Diversification and Stability of African Banks

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The present study empirically examines whether banks operating within Africa concentrate or diversify their incomes and loan portfolios and how these decisions affect their stability. The present study uses Generalized Methods of Moments (GMM) as the econometric tool in carrying out the analysis. The study shows that banks in Africa are relatively stable and well diversified. However, income diversification strategies do not enhance banks' stability. Loan portfolio concentration guarantees a reduction in bank credit risk and boosts stability. Overall, loan portfolio concentration is therefore more important for stability than income diversification among banks in Africa.

Keywords: banks, diversification, Islamic, generalized methods of moments (gmm), Africa

INTRODUCTION

This study investigates whether banks operating within Africa focus or diversify their incomes and loan portfolios and how these decisions affect their stability. The motivation for this present study is in two-fold: First, in the seventies and eighties, the world recorded an unprecedented record of bank failures on a global scale (FDIC, 2016). Globally, these failures and financial crises have affected banks' stability. Nevertheless, in recent times banks have responded to these crises by adopting proactive diversification strategies either by growing the volume of non-interest income in profits or along the prudent management of loan portfolios of banks (Berger et al., 2010). Second, the past decades have witnessed a rapid movement of financial institutions around the world. The rapid movement of financial institutions has culminated into a gradual but noticeable liberalization of its financial sector. The liberalization and financial reforms are considered to have shifted the focus towards a greater diversity of products and services. Thus, African continent has not been spared of this paradigm shift hence the value relevance of diversification on banks' stability. The present study extends and contributes to the literature in a number of ways: First and foremost, using a worldwide data, Doumpos et al. (2016) established that banks operating in developing economies benefit more from diversification than the developed countries. This finding therefore merits an extensive examination, especially for banks operating in Africa which have been largely neglected in existing literature. Second, this work is singular in the sense that it uses 4,346

globally active banks with varied lines of business headquartered in 49 African countries from 2001 to 2017. The dataset is decomposed into conventional and Islamic banks and periods before and after the global financial crisis (GFC). The sample decompositions would allow better understanding of the channels by which diversification impact on banks' stability under changes in economic conditions. This is because while studies have shown that diversification affects conventional bank performance and credit risk (Vallascas et al., 2012), Islamic banks are found to be better able to withstand the onslaught of a major financial crisis than conventional banks (Tabash and Dhankar, 2014). These stands generate more interest in examining same using banks in Africa as the unit of analysis. Third, the focus on Africa was unhurried. Although banking environment in Africa is somewhat shallow, developments in the African banking industry provides an interesting background for such investigations. According to Nyantakyi et al, (2015), the continent has made progress in banking technology and is well controlled. Finally, following Edirisuriya et al. (2015) findings, the study extricates income and loan portfolio diversifications and investigates the impact of each type on banks' stability. This would help register which type of diversification profits banks the most. To our knowledge, this approach remains to be studied and investigated in an African frame of reference.

The remaining sections of the study are as follows: Section 2 focuses on the literature review and hypothesis development. Data and methodology are discussed in section 3. Empirical results of the study are presented in the next section. Section 5 concludes the study.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Theoretical Underpinning

The study situates the diversification and banks' stability nexus in four theories namely strategic focus, conglomeration theories, traditional banking theory and corporate finance theory. While two of the theories namely strategic focus and corporate finance theory do not support diversification, the remaining two i.e. conglomeration theories and traditional banking strongly reinforce firms' diversification. Strategic focus posits that the value of a firm is maximized when it concentrates on their core expertise and capability. Thus, diversification reduces performance (Berger and Ofek, 1995). Corporate finance theory stipulates that firms benefit more in terms of expertise development and comparative advantage when they specialize on their core activities (Stomper, 2006). Conversely, conglomeration theory contends that owing to risk-reduction, larger internal capital markets and scope economies diversification enhances and adds value to a firm (Teece, 1980). Traditional banking theory suggests that bank performance is enhanced when they diversify their loan portfolio along various economic sectors (Berger et al., 2010). These contradictory theories seem to demonstrate that there is a lack of linearity between diversification and stability. Few empirical studies have supported the fact that these theories are completely right for all banks.

Diversification and Stability in Conventional and Islamic Banks

According to Masruki et al. (2011) and Farook et al. (2014), Islamic banks have more stable operations though they are less profitable, as opposed to conventional banks. The high-rise in the value of conventional banks can be attributed to the higher transaction fees charged and more channels of external financing than those of Islamic banks. Additionally, conventional banks have a pre-fixed rate payment of interest, whereas Islamic banks are based on profit sharing. Liquidity in Islamic banks is higher, because of their lower variety of loans or financial products than conventional banks. A growing literature examines the effectiveness, risk and stability characteristics of Islamic in relations to conventional banks (Hassan and Aliyu, 2018). Beck et al., (2013) concur that Islamic banks are better capitalized and command asset quality as compared to conventional banks. Kabir et al., (2015) find that religious customers are more relationship oriented and this reduces risk since these customers have a lower probability of default. Islamic banks are found to be well balanced and more stable than conventional banks (Abedifar et al., 2013). Faye et al., (2013) find that Islamic banks have lower risk, unlike the conventional banks. In contrast, Kuran (2004) suggests that Islamic banks do not have any noticeable

advantages over conventional banks in their efficiency and stability. Gheeraert and Weill (2015) find that constraints on Islamic banking positively contribute to efficiency up to a point. Kabir et al., (2015) argue that Islamic banking that prohibits the use of derivatives for hedging through limited access to collateral and recovery problems (in the event of loan default) can weaken risk management techniques and promote instability.

Concentration, Diversification and Stability

In corporate finance literature, studies on the impact of concentration and diversification on bank stability command an extensive history but lack a comprehensive examination particularly in depository institutions. Even where such studies are found, findings have been mixed and inconclusive. Proponents of diversification suggest that diversified banks can benefit from leveraging managerial skills and abilities across products and geographic regions (Iskandar-Datta and McLaughlin, 2007). International and geographical diversifications offer more benefits to banks (Dahl and Logan, 2003; Buch et al., 2004). According to Stiroh and Rumble (2006), diversification positively affects stability. Brighi and Venturelli (2016) findings suggest that greater diversification decreases bank risk. In Argentina and Austra, Bebczuk and Galindo (2008) and Rossi et al (2009) empirically underpin the importance of the diversification to stability. On the contrary, other studies have also reported that sectoral loan concentration enhances banks' stability. A number of studies conducted in Italy, Brazil and Germany banking industries have found that sectoral loan portfolio concentration reduces bank credit risk (Tabak et al., 2011). Petersen and Rajan (1994) conclude that penetration into different sectors to reach a more diverse portfolio may imply considerable learning costs. Firms benefit more in terms of expertise development and comparative advantage when they specialize on their core activities (Stomper, 2004). Studies conducted in Italy, Brazil and Germany banking industries have found that sectoral loan portfolio concentration reduces bank credit risk (Tabak et al., 2011). Brunnermeier et al. (2012) suggest that banks which experience high levels of systemic risk often diversify more. Lepetit et al. (2008) draw a related outcome from their study. In Vietnamese banks, Batten and Vo (2016) indicate that intense diversification activities bring about a high level of risk. Overall, the reviewed literature on diversification remains intense in countries outside of Africa, leaving a void. The present study intends to fill this void in examining whether banks found within Africa focus or diversify their incomes and loan portfolio and how these choices affect their stability. Thus, the study hypothesizes the following links:

H₁: Income diversification is negatively related to banks' stability.

H₂: Loan portfolio diversification is negatively related to banks' stability.

DATA AND METHODOLOGY

Sample, Data Sources and Justification

The study employs unbalanced panel data spanning from 2001 to 2017. Employing a sample of conventional and Islamic banks, the study carefully selects and limits the sample to forty-nine (49) countries due to data limitations. However, these countries have unique characteristics and thus merit inclusion. The choice for the selection of these countries that forms a cohort for each cluster of the region is mainly because in recent times most of these countries have shown sustained economic growth (The World Bank, 2017). The data for both dependent and independent variables are carefully selected and retrieved from the databases of both Bankscope and World Bank Development Indicators from the period 2001 to 2017. Since Bankscope mostly covers all existing large banks, coverage for small banks is heterogeneous across countries, space and time. To deal with the possible selection biases, the study focuses on some criteria in determining sampled banks, and interpretations are carefully made. The final sample contains about 4,346 globally active banks. Dummy variables assuming the value 1 and 0 are introduced.

The study originally used 5,212 banks in Africa and applied the following restrictions:

(1) The study decomposed the data into conventional banks and Islamic banks

(2) Acquired, merged and collapsed banks are duly considered and excluded.

(3) Banks without the required data are eliminated.

After considering the above-mentioned restrictions, the study yields a usable sample of 4,346 banks observations spanning from 2001 to 2017. The justification for the restrictions and the selection of these variables are not far-fetched. First, products wise, Islamic banks and conventional banks appear to be similar but these entities diverge in terms of concept. The authors are compelled to decompose the dataset into conventional and Islamic banks because of their business modules. Furthermore, the banking sector in recent times has experienced a significant amount of mergers, takeovers and acquisition activities. Finally, the rationale for the inclusion of stability measures is based on the fact that these key ratios are commonly used by financial analysts in determining banks' stability.

Construction of Bank Diversification Measures

The study investigates diversification by using two traditional measures specifically Adjusted Hirschman-Herfindahl Index ($HHIadj$), Shannon entropy (SH_EN). In addition to the two traditional measures, one distance measure namely absolute distance (abs_DIST) is also employed. The diversification measures follow the works of Stiroh and Rumble (2006) and Delpachitra and Lester (2013) in estimating the Adjusted Hirschman-Herfindahl Index ($HHIadj$) for all the sample banks. The $HHIadj$ index would measure the relative value relevance of each part of net operating income in addition to non-interest income. Two income diversifications are measured as follows:

The net operating income is calculated as:

$$HHIadj\_{NOI} = 1 - [(NII/NOI)^2 + (NOI/NOI)^2] \tag{1}$$

where:

NOI = Net operating income (NII+NON)

NII = Net interest income for both banks

NON = Non-interest income for both banks

For non-financing income of banks, the study mimics the work of Lee et al., (2014) and is computed as:

$$HHIadj_{-NON} = 1 - [(FEE/NON)^2 + (TRAD/NON)^2 + (OTH/NON)^2] \tag{2}$$

where:

FEE = Fees and commission income

TRD = Trading income from foreign exchange transactions and trading securities

OTH = Other non-interest income

The possible value of the Herfindahl Index (HHI) ranges from $1/N$ to one, where N is the number of firms in the market. In a perfectly competitive market, HHI approaches zero. The closer the value to 1 (i.e., the higher the value), the more focused (i.e., less diversified) the bank is. Overall, a higher value of HHI implies a lesser diversification (more focused) of the bank. The Shannon Entropy (SH_EN) is a solid tool to measure changes of distributions at a given point of time. It is used to estimate industrial concentration. If SE is equal to 0, the loan portfolio is highly concentrated (the bank loans to only one industry). If SE equal to -In (n), the bank portfolio is perfectly diversified. The measure is estimated as:

$$SH\_EN = \sum_{i=1}^{s} - (Pi * \ln Pi) \tag{3}$$

In addition, the distance measure is used to estimate the divergence between a bank (r) and the benchmark (x) loan portfolios, thus larger values mean less diversification (Pfingsten and Rudolph, 2002). The absolute distance is measured as:

$$abs\_DIST = 1/2 \sum_{i=1}^{s} (rbti - X\,bti) \tag{4}$$

The values of the distance range between 0 and 1. Whereas 0 means perfect diversification and 1 means perfect specialization.

Model for Empirical Estimation

To estimate the relationship between diversification and banks' stability among banks in Africa, this section estimates the empirical models and the description of the variables employed in the study. The model mimics the empirical works of Hayden et al. (2006) and Adzobu et al (2017). The equation is specified below as follows:

$$STAB_{it} = \beta_0 + \beta_1 STAB_{it-1} + \beta_2 IDIV_{it} + \beta_3 LPDIV_{it} + \beta_4 X_{it} + \beta_5 M_{it} + \varepsilon_{it} \tag{5}$$

where $STAB_{it}$ is a vector containing measures of stability such as Z-score ($ZSCORE_{it}$) for firm i in time t and the non-performing loans ratio ($NPLR_{it}$) for firm i in time t; $IDIV_{it}$ is a vector of measures of income diversification for $HHIadj\_{NOI}$ and $HHIadj\_{NON}$; $LPDIV_{it}$ is a vector of measures of loan portfolio diversification measures for SH_EN and abs_DIST; X_{it} is a vector of bank-specific characteristics; M_{it} is a vector of macroeconomic variables; ε_{it} is the error term. The study also controls for the global financial crisis (CRISIS).

Description of Variables

From the study, whereas both Z-Score and NPL are used as dependent variables, the rest are employed as independent and control variables: bank size (SIZE), average bank growth (BGROWTH), cost-income ratio (COINR), deposits to total assets ratio (DEPTA), funding cost (FUNCOST), equity to total assets ratio (EQUITY), net loans to assets ratio (LOTA) and age of bank (AGE) Gross Domestic Product (GDP), inflation rate (INF), real interest rate (RIR) and global financial crisis (CRISIS). The variables are described as follows: Following the empirical works of Köhler (2014) and Amidu and Wolfe (2013), Z-Score as an accounting measure is captured as dependent variables to estimate banks' stability. The Z-Score is calculated as:

$$Z_{it} = (ROA_{it} + E/A_{it})/\sigma_{ROA_{it}} \tag{6}$$

where ROA is the return on assets, E/A_{it} is the shareholders' equity divided by total assets and $\sigma_{ROA_{it}}$ is the standard deviation of the return on assets. Studies have shown that this indicator has been used widely (see, e.g., Kabir et al., 2015; Altunbas et al., 2018). Non-performing loans: This ratio measures bank credit risk and the level of expected losses. It is calculated as a ratio of total impaired loans to net loans. A higher value of NPLR suggests a weak ability to manage credit risk (Abedifar et al., 2013). The summarized form of all internal and external variables regarding their measurement, hypotheses and their previous studies that justify their inclusion are presented in Table 1.

TABLE 1

DEFINITION, MEASUREMENT, HYPOTHESES AND REFERENCES

Variable	Definition	Measured by	References	Expected sign	Data source
Dependent variable					
Z-Score	The bank-level Z-score	$(ROA+E/A)/\square ROA$	Beck et al. (2013), and Abedifar, et al. (2013)	N/A	Authors' calculation
NPL	Non-performing loans	Impaired loans/Net loans	Fiordelisi et al. (2011) and Kabir et al. (2015)	N/A	Bankscope
Independent variable					
a. Diversification measures					
$HHIadj_{\_NOI}$ $HHIadj_{\_NON}$	Adjusted Herfindahl Hirschman Index (AHHI) for all banks	$HHIadj_{\_NOI} = 1-[(NII/NOI)^2+(NOI/NOI)^2]$ $HHIadj_{\_NON} = 1-[(FEE/NON)^2+(TRAD/NON)^2+(OTH/NON)^2]$	Delpachitta and Lester (2013), Goddard et al.(2008) and Stiroh and Rumble (2006)	(-,+)	Authors' calculation
SH-_EN	Shannon entropy	$SH\_EN = \sum_{i=1}^{s} - (Pi * \ln Pi)$	Meyer and Yeager (2001) Tabak et al. (2011) and Adzobu et al. (2017)	(-,+)	Authors' calculation
abs_DIST	Absolute distance	$abs\_DIST = 1/2 \sum_{i=1}^{s} (rbti - X\,bti)$	Tabak et al. (2011) and Adzobu et al. (2017)	(-,+)	Authors' calculation

Authors' compilation (2019)

TABLE 1
DEFINITION, MEASUREMENT, HYPOTHESES AND REFERENCES (CON'T)

Independent variables	Definition	Measured by	References	Expected sign	Data source
b. Bank specific variables					
EQUITY	Capital adequacy	Total equity/total assets	Stiroh and Rumble (2006) Chiorazzo et al. (2008) Stiroh (2004) and Lepetit et al. (2008).	+	Bankscope
SIZE	Bank size	Natural logarithm of total assets	Lee et al. (2014)	+	Bankscope
BG	Bank growth	Annual change in total assets		(-,+)	Authors' calculation
LOTA	Net loans to assets ratio	Net loans/assets		-	Bankscope
DTA	The deposit-to-total assets ratio	Deposit/total assets	Wagner (2005)	+	Bankscope
CIR	Cost income ratio	Total operating cost/total operating income	Abedifar et al. (2013)	-	Bankscope
FUNCOST	Funding cost	Interest expenses/ Average interest-bearing liabilities	Dietrich and Wanzenri (2014)	-	Bankscope
AGE	Age	Years in operation for all banks		+	Bankscope
Crisis	Crisis dummy	Before crisis takes the value of 0 and years during and after the crisis take a value of 1		N/A	Authors' calculation
c. Macroeconomic variables					
GDP	GDP growth	Gross domestic product growth		+	World Economic Indicators
INF	Inflation	Percentage change in the Consumer Price Index		-	World Economic Indicators
RIR	Real interest rate	Real interest rate = nominal interest rate – inflation rate.		(-,+)	World Economic Indicators

Authors' compilation (2019)

Estimation Technique

The present study uses Arellano and Bond (1991) first-differenced Generalized Methods of Moments (Diff-GMM) as the econometric tool in carrying out the analysis. This is justifiable since it allows testing for convergence in bank stability. Due to the dynamic nature of our model, least squares estimation methods provide biased and inconsistent estimates (Baltagi, 2001). However, this potentially creates endogeneity as the lagged dependent variable corresponds with the error term. There could also be a reverse flow of effect among bank growth, equity and stability, which could also create endogeneity. For instance, García-Herrero et al. (2009) report that high-performance banks may be more likely to raise equity more effortlessly through profit retention. The causality could also go in the opposite direction since more stable banks are capable of attracting investment and equity. Since stable banks are less risky, they are able to inspire confidence in their customers for them to readily subscribe to new services that are introduced by the bank, thus, fostering diversification. As per its modus operandi, the Dif –GMM deploy lagged values of the dependent and independent variables as instruments. The estimated model inculcates a one-period lag of bank stability as an independent variable. Our initial analysis showed that bank stability measures are not persistent and significantly demonstrate no inertia, thus, eliminating the use of the System GMM which is useful in the presence of a persistent time series. Using a one period lag of profitability measures, the study conducts both Sargan and Hansen tests of over-identifying restrictions to assess the validity of our internal instruments. That is, to test whether there are at least as many instruments as endogenous explanatory variables in the model. Failure to reject the null of valid overidentifying restrictions would mean all instruments are valid and GMM estimates are consistent. Our estimates are therefore consistent and could be interpreted as causal relationships. In order to make sure there is no second order autocorrelation in the estimation, the endogenous variable is instrumented using levels lagged by two years periods. Arellano and Bond (1991) further explain that the consistency of Diff-GMM estimator depends on the premise that second-order serial correlation is not exhibited in the error terms and that only valid instruments are used (also Blundell and Bond, 1998). Thus, Arellano-Bond test for second-order autocorrelation is done to attest to the validity, consistency and appropriateness of the data. If the null hypothesis of no second-order autocorrelation cannot be rejected, our Diff-GMM is consistent. To ensure that there is no second order autocorrelation in the estimated model, the endogenous variable is instrumented by employing its two-year-lagged values.

EMPIRICAL RESULTS

Descriptive Statistics

Table 2 presents the descriptive statistics for diversification measures and banks' stability. In terms of stability, generally, banks in Africa are stable. Whereas the Islamic banks show a Z-Score of 0.954 and NPLR of 0.036, conventional banks record a Z-Score value of 4.131 and NPLR of 1.760 respectively. The results, therefore, show that Islamic banks in terms of the pecking order are less stable than the conventional banks. This result finds support in previous studies (See Naceur et al., 2011; Rajhi and Hassairi (2013). For diversification measures and as rule of thumb, the closer the value to 1 (i.e., the higher the value), the more focused (i.e., less diversified) the bank is. From Table 2, banks in Africa are relatively well diversified in terms of income. This result, therefore, demonstrates that banks in Africa do not generate income only through the traditional sources but a mix of both the traditional (interest income) and non-traditional (non-interest income) sources. When the data is decomposed into conventional and Islamic banks, results do not show any variations regarding the income diversification. This implies that both conventional and Islamic banks are fairly well diversified. In relation to loan portfolio diversification measures, the two indicators employed confirm a perfect specialization. Thus, banks in Africa averagely lend to one industry or experience high loan concentration level. This position is further supported by Tabak et al (2011) who posits that the credit portfolio of banks in Brazil is moderately concentrated. The summary statistics for bank-specific characteristics and macroeconomic variables are presented in Table 3. In terms of bank size, both conventional and Islamic banks represent 13% and 13% respectively. This seems to imply that these banks are not different when it comes to the

allocation of loans to businesses. Bank growth which is measured as an annual change in total assets shows a figure of -41% and -3% for conventional and Islamic banks. These values confirm that bank growth is not rapid in Africa, hence diversification opportunities are not enhanced. Cost-interest rate used as a proxy for management efficiency, the study records average values of 66% and 64% for both conventional and Islamic banks respectively. These results indicate that management of banks in Africa are relatively inefficient in managing resources. Apart from deposit to total assets, similar results are recorded by the study.

TABLE 2
SUMMARY STATISTICS FOR BANK STABILITY, INCOME DIVERSIFICATION AND LOAN PORTFOLIO DIVERSIFICATION VARIABLES

Variable	Stability		Income Diversification		Loan Portfolio Diversification		Macroeconomic controls		
	Z-SCORE	NPLR	$HHIadj_{NOI}$	$HHIadj_{NON}$	SH_EN	abs_DIST	logGDP	INFL	RIR
All Banks									
Obs	5,778	5,778	5,778	5,778	5,778	5,778	5,778	5,778	5,778
Mean	4.342	0.082	0.371	0.321	0.123	0.927	23.445	11.044	7.468
Std. Dev	5.037	1.467	0.056	0.054	1.556	3.783	1.380	36.444	11.879
Min	0.780	-3.946	0.000	0.122	-90.443	0.110	19.879	-9.798	-28.402
Max	7.903	54.000	0.500	0.500	36.988	74.736	26.460	728.666	252.115
Conventional Banks									
Obs	5,608	5,608	5,608	5,608	5,608	5,608			
Mean	4.131	1.760	0.372	0.324	0.124	0.947			
Std. Dev	5.011	0.457	0.057	0.051	1.612	3.679			
Min	0.720	-3.946	0.000	0.122	-90.443	0.110			
Max	7.300	27.49997	0.500	0.500	36.988	74.736			
Islamic Banks									
Obs	170	170	170	170	170	170			
Mean	0.954	0.036	0.372	0.312	0.135	1.810			
Std. Dev	1.235	7.880	0.064	0.063	0.458	4.057			
Min	0.086	-0.045	0.049	0.245	-0.832	0.369			
Max	1.836	54.000	0.500	0.466	2.982	14.970			

Notes: The stability variables are decomposed into Z-Score and NPL. $HHIadj_{NOI}$, Hirschman-Herfindahl Index (net operating income); $HHIadj_{NON}$ Hirschman-Herfindahl Index (non-interest income); SH_EN, Shannon entropy; abs_DIST, absolute distance; logGDP, gross domestic product; INFL, inflation; RIR, real interest rate.
Source: Author's estimate (2019)

TABLE 3

SUMMARY STATISTICS FOR BANK-SPECIFIC CHARACTERISTICS AND MACROECONOMIC VARIABLES

Variable	Bank Characteristics							
	SIZE	BGROWTH	COINR	DEPTA	FUNCOST	EQUITY	LOTA	AGE
All Banks								
Obs	5,778	5,766	5,774	5,778	5,767	5,778	5,777	5,770
Mean	12.554	-41.203	65.769	47.174	4.484	14.482	0.438	29.701
Std. Dev	1.029	492.197	49.128	1,508.591	14.239	14.344	0.157	28.363
Min	3.179	-15,545.340	0.373	0.000	-7.920	-208.910	0.000	0.000
Max	18.658	1.000	933.333	74,468.590	875.350	100.000	1.050	181.000
Conventional Banks								
Obs	5,608	5,597	5,604	5,608	5,598	5,608	5,607	5,600
Mean	12.680	-41.260	65.923	48.592	4.473	14.373	0.428	29.564
Std. Dev	1.858	500.229	49.547	1532.134	14.450	14.383	0.193	28.310
Min	3.179	-15545.340	0.373	0.000	-7.920	-208.910	0.000	0.000
Max	18.658	1.000	933.333	74468.590	875.350	100.000	1.050	181.000
Islamic Banks								
Obs	170	169	170	170	169	170	170	170
Mean	12.621	-2.947	64.321	2.535	4.146	18.201	0.590	33.638
Std. Dev	1.558	11.175	37.636	4.344	3.728	14.106	0.147	26.883
Min	9.164	-75.615	23.288	0.000	0.210	1.700	0.119	0.000
Max	15.472	0.992	372.090	19.273	41.930	69.780	0.955	146.000

Notes: SIZE, bank size; BGROWTH, bank growth; COINR, cost to interest rate; DEPTA, deposit to total assets; FUNCOST, funding cost; EQUITY, equity to total asset; LOTA, net loans to total assets; AGE, bank age.
Source: Author's estimate (2019)

Estimation Results

To examine the impact of diversification on the stability of banks in Africa, Table 4 reports estimates from our Diff-GMM. The Arellano-Bond test is carried out in all models and the null of no second-order autocorrelation is not rejected, thus, confirming the absence of second-order autocorrelation. Additionally, both the Hansen and Sargan probabilities confirm the validity of the instruments used by failing to reject the null hypotheses of valid overidentifying restrictions. In other words, all the Hansen and Sargan probabilities exceed 0.05, hence there is ample evidence that the internal instruments used appropriately and all estimates are robust. The study, therefore, avoids estimating the model with the two variables concurrently used. Further, it also adopts a log-log estimation approach for all estimations. This approach has the advantage of the coefficients being interpreted as elasticities. In all estimations, the included lagged-values of the measures of banks' stability are positive but statistically not different from zero. This provides evidence that there is no convergence in stability among banks in Africa.

TABLE 4
INCOME DIVERSIFICATION, LOAN PORTFOLIO DIVERSIFICATION AND BANK STABILITY

VARIABLES	Model 1 NPLR	Model 2 NPLR	Model 3 NPLR	Model 4 NPLR	Model 5 ZSCORE	Model 6 ZSCORE	Model 7 ZSCORE	Model 8 ZSCORE
L.NPLR	0.0123	0.0130	0.0124	0.0130				
	(0.0119)	(0.0120)	(0.0119)	(0.0120)				
L.ZSCORE					0.0142	0.0140	0.0176	0.0172
					(0.0216)	(0.0192)	(0.0224)	(0.0200)
adjHHI_NOI	-0.0060**	-0.0041			0.0173	0.0197		
	(0.0029)	(0.0030)			(0.0254)	(0.0269)		
adjHHI_NON			-0.0101**	-0.0097			-0.0107	-0.0050
			(0.0048)	-0.0065			(0.0487)	(0.0468)
SH_EN		-0.0097***		-0.0092***		0.0943**		0.0918**
		(0.0012)		(0.0013)		(0.0433)		(0.0448)
abs_DIST		-0.0021**		-0.002**		0.0286**		0.0289**
		(0.0009)		(0.0009)		(0.0143)		(0.0143)
SIZE	-0.0004	-0.0009	-0.0004	-0.0009	-0.0011	-0.0130	-0.0023	-0.0141
	(0.0014)	(0.0010)	(0.0014)	(0.0009)	(0.0136)	(0.0110)	(0.0139)	(0.0111)
BGROWTH	0.0009	0.0007	0.0005	0.0007	0.0004	0.0146	-0.0058	0.0116
	(0.0017)	(0.0013)	(0.0021)	(0.0012)	(0.0196)	(0.0192)	(0.0211)	(0.0201)
COINR	-0.0010	-0.0002	-0.0032	-0.0014	-0.0368	-0.0191	-0.0611	-0.0278
	(0.0024)	(0.0018)	(0.0029)	(0.0021)	(0.0404)	(0.0321)	(0.0399)	(0.0309)
DEPTA	0.0017	0.0012	0.0017	0.0014	0.0085	0.0119	0.0054	0.0109
	(0.0016)	(0.0012)	(0.0017)	(0.0012)	(0.0226)	(0.0191)	(0.0216)	(0.0189)
FUNCOST	0.0080*	0.0099***	0.0071*	0.0090***	0.0944	0.0463	0.0701	0.0351
	(0.0045)	(0.0034)	(0.0039)	(0.0032)	(0.0892)	(0.0924)	(0.0813)	(0.0886)
EQUITY	-0.1302***	-0.1318***	-0.1295***	-0.1345***	0.2018***	0.1988***	0.2039***	0.2064***
	(0.0312)	(0.0374)	(0.0326)	(0.0360)	(0.0711)	(0.0667)	(0.0686)	(0.0664)
LOTA	0.0040	0.0105**	0.0029	0.0087	-0.1133	0.0651	-0.1357	0.0480
	(0.0066)	(0.0053)	(0.0089)	(0.0059)	(0.1098)	(0.0736)	(0.0968)	(0.0685)
AGE	-0.0030**	-0.0012	-0.0039**	-0.0021	-0.0279	-0.0328*	-0.0307	-0.0327*
	(0.0012)	(0.0011)	(0.0015)	(0.0016)	(0.0216)	(0.0179)	(0.0213)	(0.0177)
GDP	-0.0011*	-0.0011**	-0.0009	-0.0012**	-0.0096	-0.0016	-0.0085	0.0016
	(0.0006)	(0.0005)	(0.0006)	(0.0005)	(0.0118)	(0.0095)	(0.0120)	(0.0093)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
INFL	0.0040*	0.0060***	0.0041*	0.0060***	-0.0388	-0.0121	-0.0432	-0.0206
	(0.0021)	(0.0015)	(0.0021)	(0.0019)	(0.0417)	(0.0320)	(0.0409)	(0.0307)
RIR	0.0187***	0.0135***	0.0186***	0.0144***	-0.0333	0.0120	-0.0252	0.0211
	(0.0057)	(0.0033)	(0.0051)	(0.0035)	(0.0785)	(0.0487)	(0.0718)	(0.0475)
CRISIS	-0.0035***	-0.0033**	-0.0035***	-0.0034**	0.0304*	0.0388**	0.0326**	0.0397***
	(0.0011)	(0.0014)	(0.0011)	(0.0014)	(0.0174)	(0.0155)	(0.0160)	(0.0151)
Constant	2.1742***	2.2313***	2.1864***	2.2419***	8.6761***	7.8431***	8.8224***	7.7928***
	(0.1642)	(0.1886)	(0.1781)	(0.1850)	(0.6255)	(0.5646)	(0.6206)	(0.5569)
Sargan (Prob)	[0.988]	[0.828]	[0.923]	[0.946]	[0.827]	[0.845]	[0.839]	[0.811]
Hansen (Prob)	[0.481]	[0.433]	[0.595]	[0.767]	[0.325]	[0.987]	[0.436]	[0.989]
AR1 (Prob)	[0.003]	[0.003]	[0.003]	[0.003]	[0.000]	[0.000]	[0.000]	[0.000]
AR2 (Prob)	[0.126]	[0.165]	[0.125]	[0.142]	[0.821]	[0.745]	[0.896]	[0.789]
Difference-in-Hansen	[0.319]	[0.668]	[0.443]	[0.607]	[0.136]	[0.367]	[0.328]	[0.469]
Observations	3,461	3,461	3,462	3,462	3,461	3,461	3,462	3,462
Number of banks	598	598	598	598	598	598	598	598

Robust standard errors in parentheses; Prob. values in square brackets. *** p<0.01, ** p<0.05, * p<0.1

Source: Author's estimate (2019)

The Relationship Between Diversification and Stability

Table 4 presents the empirical findings of the study. The coefficient of the $HHIadj_{NON}$ and $HHIadj_{NOI}$ are negative and significant at 5 percent in model 1 and 3. This suggest that a high income diversification significantly leads to an increase in NPLR. Thus, income diversification is not beneficial for banks in Africa. This therefore implies that bank stability in Africa is not enhanced by income diversification strategies. This result is consistent with some previous studies (See Abuzayed et al., 2018; Chiorazzo et al., 2008; Lee et al., 2014b). Maudos (2017) also concludes for European banks, a rise in the share of non-interest income increases bank risk (instability). The result contradicts other findings that confirm that income diversification benefits banks if diversified activities are inherently less risky (See Nisar et al., 2015; Stiroh and Rumble, 2006). Ahamed (2017) concludes that an increased share of non-interest income increases the profitability and risk-adjusted profitability (stability) of Indian banks. The study further observes that both measures of income diversification lose their statistical significance when loan portfolio diversification measures are added. As shown in Table 4 when NPLR is used, the coefficient of SH_EN and abs_DIST are negative in models 2 and 4 respectively. This means an increase in loan portfolio concentration reduces NPLR. Thus, banks' stability is enhanced. However, a positive relationship of SH_EN and abs_DIST are reported in model 6 and 8 respectively when Z-Score is used as dependent variable. This result indicates that sectoral loan focus or specialization by banks operating in Africa positively affects their stability. This relationship provides evidence that sectoral loan concentration warrants a reduction in bank credit risk and boosts stability. This may suggests that continuously concentrating loan portfolio on one sector potentially improves loan quality and further strengthens the stability of banks. The implication could be that banks in Africa do have the required expertise to monitor these loans. The result is consistent with other works (See, Tabak et al., 2011). Overall, loan portfolio concentration is therefore more important for stability than income diversification among banks in Africa. Funding cost positively affect NPLR, implying a reduction in stability. Specifically, a 1 percent increase in FUNCOST leads to about 0.009 percent reduction in stability in our preferred estimation at the 1 percent level of significance. This means that stability is not enhanced when cost of funding is high. In all four models with Z-Score as the dependent variable, EQUITY has a consistent positive coefficient. At the 1 percent significance level, a percentage increase in equity leads to a 0.2 percent increase in Z-Score. EQUITY has a stable and robust effect on Z-Score among banks in Africa. This indicates that a higher equity level improves banks' stability. A similar relationship is recorded when NPLR is used as a dependent variable; the negative coefficient of EQUITY in models 1, 2, 3 and 4 confirm that highly capitalized banks have less NPLR and are more stable. AGE used as a proxy for market experience reduces NPLR in models 1 and 3, at a 5 percent significance level. However, when loan portfolio diversification measures are added, its effect on bank stability becomes insignificant. Again, the first 4 models of Table 4 provide evidence that INF and RIR increase credit risks, and thus, reduce stability while GDPG increase stability.

Conventional Banks Vrs. Islamic Banks

Table 5, further presents results when diversification and banks' stability nexus is examined under banks' types and their orientations. The sample is grouped into conventional and Islamic banks to estimate the full specification of equation (5). Identification strategy is apt and all post-estimation tests show that estimates are consistent and instruments are appropriately deployed to tackle any potential endogeneity. It is worthy to note that income diversification strategies do not affect banks' stability when banks in Africa are decomposed into conventional and Islamic banks. Interestingly, diversification in terms of loan portfolio significantly affects banks' stability although varied. Overall, when banks in Africa are grouped into conventional and Islamic banks (operational orientation), impacts are diverse. While loan portfolio concentration enhances stability among conventional banks, it reduces stability among Islamic banks. Surprisingly, apart from BGROWTH which increases NPLR and thus, reduces stability, other bank-specific and macroeconomic characteristics are insignificant in explaining stability for Islamic banks. For conventional banks, FUNCOST, EQUITY, AGE, GDP, INFL and RIR appear to

have significant relationship with stability with the signs and direction similar to those found in the overall sample. It is relevant to note that periods after the global financial crisis, conventional banks in Africa are more stable, compared to periods before the crisis. However, among Islamic banks, there is no difference in stability in the periods before and after the crisis. This result is consistent with Abuzayed et al. (2018). Abuzayed et al. (2018) conclude that conventional banks appear to be more adversely impacted on the risk side than Islamic bank.

TABLE 5
INCOME DIVERSIFICATION, LOAN PORTFOLIO DIVERSIFICATION AND BANK STABILITY
(ISLAMIC VS CONVENTIONAL BANKS)

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
		Islamic Banks				Conventional Banks		
	NPLR	NPLR	ZSCORE	ZSCORE	NPLR	NPLR	ZSCORE	ZSCORE
L.NPLR	-0.0014	-0.0011			0.0257	0.0259		
	(0.0024)	(0.0031)			(0.0197)	(0.0196)		
L.ZSCORE			0.0804	0.0000			0.0083	0.0126
			(1.5064)	(0.0000)			(0.0193)	(0.0200)
adjHHI_NOI	-0.0018		0.1746		-0.0039		0.0218	
	(0.0117)		(0.5798)		(0.0031)		(0.0261)	
adjHHI_NON		-0.0083		0.2702		-0.0085		-0.0013
		(0.0080)		(4.9864)		(0.0062)		(0.0491)
SH_EN	-0.0076	-0.0212	0.016	0.0212	-0.0098***	-0.0094***	0.1046**	0.1004**
	(0.0093)	(0.0147)	(0.091)	(0.0174)	(0.0014)	(0.0016)	(0.0418)	(0.0441)
abs_DIST	0.0024**	0.0025*	-0.0012	-0.0323	0.0007	0.0005	0.0387**	0.0375*
	(0.0011)	(0.0013)	(0.1049)	(0.0174)	(0.0012)	(0.0013)	(0.0172)	(0.0171)
SIZE	-0.0019	-0.0004	-0.0158	-0.0642	-0.0005	-0.0006	-0.0117	-0.0136
	(0.0018)	(0.0030)	(0.9789)	(2.2626)	(0.0010)	(0.0009)	(0.0116)	(0.0115)
BGROWTH	0.1733***	0.1699***	0.4654	0.5741	0.0005	0.0003	0.0154	0.0113
	(0.0106)	(0.0140)	(3.7612)	(6.2239)	(0.0015)	(0.0014)	(0.0183)	(0.0196)
COINR	-0.0057	-0.0068	0.0435	-0.0927	-0.0000	-0.0009	-0.0090	-0.0210
	(0.0065)	(0.0150)	(1.5556)	(3.8802)	(0.0019)	(0.0022)	(0.0283)	(0.0293)
DEPTA	0.0007	0.0003	0.0507	0.0942	0.0009	0.0011	0.0116	0.0098
	(0.0034)	(0.0064)	(0.5326)	(2.2137)	(0.0013)	(0.0013)	(0.0190)	(0.0186)
FUNCOST	-0.0103	-0.0006	0.2435	0.2475	0.0089***	0.0085**	0.0478	0.0367
	(0.0099)	(0.0158)	(2.0776)	(5.6304)	(0.0034)	(0.0034)	(0.0927)	(0.0885)
EQUITY	0.0042	0.0062	0.0036	0.0054	-0.1273***	-0.1293***	0.1976***	0.2001***
	(0.0217)	(0.0317)	(0.0080)	(0.0063)	(0.0408)	(0.0404)	(0.0687)	(0.0666)
LOTA	0.0057	-0.0041	-0.0918	-0.5273	0.0065	0.0026	0.0911	0.0517
	(0.0184)	(0.0304)	(2.1267)	(10.6363)	(0.0055)	(0.0066)	(0.0816)	(0.0771)
AGE	-0.0001	-0.0025	-0.0286	0.0166	-0.0014	-0.0020	-0.0388**	-0.0354**
	(0.0031)	(0.0030)	(0.4186)	(1.5324)	(0.0012)	(0.0012)	(0.0178)	(0.0174)

GDP	0.0007	-0.0001	0.0933	0.1322	-0.0009*	-0.0011**	0.0011	0.0043
	(0.0031)	(0.0048)	(0.4646)	(1.8844)	(0.0005)	(0.0005)	(0.0092)	(0.0091)
INFL	-0.0053	-0.0036	-0.0637	-0.0693	0.0057***	0.0048***	-0.0088	-0.0219
	(0.0061)	(0.0097)	(1.1774)	(3.7684)	(0.0015)	(0.0019)	(0.0309)	(0.0301)
RIR	-0.0039	-0.0027	0.4771	0.5089	0.0145***	0.0144***	0.0046	0.0143
	(0.0130)	(0.0169)	(4.0772)	(6.4058)	(0.0038)	(0.0040)	(0.0492)	(0.0457)
CRISIS	0.0040	0.0017	0.0603	0.0493	-0.0030**	-0.0032**	0.0392**	0.0415***
	(0.0024)	(0.0063)	(0.2872)	(0.4626)	(0.0013)	(0.0014)	(0.0160)	(0.0155)
Constant	2.6473***	2.4360***	7.4378***	7.2786***	2.1902***	2.2040***	7.7551***	7.7708***
	(0.3650)	(0.2860)	(0.4376)	(0.3746)	(0.2101)	(0.2079)	(0.5525)	(0.5573)
Sargan (Prob)	[0.477]	[0.584]	[0.369]	[0.405]	[0.936]	[0.897]	[0.843]	[0.750]
Hansen (Prob)	[0.674]	[0.636]	[0.973]	[0.695]	[0.858]	[0.837]	[0.899]	[0.882]
AR1 (Prob)	[0.008]	[0.012]	[0.000]	[0.000]	[0.004]	[0.004]	[0.000]	[0.000]
AR2 (Prob)	[0.825]	[0.875]	[0.698]	[0.938]	[0.152]	[0.130]	[0.681]	[0.756]
Difference-in-Hansen	[0.738]	[0.665]	[0.202]	[0.782]	[0.641]	[0.672]	[0.294]	[0.192]
Observations	104	104	104	104	3,357	3,358	3,357	3,358
Number of banks	42	42	42	42	557	557	557	557

Robust standard errors in parentheses; Prob. values in square brackets. *** p<0.01, ** p<0.05, * p<0.1

Source: Author's estimate (2019)

CONCLUSION

This study investigates whether banks operating within Africa focus or diversify their incomes and loan portfolios and how these decisions affect their stability. The present study uses Arellano and Bond (1991) first-differenced Generalized Methods of Moments (Diff-GMM) as the econometric tool in carrying out the analysis. The study shows while banks in Africa are relatively stable, Islamic banks are less stable. In terms of income, banks in Africa are relatively well diversified. However, income diversification strategies do not enhance banks' stability. Sectoral loan focus or specialization by banks operating in Africa positively affects their stability. Thus, sectoral loan concentration guarantees a reduction in bank credit risk and boosts stability. Overall, Loan portfolio concentration is therefore more important for stability than income diversification among banks in Africa. When banks in Africa are grouped into conventional and Islamic banks (operational orientation), impacts are diversed. While loan portfolio concentration enhances stability among conventional banks, it reduces stability among Islamic banks. It is relevant to note that periods after the global financial crisis, conventional banks in Africa are more stable, compared to periods before the crisis. However, among Islamic banks, there is no difference in stability in the periods before and after the crisis. Finally, while the result invalidates strategic focus and corporate finance theory, conglomeration and traditional banking theories are validated but somewhat bidirectional in nature.

From the results of the study, the study recommends the following strategic managerial and policy implications:

Managerial Implications

The results of this study have some policy implications for the central banks and other regulators. From the result of the study, although banks in Africa are stable, Islamic banks especially must endeavor to make more investment in risk management mechanism to improve credit quality. Second, the study reveals that banks in Africa are well diversified. Nevertheless, bank stability in Africa is not enhanced by income diversification strategies. This means income diversification appears to threaten the survival of banks in Africa. This adds to the call for management of these banks to rather concentrate or focus on their traditional sources of income. Besides, in terms of loan portfolio diversification, the study validates perfect specialization for banks in Africa. Thus, banks in Africa should averagely lend to one industry or experience high loan concentration level. The variation of the effects when different stability measures are employed should be a concern for investors and financial analyst who invest in Africa.

Policy Implication

The inclusion of the global financial crisis should provide some useful lessons to policymakers, governments and regulators. The recent global financial crisis has shed more light on banks' stability and bank in Africa are not exempted. Findings from the study confirmed after the global financial crises, banks in Africa are more stable. Policy makers and governments should institute measures to consolidate the gains and protect these banks against an onslaught of foreign influences.

Limitation and Future Research

The results are based on 4,346 banks in Africa from 2001 to 2017. However, this does not invalidates the general outcome of the study. Therefore, including more banks amid normal and recession cycles surely deserve attention in future research.

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