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Article

How Does Banking Concentration Affect Financial Inclusion in the Southern African Region?

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Abstract: Financial inclusion is an important enabler of economic development and aligns with several United Nations Sustainable Development Goals. In most sub-Saharan African countries, financial inclusion efforts take place in the presence of concentrated and bank-dominated systems. This study investigates the relationship between banking concentration and financial inclusion, focusing on account ownership, savings, and loans from 2010 to 2021. This paper employs dynamic panel threshold modelling to identify concentration thresholds that influence the direction of the relationship. A U-shaped relationship is identified, indicating relatively high levels of bank concentration that can benefit bank account ownership and loans. Thresholds for savings are relatively low. The effect of bank concentration on savings and loans is tempered by mobile phone penetration. Strong property rights and low levels of corruption also moderate this relationship, underscoring the importance of institutional frameworks in fostering trust and reducing informational asymmetries.

Keywords: banking concentration; financial inclusion; Southern Africa

1. Introduction



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Financial inclusion is widely accepted as an important enabler of economic development and social empowerment and has become a policy priority for many governments and international organisations. The significance of financial inclusion in fostering inclusive economic growth and the fight against poverty aligns closely with several of the United Nations' Sustainable Development Goals (SDGs) (Demirgüç-Kunt et al., 2018; Jungo et al., 2022; Chinoda & Kapingura, 2023). In sub-Saharan Africa (SSA), financial inclusion efforts often occur within highly concentrated banking systems dominated by a few large institutions (Berger & Hannan, 1998; Avom et al., 2021). This contradiction raises questions about the relationship between banking concentration and financial inclusion, particularly in regions where both indicators coexist at relatively high levels (Avom et al., 2021; Owen & Pereira, 2018).

The nexus between banking concentration and financial inclusion has elicited contrasting theoretical and empirical views. The market power hypothesis posits that high banking concentration limits financial inclusion through monopolistic practices (Avom et al., 2022). In contrast, the information hypothesis suggests that concentrated banking systems can reduce information asymmetries and enhance access for marginalised groups (Beck et al., 2015; Avom et al., 2022; Chinoda & Kapingura, 2023). Empirical studies reflect this ambiguity, with some finding a negative relationship between concentration and financial inclusion (Avom et al., 2022) and others highlighting negative effects or nonlinear dynamics in the relationship (Chinoda & Kapingura, 2023; Avom et al., 2022). For instance, Avom et al. (2022)

demonstrate that the impact of banking concentration on financial inclusion is highly contingent on specific thresholds of concentration and market conditions.

This paper contributes to the literature by examining the nonlinear relationship between banking concentration and financial inclusion in Southern Africa. This paper uses data from 2010 to 2021 and employs dynamic panel threshold modelling to identify concentration thresholds that promote or hinder financial inclusion. The findings suggest evidence of threshold effects for account ownership, savings, and loans and that the impact of banking concentration on financial inclusion is influenced by factors such as mobile phone penetration, transparency, and property rights.

The primary contributions of this paper are threefold. First, it extends the literature on banking concentration and financial inclusion by adopting a nonlinear methodological framework, addressing gaps identified in prior research (Owen & Pereira, 2018; Avom et al., 2021). We extend this discussion by using disaggregated measures of financial inclusion. Second, it provides region-specific insights into Southern Africa, where financial systems are characterised by unique structural and institutional dynamics (Avom et al., 2021). Third, this study contributes to the ongoing debate on the role of banking concentration in economic development, taking into account the increasingly recognised role of institutional and infrastructural frameworks (Demirguc-Kunt et al., 2018; Avom et al., 2021; Ahmat-Tidjani & Aka, 2022).

The remainder of the paper is organised as follows: Section 2 reviews the relevant literature and theoretical underpinnings of the relationship between banking concentration and financial inclusion. Section 3 details the data and methodology employed in this study. Section 4 presents the results and discusses their implications. Finally, Section 5 concludes with recommendations for policymakers and directions for future research.

2. Channels of Transmission

2.1. COSTS

Banking concentration can affect financial inclusion through the cost, diversification, and quality of financial services. The market power hypothesis argues that concentrated banking systems allow large banks to exploit their market power by extracting rents from their customers and paying much lower interest rates on their deposits. Drechsler et al. (2017) investigate the interest-rate-setting behaviour of banks with branches in markets of varying concentration levels and find that branches in more concentrated markets have higher spreads. Similarly, the quiet life hypothesis (Hicks, 1935) suggests that large banks tend to exert less effort in maximising efficiency, resulting in higher costs for consumers (Berger & Hannan, 1998). Furthermore, as banks grow larger, internal structures become more complex and difficult to manage, leading to inefficiencies and increased operational risks. Both perspectives imply higher transaction costs for customers.

In contrast, the information hypothesis suggests that concentrated banking systems exhibit lower costs than more competitive markets. Larger banks can better internalise the costs of information gathering and monitoring, thereby enabling the development of long-term relationships that provide informational advantages (Petersen & Rajan, 1995). Consequently, these banks experience lower incidences of moral hazard and adverse selection, resulting in lower consumer costs. On the other hand, a competitive environment with many banks makes it easier for customers to switch providers. This increases costs associated with attracting, screening, and retaining customers. Additionally, higher competition can increase demand for loanable funds, driving up interest rates and lowering financial inclusion (Owen & Pereira, 2018).

2.2. Product Diversification and Quality

The second channel through which banking concentration can affect financial inclusion is product diversification and quality of financial services. Effective financial inclusion requires that consumers are able to access and use relevant financial products. The literature shows that markets with low levels of financial inclusion either lack appropriate financial products or those that exist are not effective at reaching marginalised groups (Demirguc-Kunt et al., 2017). As with costs, there are two contrasting views. The first argues that banking concentration increases the number of financial products available. Large banks are better able to build a profit buffer, which allows them to invest in newer and better-quality products (Owen & Pereira, 2018). Conversely, smaller banks are constrained in price since they largely operate in competitive markets. They will therefore have undiversified portfolios, limiting financial inclusion.

The counter-argument is that diversified portfolios of large banks are complex and associated with higher risks, which can harm financial inclusion. In addition, following from the ‘lazy’ attitude of large banks implied by the quiet life hypothesis, banks do not make an effort to actively innovate or invest in newer products (Manove et al., 2001; Abdel-Halim & Al-Assaf, 2022). As a result, large banks will have a narrow portfolio and provide inappropriate services to marginalised consumers. In the same vein, large banks tend to receive subsidies from governments as a safety net against failure and fragility in the sector. This can lead to additional laxity from large banks, resulting in poor attention to product innovation (Berger & Hannan, 1998).

These contradicting perspectives have both been supported in the empirical literature. Some evidence shows that concentrated bank markets support both access and usage of financial services (Geraldes et al., 2022; Lu et al., 2020). Owen and Pereira (2018) indicate that concentrated banking sectors with banks that have high asset concentrations exhibit greater levels of financial inclusion. They find that the relationship is reversed with mobile money accounts. This result is supported by Chinoda and Kapingura (2023). This is an interesting finding, as data show that the bulk of the growth in financial inclusion in most of Africa is being driven by increases in mobile money accounts.

Studies such as those by Ryan et al. (2014), Avom et al. (2021), and Chauvet and Jacolin (2017) lend support to the argument that banking concentration is harmful to financial inclusion. For example, Ryan et al. (2014) demonstrate that banking concentration increases financing constraints for small and medium enterprises, although this effect differs across firm size and availability of information. In the same vein, Avom et al. (2021) show that at levels of concentration below 60% and 80% for three-bank and five-banking concentrations, respectively, banking concentration has a negative effect on financial inclusion. Similarly, Chauvet and Jacolin (2017) show that banking concentration has a negative effect on financial inclusion in highly inclusive financial systems.

The contradictory findings in the literature support a nonlinear relationship between banking concentration and financial inclusion, which may have different consequences depending on concentration thresholds. Studies by Owen and Pereira (2018) and Avom et al. (2021) have examined this nonlinear relationship. Owen and Pereira (2018) use the square of the concentration variable to capture nonlinearity and find it significant. Avom et al. (2021) explicitly estimate a threshold and identify a U-shaped relationship where concentration initially harms financial inclusion but becomes beneficial beyond a specific threshold. This study builds on these insights by employing a dynamic panel threshold approach to identify levels of banking concentration that either promote or hinder financial inclusion. Accordingly, this study posits the following hypothesis.

H1: *There is a nonlinear relationship between banking concentration and financial inclusion.*

Similarly, there is evidence that mobile technology enables the development of digital financial services, which enhances inclusion in markets with limited traditional banking infrastructure (Chinoda & Kapingura, 2023; Chinoda & Kapingura, 2023). We, therefore, test this assertion by investigating whether mobile phone penetration affects the banking concentration–financial inclusion nexus. We posit the second hypothesis as follows.

H2: *Mobile phone penetration positively moderates the relationship between banking concentration and financial inclusion.*

Finally, the literature also suggests that strong institutions can mitigate the adverse effects of concentration by ensuring accountability and fostering trust in financial systems (Avom et al., 2022; Demirguc-Kunt et al., 2018). Based on this, we propose the following hypothesis.

H3: *Institutional factors such as transparency and property rights influence the impact of banking concentration on financial inclusion.*

3. Data and Methods

3.1. Method

This paper starts off with the estimation of a linear model. The system GMM is used, as it provides more robust estimates and accounts for endogeneity problems (Blundell & Bond, 1998). The linear results allowed us to check our results against results in the older papers investigating the relationship between banking concentration and financial inclusion that do not account for non-linearities. The baseline regression is estimated using Equation (1).

$$FI_{it} = \beta_0 + \beta_1 FI_{it-1} + \beta_2 Conc_{it} + \beta_3 X_{it} + \gamma_i + \mu_t + \varepsilon_{it} \quad (1)$$

The nonlinear model relies on the dynamic panel threshold method of Seo and Shin (2016) and Seo et al. (2019) to model the threshold. The method fits the empirical analysis for its robustness in addressing the inherent endogeneity acknowledged in the relationship. The method also accounts for thresholds and validates the threshold level in the presence of kinks and linearity tests, unlike approach. The method has been applied in empirical threshold analysis in banking studies (Bolarinwa et al., 2021). Following Seo and Shin (2016), the model is specified as follows:

$$y_{it} = x'_{it}\beta + (1, x'_{it})\delta 1\{q_{it} > \gamma\} + \mu_i + \varepsilon_{it}, \quad i = 1, \dots, n; t = 1, \dots, T \quad (2)$$

In the model, x_{it} contains the lag of the dependent variable, while q_{it} is the threshold variable. It is expected that T is fixed and the sample size n grows to infinity. Hence, the firm-specific effect, μ_i , is eliminated from the model through the process of first differencing the transformation and then estimating the unknown parameters $\theta = (\beta', \delta', \gamma)'$ using the difference GMM. Following Seo and Shin (2016), the system GMM is adopted in this study. In the absence of serial correlation and with valid instruments, the system GMM is superior to the difference GMM estimator and can significantly improve efficiency (Bond & Temple, 2001).

Equation (2) is operationalised in Equation (3) in line with other financial threshold studies.

$$FINCL_{it} = (\alpha_1 FINCL_{it-1} + \theta_{11} BANKCONC_{it} + \theta_{21} NPL_{it} + \theta_{31} GDPPC_{it}) 1\{q_{it} \leq \gamma\} (\alpha_2 FINCL_{it-1} + \theta_{12} BANKCONC_{it} + \theta_{22} NPL_{it} + \theta_{32} GDPPC_{it}) 1\{q_{it} > \gamma\} + \mu_i + \varepsilon_{it} \quad for i = 1, \dots, n; t = 1, \dots, T \quad (3)$$

In Equation (2), $1\{\cdot\}$ is the indicator function, q_{it} is the transition variable, and Υ is the threshold parameter in the model. Equation (2) is estimated within the system GMM framework, which allows for both regressors and transition variables to be endogenous.

3.2. Data and Sources

This paper adopted yearly data from 14 highly concentrated banking systems in African countries between 2010 and 2021. The data were averaged using a three-year mean to smooth the effects of business cycles and address short-run disturbances. Data sources and measurements are shown in Table 1. All data were sourced from the World Bank Development, Global Financial Development, and Financial Inclusion Databases.

Financial inclusion (FI_{it}) was measured by three indicators that are deemed to be very important in sub-Saharan Africa. Most economies in sub-Saharan Africa are bank-dominated. Accordingly, bank account ownership, savings, and loans were used as measures of financial inclusion.¹ Evidence shows that the rapid growth seen in financial inclusion in sub-Saharan Africa is largely due to the growth of mobile money accounts (Demirguc-Kunt et al., 2022). As a result, we considered measuring financial inclusion using mobile money accounts. Unfortunately, the data had a significant number of missing variables, making it difficult to estimate comparable models with mobile money accounts as a dependent variable.

Table 1. Data, description, and Sources.

Variables	Notation	Measurement	Source
3-bank concentration	Bank3	Assets of the three largest commercial banks as a share of total commercial banking assets in the industry.	WBFI
5-bank concentration	Bank5	Assets of the five largest commercial banks as a share of total commercial banking assets in the industry.	WBFI
Nonperforming loans	NPL	The proportion of defaulting loans to total gross loans.	WBFI
Economic growth	GDPPC	Gross domestic product per capita, expressed in dollars (USD).	
Financial development	FSD	The proportion of domestic credits provided by the financial sector to GDP.	WBFI
Education	SCH	Secondary school enrolment as a proportion of total enrolment.	WBDI
Accounts owned by 1000 people.	ACC1000	Number of depositors with commercial banks per 1000 adults.	WBFI
Saving rate	SAV	The percentage of respondents who report saving or setting aside any money by using an account at a formal financial institution such as a bank, credit union, microfinance institution, or cooperative in the past 12 months (% age 15+).	WBFI
Loans to the Public.	LOANS	The percentage of respondents who report borrowing any money from a bank, credit union, microfinance institution, or another financial institution such as a cooperative in the past 12 months.	WBFI
ATM usage	ATM	Number of ATMs per 100,000 adults.	WBFI
Transparency and corruption	CORRUP	CPIA transparency, accountability, and corruption in the public sector rating (1 = low, 6 = high).	WBFI
Property rights	PROP RIGHT	CPIA property rights and rule-based governance rating (1 = low, 6 = high).	WBDD
Mobile phone	MOBILE	Mobile cellular subscriptions, per 100 people.	WBDD

Countries included: South Africa, Namibia, Mozambique, Botswana, Zimbabwe, Zambia, Angola, Congo, DR, Tanzania, Seychelles, Malawi, Mauritius, Lesotho, Madagascar.

Note: WBFI, WBDI, and WBDD represent the World Bank Financial Database, World Bank Development Indicators Database, and World Bank Development Database, respectively.

Banking concentration ($Conc_{it}$) was measured using the 3-bank and 5-bank concentration ratios. Following the literature, a number of control variables were included. Several control variables (X_{it}) in Equation (1) were also included, in line with the literature. GDP per capita ($GDPPC_{it}$) captures the effect of income on financial inclusion (Barajas et al., 2020; Feghali et al., 2021). Financial sector development (FSD_{it}) is proxied by the proportion of private credit to public credit (Avom et al., 2021; Barajas et al., 2020). Financial stability affects financial inclusion. Stability is proxied by the share of nonperforming loans in total loans (NPL_{it}).

The literature also shows a strong relationship between education and financial inclusion (Grohmann et al., 2018). In the absence of a measure of financial literacy, secondary school enrollment as a proportion of total enrollment (SCH_{it}) is used (Čihák et al., 2016). A key variable that affects access to financial services is information asymmetries. To capture this effect, we followed the literature and used a transparency index, which measures transparency, accountability, and corruption ($CORRUPT_{it}$) in the public sector (Avom et al., 2021; Chauvet & Jacolin, 2017). Similarly, a measure of property rights was included, with the view that access to finance is likely to be enhanced in environments with strong property rights ($PROPRIGHT_{it}$) (Avom et al., 2021). Finally, in the absence of adequate data on mobile money accounts, mobile phone penetration ($MOBILE_{it}$) was used to capture the possibility of mobile finance as an alternative to mainstream finance.

4. Results and Discussion

4.1. Descriptive Statistics and Correlation Analysis

The descriptive statistics are presented in Table 2. The asset concentration of the three biggest banks averaged about 72% but was as high as 99% in some countries. The five-bank asset concentration average was 85.6% but constituted the whole industry in some countries. This includes large countries like South Africa, where the five-Bank asset concentration was 99.3%. The average account ownership was 55.6% compared to the sub-Saharan average of 33%. However, there was great variation across the countries, as evidenced by the high standard deviation. The data showed a general low level of savings across the region. The average level of savings of 15% was in line with the regional average. On average, the banking industries had nonperforming loans amounting to 6% of total loans. Only 9% of people, on average, reported having borrowed money in the 12 months prior, compared to 7% for sub-Saharan Africa region. There was a diversity in GDP per capita, which varied between USD 312 and USD 17,253 per year. The correlation between the variables is shown in Table 3.

Table 2. Descriptive statistics of the variables.

Variables	Mean	Std Dev.	Min.	Max
3-Bank	71.8842	16.6444	59.15	99.08
5-Bank	84.5707	12.2727	59.8915	100
ACC1000	556.4974	661.2460	12.01465	3392.427
SAV	14.86846	10.6246	3.2435	37.2066
ATM	47.4352	87.5145	0.4055	369.6143
LOAN	9.1736	6.2124	1.5165	25.1514
FSD	34.4397	34.4262	4.0230	128.8384
GDPPC	3814.398	4296.043	312.1428	17,253.51
SCH	58.9307	26.5819	25.5068	109.4441
NPL	6.7662	4.1337	1.2856	25.8361
CORRUP	2.5268	0.4642	1.5	3.5
PROPRIGHT	2.7143	0.5878	1.5	3.5
MOBILE	82.9372	45.7132	5.8859	185.5593

Table 3. Correlation matrix of the variables.

	Bank3	Bank5	ACC1000	SAV	ATM	LOAN	FSD	GDPPC	SCH	NPL	CORRUP	PROP R.	MOBILE
Bank5	1												
Bank3	0.9243 ***	1											
ACC1000	0.4117 ***	0.1520	1										
ATM	0.4154 ***	0.1608 **	0.6263 ***	1									
SAV	0.1272	−0.0831	1 0.3190	0.5530 ***	1								
LOAN	0.0389	−0.0870	0.3615 *	0.4482 ***	0.8844 ***	1							
FSD	0.2868 ***	−0.0096	0.4257 ***	0.8228 ***	0.8211 ***	0.7326 ***	1						
GDPPC	0.0409	0.0587	0.1822 *	0.4871 ***	0.8501 ***	0.6978 ***	0.6519 ***	1					
SCH	0.0473	0.0158	0.2857 **	0.7127 ***	0.8781 ***	0.7281 ***	0.8438 *	0.8588 ***	1				
NPL	−0.3926 ***	−0.2637 ***	−0.1714	−0.2891 ***	−0.5195 ***	−0.2998	−0.4379 ***	−0.3293 ***	−0.5066 *	1			
CORRUP	−0.0752	0.2978 ***	−0.2464 **	0.4390 ***	0.1327	0.2119	0.1617	0.1303	−0.0748	−0.4480 ***	1		
PROP R.	−0.0274	0.2742 ***	−0.2808 **	0.2462 **	0.0696	0.3242 *	0.1211	−0.1156	0.0345	−0.2649 ***	0.7794 ***	1	
MOBILE	0.1255	0.1267 *	0.4132 ***	0.5671 ***	0.7596 ***	0.6849 ***	0.6047 ***	0.8615 ***	0.7939 ***	−0.4696 ***	0.2630 ***	0.0957	1

***, **, and * represent 1%, 5%, and 10%, respectively.

4.2. Linear vs Nonlinear Relationship in the Banking Concentration–Financial Inclusion Nexus

As an initial step, financial inclusion was regressed on the variables represented in Equation (1) using the system GMM. Tables 4–6 show the results for all three financial inclusion measures. The first column shows the three-bank concentration results, and the second column shows the results for the five-bank concentration ratio as a measure of concentration. The nonlinear regression results confirm that the nonlinear model better captured the relationship between banking concentration and financial inclusion. The thresholds identified for all financial inclusion measures suggest that the relationship was negative below the threshold but became positive above it. This U-shaped relationship is consistent with [Owen and Pereira \(2018\)](#) and [Avom et al. \(2021\)](#), indicating that banking concentration can only enhance financial inclusion in sufficiently concentrated markets.

The analysis shows mixed results for the relationship between banking concentration and financial inclusion. There was a positive relationship for account ownership, consistent with [Owen and Pereira \(2018\)](#) and [Geraldes et al. \(2022\)](#). [Owen and Pereira \(2018\)](#) found that industry concentration was positively correlated with account ownership. Similarly, [Geraldes et al. \(2022\)](#) demonstrated that banking concentration is a necessary condition for financial inclusion, as measured by account ownership. This result can be explained by the ability of larger banks in concentrated markets to provide a diverse range of accounts and expand branch networks into underserved areas. However, as the nonlinear analysis below notes, this positive relationship was only observed above a given threshold.

Table 4. Direct effect of banking concentration on financial inclusion (account ownership).

	3-Bank Concentration	5-Bank Concentration
Bank Account	13.8053 *** (4.4224)	17.3003 *** (5.78438)
FSD	24.3678 *** (4.5622)	39.1150 *** (9.3874)
LGDPC	122.1473 (130.7473)	−201.183 (169.9037)
SCH	−35.8769 *** (13.0895)	−35.42576 ** (17.652)
NPL	−10.8305 *** (36.1449)	126.2705 * (63.976)
F-Stat. (Prob.)	23.26 (0.0000)	24.19 (0.0000)
R-Square	0.7166	0.8287

***, **, and * represent 1%, 5%, and 10%, respectively.

Table 5. Direct effect of banking concentration on financial inclusion (savings).

	3-Bank Concentration	5-Bank Concentration
Savings	−0.1578 ** (0.0517)	−0.1401 * (0.0664)
FSD	0.0510 (0.0703)	0.0722 (0.1144)
LGDPC	0.4415 (1.4714)	−1.1519 (2.2848)
SCH	0.2630 (0.1622)	0.3585 (0.2149)
NPL	0.5488 (0.6053)	1.4806 (1.1269)
F-Stat. (Prob.)	64.73 (0.000)	48.04 (0.000)
R-Square	0.9700	0.9756

**, and * represent 1%, 5%, and 10%, respectively.

In the linear models, savings and loans exhibited a negative relationship with banking concentration. This finding aligns with [Chinoda and Kapingura \(2023\)](#) and [Chauvet and Jacolin \(2017\)](#), who demonstrated that banking concentration negatively impacts financial inclusion due to monopolistic behaviours or inefficiencies. The results of [Chauvet and Jacolin \(2017\)](#) are only applicable in highly inclusive financial systems. These outcomes are supported by the market power and quiet life hypotheses, which suggest that large banks in concentrated markets tend to set high interest rates, resulting in the exclusion of marginal borrowers. These high interest rates can result from the lazy attitude of banks,

as suggested by the quiet life hypothesis, or simply from the exercise of market power. Moreover, large banks also tend to offer low interest rates on deposits which, can raise the opportunity cost of savings, leading to marginal consumers opting to use alternative systems for savings.

Table 6. Direct effect of banking concentration on financial inclusion (loans).

	3-Bank Concentration	5-Bank Concentration
Loans	−0.1745 *** (0.0452)	−0.1310 ** (0.0372)
FSD	−0.0721 (0.0615)	−0.0907 (0.0641)
LGDPC	−1.2442 (1.2862)	−3.5992 ** (1.2798)
SCH	0.4116 ** (0.1419)	0.5928 *** (0.1204)
NPL	1.4146 ** (0.5292)	2.5322 *** (0.6312)
F-Stat. (Prob.)	35.62 (0.000)	66.89 (0.000)
R-Square	0.9468	0.9824

***, and **, represent 1%, 5%, and 10%, respectively.

Additionally, large banks also offer complex product portfolios, which could deter marginal users who struggle to navigate or trust these offerings. [Chauvet and Jacolin \(2017\)](#) suggest that this effect is compounded in economies where institutions are weak, so regulating large banks is difficult. The effect of institutional variables was tested in the dynamic threshold models below. The results indicate that the five-bank thresholds are sensitive to corruption, property rights, and mobile phone penetration.

4.2.1. Concentration Threshold

Three key results stand out from the nonlinear regression. First, the results confirm that the nonlinear model best fit the data. Thresholds were identified for all dependent variables, and all the thresholds were significant at the 1% level. The linearity tests validated this conclusion. All the linearity tests were significant at the 1% level. Second, the relationship between the various measures of financial inclusion and banking concentration was negative below the threshold and positive above the threshold. The results are presented in Tables 7–12. Third, savings and loans were sensitive to institutional variables, but account ownership was not.

Table 7. Dynamic threshold models (account ownership and 3-bank concentration).

	Banking Concentration	Corruption	Mobile	Property Rights
Lag of Account	0.1972 *** (0.03194)	0.1923 *** (0.0126)	0.1981 *** (0.0361)	0.1994 *** (0.0210)
LGDPC	−32.0023 (30.1200)	−34.5989 (43.2042)	−18.7620 (59.1774)	−5.5817 (29.2609)
NPL	−26.3206 * (14.9759)	−4.6770 (3.2287)	0.9512 (5.3785)	−5.1002 (3.2103)
Threshold (%)	82.4542 *** (1.6375)	81.5729 *** (1.9809)	82.4542 *** (1.6274)	82.4542 *** (0.9921)
Bank Asset Conc.				
Lower Regime	−14.3829 ** (6.6094)	−14.3829 ** (6.6094)	−14.3829 ** (6.6094)	−14.3829 ** (6.6094)
Upper Regime	27.2064 ** (22.2322)	27.2064 ** (22.2322)	27.2064 ** (22.2322)	27.2064 ** (22.2322)
Bounds (%)	(79.24–85.66%)	(77.69–85.46%)	(80.51–84.40%)	(80.50–84.40%)
Kink	52.8704 *** (17.1645)	55.8335 *** (23.1641)	58.8734 * (31.3125)	50.6231 *** (18.9772)
No. of Countries	14	14	14	14
Linearity Test	0.000 ***	0.000 ***	0.000 ***	0.000 ***

***, **, and * represent 1%, 5%, and 10%, respectively.

Table 8. Dynamic threshold models (account ownership and 5-bank concentration).

	Banking Concentration	Corruption	Mobile	Property Rights
Lag of Account Ownership	0.1677 *** (0.0146)	0.1494 *** (0.0384)	0.1308 *** (0.0288)	0.1339 *** (0.0199)
LGDPC	31.9152 *** (6.4355)	19.5367 (27.7978)	76.3475 *** (24.0578)	45.4777 *** (15.3334)
NPL	−22.8162 ** (10.3552)	−16.9092 * (10.0975)	15.5367 *** (2.9497)	−11.6569 *** (4.30519)
Threshold (%)	90.3515 *** (0.2545)	91.1003 *** (2.7481)	89.353 ** (1.1712)	91.1003 *** (2.1243)
Bank Asset Conc.				
Lower Regime	−38.7401 (31.7176)	−38.7401 (31.7176)	−38.7401 (31.7176)	−38.7401 (31.7176)
Upper Regime	224.4406 ** (103.4027)	224.4406 ** (103.4027)	224.4406 ** (103.4027)	224.4406 ** (103.4027)
Bounds (%)	(76.71–99.62%)	(85.71–96.49%)	(87.06–91.65%)	(82.31–91.21%)
Kink	118.9514 *** (25.4057)	114.074 * (70.7999)	71.3634 *** (16.6879)	84.9022 *** (30.8171)
No. of Countries	14	14	14	14
Linearity Test	0.000 ***	0.000 ***	0.000 ***	0.000 ***

***, **, and * represent 1%, 5%, and 10%, respectively.

Table 9. Dynamic threshold models (saving and 3-bank concentration).

	Banking Concentration	Corruption	Mobile	Property Rights
Lag of Saving	−0.7599 *** (0.1188)	0.3577 ** (0.1530)	−0.5000 *** (0.1207)	−0.76825 *** (0.2237)
LGDPC	0.2711 (0.4373)	1.4255 *** (0.4240)	0.1281 (0.3186)	1.8444 ** (0.8310)
NPL	0.0221 (0.0279)	−0.2039 ** (0.0847)	−0.0729 (0.0610)	−0.1420 ** (0.0687)
Threshold (%)	56.0163 *** (1.208)	77.4603 *** (3.4168)	56.016 *** (1.0184)	56.016 *** (1.018)
Bank Asset Conc.				
Lower Regime	−1.5717 ** (0.0371)	−1.5717 ** (0.0371)	−1.5717 ** (0.0371)	−1.5717 ** (0.0371)
Upper Regime	0.0987 ** (0.0421)	0.0987 ** (0.0421)	0.0987 ** (0.0421)	0.0987 ** (0.0421)
Bounds (%)	(78.92–91.28%)	(70.76–84.16%)	(70.46–84.86%)	(51.72–93.16%)
Kink	0.6173 ** (0.2422)	0.1583 *** (0.0505)	0.4732 *** (0.1588)	0.3474 ** (0.1559)
No. of Countries	14	14	14	14
Linearity Test	0.000 ***	0.000 ***	0.000 ***	0.000 ***

***, **, and * represent 1%, 5%, and 10%, respectively.

Table 10. Dynamic threshold models (saving and 5-bank concentration).

	Banking Concentration	Corruption	Mobile	Property Rights
Lag of saving	−0.0156 (0.1317)	0.07463 (0.0788)	−0.2184 (0.2541)	−0.0879 (0.2560)
LGDPC	1.0272 * (0.549)	0.7457 * (0.4497)	1.8831 *** (0.4391)	1.1092 ** (0.3649 *)
NPL	−0.1764 (1.03)	0.0575 (0.0675)	−0.1142 (0.0916)	−0.0520 ** (0.0213)
Threshold (%)	90.8507 *** (0.5379)	83.115 *** (6.795)	74.3803 *** (1.5712)	74.879 ** (2.2301)
Lower Regime	−0.6066 ** (0.0288)	−0.6066 ** (0.0288)	−0.6066 ** (0.0288)	−0.6066 ** (0.0288)
Upper Regime	0.7835 (1.1443)	0.7835 (1.1443)	0.7835 (1.1443)	0.7835 (1.1443)
Bounds (%)	(89.79–91.91%)	(93.35–97.84%)	(94.59–98.59%)	(90.18–93.51%)
Kink	1.0257 *** (0.3010)	0.3807 * (0.2284)	1.0319 *** (0.3778)	0.3519 ** (0.1541)
No. of Countries	14	14	14	14
Linearity Test	0.000 ***	0.000 ***	0.000 ***	0.000 ***

***, **, and * represent 1%, 5%, and 10%, respectively.

Table 11. Dynamic threshold models (loans and 3-bank concentration).

	Banking Concentration	Corruption	Mobile	Property Rights
Lag of Loans	0.0798 (0.1122)	0.4343 *** (0.0927)	−0.2697 *** (0.09267)	−1.0163 * (0.5985)
LGDPC	0.6705 *** (0.2518)	0.4344 *** (0.0927)	1.4547 *** (0.1706)	0.5928 *** (0.1518)
NPL	0.0026 (0.0231)	0.0146 (0.0214)	0.0435 (0.0384)	−0.1318 * (0.0728)
Threshold (%)	57.7789 *** (13.0762)	56.0163 *** (3.695)	78.635 *** (8.6294)	57.7789 *** (4.998)
Bank Asset Conc.				
Lower Regime	−1.2202 ** (1.0079)	−1.2202 ** (1.0079)	−1.2202 ** (1.0079)	−1.2202 ** (1.0079)
Upper Regime	0.0311 ** (0.0177)	0.0311 ** (0.0177)	0.0311 ** (0.0177)	0.0311 ** (0.0177)
Bounds (%)	(25.41–98.07%)	(51.741–79.09%)	(33.13–97.70%)	(32.83–98.42%)

Table 11. *Cont.*

	Banking Concentration	Corruption	Mobile	Property Rights
Kink	0.0616 (0.0531)	0.1868 (0.1250)	−0.0598 (0.0565)	0.0842 *** (0.0293)
No. of Countries	14	14	14	14
Linearity Test	0.000 ***	0.000 ***	0.000 ***	0.000 ***

***, **, and * represent 1%, 5%, and 10%, respectively.

Table 12. Dynamic threshold models (loans and 5-bank concentration).

	Banking Concentration	Corruption	Mobile	Property Rights
Lag of Account	−0.0682 (0.0928)	−0.0682 (0.0928)	−0.2415 *** (0.0479)	−0.4286 *** (0.1028)
LGDPC	0.1538 (0.4070)	0.1538 (0.4070)	0.4286 *** (0.1183)	−0.1157 (0.1464)
NPL	0.0312 (0.0392)	0.0312 (0.0393)	−0.0620 ** (0.0308)	−0.0148 * (0.0080)
Threshold (%)	98.5868 *** (0.6198)	99.0859 *** (0.7452)	77.6244 *** (16.7483)	79.9081 ** (4.1845)
Bank Asset Conc.				
Lower Regime	−0.2548 ** (0.0616)	−0.2548 ** (0.0616)	−0.2548 ** (0.0616)	−0.2548 ** (0.0616)
Upper Regime	0.0029 (0.3046)	0.0029 (0.3046)	0.0029 (0.3046)	0.0029 (0.3046)
Bounds (%)	(97.37–99.80%)	(97.63–99.32%)	(97.35–99.46%)	(96.56–99.64%)
Kink	−3.8044 (7.5015)	−2.6695 (6.2928)	0.0492 (0.0908)	0.0398 (0.0278)
No. of Countries	14	14	14	14
Linearity Test	0.000 ***	0.000 ***	0.000 ***	0.000 ***

***, **, and * represent 1%, 5%, and 10%, respectively.

4.2.2. Threshold Effects and Mobile Phone Penetration

The effect of mobile phone penetration on the banking concentration–financial inclusion relationship varied across the three financial inclusion measures. The thresholds for account ownership, savings, and loans reveal the complex dynamics of the banking concentration–financial inclusion nexus. The significance of mobile phone penetration reflects the transformative role of mobile technology in driving financial inclusion, particularly in contexts with limited traditional banking infrastructure.

The thresholds for account ownership were very high, implying that banking concentration generally had a negative effect on access to bank accounts. The estimated thresholds suggest that banking concentration was negatively associated with account ownership at concentration levels lower than 82% and positively associated at levels higher than that for the three-bank concentration ratio. The threshold rose to just over 90% for the five-bank concentration ratio. These ratios were above the sample average concentration ratios of 72% and 85% for the three-bank and five-bank concentration ratios, respectively. The results suggest that competition is good for access to bank accounts. Mobile phone penetration had no significant influence on the thresholds, as account ownership is largely necessity-driven in sub-Saharan Africa. Many individuals hold accounts to receive wages or salaries, making mobile technology less critical in this context (Demirguc-Kunt et al., 2022; Simatele & Maciko, 2022).

The thresholds for savings were relatively low, with the base threshold at just over 56% for the three-bank concentration ratio. In contrast to account ownership, savings were significantly influenced by mobile phone penetration. This effect was evident in the five-bank concentration model. Mobile phone penetration lowered the concentration thresholds for savings in the five-bank concentration model from 91% to 74%. This effect reflects the role of mobile phone penetration in facilitating digital saving platforms, such as mobile money. These platforms provide accessibility in countries where traditional banking infrastructure is limited. However, the fact that this variable had no significant influence in the three-bank concentration model demonstrates the restricting implications of concentrated banking and mobile network partnerships, which may limit access for marginal customers.

The relationship between banking concentration and loans is somewhat different. Including mobile phone ownership significantly influenced the thresholds in both the competitive (five-bank concentration models) and non-competitive (three-bank concentration models) environments. In the three-bank concentration model, mobile phone ownership raised the threshold from 56% to 78%, and it lowered it from 99% to 77% in the five-bank concentration model. Essentially, the threshold for loans was the same for both measures of concentration. This effect reflects the critical role that mobile technology has played in facilitating access to credit. Digital platforms, particularly those linked to mobile money services, have increasingly bridged gaps in credit provision, enabling more individuals and small businesses to access loans.

4.2.3. Threshold Effects and Institutional Quality

Institutional factors, such as corruption, property rights, and regulatory quality, significantly affect the thresholds for savings and loans. These variables influence the operational environment of banks, affecting their ability to extend financial services and the extent to which banking concentration promotes or hinders financial inclusion. For account ownership, institutional variables had no significant impact on the thresholds. As alluded to, this likely reflects the necessity-driven nature of account ownership in sub-Saharan Africa. For instance, the corruption index increased the benefit threshold for savings to over 77% from 56%. This result underscores the role of transparency and accountability in mitigating the negative impacts of banking concentration.

This finding suggests that weak institutional environments exacerbate information asymmetries, deterring individuals from engaging with formal savings mechanisms. The corruption variable measures transparency and accountability in the public sector and could be interpreted as a proxy for the role played by information asymmetries. With that in mind, this result would suggest that information asymmetry problems undermine the benefits of competition in the banking sector, as implied by Chauvet and Jacolin, 2017. Trust in banks is undermined in poorly governed systems, and individuals often turn to informal savings methods, such as rotating savings and credit groups. Conversely, stronger institutions foster transparency and accountability, enabling banks to attract savers and lower the concentration thresholds required for positive impacts on savings.

For loans, institutional variables also play a significant role in moderating the relationship between banking concentration and financial inclusion. The thresholds for the five-bank concentration ratio were notably high, at 99%, but they were significantly lowered when the property rights index was incorporated. The threshold was reduced to 80%. Hence, strong property rights reduce the negative impacts of banking concentration by fostering trust and reducing barriers to credit access. For example, strong property rights create a favourable environment for lending by enhancing collateral security and encouraging banks to extend credit to a broader base of borrowers. On the other hand, weak property rights exacerbate credit risks, forcing banks to restrict lending or charge higher interest rates, disproportionately affecting marginal borrowers.

4.3. Discussion

The findings highlight the critical role of nonlinear dynamics and contextual factors in the banking concentration–financial inclusion nexus. While high levels of banking concentration can enhance financial inclusion, this relationship is contingent on surpassing specific thresholds. Moreover, the benefits of concentration depend on enabling factors, such as mobile phone penetration and strong institutional quality.

The strong effect of mobile phone ownership in this relationship underlines the increasingly important role that mobile phones play in African financial markets. The relationship

between banking concentration and financial inclusion becomes positive at very high concentration levels in an environment with high mobile phone ownership. The rapid uptake of mobile accounts in sub-Saharan Africa may explain this phenomenon. Mobile money accounts have rapidly grown in sub-Saharan Africa and have increased financial inclusion in many countries (Demirguc-Kunt et al., 2022). The high concentration threshold required for financial inclusion to benefit from concentration, in this case, could be influenced by the fact that in most of these countries, both banking and mobile network sectors are highly concentrated. Often, mobile network operators provide mobile money through relationships with existing banks. This symbiotic relationship between network operators and banks could result in closing up access for marginal users in the savings and loan markets. For example, in some countries, such as South Africa, only banks can issue electronic money. Such regulations reinforce the relationship between network operators (who are often the agents that issue mobile money) and banks, resulting in limited access to alternative digital financial services.

The thresholds for the five-bank ratios were more sensitive to moderating variables. This characteristic was observed for both savings and loans. If we assume that five-bank ratios imply higher levels of competition, we can argue that more competitive banking sectors create an environment in which the relationship between financial inclusion and banking concentration is more likely to be positive if there are higher levels of mobile phone penetration and strong property rights. Avom et al. (2021) found a similar result and showed that the threshold of benefit when they used mobile phones as the threshold variable was higher. High mobile phone penetration, therefore, can only mitigate the impact of banking concentration on financial inclusion in more competitive environments.

The role of institutional quality is particularly evident in competitive banking sectors, as reflected in the five-bank concentration models. Higher levels of competition amplify the positive effects of strong governance, enabling financial inclusion to improve even at lower concentration thresholds, suggesting that banks can operate more efficiently and inclusively in environments with better institutional frameworks, regardless of market concentration levels. While account ownership is less affected by governance factors due to its necessity-driven nature, savings and loans are highly sensitive to institutional quality. Strengthening governance structures such as property rights, transparency, and regulatory quality can significantly lower the barriers to financial inclusion.

5. Conclusions

This paper investigated the relationship between banking concentration and financial inclusion using a sample of African countries with high levels of inclusion. The linear model results generally point to a positive relationship between account ownership and banking concentration, whereas the results for loans and savings suggest a negative relationship. A threshold model was estimated in line with growing concerns that the relationship between banking concentration and financial inclusion may be nonlinear. The results support the existence of thresholds in which the relationship between financial inclusion and banking concentration is negative below given thresholds and positive above the thresholds. We also found that the thresholds for account ownership were not sensitive to measures of transparency and accountability (proxying information asymmetry), property rights, and mobile phone ownership (as a proxy for alternative financial services). We explained this by pointing to the fact that many users of bank accounts in sub-Saharan Africa use their accounts to receive salaries and wages. Demirguc-Kunt et al. (2022) in fact suggest that account ownership could grow rapidly if government salaries, for instance, were paid through bank accounts. However, it is not clear what the benefits of such a policy would be given the fact that evidence shows that many users simply

use these accounts as mailboxes and do not use them for any other benefits that could accrue from account ownership. Complimentary action is required to encourage use. As a result, account ownership, therefore, may not be a good measure to track improvements in financial inclusion.

Thresholds for loans and savings, on the other hand, were responsive to the three moderator variables used. The transparency and property rights variables lowered the thresholds where the benefits of concentration could be realised. Since bank consolidation seems to be inevitable in most African countries, promoting the use of mobile money (here proxied by mobile phone penetration) as well as strengthening property rights may help policy efforts to increase financial inclusion. Our results suggest that financial inclusion studies should consider disaggregated measures, given the differing responses to possible intervention instruments such as transparency and property rights. For instance, aggregate measures may show high levels of financial inclusion because of high account ownership and lead to erroneous conclusions about consolidation, whereas account ownership may not imply effective financial inclusion. A shortcoming of this paper is that we were not able to estimate the relationship between mobile money accounts and banking concentration due to the lack of adequate data. This is an important facet of financial inclusion in Africa. Therefore, further work investigating the effect of banking concentration on inclusion through mobile money accounts is required to complement that of [Chauvet and Jacolin \(2017\)](#) and [Chinoda and Kapingura \(2023\)](#).

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Notes

¹ There is evidence that shows that there are high levels of informal savings and credit in sub-Saharan Africa, which may not be captured in these data ([Demirguc-Kunt et al., 2022](#)).

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