972935	1.956673	2.225152	1.892565

Note: The 1%, 5% and 10% significant are represented as ***, ** and *, respectively.

Model 1 shows that the financial integration effect on economic growth is significantly negative in the short run. The effect of financial inclusion on economic growth is positive and statistically significant only in the short run, with a coefficient of 0.316936. The impact of financial development on economic growth is positive and statistically insignificant in the short run. In the long run, the effect of financial integration on economic growth turns positive and statistically significant, with a coefficient of 0.095703. This could suggest the existence of a minimum threshold beyond which financial integration will start having a positive effect on economic growth. Financial development's effect on economic growth is positive and statistically significant in the long run. This could also suggest the existence of a minimum threshold beyond which financial

development will exert a positive effect on economic growth. Another implication is that financial integration benefits economic growth beyond a minimum threshold. The result for Model 1 is consistent with Altaee and Al-Jafari (2015) and Ang and McKibbin (2007), who postulate that financial development and financial integration have a positive impact on economic growth.

For the estimated model, the coefficient of the error correction term (ECM(-1)) of - 0.380470 is found to be negative and significant at a 1% level of significance as expected. The negative and statistically significant estimate of the lagged error correction term (ECM(-1)) validates an established long-run relationship between all the variables in the estimated model for all SADC countries. This implies that approximately 38% of shock or disequilibrium from the previous year converges back to the long-run equilibrium path in the current year for economic growth. In other words, a 38% yearly change in economic growth is corrected by deviations in the short run toward the long-run equilibrium path. The implication is that financial development, financial integration, and financial inclusion are expected to granger cause economic growth.

Model 2 shows that only financial integration supports financial development in the short run, with a coefficient of 0.063634. The findings show that the effect of financial inclusion and economic growth on financial integration are statistically insignificant. In the long run, financial integration has a statistically significant negative role in financial development, with a coefficient of -0.402932. Thus, the positive influence of financial integration on financial development diminishes in the long run. This suggests the existence of a threshold for financial integration beyond which it will harm financial development. The relationship between economic growth and financial development is positive and statistically significant, with a coefficient of 0.195569, in the long run. The result suggests that economic growth should reach a certain level of growth for it to positively influence financial development. Financial inclusion supports financial development in the long run. Thus, economic growth and financial inclusion have a significant impact on financial development in the long run. The results are in line with Asongu and Odhiambo (2019) and Batuo et al. (2018).

Model 3 shows that the effect of economic growth on financial integration is positive and statistically significant in the long run, with a coefficient of 0.251589. In the long run, economic growth positively affects financial integration, but its effect in the short run is statistically insignificant. This suggests that there should be a level of economic development (threshold) beyond which it will have a significant effect on financial integration (Ahmed, 2010; 2011).

Finally, Model 4 shows that the role of economic growth and financial development on financial inclusion is positive and statistically significant. In the short run, both have positive effects on financial inclusion, but the association is statistically insignificant in the long run. This suggests that economic growth and financial development should grow beyond certain threshold levels to realize positive significant effects on financial inclusion. In the short run, the impact of financial integration is statistically significant as it negatively affects financial inclusion, with a coefficient of -0.031572. The relations change to positive in the long run, but the association is no longer statistically insignificant. The result suggests that economic growth, financial development, and financial integration promote financial inclusion beyond certain thresholds. In the long run, the relationship between economic growth and financial inclusion is positive and significant, with a coefficient of 0.062542. The relationship between financial development and financial development is also positive in the long run. Although not significant, financial integration also supports financial inclusion.

The regression for the underlying ARDL models for all models fits well, as indicated by the statistically significant F-statistics at a 1% level of significance. Given that the overall fit of the models is significant, the models can be used for meaningful inferences. The Durbin-Watson test shows that the variables in the models are free of autocorrelation as the values of the Durbin-Watson statistics are within the 1.5-2.4 range.

The next section presents the results of the threshold effects.

4.3. Threshold effect

Table 3 presents the results of the threshold analysis. As alluded to in the introduction section, the current study is the first known study by the author to analyze threshold levels using a non-linear form of quadratic functions for SADC, which is split into four categories. The first category includes all SADC countries, whereas the other three are determined based on the income levels: SADC low-income countries, SADC middle-income countries, and SADC middle-income countries excluding South Africa. The hypothesis is that specific financial development, integration, and inclusion policy variables start having positive or negative effects on economic growth after certain threshold values are reached.

Table 3. Threshold results of the generalized linear model

Independent variables	All SADC Countries	SADC Low-Income Countries	SADC Middle-Income Countries	SADC Middle-Income Countries, excluding South Africa
		Dependent variable – LNEG		
FD	-0.016940**	-0.095203*	-0.019315**	-0.164722**
FD^2	0.0000865*	0.003428*	0.000101*	0.002793
FI	0.005025	0.006278	-0.008767	-0.015361
FI^2	-0.0000929	-0.000666	0.000354	-0.000433
FIC	0.006977**	0.016898*	0.010887**	0.025314***
FIC^2	-0.0000414*	-0.000521**	-0.0000578*	-0.0000995*
LNGFCF	0.159558	0.756965	-0.415852*	-0.358326
LNLFPR	0.275611***	0.037037	0.657429***	0.951460***
LNPOPG	-	0.385730	-	-0.249783
LNEDU	-	0.160598	-	-
LNRIR	-	-0.289331*	0.060836	-
		Effects Specification: Ramsey RESET Test		
T-statistic	0.142602	1.385715	1.522042	1.287939
F-statistic	0.020335(0.8868)	1.920205(0.1724)	2.316610(0.1323)	1.658786(0.2025)
Likelihood ratio	0.020335	1.920205	2.316610	1.658786
		Threshold		
FD	98% (Min)	14% (Min)	96% (Min)	29% (Min)
FI	27% (Max)	5% (Max)	12% (Min)	-
FIC	84% (Max)	16 (Max)	94% (Max)	127 (Max)

Notes: The 1%, 5% and 10% significant levels are represented as ***, ** and *, respectively. Ramsey RESET Test - Ho: the functional form is correctly specified.

Signs of the linear terms of policy variables and the corresponding quadratic terms reflect whether the threshold is minimum or maximum (Rousseau and Wachtel, 2002). For all SADC, the threshold level of financial development (Equation (6)) for all SADC countries proxied by DCPS is as follows.

$$FD^* = \frac{0.016940}{2*0.0000865} = 98\%$$

The result establishes that the minimum level of financial development, which supports economic growth, is 98%. In other words, the rate of financial development below the threshold of 98% for all SADC countries has a negative statistically significant impact on economic growth.

The result suggests that financial systems in SADC countries are still in a phase of development and unstable. The result substantiates findings by Yabu and Kessy (2015) and Khadraoui (2012). The drop from 96% to 29% for SADC middle-income countries and SADC middle-income countries without South Africa shows the critical role or influence of South Africa on financial development in SADC.

The threshold level of financial integration (Equation (7)) for all SADC countries is as follows.

$$FI^* = \frac{0.005025}{2 * 0.0000929} = 27\%$$

The result establishes that the maximum level of financial integration, which supports economic growth, is 27%. That is, the rate of financial integration beyond the threshold of 27% for all SADC countries has a negative impact on economic growth, though statistically insignificant, given that the coefficients of FI and FI^2 are insignificant. The implication of the findings suggests that full liberalization of the capital account in SADC countries can destabilize these economies if other macroeconomic variables like real sector growth are not addressed. The result, compared with the threshold levels for financial development, seems to suggest that the financial domestic system has to be a prerequisite for financial integration decisions. Generally, the result confirms the previous empirical studies like Naceur *et al.* (2017), Khadraoui (2012), and Aziakpono (2007).

The threshold level of financial inclusion (Equation (8)) for all SADC countries is shown next.

$$FIC^* = \frac{0.006977}{2 * 0.0000414} = 84\%$$

The result establishes that the maximum level of financial integration, which supports economic growth, is 27%. That is, the rate of financial integration beyond the threshold of 27% for all SADC countries has a negative impact on economic growth, but is statistically insignificant, given that the coefficients of FI and FI^2 are insignificant. Findings suggest that full liberalization of the capital account in SADC countries can destabilize these economies if other macroeconomic variables like real sector growth are not addressed. The result, compared with the threshold levels for financial development, suggests that the financial domestic system is a prerequisite for financial integration decisions. Generally, the result confirms the previous empirical studies like Naceur *et al.* (2017), Khadraoui (2012), and Aziakpono (2007).

Ramsey RESET test is used to examine whether non-linear combinations of fitted values explain the response variable significantly at the 5% level. At the 5% significance level, we fail to reject the null hypothesis, which indicates that the functional form is correctly specified for all the models in Table 3. Thus, the results show that the models can be used for meaningful inferences.

The threshold levels for financial development, integration, and inclusion varies across the specified models. For financial development, minimum threshold levels are 14%, 96%, and 29% for SADC low-income countries, SADC middle-income countries, and SADC middle-income countries without South Africa, respectively. For all SADC countries, the threshold level is 98%. The result implies that low-income countries should focus more on real sector growth and institutional quality to benefit significantly from financial development. The result also shows that South Africa is the major determinant of financial development in SADC (Taivan and Gibson, 2016).

Although statistically insignificant, the maximum threshold level is 5% for SADC low-income countries in the case of financial integration, whereas SADC middle-income countries have a minimum financial integration threshold level of 12%. This implies that for SADC low-income countries, FDINI of more than 5% will negatively affect economic growth, while FDINI should be above 12% for SADC middle-income countries for it to have a positive impact on economic growth. The mixed relationships across countries relative to the level of income, policy regime, and institutional quality are in line with the findings of previous studies like Naceur *et al.* (2017) and Chen and Quang (2014).

For financial inclusion, the maximum threshold level for SADC low-income countries is 16%. Maximum threshold levels are 94% and 127% for SADC middle-income and SADC middle income countries without South Africa, respectively, compared to 84% for all SADC countries. Beyond these threshold levels of MPR, financial inclusion will negatively affect economic growth. The result suggests that financially well-developed countries tend to grow faster when the level of financial inclusion is high (Kpodar and Andrianaivo, 2011).

The study considered other topical measures of financial inclusion, which include fixed broadband internet subscribers (FBIS) and the number of automated teller machines (NATM). The results are reported in Tables 4 and 5 in the Appendix. FBIS is considered since it has a long-run significant and positive relationship with economic growth (Chiwira, 2021). NATM is considered since it is highly correlated with other financial inclusion measures like the number of bank branches, the number of depositors' accounts, and the number of borrowers from regulated financial institutions (Chiwira, 2021). NATM also captures the supply side dimension of financial inclusion. The results did not fundamentally change regardless of the proxy used for financial inclusion.

5. Conclusion and policy implications

The main finding of this study is that financial development, along with its facets of financial integration and inclusion, are drivers of economic growth in SADC. In addition, there is a need to establish a strategic mix of these facets of financial development for the significant realization of economic growth. Importantly, SADC should carefully pay attention to the limited short-term positive impact of financial inclusion on economic growth since financial inclusion may be detrimental to economic growth in the long run, especially, in the absence of well-developed institutions.

Unlike previous studies, the current study analyzed the desired or the corresponding threshold levels of mobile phone penetration rate that promotes economic growth. It was observed in this study that beyond varying threshold levels across categories, mobile penetration rate, which primarily informs mobile banking, will start having a detrimental effect on economic growth. It is worth noting that the threshold is low for poor countries in SADC, yet most of these countries, for example, Zimbabwe, have the highest mobile banking facilities in SADC. This implies that these countries are operating at financial inclusion levels detrimental to economic growth.

A unique empirical finding of the current study is that although bank credit to the private sector negatively affects economic growth in the long run, most SADC countries are still operating below the minimum threshold levels. A possible explanation for this paradox is that in SADC, credit to the private sector is either channeled to non-productive sectors or sectors that do not promote economic growth leading to unbalanced growth of the financial sector and the real sector. Therefore, policymakers in SADC countries should consider a comprehensive assessment of both macroeconomic and financial sector environments to inform robust macro-prudential policy regulations and strategies. Additionally, in order to promote economic growth, policy makers' focus should be on long-run policies of financial development, which include reviewing regulatory and supervisory frameworks (Reserve Bank of Malawi, 2010).

The study also reveals an important issue regarding foreign direct investment. It was observed that there are no thresholds for financial integration measured by FDINI. This result implies that any level of FDINI is permissible. The result holds for all SADC countries, SADC middle-income countries, SADC low-income countries, and SADC middle-income countries, excluding South Africa. Further, compared with the threshold levels for financial development, the finding suggests that the financial domestic system and some level of economic development are a prerequisite for financial integration decisions like previous empirical studies (Naceur *et al.* 2017; Khadraoui, 2012; Aziakpono, 2007). SADC, at country-specific levels, should empirically substantiate how financial integration impacts economic development mainly through supporting a more advanced industrialization process before considering any policy interventions.

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Appendix

Table 4. Threshold results of the generalized linear model - FBIS

	Dependent variable - LNEG			
Independent variables	All SADC Countries	SADC Low-Income Countries	SADC Middle-Income Countries	SADC Middle-Income Countries, excluding South Africa
FD	-0.017826**	-0.005459	-0.106274*	-0.106288*
FD^2	0.000103**	0.000555	0.001625	0.001621
FI	-0.025998	-0.007500	-0.063166*	-0.063609*
FI^2	0.000664	0.0000940	0.001423	0.001491
FIC	-0.071384	-1.827487	0.116319	1.113762
FIC^2	-0.084742	5.771215	-0.636071	-0.634306
LNGFCF	0.485906***	0.361743	0.428304	0.424188
LNLFPR	0.0133809	-0.668016**	0.404901	0.411083
LNPOPG	-	3.254812***	0.013114	-
Effects Specification: Ramsey RESET Test				
T-statistic	0.745120	1.376169	0.051993	0.025096
F-statistic	0.555203(0.4579)	1.893842(0.1756)	0.002703(0.9589)	0.000630(0.9801)
Likelihood ratio	0.555203	1.893842	0.002703	0.000630
Threshold				
FD	87% (Min)*	5% (Min)	33% (Min)	32% (Min)
FI	20% (Min)	40% (Min)	22% (Min)	21%(Min)
FIC	-	16 (Min)	9% (Max)	87 (Max)

Notes: The 1%, 5% and 10% significant levels are represented as ***, ** and *, respectively. Ramsey RESET Test - Ho: the functional form is correctly specified. The variable fixed broadband internet subscribers (FBIS) is the proxy for financial inclusion.

Table 5. Threshold results of the generalized linear model - NATM

	Dependent variable - LNEG			
Independent variables	All SADC Countries	SADC Low-Income Countries	SADC Middle-Income Countries	SADC Middle-Income Countries, excluding South Africa
FD	-0.037218**	-0.288932***	-0.266960***	-0.266849***
FD^2	0.000221*	0.008289**	0.004775***	0.004784***
FI	-0.029123*	-0.011117	-0.050056	-0.050651**
FI^2	0.001002*	-0.000119	0.000900	0.001015
FIC	0.026555	0.660435***	0.076419	0.075490
FIC^2	-0.000566**	-0.076537***	-0.001178	-0.001167
LNGFCF	0.290809*	0.927369****	-0.256440	0.241827
LNLFPR	0.244654**	-	0.803326***	0.821011***
LNPOPG	-	-	0.031599	-
Effects Specification: Ramsey RESET Test				
T-statistic	0.030035	1.286488	1.156446	1.202875
F-statistic	0.000902(0.9761)	1.655052(0.2053)	1.337366(0.2553)	1.446909(0.2369)
Likelihood ratio	0.000902	1.655052	1.337366	1.446909
Threshold				
FD	84% (Min)*	17% (Min)*	28% (Min)*	28% (Min)*
FI	15% (Max)*	-	27% (Min)	30 (Min)
FIC	23% (Max)	4% (Max)*	32% (Max)	32 (Max)

Notes: The 1%, 5% and 10% significant levels are represented as ***, ** and *, respectively. Ramsey RESET Test - Ho: the functional form is correctly specified. The number of automated teller machines (NATM) is the proxy for financial inclusion.