



Nexus between Insider Loans, Loan Quality and Fragility among Banks in Kenya

*Bwire C. O. Albert, Tenai K. Joel and Odunga M. Robert

Department of Accounting and Finance, School of Business and Economics, Moi University, P.O Box 3900-30100, Eldoret, Kenya

Corresponding author's email Address: bwirealberto@yahoo.com

Abstract

The aim of the study was to assess the ex-ante predictive ability of Insider loans and Loan quality on fragility among banks in Kenya. Methodology: The study utilised a sample of thirty (30) Commercial Banks with at least five (5) years data for period 2010-2014 before the fragility events of 2015-2016. Data was collected from Central Bank of Kenya. Findings: The lagged dependent variable had significant predictive ability on bank fragility. Insider loan's ability was not statistically significant inconsistent with findings by Central Bank of Kenya Inspection reports. The loan quality variable was not statistically significant. Using Generalised Linear regression model, lagged dependent variable had $\beta=0.91$, z-statistics 8.46, $p>z = 0.000$; loan quality had $\beta=-0.05$, z-statistic -1.20 with $p>z=0.229$, while insider loans had $\beta=0.39$, z-statistics of 1.84, $p>z=0.065$. At 95% level the lagged dependent variable could explain bank fragility in Kenya. Implications for Research: Most studies in Kenya show ex-post that insider loans are a problem. The study did not however, find evidence that insider loans could predict fragility ex-ante. There is need for continued development of new matrix to identify how insider loans can be useful ex-ante in early warning studies. Due to sophistication of Commercial banking business, loan quality as a measure of dependence on loans had less predictive ability. Policy makers should focus more on additional metrics utilising the non-performing loans as lagged bank fragility variable had good predictive ability. Originality: The study contributes to early warning interventions in bank fragility predicated upon the notion that disruptive instability in banking is cyclic in nature and that bank fragility has negative impact on social-economic welfare of citizens.

Keywords: Loan quality, Insider loans, Bank fragility, Early Warning System

INTRODUCTION

The quality of a Commercial Bank's financial performance can be measured by how much the institution relies on interest income. Institutions that rely on interest income show evidence of non-diversification which can be perilous to their health. Directors, management and staff borrow funds to implement their own projects. Such insider loans to connected parties can be at preferential terms to the detriment of depositors. Banks are major players in Kenya's financial system and therefore a stable banking industry contributes to economic development and is consistent with government's national development goals of poverty reduction and employment creation. The behaviour of management has an impact on financial health; therefore, the study is anchored on agency cost theory. The discussion section will show the influence of lagged dependent variable, loan quality and insider loans on fragility among commercial banks in Kenya.

General Objective

Investigate the effect of impaired loans, loan quality and insider loans on bank fragility.

Statement of the problem

Bank fragility manifests in the industry when the level of non-performing loans to total loans exceeds 10% Cihak and Schaeck (2010). Bank distress stems from systemic banking crisis and bank fragility. Bank distress in Kenya is a cyclic problem with consequences on the economy. Kenya's banking problems are grouped into three episodes, 1984-1989 identified by Brownbridge (1996) and 1993-1997, 2000-2003 as argued by Daumont, Gall and Leroux (2004). During the latest episode of bank instability 2015-2016, three commercial banks were distressed leading to economic disruptions of these banks' debtors and creditors businesses.

Research Hypotheses

H₀₁: Lagged bank fragility has statistically no significant influence on bank fragility

H₀₂: Loan quality has statistically no significant influence on bank fragility

H₀₃: Insider loans have statistically no significant influence on bank fragility

Significance of the Study

Bank fragility can be costly to bank stakeholders. It is due to this socio-economic impact that efforts must be expended to minimise fragility in the sector. The study aimed at finding the effect of lagged bank fragility variable, loan quality and insider loans on bank fragility in Kenya. Loan quality measures the level of diversification by a bank, while insider loans show the use of depositors' funds by bank insiders. On the other hand, there was need to understand the effect of lagged dependent variable on fragility. This study contributes to early warning signal in bank fragility and should interest researchers, managers in commercial banks and regulators.

Scope of the Study

The study period was 2010-2014 after the bank instabilities of 1993-2006. The study focused on lagged bank fragility, loan quality and insider loans to offer direction on future bank regulation. The paper is organised as follows; section two reviews the literature, section three is the methodology while section four focuses on diagnostic tests and results. Section five discusses the results while section six, seven and eight discuss policy implications, conclusion and areas for future research.

LITERATURE REVIEW

Bank fragility

Bank distress follows from bank fragility. Bank fragility occurs if the level of non-performing loans to total loans is greater than 10% Cihak et al., (2010). Kenya has had periodic bank distress events with the first being 1984 -1989 according to Brownbridge (1996), this was followed by 1993-1997 and 2000-2003 episodes as discussed by Daumont, Gall and Leroux (2004). During the period 2015-2016, Dubai Bank, Imperial Bank of Kenya and Chase Bank of Kenya Ltd were closed according to Central Bank of Kenya Bank Supervision Department Annual Report, 2017.

The causes of bank fragility are diverse, Bernanke (1983); Kaufmann (1988); Wheelock & Wilson (2000) find that USA bank distress of 1920s were caused by severe problems in the agricultural sector due to natural causes upon which many small rural banks foundered; a clear case of minimal sectoral and agricultural diversification. Corruption, fraud and violations of laws have also been found to cause bank distress. Alston, Groove & Wheelock (1994); Kaufmann (1988); Chijoriga (1999) and Aharony & Swary (1983) point out that fraud is a cause of bank distress. Alston et al., (1994)

aver that fraud becomes rampant when bankers conceal detection of malpractice. Prevention of fraud and other internal causes would limit failure even in bad times. Fraud becomes pronounced during bad times, because in bad times absorption of losses or concealment of fraud becomes difficult because profit can no longer cover financial impropriety. However, Aharony et al., find that bank distress due to specific or unique factors to the institution such as fraud or internal irregularities have no contagious effect.

Wheelock et al., (2000) argue that diversification would have helped limit distress in the US due to sectoral shocks. In a study conducted in Tanzania by Chijoriga (1999) it was affirmed that concentration on a few borrowers or group of borrowers created a fertile ground for possibility of failure, the same applies to concentration on a few depositors.

Insider loans have been found to cause bank failure. Kenn-Ndubuisi & Akani (2015) and Babajide, Olokoyo & Folasade (2015) show that insider loans or gross insider abuses are a cause of bank closures. Insiders are able to abuse the system due to information asymmetry and their ability to conceal loans to their family, related companies and themselves. Therefore, excessive loans to enterprises in which officers are interested, direct loans to officers for speculative purposes can cause bank distress.

Alvarez-Franco & Restrepo-Tobon (2016), state that banks with low quality loans are likely to fail. They measure the low-quality loans using non-performing loans and loan loss provisions. Shaffer (2012) finds that higher expenses and non performing loans contribute to the risk of distress. Kenn –Ndubuisi et al., (2015); Frolov (2006) and Babajide et al., (2015) find poor credit base, credit quality and poor asset quality as causes of bank failure.

According to DeYoung & Torna (2013), declining net interest income leads banks into risky businesses in order to generate non interest income. These risky businesses elevate the leverage of the bank and non bank institution. Such risky business is the non-traditional banking activities which DeYoung et al., (2013) aver have economically meaningful effects on the probability of bank distress. They also find that income from non traditional banking activities can be quite volatile leading to volatile income by the banks.

Theoretical Framework

The agency cost theory is fundamental to the soundness of the banking system.

Agency Cost Theory

Jensen (1986), shows that managers have incentives to cause firms to grow beyond optimal size. This growth is normally in the managers' interest as growth increases their power because of the resources they control. Besides, growth of the firm is positively related to changes in compensation in managers interests rather than shareholders.

With positive growth, bank management can still plead bad luck when outcomes are poor according to Heffernan (2009). Ang, Cole & Lin (2000) aver that when managers own less than 100 per cent of the firm's equity, shareholders incur costs emanating from management shirking and perquisites consumption. Arnould (1985) argues that managers seek goals that deviate from those of the owners and especially where ownership of the firm is dispersed enough to put control in the hands of management.

Heffernan (2009) argues that in the process of aligning their interest's officers create suboptimal credits which when expectations are good lead to good profits but when the expectations are negative lead to bank failure. According to Heffernan (2009) banks act as principal and debtors as agents; the debtors who are borrowers are expected to operate in the bank interests, invest in positive net present value and eventually pay back their loans. However due to information asymmetry, debtors maximize their interests as they know more than the bank about their projects. This is part of the reason for poor quality of loan portfolio. Heffernan (2009) elucidates the next agency problem, in which depositors act as principal and banks as agents. Depositors entrust banks to utilise their savings in a manner the deposits will be repayable on demand or notice, however, banks in an effort to make profits may lend to debtors who turn out to be bad credits thereby impacting the depositor's funds. In such case depositors may not recover 100% of their deposits. It is those who are fully covered by the deposit insurance who receive their funds in full, the rest may have to wait for realisation of bank assets and recovery of loans before they are paid.

The agents possess more information than the principals and will grow the loan portfolio knowing well that their remuneration will be measured by the bank performance. The rapid growth of loans may well be as a result of self-lending to management and staff and associates of commercial banks. Such lending to insider is normally at preferential terms and for own projects. Such lending may have undesirable consequence on the quality of the loan portfolio.

Non-Performing Loans

Demirguc-Kunt (1989), Whalen (1991) assert asset quality can predict bank instability. According to Fofack (2005) accumulation of impaired loans can precipitate a banking crisis. Non-performing loans normally constitute a sizeable percentage of total assets of distressed financial institutions. Fofack adduces evidence to show the banking crises that affected most sub-Saharan African countries was precipitated by huge level of nonperforming loans. Boudriga, Taktak & Jellouli (2009) state that the aggregate rate of NPL is a frequently used measure of bank soundness. Further they aver that NPLs are a major problem for international and local regulators, though aggregate NPLs exhibit wide disparities between countries. Some countries suffer severely with NPL rates greater than fifteen (15%) percent.

Insider Loans

Brownbridge (1998) finds insider loans a contributing factor to impaired loans. He states that the single biggest contributor to bad debts of the failed banks in Kenya, Nigeria, Uganda and Zambia was insider lending which accounted for 65% of the total loans of four banks liquidated in Nigeria in 1995, and almost half of the loan portfolio of a bank taken over by Bank of Uganda. Thomson (1991) argues that insider loans can act as a proxy for management risk, which manifests in form of fraud and or insider abuse. Insiders take advantage of asset price booms to self-lend and derive the benefits but when projects deviate from expected the risks are borne by depositors. This is partly the reason prohibitions have been imposed to ensure that facilities to insiders are limited to owners' capital component and therefore limit the level of depositors' funds that may be misapplied by directors, management and staff and their related associates.

Loan Quality

According to DeYoung et al. (2013) the most traditional source of bank income is net interest income. As net interest income increases the probability of bank fragility declines. Poor loan quality can lead to declining interest income because interest on impaired assets is not recognised as income. Besides, an increase in interest expense

means sources of bank deposit or loan capital are expensive and this undermines the quality of interest income. Banks perform intermediation function, therefore efficiency in performance of this function is a pointer to effectiveness Clancy & Zhao (1999). Troubled banking institutions pay higher interest rates in order to attract deposits as the markets recognise the risk and earn lower returns on loans due to the high level of impaired loan assets.

Logan (2001) advises management to diversify bank income streams to include fees and commission, and trading income to reduce overreliance on loan derived income. Logan's advise is in contrast to arguments by DeYoung et al., (2013) who provide evidence that non-traditional banking activities have a significant influence on chances of bank instability. Dependency on net interest income is a pointer to lack of functional diversification that could lead to distress. Jin, Kanagaretnam & Lobo (2018) find net interest margin as a key performance measure of a bank's lending business. Variability of net interest margin may signal volatile bank performance showing a riskier strategy by the bank may lead to more uncertain interest margin with a negative impact on solvency.

METHODOLOGY

The population for the study was thirty (30) Commercial banks excluding foreign owned banks, Islamic banks and banks with less than 5-years data. The research philosophy adopted was epistemology, which according to Saunders, Lewis & Thornbill (2009) relates to the development of knowledge and the nature of that knowledge and underpinned by positivism which Bryman (2012) states that it advocates the application of natural sciences to study social reality and beyond. According to Smith, Thorpe & Jackson (2012), with positivism, hypothesis can be derived from existing theory and literature, data collected, analysed and tested to either accept or reject the hypotheses.

Model Specification

Multiple regression analysis was considered ideal in establishing if the variables could predict fragility. The generalised linear regression model was specified as follows:

$$g(E(Y|X_1, X_2, \dots X_p)) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where X_1, X_2, X_3 represent the independent variables $lagbf_{t-1}, lq_{it}$ and il_{it}

$\beta_1 \dots \beta_3$ = Coefficient of independent variables

$X_1 = Ybf_{t-1}$ = lagged dependent variable

$X_2 = il$ = Insider Loans

$X_3 = lq$ = Loan Quality

Table 1: Variable Measurement

Variables	Researcher(s)	Measures
Bank fragility	Shen & Chen (2008) and Cihak & Schaeck (2010)	Gross Non-Performing Loans Total loans
Loan quality ratio	Calomiris & Mason (2003)	Net Interest Income Total Income
Insider Loans ratio	Thomson, J. B. (1991)	Total Insider Loans Total Assets

Source: Author, 2021

Bank fragility

Cihak and Schaeck (2010) argued that if a bank's asset quality declines due to an increase in NPL as a ratio of total loans and breaches the 10% level, that could be indicative of banking turmoil. Shehzad, Haan & Scholtens (2010) while discussing the impact of ownership concentration on impaired loans and capital adequacy used impaired loans as a proportion of total loans and risk weighted capital adequacy as dependent variables. They stated that gross non-performing loans to total loans was a standard proxy for bank asset risk. Galil, Samuel & Shapir (2018) state that the higher the ratio of NPL to total loans the poorer the quality of the loan portfolio and can trigger financial problems and accelerate bank fragility. Dimitrios, Helen & Mike (2016) concur with the above conclusion and state that bank insolvency arises from deterioration in asset quality over time. Jing & Fang (2018) conclude that it is important to predict bank distress to enable regulatory authorities to take timely action and reduce the costs associated with resolving distress. Boudriga, Taktak & Jellouli (2009) argued that fragility indicators above 15% cause severe damage. The variable was found appropriate as a dependent variable of the study following the empirical review of literature.

Loan Quality

Galil et al., (2018), Altman et al., (2016) employ net interest margin to total assets as an explanatory variable to measure earnings. The ratio shows the income the bank earned on assets during the period. When expressed as a ratio of total income, it measures dependency on loans as a source of income.

Insider Loans

Loans to directors, management and staff and their associates can be a source of fraud, bank instability or misuse of fiduciary responsibility. Commercial banks have a duty to invest depositors' funds responsibly. Brownbridge (1998), Thomson (1991) find insider abuse a significant factor in bank failure. According to Thomson it is a proxy for management risk.

Lagged Dependent Variable

Gujarati et al., (2009) states that autoregressive and distributed lag models are used extensively in economic analysis. Autoregressive models show the path of the dependent variable in relation to its past. The reasons for lags include psychological reasons as a result of habits which do not change immediately, technological reasons where imperfect knowledge accounts for lags and also institutional factors contribute to lags, in case of contracts it may switch to alternative easily.

Iftikhar (2015) utilised lagged dependent variable of the relationship between impaired loans to gross loans and found financial weaknesses of the previous year have an impact on the current year. Flannery & Hankins (2013), Iftikhar (2015) and Baltagi (2005) state that dynamic relationships are characterised by the presence of a lagged dependent variable among the explanatory variables.

Diagnostic Tests and Regression results

Table 2: Shapiro-Wilk W test for normality

Variable	Obs	W	V	z	Prob>z
bf	150	0.67496	37.820	8.236	0.00000
lagbf1	120	0.72676	26.293	7.325	0.00000
lq	150	0.96489	4.086	3.191	0.00071
il	150	0.76482	27.364	7.502	0.00000

Source: Research Data, 2021

The H_0 assumes data is normally distributed. At 95% level if the values are greater than 0.05, it is assumed data is normally distributed. The results show $p > z = 0.00$ the null hypothesis that data was normal was rejected. . There was evidence of non-normality for all the variables. This violated classical linear regression model assumption.

Tests of heteroscedasticity

White's test for H_0 : homoskedasticity

against H_a : unrestricted heteroskedasticity

$\chi^2(9) = 32.52$

Prob > $\chi^2 = 0.0002$

Table 3: Cameron & Trivedi's decomposition of IM-test

Source	χ^2	df	p
Heteroskedasticity	32.52	9	0.0002
Skewness	10.21	3	0.0169
Kurtosis	1.62	1	0.2026
Total	44.36	13	0.0000

Source: Research Data, 2021

The null hypothesis stated that data had constant variance. The $\chi^2=32.52$, prob > $\chi^2 = 0.00$, p-value $0.0002 < 0.05$ at 95% level implied the data was heteroscedastic. The null hypothesis was therefore rejected.

Table 4: Multicollinearity test

Variable	VIF	1/VIF
lagbf1	1.60	0.626175
il	1.42	0.706286
lq	1.22	0.821468
Mean VIF	1.41	

Source: Research Data, 2021

The multicollinearity test confirmed the data was devoid of serious collinearity. The presence of multicollinearity normally leads to inaccurate estimates of the slopes. Ott & Longnecker (2010) indicate that the variance inflation factor of 1 shows no collinearity at all, VIF of 10 would mean serious collinearity problem. The multicollinearity test $VIF < 10$, $1/VIF > 0.1$ and therefore multicollinearity was not a problem.

Stationarity test

Table 5: Harris-Tzavalis unit-root test

rho	0.6701	1.9119	0.9721	Bank fragility
rho	-0.2744	-8.7040	0.0000	Loan quality
rho	-0.2130	-8.0134	0.0000	Insider loans
rho	0.1347	-2.5130	0.0060	Lagged bank fragility

Source: Research Data, 2021

Stationarity of data is important in regression analysis in order to avoid spurious correlation. The null hypothesis that the data contains unit root was rejected and

therefore concluded that the data was stationary for loan quality, insider loans and lagged bank fragility variable. The null hypothesis $p > 0.05$ means data contains units root, however if $p < 0.05$ then data is stationary. The bank fragility variable $0.9721 > 0.05$ shows evidence of unit root, while the independent variables $p < 0.05$ are stationary.

Table 6: Correlation matrix

	bf	lagbf1	lq	il
bf	1.0000			
lagbf1	0.8948*	1.0000		
	0.0000			
lq	-0.3032*	-0.3403*	1.0000	
	0.0002	0.0001		
il	0.4747*	0.4897*	0.0519	1.0000
	0.0000	0.0000	0.5282	

Source: Research Data, 2021

The correlation matrix shows lagged dependent variable was significantly correlated with the dependent variable with correlation of 0.89, and significant at 95% level, $0.00 < 0.05$ while loan quality variable had significant negative correlation with bank fragility and lagged bank fragility of -0.30 and -0.34 at 95% level. Insider loans were significantly correlated with bank fragility and lagged bank fragility with correlation of 0.48 and 0.49 respectively. The loan quality and insider loans had insignificant correlation at 95% with correlation of 0.05 with $0.53 > 0.05$. There was no evidence of high correlation between the independent variables.

Descriptive Statistical Analysis

The data collection and variable computation was conducted using Microsoft Excel before exporting to Stata statistics/Data Analysis package for data analysis. The mean for the dependent and independent variables of the study were highlighted and discussed in view of the literature reviewed.

Table 7: Summary of Industry Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
bf	150	.1015994	.1138603	.0105613	.7940975
lagbf1	120	.0983025	.1039462	.0105613	.6784101
lq	150	.4323862	.1109743	.0128168	.6212121
il	150	.0361422	.026284	.0027605	.1838235

Source: Research Data, 2021

The mean bank fragility variable for the period 2010-2014 was 10.15%. Bongini, Claessens and Ferri (2000) indicate that politics, regulatory capture and forbearance have a role in dealing with financial crisis. Fofack (2005) reports NPL/total loans in sub-Saharan Africa reached 32% in 1993, and 25 % during the 1997 Asian financial crisis. The level of Kenya's bank fragility variable was at crisis level with mean of 10.15% and maximum for the period at 79.40%. This was a clear indicator of a weak banking system.

If mean loan quality ratio is high, this may be indicative of dependence on interest income. The industry average was 43.23% with maximum for the period of 62.12%, this shows less dependency on interest income as a source of revenue for some

Commercial Banks in Kenya. It also points at the structure of deposit and Loans in the Commercial banks' businesses. Alvarez-Franco et al., find that loan quality is a significant predictor of bank survival. It is in this light they argued that banks that are dependent on interest income exhibit lack of diversification and likely to be distressed.

The mean insider loans level was 3.6% with maximum of 18.38%. The variable was low signifying some level of stability and therefore not a problem in the industry. However, Central Bank of Kenya findings show, the failure of Chase Bank Ltd was partly attributable to insider loans due to falsified records of actual insider loans.

Regression Results

Bishara and Hittner (2015) assert non-normality of data is common. Osborne (2011) argues against transformation of data in case of non-normality due to complexity created. Consequently, the researcher used generalised linear model as described in table 8.

Table 8: Generalised linear model

Generalized linear models		No. of obs	=	120
Optimization : ML		Residual df	=	116
		Scale parameter	=	.0025426
Deviance	= .294944184	(1/df) Deviance	=	.0025426
Pearson	= .294944184	(1/df) Pearson	=	.0025426
Variance function: V(u) = 1		[Gaussian]		
Link function : g(u) = u		[Identity]		
		AIC	=	-3.103917
Log pseudolikelihood = 190.2350294		BIC	=	-555.0541

bf	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
lagbf1	.9083527	.1074292	8.46	0.000	.6977952	1.11891
lq	-.0510519	.0424598	-1.20	0.229	-.1342716	.0321677
il	.3936065	.2135309	1.84	0.065	-.0249064	.8121193
_cons	.0157996	.023665	0.67	0.504	-.0305829	.0621822

Source: Research Data, 2021

The lagged bank fragility $\beta=0.91$, $z=8.46$ and p-value $0.00 < 0.05$. An increase in lagged dependent variable increases overall bank fragility. Such positive relationship means that there is a correlation between the non-performing loans level now with the previous period NPLs. The loan quality variable had $\beta=-0.05$, $z=-1.20$ and p-value $0.23 > 0.05$. Loan quality had a negative relationship which means, as loan quality level declines chances of fragility increases. High percentage of loan quality ratio indicates a dependency syndrome on interest income pointing at lack of diversification. The insider loans variable had $\beta=0.39$, $z=1.84$ and p-value $0.07 > 0.05$. Insider loans are positively related to fragility. As insider loans ratio increases bank fragility too increases. This indicates, insider loans can be a source of instability partly because of their preferential terms.

DISCUSSION

In this study a total of seven banks had NPL/Gross loans above 25%. Of the seven banks, Dubai bank had NPL/Total loans ratio at 79.4% the highest for these banks. The other six had the ratio ranging from 25.9% to 36.4%. The six remain operational but with varying degrees of financial performance. The level of loan quality above 51% which means over-reliance on interest income had a total of eleven banks with the ratio

ranging from 54% to 62%. It is noteworthy that the large banks in Kenya had high loan quality ratios. Though, it is argued that large banks tend to be well diversified, the evidence shows the large banks still derive most of their income from loans. The level of insider loans as a ratio of total assets ranged between 0.2% and 18.38% considered low. However, evidence from Central Bank of Kenya shows part of the reason Chase Bank entered distress was creative accounting of insider loans on its balance sheet.

The regression results highlight the stickiness of non-performing loans in bank fragility. The previous period NPLs impact future NPLs and the health of the bank. The lagged dependent variable had a major impact on the bank instability $\beta=0.91$, $z=8.46$ and $p > z = 0.00$. The variable positively impacts bank fragility. An increase in the lagged dependent variable increases bank fragility. With respect to Insider loans, the regression results are near the borderline with $\beta= 0.39$, $z = 1.84$, $p > z = 0.07$. The variable is positively related to bank fragility, a declining insider level has minimal effect on fragility while an increasing insider level could lead to fragility. Though insignificant, the 2015-2016 bank instability was among other factors caused by fraudulent application of insider loans. The loan quality variable had $\beta= -0.05$, $z= -1.20$ and $p > z = 0.23$, negative and insignificant. A declining loan quality increases bank fragility. Kenyan banks exhibit mixed loan quality signals with large banks showing dependence on interest income.

The results of this study confirm agency cost theory, where insider loans are treated as perquisites. Insiders utilise these funds for their investments. Such loans generate interest income however they also peril the banks in case of down-turn in investment fortunes.

Bank fragility has been a problem in Kenya since mid 1980s when the first banks to encounter financial weaknesses were closed. There is evidence of weak banks but of which the regulatory authorities have allowed to operate or have been provided financial assistance by government. The maximum level of loan quality for some banks was above 50%, maximum insider loans above 18% and fragility indicator above 10% for the period of study 2010-2014.

H_{01} : There is no statistically significant influence by lagged bank fragility on bank fragility. The hypothesis was rejected $p>z=0.00$ less than 0.05, meaning the variable was a significant contributor to fragility.

H_{02} : There is no statistically significant influence by loan quality on bank fragility. The hypothesis could not be rejected, $p>z = 0.23$ greater than 0.05. The variable had insignificant contribution.

H_{03} : There is no statistically significant influence by insider loans on bank fragility. The hypothesis could not be rejected $p > z = 0.07$ greater than 0.05.

Policy Implications

The impact of non-performing loans on the financial health of banks in Kenya is confirmed. The lagged dependent variable of non- performing loans as a ratio of total loans shows that the NPL in the previous year tends to have influence on subsequent years. Since high NPLs are associated with instability, policy makers should impose limitations on banks with NPLs to total loans greater than 10%. Two, policy makers should institute measures in the banking industry to ensure NPLs to total loans in the industry progressively falls well below 10%.

CONCLUSION

The study found loan quality and insider loans statistically insignificant in explaining bank fragility. However, the lagged dependent variable was statistically significant. The researcher therefore recommends new measures for insider loans as a predictor of bank fragility to help in ex-ante predictions. The Loan quality variable should be measured against total loans to indicate the income generating ability of loans and the predictive ability. Regulatory authorities should expand the measure of non-performing loans as they are better predictors of fragility.

Future Research

Regulatory authorities should design new metrics to measure insider loans and loan quality. It seems banks have reduced reliance on Loans, yet NPL remains a good predictor of fragility. Find out why insider loans seem to be discovered ex-post, and what new measures can be designed to measure the variable. Further research should also examine the relationship between non-performing loans and other bank variables apart from loans. A comparative analysis of bank fragility before and after the instability events of 2015-2016 should be of interest.

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