DETERMINANTS OF BANK PROFITABILITY IN THREE SUB-SAHARAN AFRICAN COUNTRIES

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Abstract

- In light of the importance of bank profitability for provision of financial services and for financial stability, this study examines its determinants in three major Sub-Sharan African countries, namely Kenya, Nigeria and South Africa. Our panel econometric approach using bank-level fixed effects seeks to identify the bank-specific, banking-market and macroeconomic determinants of bank profitability in 240 banks across the three countries over 1990-2019. Across a range of estimates, we find that bank liquidity and the non-interest income to total income ratio had a significant positive effect on profitability while credit risk and the cost-to-income ratio had a significant negative effect. In most models, real GDP growth affected bank profitability positively. Small banks and large banks differ in terms of their determinants of profitability. Competition among banks is found to be quite marked. There are important implications for both bank management and regulators, which in turn may affect both financial stability and scope for economic development.

Structure

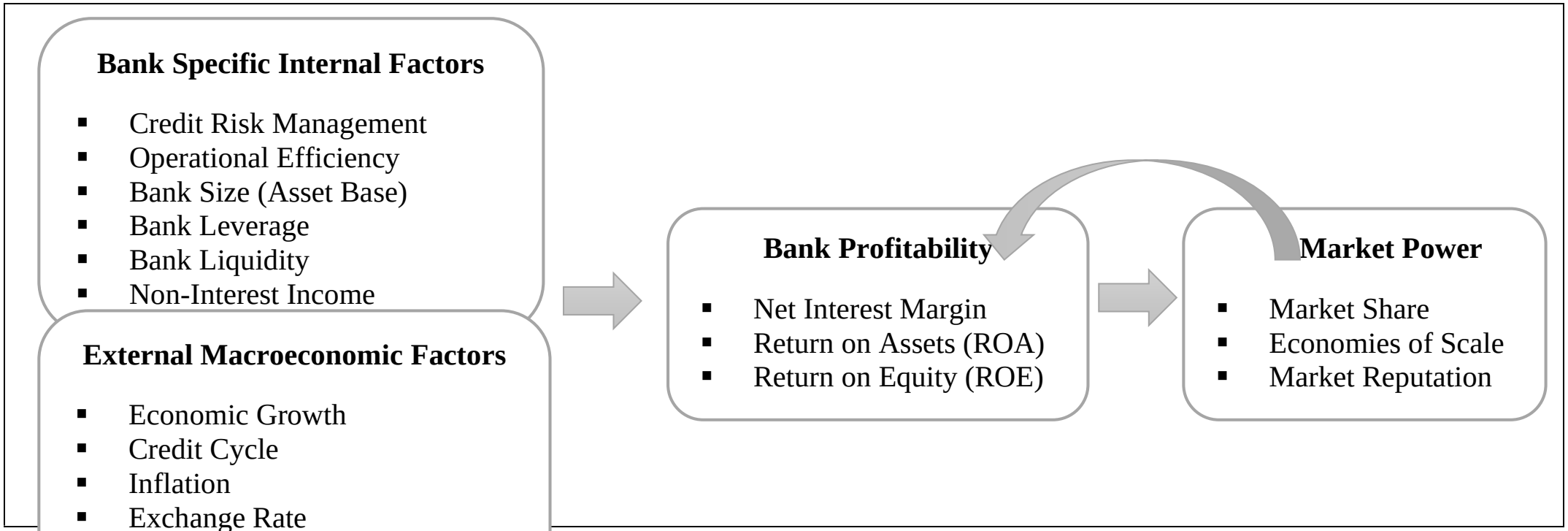
- Introduction
- Literature review
- Methodology
- Data
- Results
- Discussion of results
- Alternative measures of competition and comparison with wider samples
- Conclusion

Introduction

- Rapid economic growth in Africa, benefiting commercial banks
- Role of commercial banks and importance of regulation
- Importance of mobile banking for financial inclusion and bank profits
- Studies of bank profitability rarely focused on Africa
- Our aim to assess determinants of profitability for Kenya, Nigeria and South Africa over 1990-2019
- Implications for regulators, international organisations and banks themselves….
- …..not least in the light of current regulatory challenges

Literature review – theoretical aspects

- Underlying framework is efficient structure hypothesis, which implies a focus on operational efficiency and credit risk management. Schematic below shows conceptual framework



Literature review – empirical aspects

- Internal and external factors determining profitability
- Internal factors
  - Credit risk management
  - Size of the bank
  - Operating efficiency – cost/income ratio
  - Capital adequacy
  - Diversification
  - Asset quality
  - Liquidity
  - African studies highlight such effects, notably Flamini et al (2009), Francis (2013) and Akinkumni (2017)

- Recent studies of developed countries and global samples show similar outcomes for internal factors
- For example Davis et al (2022) found that profitability across a sample of 7,250 global banks in 92 countries over 1990-2018 was influenced by bank size negatively, while the leverage ratio had a negative and significant effect on the ROAE but a positive impact on the ROAA. There was a negative effect from credit risk (measured by non-performing loans/gross loans) while a higher deposit/liabilities ratio (implying less risk of runs due to deposit insurance), raises profitability. The cost/income ratio had a significant and negative relationship to banks' profitability.
- External factors
  - Macroeconomic factors – GDP growth, inflation, interest rates, Exchange rates
  - Market concentration

Key finding and shortcomings of African studies

Author	Findings	Knowledge Gaps
1. Tarus, Chekol and Mutwol (2012)	The study relies on data from 44 Kenyan banks for the period, 2000-2009 and fixed-effects regression to establish the determinants of bank profitability in Kenya. It finds that operating expenses and credit risk are the main internal bank-specific determinants of profitability. However, inflation had a negative effect on bank profitability in Kenya.	The study fails to capture the effect of business model and bank concentration on profitability and the dataset ends in 2009.
2. Aminu (2013)	On the basis of a regression analysis using a sample of seven Nigerian banks, Aminu (2013) found that only management efficiency was a significant internal bank-specific determinant of bank profitability in the country. However, the GDP growth rate negatively affected bank profitability.	The study fails to incorporate the effect of market structure on bank profitability. The data periods was short (2005-11) and only large banks were assessed.
3. Francis (2013)	The study, which relied on a panel data of 216 banks from 42 SSA countries, found that internal bank-specific factors (capital adequacy, asset size and liquidity) as well as macroeconomic factors significantly influenced bank profitability in the region.	Does not consider how market structure and bank concentration would affect the profitability of commercial banks, and also does not include non-interest income ratio. The dataset concludes in 2006.
4. Ongore and Kusa (2013)	This study finds that with the exception of liquidity, all bank-specific factors had a significant effect on bank profitability in Kenya. However, the effect of macroeconomic variables on bank profitability was inconclusive.	The study fails to capture the effect of market factors and business model on bank profitability in Kenya.
5. Osuagwu (2014)	The study relies on a panel dataset that covers 60% of banks in Nigeria and finds that credit risk and market concentration factors were the main determinants of profitability performance in Nigeria.	The study fails to assess the role of business model and the external macroeconomic factors on bank profitability. The dataset concludes in 2010.
6. Zouari-Ghorbel (2014)	Using a panel dataset of 16 Tunisian banks over the period, 2003-2012, this study only shows the effect of the external macroeconomic factors (GDP, inflation, and interest rates) on bank profitability.	The study fails to capture the effect of internal bank-specific factors and business model on profitability of banks in Tunisia.

7. Akinkunmi (2017)	The study finds that long-run profitability of commercial banks in Nigeria is mostly influenced by the capital adequacy ratio and credit risk management efficiency.	The study fails to incorporate the effect of external factors such as market concentration and macroeconomic factors on bank profitability.
8. Issn, Ebenezer, Ahmad & Bin (2017)	The findings from the study indicate that capital adequacy and liquidity ratio have a significant positive effect on Nigerian bank profitability while bank operational efficiency had a significant negative effect on bank profitability.	There is a gap on how market concentration factors and the nature of the business model would affect bank profitability.
9. Nalianya and Miroga (2020)	The study relies on the qualitative insight from 244 bank staff in Kenya to analyse the determinants of bank profitability. Only leverage, capital adequacy, liquidity, and operational expenses were identified as having a significant effect on bank profitability in Kenya.	The study fails to incorporate and assess the effect of external factors (macroeconomic variables and market concentration factors) on bank profitability.
10 Flamini et al (2009)	Using a sample of 389 banks from 41 Sub-Saharan-African countries for the period 1998-2006, profitability is mostly affected by credit risk, operating efficiency and bank size as well as non-interest income. Fluctuation in external macroeconomic factors, such as economic growth, inflation, interest rates, and exchange rates also have a significant influence.	There is a gap on how market concentration factors and the nature of the business model would affect bank profitability. The dataset finishes in 2006.
11 Lawa, Zogli and Dlamini (2017)	Using data from the “big four” banks (N = 4 banks) in South Africa (1995-2013), this empirical research study found non-performing loans, capital adequacy, and GDP market price are the main determinants of bank performance in South Africa	There is a gap in the sample which excludes smaller banks in South Africa.
12 Nessibi (2016)	Over 1990–2008 the more profitable of 10 Tunisian banks are those with higher amount of capital and lower operating costs. Private banks tend to perform better than state owned ones. The real interest rate has a positive effect on bank profitability.	Study ends in 2008 and only the top 10 banks are covered.

Methodology

- This study employs a linear panel OLS regression econometric model to establish the bank-specific, macroeconomic and market structure determinants of bank profitability in the three African countries.
- Dependent variables are profitability (measured by the return on average assets (ROAA) and return on average equity (ROAE))
- Profitability = f (Bank-specific factors, macroeconomic factors, market factors)
- $ROAA_{it} = \alpha_0 + \alpha_1 CR_{it} + \alpha_2 AQ_{it} + \alpha_3 CAD_{it} + \alpha_4 LNAS_{it} + \alpha_5 LIQ_{it} + \alpha_6 NIMTI_{it} + \alpha_7 CI_{it} + \alpha_8 MC_{it} + \alpha_9 GDP_{it} + \alpha_{10} INF_{it} + \alpha_{11} INT_{it} + \alpha_{12} EXCH_{it} + \varepsilon_{it}$ (**Model1**)
- $ROAE_{it} = \alpha_0 + \alpha_1 CR_{it} + \alpha_2 AQ_{it} + \alpha_3 CAD_{it} + \alpha_4 LNAS_{it} + \alpha_5 LIQ_{it} + \alpha_6 NIMTI_{it} + \alpha_7 CI_{it} + \alpha_8 MC_{it} + \alpha_9 GDP_{it} + \alpha_{10} INF_{it} + \alpha_{11} INT_{it} + \alpha_{12} EXCH_{it} + \varepsilon_{it}$ (**Model2**)

Variables

Dependent Variables	**Acronym**	**Formula**	**Expected Effect**
Return on Average Assets	ROAA	$ROAA_{it} = \frac{Net\ Income_{it}}{Average\ Assets_{it}}$	
Return on Average Equity	ROAE	$ROAE_{it} = \frac{Net\ Income_{it}}{Average\ Equity_{it}}$	
IV: Bank-Specific Variables	**Acronym**	**Formula**	**Expected Effect**
Credit Risk	CR	$CR_{it} = \frac{Total\ Loan\ Loss\ Reserve_{it}}{Gross\ Loans_{it}}$	Negative (-)
Asset Quality	AQ	$AQ_{it} = \frac{Loans_{it}}{Total\ Assets_{it}}$	Positive (+)
Capital Adequacy Ratio	CAD	$CAD_{it} = \frac{Total\ Equity_{it}}{Total\ Assets_{it}}$	$\pm$
Asset Size	LnAS	$LnAS_{it}$ = Ln (Total Assets)	$\pm$
Liquidity Ratio	LIQ	$LIQ_{it} = \frac{Liquid\ Assets_{it}}{Total\ Assets_{it}}$	Negative (-)
Non-Interest Income to Total Income	NIMTI	$NIMTI_{it} = \frac{Non-Interest\ Income}{Total\ Income_{it}}$	Positive (+)
Cost to Total Income	CI	$CI_{it} = \frac{Total\ Cost}{Total\ Income_{it}}$	Negative (-)
IV: Market Variables	**Acronym**	**Formula**	**Expected Effect**
Market Concentration	MC	MC_{it} =Share of top 3 banks in banking sector assets	+
IV: Macroeconomic Variables	**Acronym**	**Formula**	**Expected Effect**
Real Gross Domestic Product Growth	GDP	Annual Real GDP Growth	$\pm$
Inflation Rate	INF	Annual Inflation Rate	+
Interest Rate Spread	INT	Lending rate less deposit rate	+
Real Exchange Rate	EXCH	Average Real Exchange Rate (2010=100)	+

Data

- Bank data from Fitch-Connect, 240 banks from the 3 countries over 1990-2019, 73 banks from Kenya, 101 banks from Nigeria and 66 banks from South Africa.
- Banks were selected from the retail consumer bank and universal commercial bank categories.
- Data on real GDP, real exchange rate, real interest rate and inflation rate were collected from World Bank WDI (2020) database and concentration from the World Bank GFDD (2019) database
- Data winsorised at 1% and equations tested by Hausman test for fixed or random effects – finding fixed effects justified.
- Besides main estimate, estimated by sub-periods (1990-2019, 1990-2009 and 2010-2019), by size of the commercial banks (large and small) and by country of operation (Kenya, Nigeria and South Africa), robustness checks, alterative measures of competition, and comparison with global and EMDE samples

Descriptive statistics for the full sample

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
ROAA	1.906	1.730	11.590	-14.460	3.141	2450
ROAE	15.149	15.590	66.600	-80.896	19.492	2411
CR	8.623	4.245	66.279	0.230	11.373	2532
AQ	0.532	0.532	1.036	0.011	0.215	2749
CAD	16.079	12.720	81.760	-14.734	14.398	2813
LNAS	19.842	19.433	25.380	15.499	2.232	2813
LIQ	30.484	25.780	83.072	0.814	20.860	2809
NIMTI	0.396	0.377	1.034	0.007	0.208	2709
CI	67.720	62.430	261.781	17.963	32.868	2715
MC	61.208	62.638	98.885	22.281	22.341	7200
GDP	3.710	3.307	15.329	-2.035	3.184	7200
INF	13.199	9.378	72.836	1.554	13.002	7200
INT	7.287	7.140	18.360	3.120	3.248	7200
EXCH	101.318	94.652	273.013	49.750	37.172	7200

Note: ROAA is the return on average assets, ROAE is the return on average equity, CR is Credit Risk (loan loss reserves/gross loans), AQ is Asset Quality (loans/total assets), CAD is the Capital Adequacy Ratio (total equity/total assets), LnAS is Asset Size (log of total assets), LIQ is the Liquidity Ratio (liquid assets/total assets), NIMTI is Non-Interest Income to Total Income, CI is the Cost to Total Income ratio, MC is market concentration, GDP is growth in real GDP, INF is annual inflation, INT is the interest rate spread and EXCH the real exchange rate. Variables are winsorised at 99% and in level (not lagged).

Profitability for subsamples

Mean ROAA and ROAE by country (percent)

Profitability Measure: ROAA	**Kenya**	**Nigeria**	**South Africa**
Mean	1.58	2.60	1.58
Median	1.83	2.54	1.29
Standard Deviation	2.92	3.25	3.18
Profitability Measure: ROAE	**Kenya**	**Nigeria**	**South Africa**
Mean	11.28	20.94	13.93
Median	11.95	20.50	15.48
Standard Deviation	18.21	21.54	17.26

Mean ROAA and ROAE by Size of the Bank (percent)

Profitability Measure: ROAA	**Small-Sized Banks**	**Large-Sized Banks**
Mean	1.72	2.07
Median	1.65	1.83
Standard Deviation	3.79	2.42
Profitability Measure: ROAE	**Small-Sized Banks**	**Large-Sized Banks**
Mean	11.98	17.93
Median	11.64	17.85
Standard Deviation	21.88	16.64

Main Results

ROAA is the return on average assets, ROAE is the return on average equity, CR is Credit Risk (loan loss reserves/gross loans), AQ is Asset Quality (loans/total assets), CAD is the Capital Adequacy Ratio (total equity/total assets), LnAS is Asset Size (log of total assets), LIQ is the Liquidity Ratio (liquid assets/total assets), NIMTI is Non-Interest Income to Total Income, CI is the Cost to Total Income ratio, MC is market concentration, GDP is growth in real GDP, INF is annual inflation, INT is the interest rate spread and EXCH the real exchange rate. Variables are winsorised at 99% and in level (not lagged).

Variables	ROAA Model			ROAE Model		
	1990-2019	1990-2009	2010-2019	1990-2019	1990-2009	2010-2019
Intercept	8.559***	13.604***	-18.071***	61.638***	120.942***	-211.85***
	(5.4)	(6.4)	(3.3)	(5.4)	(8.1)	(4.6)
CR	-0.0405***	-0.031***	-0.0277*	-0.222***	-0.207***	-0.0605
	(6.2)	(4.0)	(1.9)	(4.5)	(3.6)	(0.5)
AQ	-1.32***	-0.968	-0.965	-7.843**	-20.542***	6.956
	(2.6)	(1.4)	(1.2)	(2.1)	(4.0)	(1.0)
CAD	0.0951***	0.0552***	0.19***	0.0366	-0.254***	1.05***
	(14.0)	(6.4)	(13.4)	(0.7)	(3.2)	(8.8)
LNAS	-0.245***	-0.43***	1.037***	-1.517***	-3.364***	11.829***
	(3.9)	(4.9)	(4.1)	(3.4)	(5.4)	(5.6)
LIQ	0.0077	0.0204***	-0.00005	0.118***	0.041	0.0267
	(1.6)	(2.8)	(0.1)	(3.4)	(0.8)	(0.4)
NIMTI	1.116***	2.002***	0.187	8.618***	7.363**	11.138**
	(3.0)	(4.2)	(0.3)	(3.1)	(2.1)	(2.3)
CI	-0.0508***	-0.075***	-0.0345***	-0.403***	-0.516***	-0.304***
	(24.1)	(24.8)	(11.2)	(25.4)	(22.7)	(12.2)
MC	-0.0049*	0.001	-0.0088**	0.0048	0.0336	-0.081**
	(1.7)	(0.3)	(2.0)	(0.2)	(1.3)	(2.4)
GDP	0.0197	-0.0124	0.086*	0.289**	0.187	0.313
	(1.2)	(0.7)	(1.9)	(2.4)	(1.5)	(0.9)
INF	0.0107*	-0.0005	0.0232	0.192***	0.125***	-0.109
	(1.8)	(0.1)	(0.7)	(4.6)	(3.1)	(0.4)
INT	-0.0032	-0.0425	-0.0004	0.0154	-0.165	-0.0677
	(0.1)	(1.2)	(0.1)	(0.1)	(0.6)	(0.1)
EXCH	0.007***	0.0062***	-0.0186**	0.0506***	0.0484***	-0.222***
	(5.7)	(4.9)	(2.3)	(5.8)	(5.5)	(3.5)
Standard Errors	1.845	1.71	1.578	13.03	11.83	12.39
F-statistics	16.23	14.36	17.47	11.716	10.54	9.885

Size of bank

ROAA is the return on average assets, ROAE is the return on average equity, CR is Credit Risk (loan loss reserves/gross loans), AQ is Asset Quality (loans/total assets), CAD is the Capital Adequacy Ratio (total equity/total assets), LnAS is Asset Size (log of total assets), LIQ is the Liquidity Ratio (liquid assets/total assets), NIMTI is Non-Interest Income to Total Income, CI is the Cost to Total Income ratio, MC is market concentration, GDP is growth in real GDP, INF is annual inflation, INT is the interest rate spread and EXCH the real exchange rate. Variables are winsorised at 99% and in level (not lagged).

Variables	ROAA Model		ROAE Model		Memo: full sample	
	Small Banks	Large Banks	Small Banks	Large Banks	ROAA	ROAE
Intercept	-11.46*** (2.9)	13.216*** (6.6)	-71.44*** (2.7)	105.16*** (6.6)	8.559*** (5.4)	61.638*** (5.4)
CR	-0.0116 (1.0)	-0.0704*** (8.7)	-0.0584 (0.7)	-0.506*** (7.5)	-0.0405*** (6.2)	-0.222*** (4.5)
AQ	0.239 (0.2)	-1.654*** (3.1)	-4.534 (0.7)	0.997 (0.2)	-1.32*** (2.6)	-7.843** (2.1)
CAD	0.111*** (9.7)	0.108*** (11.3)	0.336*** (4.2)	-0.168** (2.0)	0.0951*** (14.0)	0.0366 (0.7)
LNAS	0.764*** (4.1)	-0.478*** (6.2)	5.258*** (4.2)	-3.534*** (5.8)	-0.245*** (3.9)	-1.517*** (3.4)
LIQ	0.0285*** (2.9)	0.00362 (0.7)	0.205*** (3.1)	0.149*** (3.7)	0.0077 (1.6)	0.118*** (3.4)
NIMTI	1.076* (1.9)	1.458*** (3.0)	8.053* (1.9)	13.051*** (3.4)	1.116*** (3.0)	8.618*** (3.1)
CI	-0.0538*** (16.1)	-0.0489*** (16.1)	-0.381*** (16.6)	-0.515*** (19.2)	-0.0508*** (24.1)	-0.403*** (25.4)
MC	-0.0077 (1.3)	-0.00278 (0.9)	-0.0542 (1.4)	0.0428* (1.9)	-0.0049* (1.7)	0.0048 (0.2)
GDP	-0.0617** (2.2)	0.0467** (2.3)	-0.149 (0.8)	0.329** (2.1)	0.0197 (1.2)	0.289** (2.4)
INF	0.00316 (0.3)	0.169** (2.2)	0.135** (2.2)	0.222*** (3.7)	0.0107* (1.8)	0.192*** (4.6)
INT	0.0277 (0.6)	0.0918*** (2.8)	0.376 (1.1)	0.536** (2.1)	-0.0032 (0.1)	0.0154 (0.1)
EXCH	0.0028 (1.3)	0.00694*** (4.8)	0.00411 (0.3)	0.0636*** (5.7)	0.007*** (5.7)	0.0506*** (5.8)
Standard Errors	2.077	1.471	13.624	11.277	1.845	13.03
F-statistics	11.93	15.84	8.809	11.631	16.23	11.716
Prob (F-statistic)	0	0	0	0	0	0
Adjusted R^2	0.66	0.612	0.58	0.534	0.614	0.529
Periods	30	30	30	30	30	30
Number of Banks	168	118	164	118	221	218
Observations	1010	1214	989	1198	2224	2187

Country of operation

ROAA is the return on average assets, ROAE is the return on average equity, CR is Credit Risk (loan loss reserves/gross loans), AQ is Asset Quality (loans/total assets), CAD is the Capital Adequacy Ratio (total equity/total assets), LnAS is Asset Size (log of total assets), LIQ is the Liquidity Ratio (liquid assets/total assets), NIMTI is Non-Interest Income to Total Income, CI is the Cost to Total Income ratio, MC is market concentration, GDP is growth in real GDP, INF is annual inflation, INT is the interest rate spread and EXCH the real exchange rate. Variables are winsorised at 99% and in level (not lagged).

Variables	ROAA Model			ROAE Model		
	Kenya	Nigeria	South Africa	Kenya	Nigeria	South Africa
Intercept	-9.606***	10.474***	12.57**	-77.847***	74.077***	79.168**
	(3.1)	(3.9)	(2.6)	(4.0)	(3.7)	(2.2)
CR	-0.029**	-0.346***	-0.143***	-0.103	-0.361***	-0.359**
	(2.8)	(3.4)	(7.2)	(1.5)	(4.6)	(2.1)
AQ	-1.194	-0.609	-0.011	-3.276	-0.301	1.952
	(1.5)	(0.6)	(0.1)	(0.6)	(0.1)	(0.3)
CAD	0.136***	0.0405***	0.121***	0.543***	-0.38***	-0.022
	(13.7)	(3.1)	(8.2)	(8.2)	(3.6)	(0.2)
LNAS	0.646***	-0.324***	-0.546***	6.125***	-1.816**	-2.777**
	(4.3)	(3.1)	(3.2)	(6.4)	(2.3)	(2.2)
LIQ	0.0166**	0.0163*	0.0144*	0.155***	0.259***	0.021
	(2.2)	(1.8)	(1.6)	(3.2)	(3.8)	(0.3)
NIMTI	-0.199	1.445**	0.964	-12.349***	9.737**	13.5**
	(0.3)	(2.2)	(1.5)	(3.2)	(2.0)	(2.4)
CI	-0.043***	-0.0628***	-0.037***	-0.275***	-0.575***	-0.357***
	(15.2)	(15.1)	(7.4)	(15.5)	(16.4)	(9.0)
MC	-0.014**	0.002	0.0154	-0.098**	0.064**	0.101
	(2.1)	(0.5)	(1.5)	(2.3)	(2.3)	(1.3)
GDP	0.0931**	-0.0366	0.160***	0.742**	-0.122	1.205***
	(2.2)	(1.6)	(3.3)	(2.7)	(0.7)	(3.4)
INF	0.0183	-0.00117	0.068	0.196*	0.103**	0.728**
	(1.1)	(0.2)	(1.5)	(1.9)	(2.0)	(2.1)
INT	0.0878	0.17***	-0.2	0.283	0.855**	-2.142
	(1.6)	(3.1)	(1.0)	(0.8)	(2.1)	(1.4)
EXCH	-0.0067	0.00417***	-0.0007	-0.183***	0.0418***	0.0478
	(0.8)	(2.8)	(0.1)	(3.3)	(3.8)	(0.9)
Standard Error	1.649	1.963	1.682	10.323	14.211	12.551
F-statistics	20.590	11.76	18.429	19.87	10.003	7.096
Prob. (F-statistic)	0	0	0	0	0	0
Adjusted R^2	0.657	0.61	0.638	0.651	0.569	0.378
Periods	27	30	28	27	30	28
Number of Banks	70	95	56	70	94	54
Observations	829	732	663	820	715	652

Robustness - country FE and bank and time FE

	ROAA	ROAE
Variables	**Panel OLS with Country Fixed-Effects**	**Panel OLS with Country Fixed-Effects**
Intercept	12.57**	11.31*
	(2.6)	(1.9)
CR	-0.143***	-0.208***
	(7.2)	(5.4)
AQ	-0.0112	2.222
	(0.1)	(1.0)
CAD	0.121***	-0.0622**
	(8.2)	(2.1)
LNAS	-0.546***	0.518***
	(3.3)	(2.7)
LIQ	0.0145*	0.183***
	(1.6)	(7.0)
NIMTI	0.964	9.925***
	(1.5)	(5.1)
CI	-0.037***	-0.397***
	(7.4)	(31.3)
MC	0.0154	0.0159
	(1.5)	(0.8)
GDP	0.16***	0.343***
	(3.3)	(2.8)
INF	0.0675	0.202***
	(1.5)	(4.8)
INT	-0.2	0.363**
	(1.0)	(2.1)
EXCH	-0.00068	0.0535***
	(0.1)	(6.1)
Standard Errors	1.682	14.264
F-statistics	18.43	121.77
Prob (F-statistic)	0	0
Country Fixed Effects	Yes	Yes
Adjusted R^2	0.638	0.436
Periods	30	30
Number of Banks	221	218
Observations	2224	2187

	ROAA	ROAE
Variables	**Panel OLS with Bank and Time Fixed-Effects**	**Panel OLS with Bank and Time Fixed-Effects**
Intercept	8.453***	54.064***
	(4.3)	(3.8)
CR	-0.0414***	-0.214***
	(6.3)	(4.2)
AQ	-1.173**	-8.515**
	(2.3)	(2.2)
CAD	0.097***	0.0633
	(14.0)	(1.2)
LNAS	-0.226**	-0.95
	(2.5)	(1.5)
LIQ	0.0076	0.1***
	(1.5)	(2.8)
NIMTI	0.925**	9.078***
	(2.4)	(3.2)
CI	-0.0506***	-0.4***
	(23.6)	(24.8)
MC	-0.0033	0.0203
	(1.0)	(0.9)
GDP	-0.0234	0.0695
	(1.0)	(0.4)
INF	0.0027	0.104*
	(0.3)	(1.8)
INT	-0.0407	-0.347
	(1.1)	(1.2)
EXCH	0.00812***	0.047***
	(5.0)	(4.0)
Standard Errors	1.84	13.00
F-statistics	14.65	10.605
Prob (F-statistic)	0	0
Bank and Time Fixed Effects	Yes	Yes
Adjusted R^2	0.615	0.531
Periods	30	30
Number of Banks	221	218
Observations	2224	2167

Discussion of results

- Results show that liquidity, capital adequacy and the ratio of non-interest income to total income generally had a significant positive effect on bank profitability. Credit risk, asset quality, asset size and the cost to income ratio had a significant negative effect on the ROAA and ROAE in most of the estimated fixed-effects regression models. In most cases, real GDP growth and real exchange rates had a significant positive effect on bank profitability while interest rate spreads and also tended to be positive. The subsample variants and robustness check indicate that the baseline ROAA and the ROAE models are stable across countries, banks and over time and when the fixed effects are varied from bank fixed effects only. The main exceptions are changes in the size coefficients.

Summary of regression results

	1990-2019		1990-2009		2010-19		Small		Large		Kenya		Nigeria		South Africa	
	ROAA	ROAE	ROAA	ROAE	ROAA	ROAE	ROAA	ROAE	ROAA	ROAE	ROAA	ROAE	ROAA	ROAE	ROAA	ROAE
CR	-***	-***	-***	-***	-*				-***	-***	-**		-***	-***	-***	-**
AQ	-***	-**		-***					-***							
CAD	+***		+***	-***	+***	+***	+***	+***	+***	-**	+***	+***	+**	-***	+***	
LNAS	-***	-***	-***	-***	+***	+***	+***	+***	-***	-***	+***	+***	-***	-**	-***	-**
LIQ		+***	+***				+***	+***		+***	+**	+***	+*	+***	+*	
NIMTI	+***	+***	+***	+**		+**	+*	+*	+***	+***		-***	+**	+**		+**
CI	-***	-***	-***	-***	-***	-***	-***	-***	-***	-***	-***	-***	-***	-***	-***	-***
MC	-*				-**	-**				+*	-**	-**		+**		
GDP		+**			+*		-**		+**	+**	+**	+**			+***	+***
INF	+*	+***		+***				+**	+**	+***		+*		+**		+**
INT									+***	+**			+***	+**		
EXCH	+***	+***	+***	+***	-**	-***			+***	+***		-***	+***	+***		

Notes: ROAA is the return on average assets, ROAE is the return on average equity, CR is Credit Risk (loan loss reserves/gross loans), AQ is Asset Quality (loans/total assets), CAD is the Capital Adequacy Ratio (total equity/total assets), LnAS is Asset Size (log of total assets), LIQ is the Liquidity Ratio (liquid assets/total assets), NIMTI is Non-Interest Income to Total Income, CI is the Cost to Total Income ratio, MC is market concentration, GDP is growth in real GDP, INF is annual inflation, INT is the interest rate spread and EXCH the real exchange rate.

- Banks are likely to profit from diversification of their income sources besides the interest income. Commercial banks need to acknowledge the importance of other non-interest income sources such as bank fees and commission from the mobile banking platform, which can be effectively exploited by all banks.
- Whereas small-sized financial institutions are likely to benefit from expanding their economies of scale in operations, for large banks, investment in assets beyond the optimal level was associated with diseconomies of scale, which had an adverse effect on bank profitability
- Liquidity ratios being often positive and significant as a determinant of profitability is contrary to usual expectations, whereby as a short-term working capital measure with lower returns than loans, liquidity is expected to have a negative effect on bank profitability. It is likely to reflect the high returns on government debt that comprise a large proportion of liquidity in African countries.
- In line with the efficient structure hypothesis and earlier studies, the findings indicate that operational efficiency and effective credit risk management are important strategic options for banks, which can enhance their financial profitability

- In several of the samples, market concentration had a significant negative effect on bank profitability, in contrast to usual expectations and previous findings. Nigeria is the main exception.
- In many of our estimates, variation in real GDP growth, inflation, interest rate spreads and the real exchange rate had a positive effect on bank profitability, illustrating the vulnerability of banks to external developments in these EMDE countries.

Alternative measures of competition and comparison with wider samples

- To investigate further the nature of competition in African banking and its link to profitability we undertook two further tests. We first assessed the size of a lagged dependent variable in the competition equations, following the Goddard et al (2011) argument that persistence of profits is a key indicator of competition in national markets. And then we included the Lerner index as a measure of individual banks' market power as in Davis et al (2022). In each case we estimated for each of the subsamples in the sections above and retained the equation structure as in the rest of the paper.
- We also added for comparison estimates for a global sample and a sample from emerging market and developing countries (EMDEs) using the same set of 92 countries as in Davis et al (2022) but with the sample covering 1990-2019 as in this paper. These data are collected with the 100 largest banks for each country in 1995, 2005 and 2015 (or less if there are less in the database). There are 40595 observations for the global sample across 3935 banks in 92 countries and 25716 observations for 2500 banks in 36 EMDEs. These provide scope for comparison of competition indicators between the three African countries and a wider sample.

Persistence of profitability

- The argument of Goddard et al (2011), following other studies in a variety of industries, is that a higher lagged dependent variable (LDV) indicates that levels of profit tend to persist and hence competitive pressures are less than in the case of a lower LDV. A lower LDV suggests that competition eliminates any abnormal profits quickly and bank profit rates converge quickly to a long run equilibrium, whereas a higher LDV suggests that advantages to incumbent banks imply competition is impeded and high profits can persist.
- The authors note that earlier studies across various industries suggest that persistence is less in developing countries than in developed ones, although their own estimates for banking across 65 countries over 1997-2007 were not significantly different between advanced and EMDE countries at just over 0.4. In their study of Sub Saharan African (SSA) banks over 1995-2006, Flamini et al (2009) found strong profitability was associated with bank size, diversification and private ownership. Concerning the lagged dependent variable as a measure of persistence they suggested that “the coefficient estimate of 0.21 suggests the existence of market power in the SSA banking sector, but indicates that the departure from perfect competition is marginal, and profits tend to adjust fairly fast to their average level” (ibid p12).

Results for profitability persistence

	Lagged dependent	
Equation/ sample	**ROAA**	**ROAE**
1990-2019	0.145** (6.8)	0.183*** (8.4)
1990-2009	0.089*** (3.3)	0.162*** (5.9)
2010-2019	0.032 (0.9)	-0.008 (0.2)
Small banks	0.017 (0.5)	0.109*** (2.9)
Large banks	0.178*** (6.9)	0.154*** (5.8)
Kenya	0.077** (2.3)	0.184*** (5.4)
Nigeria	0.096*** (2.9)	0.047 (1.3)
South Africa	0.198*** (4.3)	0.377*** (8.3)
Global sample	0.208*** (43.3)	0.23*** (46.6)
EMDE sample	0.202*** (33.4)	0.23*** (36.9)

Lerner Index as a measure of competition

- We assessed Lerner index as a measure of competition instead of concentration. It is derived by estimation of a translog cost function as in Anginer et al. (2014), Beck et al. (2013), Weill (2013) and Davis and Karim (2019). The Lerner index is a measure of the price-cost margin; it is a proxy for current and future profits stemming from pricing power, and it varies at the level of the individual bank. Under perfect competition the index is zero as the output price (marginal revenue) equals marginal cost, and “normal” economic profits are zero. The Lerner index becomes positive as a firm’s market power increases and price rises above marginal cost in a quantity-setting oligopoly model, with the limiting case being monopoly.

Results for Lerner Index

Equation/ sample	ROAA	ROAE	Memo – mean Lerner Index
1990-2019	8.57*** (10.6)	46.95*** (7.6)	0.236
1990-2009	9.167*** (8.0)	45.938*** (5.3)	0.237
2010-2019	5.948*** (4.9)	50.147*** (5.0)	0.236
Small banks	7.9** (6.3)	20.651** (2.5)	0.195
Large banks	8.935*** (9.5)	58.449*** (6.5)	0.268
Kenya	6.069*** (6.1)	14.136** (2.1)	0.245
Nigeria	11.867*** (6.2)	78.595*** (4.6)	0.246
South Africa	5.515*** (3.1)	25.047** (2.0)	0.212
Global sample	5.644*** (79.4)	32.811*** (53.3)	0.228
EMDE sample	6.223*** (66.7)	33.435*** (42.8)	0.234

Comparative data

ROAA is the return on average assets, ROAE is the return on average equity, CR is Credit Risk (loan loss reserves/gross loans), AQ is Asset Quality (loans/total assets), CAD is the Capital Adequacy Ratio (total equity/total assets), LnAS is Asset Size (log of total assets), LIQ is the Liquidity Ratio (liquid assets/total assets), NIMTI is Non-Interest Income to Total Income, CI is the Cost to Total Income ratio, MC is market concentration, GDP is growth in real GDP, INF is annual inflation, INT is the interest rate spread and EXCH the real exchange rate. Variables are winsorised at 99% and in level (not lagged).

	Africa-3	Global	EME
ROAA	1.906	0.935	1.315
ROAE	15.149	8.561	10.509
CR	8.623	4.909	6.569
AQ	0.532	0.575	0.551
CAD	16.079	13.193	16.107
LNAS	19.842	21.235	20.466
LIQ	30.484	24.122	25.891
NIMTI	0.396	0.329	0.336
CI	67.720	63.653	63.637
MC	61.208	65.318	60.133
GDP	3.710	3.062	3.749
INF	13.199	11.008	19.894
INT	7.287	7.170	9.447
EXCH	101.318	99.135	100.198

Comparison with global sample

Dependent variable	ROAA		ROAE	
	Coeff	Coeff*DAFRICA	Coeff	Coeff*DAFRICA
CR	-0.105***	0.047***	-0.772***	0.449***
	(57.3)	(6.9)	(51.7)	(8.1)
AQ	-0.901***	0.979**	-6.47***	10.7***
	(9.2)	(2.1)	(8.5)	(2.8)
CAD	0.059***	0.013**	0.148***	-0.154***
	(39.3)	(2.0)	(12.7)	(3.1)
LNAS	-0.0396**	-0.191***	-0.785***	-0.287
	(2.9)	(3.0)	(7.4)	(0.6)
LIQ	0.0032***	0.0173***	0.0386***	0.144***
	(3.1)	(3.9)	(4.7)	(4.1)
NIMTI	0.393***	-0.313	0.226	2.062
	(3.4)	(1.0)	(0.5)	(0.7)
CI	-0.032***	-0.0153***	-0.265***	-0.117***
	(83.7)	(7.7)	(86.6)	(7.3)
MC	-0.003***	-0.0092***	-0.01	-0.124***
	(3.8)	(3.0)	(1.6)	(5.2)
GDP	0.088***	-0.0688***	0.764***	-0.55***
	(25.5)	(3.7)	(28.6)	(3.8)
INF	0.0038***	0.0126	0.0654***	0.133**
	(2.8)	(1.6)	(6.3)	(2.2)
INT	0.0156***	-0.0039	-0.0228	0.0295
	(5.2)	(0.2)	(1.0)	(0.1)
EXCH	0.0011	0.013***	0.0106*	0.0481**
	(1.4)	(5.1)	(1.7)	(2.4)

Conclusions

- We find that bank-specific factors and external macroeconomic factors are important predictors of bank profitability in the three African countries. Asset size, credit risk, non-interest-income to total-income and the cost to income ratio are the main predictors of bank profitability in the three African countries. Liquidity and asset quality are also significant in a number of samples. External macroeconomic factors also have an important role in enhancing bank profitability in the three African countries, especially for large banks. Market concentration was found to generally have a negative effect on bank profitability except for the ROAE in Nigeria.
- Alternative measures of competition show a significant impact of price-cost margins as measured by the Lerner Index on profitability, in line with global and EMDE estimates. They also show persistence of profitability is somewhat less in these African countries than elsewhere globally and in a wider sample of EMDEs. This lower persistence, which is consistent with higher competition, is particularly marked for small banks in Africa, in the last decade and in Kenya and Nigeria.
- There are some sizeable contrasts in determination of profitability between the three African countries and wider samples across global banks and EMDEs. Notably, profitability in Africa is significantly more dependent on liquidity ratios and on cost-income ratios than in the wider samples, and less dependent on factors such as economic growth and credit risk.

- The strong positive effect of asset size on small bank profitability implies that small commercial banks in the three African countries need to invest in productive asset resources to strengthen their profitability, which suggests that more mergers might be required to enhance bank profitability performance and maintain stability of the financial sector. On the other hand the negative results for asset size in the case of large banks suggests that there is an optimal size of banks beyond which diseconomies of scale prevail.
- Banks need to put in place effective credit risk management strategies to lower credit risk, improve asset quality and therefore enhance profitability performance. Low financial inclusion, especially among the low-income communities indicate that few individuals can qualify for credit facilities while those who access such loans tend to default leading to low asset quality of loans held by banks.
- Banks also need to place considerable focus on their operational efficiency and consider expanding their income sources to other non-interest income, which were found to have a strong positive effect on profitability of banks. This could include further development of mobile banking.
- The results also imply that central banks and governments in African countries need to put in place appropriate monetary and fiscal policies to ensure that macroeconomic factors such as real GDP, inflation, interest rates and exchange rates have a favourable impact on bank profitability.

- Banks in some countries have been subjected to very high capital reserve requirements by their regulatory authorities, which tends to limit their interest earning potential and therefore, resulting in low ROAE profitability. A number of the Basel III regulations such as the capital adequacy and liquidity requirements do not yet apply for African banks. For instance, while most countries in Europe implemented Basel III in 2014, only Mauritius and South Africa have implemented Basel II and are currently considering the adoption of Basel III regulations. Failure to do so may enhance risks, not least since it is only with Basel III that liquidity requirements are mandated, and also capital requirements increased.
- External factors such as macroeconomic and political instability have also been noted as major issues faced by African banks, consistent with the negative effect of real exchange rate depreciation on the ROAA and ROAE as found in this study

- The finding that the profit persistence of African banks is low may on the one hand be seen as a benefit as it entails a competitive market but on the other could entail risks as much of the literature on competition and risk in banking suggests “competition fragility” whereby intense competition entails risk taking that can lead to insolvency and banking crises
- High levels of liquidity and the result that liquidity has a frequently positive effect on profitability, exceeding levels elsewhere in the world, may reflect the high dependence of African banks on government debt as an asset - banks lend considerably to their respective governments. This situation leads to constrained bank liquidity that could affect the credit and liquidity risks of financial institutions in the region. It also crowds out lending to private firms and individuals. This may give rise to risks of adverse spirals if fiscal policy is too loose, as in the European debt crises of 2010-15.
- As regards policy suggestions, African central banks and governments are recommended to create conducive environments to promote financial inclusion and engage in effective supervision and minimise the adoption of unfavorable banking regulations such as the use of excessive reserve requirements. It may be desirable to reduce exposures of banks to the public sector. BCBS should also review the relevance of the current Basel III regulations to African banks. Central banks and governments in African countries can enhance stability for African banks by adopting appropriate macroprudential regulations to maintain macroeconomic stability

Further research

- Future research should examine the determinants of bank profitability using a wider range of countries from Africa.
- A quadratic in terms of bank size and non-interest income could be used to test whether an optimal size of African banks can be found.
- Examine and compare the determinants of bank profitability in African retail banks versus universal banks.
- Use the risk-adjusted measure of capital adequacy rather than the leverage ratio.
- Given evidence that business model of the banks has considerable effect on bank profitability (Mergaerts and Vander Vennet 2016), future studies should consider how the business model influences the bank profitability in Africa.

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