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The Nexus between Financial Inclusion and Financial Stability

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Abstract

This paper investigates the nexus between bank-based financial inclusion and asset quality of 43 Banks in Kenya using data from 2001 and 2015. Based on a Dynamic Panel (System) GMM employed to investigate the empirical interactions between growth in outstanding bank credit, deposit growth and asset quality, we find that lagged credit growth has a positive significant effect on the NPL Ratio, causing a decrease in asset quality. There is a negative significant contemporaneous relationship between deposit growth and the NPL Ratio; indicating higher stability with higher deposit levels. Increase in the NPL Ratio is also seen to have a negative contemporaneous effect on credit growth, an indication of immediate supply side reactions from banks when a decrease in asset quality is observed. The findings in this paper have important policy implications for both banks and regulators, more so, highlighting the need for policies aimed, not only at management of prudential risks, but at reducing informational asymmetries between banks and borrowers, and promoting alternative platforms providing access to financial services in Kenya.

JEL Classification: *C23, E44, G10, G20*

Keywords: *Banks, Asset Quality, Credit Growth, Panel GMM*

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1.0 Introduction

1.1 Background of the Study

Financial inclusion and financial stability are policy actions high on the agenda of both local and international policy makers. As a growing economy, Kenya identifies financial inclusion as an important precursor to investment and economic growth.

According to The World Bank (2017) financial inclusion means that *"individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way".* The Committee on Financial Inclusion, defines it as *"the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost".*

The importance of financial inclusion is based on the principle of inclusive growth with stability of the financial system. This has brought on a renewed interest of policy makers since monitoring stability is a key objective for both monetary and fiscal authorities. A stable and efficient financial system underpins the intermediation process necessary for inclusion, propelled by access to need-based financial services (Kamau, 2011). According to Liu & Quiet (2015), periods of financial stress may lead to a reduction in the aggregate provision of financial services such as lending to the real economy which in turn could have a negative effect on financial inclusion. As such, considerable emphasis needs to be placed on the magnitude and efficiency of the intermediation process carried out by banks, being that any adversities to the above could be detrimental to the financial inclusion agenda.

Financial stability has become a fleeting concept to define on the notion that it is easier to define instability. Even so, the European Central Bank

(2017) defines financial stability as simply *"state whereby the build-up of systemic risk is prevented"*, where systemic risk is considered *"as the risk that the provision of necessary financial products and services by the financial system will be impaired to a point where economic growth and welfare may be materially affected"*. The definition portrays a financial system comprising of financial intermediaries, markets, and market infrastructure that is capable of withstanding shocks and the unravelling of financial balances, thereby mitigating the likelihood of disruptions in the financial intermediation process.

Reviews such as that by Khan (2011) from the Reserve Bank of India, postulate that the global market developments in recent years have ensured that the pursuit of financial inclusion and the pursuit of financial stability are no longer policy options but policy compulsions. The two must co-exist. There has been marked progress towards greater financial inclusion; in Africa, a telco firm (Safaricom) in Kenya has pioneered inclusion through mobile phone payment solutions. Latin American countries such as Peru and Bolivia have also put in place some friendly and enabling regulatory environments for microfinance, bolstering rapid growth over the past seven years to include six million clients in the formal financial system. However, recent market crises have raised a world-wide concern that an exceptionally rapid growth in financial inclusion, as seen in the subprime mortgage crisis in the United States and the India Microfinance Sector Crisis in 2010, could eventually lead to a surge in loan losses.

At the same time, there may be important latent synergies between inclusion and stability. Earlier studies, such as Keeton (1999) suggested the view that *"faster loan growth leads to higher loan losses"* should not be dismissed lightly; *"but neither should it be accepted without question"*. This is further underscored by the school of thought which supports the alternate view that financial inclusion could promote financial stability through diversification effects on financial sector balance sheet[1]. At a country level, Prasad (2010) suggests that financial inclusion can lead to greater efficiency of financial intermediation (e.g., via intermediation of greater amounts of domestic savings, leading to the strengthening of sound domestic savings and investment cycles and thereby greater stability). As such, achieving joint financial inclusion and financial stability requires exploitation of the synergies and trade-offs between the two.

1.2. Motivation of the Study

In light of the above, this study seeks to investigate the empirical relationship between savings and credit access, representing financial inclusion, and stability, illustrating the interaction between the financial sector outcomes and, eventually, the policy outcomes that could stem from these interactions. The empirical analysis carried out in this study is

1. Diversification promotes stability through expanding financial asset base and expansion deposits on financial liability side

motivated by the need to unravel how efficient bank intermediation affects and is affected by the push for financial inclusion. The study, in its choice of variables analysed, holds that the sufficient condition for financial inclusion is contact to financial institutions by the households and firms, thus providing either enhanced savings through their deposit accounts or credit access, through issuance of loans and advances by Kenyan banks.

This mutually supportive relationship between financial inclusion and financial stability can be explored and theoretically supported in consideration of the direct and indirect links: financial inclusion leads to a diversified funding base for banks, diversified loan base, greater income equality and financial stability at the household level. However, according to Rahman (2014), it must be the "right type" of inclusion. This is also suggested by the World Bank's Global Financial Development Report (2017) that states *"for inclusion to have positive effects, it needs to be achieved responsibly".* As much as the number of deposit accounts posits "inclusion", creating many bank accounts that lie dormant is useless. The report states that *"while inclusion has important benefits, the policy objective cannot be inclusion for inclusion's sake, and the goal certainly cannot be to make everybody borrow".*

The results from this study are intended have important policy implications; according to Han & Melecky (2013), policy makers face *"trade-offs when deciding whether to focus on reforms to promote financial development (financial inclusion, innovation, competition, etc.) or whether to focus on further improvements in financial stability (micro-prudential, macroprudential, business conduct supervision, etc.)".* The Kenyan Financial System is widely domintaed by banks and as such, the recognition that financial inclusion could either improve or exacerbate stability of banks needs to be considered in light of the ambiguous feedback between the two agenda. Such policies need to be formulated in view of the systemic risk and the realisable synergies of achieving certain goals.

1.3. Financial Stability in Kenya

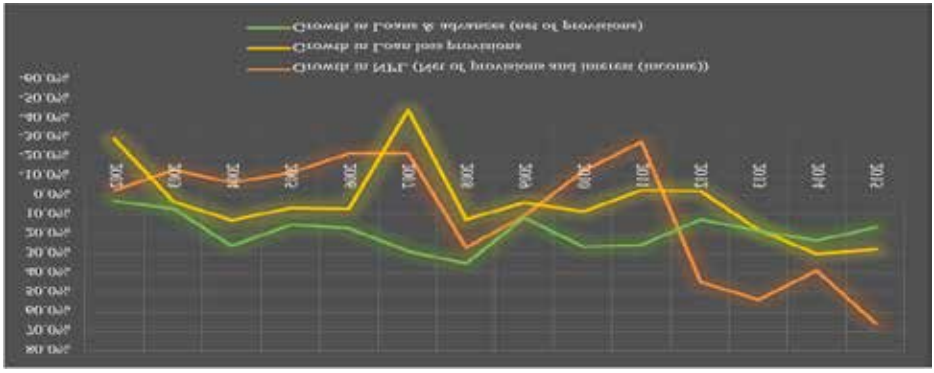
The Central Bank of Kenya uses the Basel Committee of Banking Supervision and International Monetary Fund-defined Financial Soundness Indicators (FSIs) to monitor and evaluate the performance of financial institutions. Financial Soundness Indicators (FSIs) comprise of a set of indicators that measure the health of a country's financial system. As Basel III was implemented, the definitions of the original capital-based FSIs provided by IMF in 2006 were reviewed and eventually revised to comply with the new regulatory framework (International Monetary Fund, 2013). Basel III redefined the elements to be included in total regulatory capital, placing a greater emphasis on common equity. In particular, the instruments included in Tier 1 and Tier 2 capital and the general definition of total regulatory capital were amended.

The IMF FSI Framework comprises 12 core and 14

encouraged FSIs for deposit takers, some of which include; Regulatory capital to risk-weighted assets (core), Regulatory Tier 1 capital to risk-weighted assets (core), Capital to assets, Nonperforming loans net of provisions to capital (core), Return on assets, Non-performing loans to total gross loans, Sectoral distribution of loans to total loans (core), Foreign-currency-denominated loans to total loans, etc. The choice of indicators of financial stability in this study, given the myriad of options available, is influenced largely by empirical literature on financial stability, with the most common indicator being Asset Quality, specifically measured as a ratio of non-performing loans (NPLs) to total gross loans. This FSI is intended to compare the potential impact on capital of NPLs, net of provisions. Provided that there is appropriate recognition of NPLs, this ratio can provide an indication of the capacity of bank capital to withstand NPL-related losses. In principle, the evolution of all these indicators should indicate potential vulnerabilities of the financial sector and point out possible weaknesses, thereby functioning as tools of macroeconomic policy (Navajas & Thegeya, 2013)

Currently, the banking sector in Kenya has 43 commercial banks, 1 mortgage company, 4 representative offices of foreign banks, 6 Deposit-Taking Microfinance Institutions (DTMs), 118 Forex Bureaus and 2 Credit Reference Bureaus (CRBs). In 2015, two banks were placed under receivership in August and October 2015, of which one was subsequently placed under liquidation. As the two banks did not pose a systemic threat, this limited spill-overs to the rest of the industry. A third bank was briefly placed in receivership in the first half of 2016, but reopened again under new management. Figure 2 below shows trends of non-performing loans, loan loss provisions and loans and advances to customers from 2002 to 2015.

Figure 2: Annual Trends in Non-Performing Loans, Loan Loss Provisions & Loans and Advances



Source: ThinkBusiness, Banking Survey 2016

The periods 2012 and end of 2015 were characterised by fluctuations in loans advanced, and rises in NPLs. These were periods with sharp rise in interest rates, exchange rate depreciation, and liquidity squeeze in the markets. Fluctuations in growth rates during the last quarter of 2015 and first half of 2016 is attributed to placement of three banks under receivership by CBK, and the subsequent reopening of one of the banks.

From figure 3 above, it is clear that Kenyan banks continue to rely heavily on interest income as evidenced by the increasing trend of interest income as a share of total income. The risk associated with such an income structure is that an increase in non-performing loans would greatly affect bank profitability and stability. An increase in income from non-interest generating activities would help mitigate their exposure to non-performing loans.

Figure 3: Income Structure (2006-2015, Millions of KShs.)

Source: ThinkBusiness, Banking Survey 2016

2. Literature Review

The empirical literature on the nexus between financial inclusion and financial stability is thin, and especially so in developing economies. This section highlights the insights in the area, from conference proceedings, speeches and empirical studies carried out in the area. There is a noted conflict in the views on the relationship between the two agenda.

2.1. Financial Inclusion and Financial Stability: Two Sides of the Same coin?

Ghosh (2008) suggests that financial inclusion has the potential to pose risks to the stability of the financial system. A study by Hannig & Jansen (2010) suggests that this is because financial inclusion changes the composition of the financial system with regard to the transactions, the clients and the risk profile. Hadad (2010) asserts that financial inclusion is usually linked to poverty alleviation. However, it has a strong link to financial stability as well. The author argues that financial inclusion is one of the states of financial stability and is a consequence of a well-functioning financial intermediation process. Other benefits of functioning financial intermediation suggested by Hadad (2010) include financial depth, sustainable financial infrastructure and institutions and positive contribution to economic growth.

Thorat (2010), argues that financial inclusion is not at cross-purposes with prudential regulation. Inclusion brings in a large number of clients, a diversified base both on the assets and liabilities and contributes to stability of financial institutions. This can be achieved without the provision of direct subsidies, if there is space for innovation, with adequate consumer protection. Cull et al. (2012) pointed out distinct ways in which financial inclusion is related to financial stability. The authors argue that small savers, in their large numbers, potentially contribute to stability of the financial system level through strengthened domestic savings and investment cycles.

An address by Amando Tentangco, the Governor of the Central Bank of Philippines, summed up the intricate nexus between financial inclusion and financial stability as part of his keynote remarks for the session on *"Financial Stability and Financial Inclusion"*. He suggests that, the link between reducing exclusion and increasing instability – may not be unique making it difficult to be precise. He considers two possibilities; financial inclusion will likely increase information asymmetries especially given that the access of new agents and use of information is not the same as those in the mainstream market. Second, the "tailor fitting" of guidelines following inclusion policies may create an "unintended imbalance" in incentives. This becomes a point of arbitrage, if not market pressure. Tetangco further suggests that as an empirical issue, it becomes an issue of contagion, more specifically, assessing the degree to which financial inclusion numbers affect bank asset portfolios, something which will differ across jurisdictions.

Empirical studies on the nexus between financial stability and financial inclusion have been carried out by Han and Melecky (2013) who find in a study across 95 countries that a 10% increase in access to deposits can reduce the withdrawal rate for deposits in stress times on average by approximately 3 to 8 percentage points, thus increasing financial stability. Their study sought to examine the link between the broader access to bank deposits prior to the 2008 crisis and the dynamics of bank deposit growth during the crisis. Using proxies to capture the access to deposits and the use of bank deposits, the study finds that greater access to bank deposits improves bank stability by making the deposit funding base of banks more resilient in times of financial stress. Mehrotra and Yetman (2014) posit that financial stability can enhance trust in the financial system, improving financial inclusion and the likelihood that households save. A more recent study by Morgan and Pontines (2014) suggests that an increase in the share of lending to small and medium-sized enterprises (SMEs) aids financial stability, mainly by reducing non-performing loans (NPLs) and the probability of default by financial institutions. It also suggests that policy measures to increase financial inclusion, at least by SMEs, will have the side-benefit of contributing to financial stability.

Mehrotra and Yetman (2015) further suggest that financial stability may depend on how the improvements in financial inclusion are achieved. There could be challenges if increased financial access is the result of rapid credit growth or if relatively unregulated parts of the financial system grow quickly. Also, increased financial inclusion tends to change the behaviour of consumers and firms, which could pose challenges for central banks in terms of the effectiveness of monetary policy transmission. Within the limitations of country level data, the IMF has related financial inclusion with a number of macroeconomic outcomes, including economic growth, stability and equality An analysis by Sahay et al. (2015) suggests that financial inclusion can be positively related to these outcomes but that the relationship may depend on factors such the level

of per capita income or quality of the regulatory environment.

2.2. Financial Regulation for Financial Inclusion and Financial Stability

The Global Financial Crisis of 2007 highlighted the importance of the role played by regulation in the possible trade-off between financial inclusion and financial stability. Striking a proper balance between the two has become an important compulsion for financial regulators.

On the positive side, increased savers provide a more stable source of funding for banks, and the associated risk of small savers is especially smaller, compared to large borrowers, who exhibit fat tail risks. However, the deterioration of lending standards as witnessed during the Financial Crisis could increase systemic risk requiring the design of appropriate frameworks for supervision and regulation. The work done by Hyman Minsky notes that that periods of economic prosperity tend to give way to financial fragility as banks tend to lower their credit standards. In their research, Hannig and Jensen (2010) indicate the role played by financial regulation in the interaction between financial inclusion and stability. They suggest that as much as financial inclusion has limited importance for systemic risk where small savers are involved, such transactions place substantial strain on supervisory resources.

According to Cihak, Mare, & Melecky, 2016, the increased emphasis on financial stability, especially after the Global Financial Crisis may prolong or increase involuntary financial exclusion. This is largely due to the 'inappropriate calibration' of the regulatory framework for basic financial services such as access to credit according to their contribution to risks for the entire financial system. This was earlier pointed out by Dittus and Klein (2011), who argue that for financial systems to harness the potential of financial inclusion it then becomes important to allow for different business models. An example of this is the use of M-Pesa in Kenya, a platform offered by a telecommunications firm providing access to basic financial services to even low-income categories. Dittus and Klein (2011) suggest that regulation should allow and enable such "experimentation" by being "calibrated to the type of service offered". Even so, this should be *"tightened if and when such schemes become bigger with the potential to impact financial stability"*

3.0 Empirical Methodology

3.1 Model Specification

At a conceptual level, the relationship between financial inclusion and bank stability can be positive or negative as postulated in the literature cited above. On the one hand, inclusion brings in a large number of clients, providing a diversified base both on the assets and liabilities and contributes to stability of financial institutions.

The other side of the coin suggest that the deterioration of lending standards could increase systemic risk as seen during the Global Financial Crisis. On the converse, financially sound banks are generally expected to have a competitive advantage in meeting the demand for credit, given their larger capital cushions and presumably better risk management.

We model Financial Inclusion and Bank Stability as functions of each other and various macroeconomic and bank-specific variables in a Panel GMM environment to take account of lagged dependent variables.

Financial inclusion, under the sufficient condition of contact to a financial institution by households and firms, is proxied by the two variables below;

i) Credit Extension: Loans and advances to customers

This variable captures the proportion of total bank credit directed towards customers. This is transformed using logs. According to Igan & Pinheiro, (2011), while increased credit availability is beneficial for economic growth, rapid credit growth also raises concerns about prudential risks which cause financial instability.

ii) Savings Mobilisation: Deposits by Customers

The variable is used to capture mobilisation of funds and use of formal of financial deposit accounts by customers. This is transformed using logs. Using proxies to capture the access to deposits and the use of bank deposits, Han

and Melecky (2014) find that greater access to bank deposits improves bank stability by making the deposit funding base of banks more resilient in times of financial stress.

Financial Stability is captured by Asset Quality, as defined by the International Monetary Fund, 2013. Asset Quality of bank loans refers to the timely manner with which borrowers are meeting their contractual obligations. This can be captured by the ***ratio of Non-Performing Loans*** to Total Gross Loans; the non-performing loans are facilities which payments of principal and interest are past due by three months or more.

These variables enter the equation defining the other with a lag to capture the time necessary for the posited feedback mechanism to be completed. Lagged dependent variables are also included to allow for possible persistence in loans and advances to customers and asset quality

Other variables included in the baseline model specification include:

i) Bank intermediation spread

This is measured as the ratio of net interest income to total income, and is used to capture the impact of cost of bank lending on bank stability and credit growth. Past research also indicates that the bank intermediation spread has an effect financial stability. The study by Motelle and Biekpe (2014) on financial intermediation spread and stability of the banking system in the Southern Africa Customs Union (SACU) finds a causal relationship between financial instability and the financial intermediation spread in SACU. In their research, the bank intermediation spread is measured as the gap between the lending and deposit rates. Sinkey and Greenawalt (1991) and Keeton and Morris (1998) find that banks that charge higher interest rates later tend to have the highest problem loans (non-performing loans).

ii) Bank Size

Following from empirical literature on banking sector, we use the logarithm of bank assets as the proxy for size. It is postulated that large banks would have better risk management techniques allowing them to lend more. However, the flipside suggests that credit growth (or rather too much of it), makes monitoring and screening difficult, having a detrimental effect on the asset quality of the bank (Hassan, Kyereboah-Coleman, & Andoh, 2014).

iii) Return on Assets

The profitability of the banks is also considered for its potential effect on the asset quality, level of credit issued and deposits by customers. Similar studies, such as Klein, 2013, in examining the causes of non-performing loans in Central, Eastern and South Eastern Europe from 1998 to 2011, finds bank profitability to be one of the factors that cause fluctuations in the performance of bank loan portfolios. In a study done in Nigeria, Ezeoha (2011), also provides evidence to the extent that bank profitability improved the performance of bank's loan portfolio

From the empirical literature reviewed, the following dynamic panel model formulations were employed in examining the relationship between financial

inclusion and financial stability. The following parsimonious specification is selected in consideration of the various macroeconomic and bank-specific variables identified in the recent literature as structural determinants of bank stability and access to credit.

Model 1:

$$ASQ_{i,t} = \alpha_0 + \alpha_{1j} ASQ_{i,t-j} + \beta_{1j} LNCRED_{i,t-j} + \beta_2 INT_{i,t} + \beta_3 ROA_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 GDP_t + \varepsilon_{it}$$

Model 2:

$$ASQ_{i,t} = \alpha_0 + \alpha_{1j} ASQ_{i,t-j} + \beta_{1j} LNDEP_{i,t-j} + \beta_2 INT_{i,t} + \beta_3 ROA_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 GDP_t + \varepsilon\_{it}$$

Model 3:

$$LNCRED_{i,t} = \alpha_0 + \alpha_{1j} LNCRED_{i,t-j} + \beta_{1j} ASQ_{i,t-j} + \beta_2 INT_{i,t} + \beta_3 ROA_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 GDP_t + \varepsilon_{it}$$

Model 4:

$$LNDEP_{i,t} = \alpha_0 + \alpha_{1j} LNDEP_{i,t-j} + \beta_{1j} ASQ_{i,t-j} + \beta_2 INT_{i,t} + \beta_3 ROA_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 GDP_t + \varepsilon_{it}$$

Where ASQ represents Asset Quality Indicator (Non-performing Loans proportion of Total Loans and Advances (%)); $LNCRED$ represents Logarithm of Loans and Advances to Customers; $LNDEP$ represents Logarithm of Customer deposits; INT represents the Intermediation Spread, calculated as net interest income/total income; $SIZE$ represents Logarithm of Bank Assets (proxy for size); ROA represents Return on Assets; $GDPG$ represents gross domestic product growth.

3.2 Method of Estimation

The use of Panel GMM is useful in this case, since if lagged dependent variables also appear as explanatory variables, strict exogeneity of the

regressors no longer holds. The LSDV Estimation is therefore no longer consistent with a large N and small T. The first difference transformation under Panel GMM Estimation as suggested by Arellano & Bond, (1991) ---which deals with the fixed effects and their lagged values as instruments--The one disadvantage of the first difference transformation is that it magnifies gaps in unbalanced panels.

We therefore consider an alternative transformation for robustness: the forward orthogonal deviations (FOD) transformation, suggested by Arellano & Bover, 1995. The transformation is used in a system GMM environment, which will be able to utilize one more observation per bank (reduce loss of observations due to differencing) in the level equation, and additionally estimate a constant term in the relationship. As the DPD estimators are instrumental variables methods, it is particularly important to evaluate the Sargan's J test results when they are applied.

Following Roodman, 2009, it is important to note that the lags of the bank specific variables are treated as endogenous in our estimation, therefore used as GMM Type of instruments, while the macroeconomic factors were dealt with as being exogenous, therefore being used as IV Estimation Type of instruments

4.0 Empirical Results

4.1 Descriptive Statistics

Table 1: Data Description

Variable	Mean	Std. Deviation	Min	Max	swilk
Ln Credit	8.652921	1.557677	2.579156	12.4245	0.98645
Ln Deposits	8.985095	1.640666	2.081814	12.53087	0.97617
ROA	2.527649	8.001381	-24.00581	153.6497	0.29967
Intermediation Spread	0.4360108	0.655214	-14.22666	4.473118	0.15211
ASQ	15.62769	16.81963	-0.6400832	90.65151	0.77582
Size (ln Assets)	9.442914	1.489009	4.134926	13.05567	0.98305
GDPG	4.674382	2.238456	0.2322827	8.402277	0.94404

ASQ, Asset Quality (Non-performing Loans proportion; Ln Credit, Logarithm of Loans and Advances to Customers; Ln Deposits, Logarithm of Customer deposits; ROA, Return on Assets; GDPG, gross domestic product growth

The descriptive statistics presented in table 1 above indicate that return on Assets is quite low on average, with a mean of 2.52%. Net Interest Income makes about half of total Bank Income on average, with a mean ratio of 0.43. Similarly, Asset Quality as measured by the proportion of non-performing loans to gross loans seems quite average for the sector, with an average of 15.62%. The average GDP growth over the sample time frame studied (2001 to 2015) is 4.67%. The Shapiro Wilk Normality test results provided in Table above indicate that none of the variables used in this study are normally distributed.

4.2 Unit Root Tests

We use the Fisher Type unit root tests which allows for unbalanced panels. The unit root test tests for non-stationarity of the variables used in the model. The null hypothesis of the Fisher Type Unit Root test is that all panels have unit root (non-stationary) versus the alternative hypothesis that the panels do not have unit root (they are stationary). The Fisher Type Unit Root tests provides four test statistics:

Table 2: Fisher Type Unit Root Test (Based on Augmented Dickey-Fuller tests)

Variable	Inverse chi-sq	Inverse normal	Inverse logit t	Modified inv. chi-sq
NPL/Total Loans	332.4276 (0.0000)	-3.5417 (0.0002)	10.0883 (0.0000)	18.7899 (0.0000)
Log Credit	67.2962 (0.9323)	7.9499 (1.0000)	7.8098 (1.0000)	-1.4262 (0.9231)
Log Deposits	89.4417 (0.3784)	5.7815 (1.0000)	5.3986 (1.0000)	0.2624 (0.3965)
Size	29.9573 (1.0000)	9.5323 (1.0000)	10.1922 (1.0000)	-4.2732 (1.0000)
Intermediation Spread	320.7839 (0.0000)	-8.6076 (0.0000)	-12.0388 (0.0000)	17.9021 (0.0000)
ROA	229.9452 (0.0000)	-7.3848 (0.0000)	-8.2212 (0.0000)	10.9757 (0.0000)
GDPG	244.4006 (0.0000)	-10.2890 (0.0000)	-10.0801 (0.0000)	12.0779 (0.0000)

The statistics in Table 2 above lead us to the following conclusion about the stationarity of the variables:

	Level	Difference
NPL/Total Loans	Stationary	Stationary
Log Credit	Non-Stationary	Stationary
Log Deposits	Non-Stationary	Stationary
Intermediation Spread	Stationary	Stationary
Size	Non-Stationary	Stationary
ROA	Stationary	Stationary
GDPG	Stationary	Stationary

Log Credit, Log Deposits and Size are non-stationary at level, but stationary at first difference. The estimating regression equation in first-difference is therefore specified as follows:

Model 1:

$$\Delta ASQ_{i,t} = \alpha_0 + \alpha_{1j}\Delta ASQ_{i,t-j} + \beta_{1j}\Delta LNCRED_{i,t-j} + \beta_2\Delta INT_{i,t} + \beta_3\Delta ROA_{i,t} + \beta_4\Delta SIZE_{i,t} + \beta_5 GDPG_t + \varepsilon_{it}$$

Model 2:

$$\Delta ASQ_{i,t} = \alpha_0 + \alpha_{1j}\Delta ASQ_{i,t-j} + \beta_{1j}\Delta LNDEP_{i,t-j} + \beta_2\Delta INT_{i,t} + \beta_3\Delta ROA_{i,t} + \beta_4\Delta SIZE_{i,t} + \beta_5 GDPG_t + \varepsilon_{it}$$

Model 3:

$$\Delta LNCRED_{i,t} = \alpha_0 + \alpha_{1j}\Delta LNCRED_{i,t-j} + \beta_{1j}\Delta ASQ_{i,t-j} + \beta_2\Delta INT_{i,t} + \beta_3\Delta ROA_{i,t} + \beta_4\Delta SIZE_{i,t} + \beta_5 GDPG_t + \varepsilon_{it}$$

Model 4:

$$\Delta LNDEP_{i,t} = \alpha_0 + \alpha_{1j}\,\Delta LNDEP(_{i,t-j}) + \beta_{1j}\Delta ASQ_{i,t-j} + \beta_2\Delta INT_{i,t} + \beta_3\,\Delta ROA_{i,t} + \beta_4\Delta SIZE_{i,t} + \beta_5 GDPG_t + \varepsilon_{it}$$

Taking differences to Log Credit and Log Deposits is equivalent to calculating Credit Growth and Deposit Growth respectively. Therefore, our analysis will consider credit growth and deposit growth as the financial inclusion variables due to the differencing exercise.

4.3 Empirical Results

The Sargan's J-Statistic and the Arellano-Bond test for autocorrelation (presented as part of Table 2 to Table 5 below)--which respectively test for the validity and robustness of the Dynamc Panel System (GMM) estimator-- provide evidence of the validity of the estimated models. The Sargan's J statistic tests the null hypothesis that the over-identifying restrictions are valid. The corresponding p-values of the Sargan's J-Statistics under the System GMM estimations are 0.169 in Model 1, 0.320 in Model 2, 0.790 in Model 3 and 0.181 in Model 4 indicating validity of the estimated models. The AR test by Arellano and Bond tests for the autocorrelation of the residuals. The residuals of the differenced equation should, by construction, possess serial correlation, However the differenced residuals should not exhibit significant AR(2) behaviour. All model estimations below exhibit first order autocorrelation, as shown by the Arellano-Bond test for AR(1) in first differences; however there is no second order autocorrelation as indicated by the Arellano-Bond test for AR(2) in first differences.

Model 1

The results of Model 1 are presented in Table 3 below

Table 3: Two-Step System GMM: Dependent Variable: Δ NPL/Total Loans

			F(7, 42) = 21.27		No of obs = 526	
			Prob > F = 0		No of groups = 43	
	Coefficient	Corrected Std Error	t-statistic	P>|t|	95% Confidence Interval	
Δ (NPL/Total Loans) (t-1)	0.7034***	0.0915	7.6900	0.0000	0.5188	0.8881
Credit Growth (t)	-0.0821	0.0554	-1.4800	0.1460	-0.1939	0.0297
Credit Growth (t-1)	0.1261***	0.0350	3.6000	0.0010	0.0554	0.1968
Δ Size	0.0148	0.0697	0.2100	0.8320	-0.1257	0.1554
Δ Intermediation Spread	0.0070	0.0919	0.0800	0.9390	-0.1784	0.1924
ΔROA	-0.0128	0.2408	-0.0500	0.9580	-0.4989	0.4732

		F(7, 42) = 21.27			No of obs = 526	
		Prob > F = 0			No of groups = 43	
	Coefficient	Corrected Std Error	t-statistic	P>|t|	95% Confidence Interval	
GDPG	-0.0338	0.1176	-0.2900	0.7750	-0.2711	0.2035
constant	-0.0095	0.0084	-1.1200	0.2670	-0.0265	0.0075
Arellano-Bond test for AR(1) in first differences: z = -2.781 Pr > z = 0.007						
Arellano-Bond test for AR(2) in first differences: z = 1.1 Pr > z = 0.272						
Sargan test of overid. restrictions: chi2(381) = 407.37 Prob > chi2 = 0.169						
Hansen test of overid. restrictions: chi2(381) = 32.64 Prob > chi2 = 1.000						
*Significance levels of 10% **Significance levels of 5%. ***Significance levels of 1%.						

The indicated significance of the coefficient on lagged asset quality highlights persistence in the growth of non-performing loans. There is also a negative contemporaneous but insignificant relationship between loans and advances to customers with the NPL Ratio at 5% significance level. This result, though insignificant implies that as banks lend out more to customers, there is an increase in their stability due to a reducing non-performing loans ratio.

The lagged coefficient on credit growth indicates a positive significant relationship between the lagged levels of credit growth and change in the non-performing loans ratio. This would mean that asset quality has a delayed negative reaction to credit growth from the previous period. Lagged Credit Growth increases the NPL Ratio and decreases the asset quality. This result is similar to those obtained by Igan & Pinheiro (2011) whose study finds that lagged credit growth had a negative impact on bank soundness in two five-year sub-periods. Similarly, results from a study by (Laidroo & Mannasoo, 2013) also revealed a significant and robust positive association between the 1-year lagged ratio of unused committed credit lines and loan loss reserves ratios.

Model 2

The results of model 2 presented in Table 4 below.

Table 4: Two-Step System GMM: Dependent variable: Δ NPL/Total Loans

			F(7, 42) = 2.61			No of obs = 528
			Prob > F = 0			No of groups = 43
	Coefficient	Corrected Std Error	t-statistic	P>|t|	95% Confidence Interval	
Δ (NPL/Total Loans) (t-1)	0.1650	0.1186	1.3900	0.1720	-0.0744	0.4044
Deposit Growth (t)	-0.0909***	0.0280	-3.2500	0.0020	-0.1474	-0.0345
Deposit Growth (t-1)	0.0038	0.0132	0.2900	0.7720	-0.0228	0.0305
Δ Size	0.0740***	0.0270	2.7400	0.0090	0.0196	0.1284
Δ Intermediation Spread	-0.0246	0.0612	-0.4000	0.6900	-0.1482	0.0990
ΔROA	-0.0309	0.0691	-0.4500	0.6570	-0.1705	0.1086
GDPG	0.1973	0.1871	1.0500	0.2980	-0.1803	0.5749
constant	-0.0149	0.0119	-1.2500	0.2180	-0.0389	0.0091
Arellano-Bond test for AR(1) in first differences: z = -2.19 Pr > z = 0.029						
Arellano-Bond test for AR(2) in first differences: z = 0.56 Pr > z = 0.579						
Sargan test of overid. restrictions: chi2(381) = 395.45 Prob > chi2 = 0.320						
(Not robust, but not weakened by many instruments.)						
Hansen test of overid. restrictions: chi2(381) = 35.54 Prob > chi2 = 1.000						
(Robust, but weakened by many instruments.)						
*Significance levels of 10% **Significance levels of 5%. ***Significance levels of 1%.						

There is a negative significant contemporaneous relationship between deposits by customers with the NPL Ratio; This result implies that as banks receive/accept more deposits from customers, an improvement in their asset quality is expected, due to diminishing non-performing loans ratio. Positive change in Size becomes significant in this model having an positive and significant effect on non-performing loans %; negative on asset quality.

Model 3

The results in Table 5 below from Model 3 estimations indicate there is a significant persistence in credit growth at the 5 % level of significance. There is a negative and significant contemporaneous effect of Δ in non-performing loans ratio on credit growth highlighted in the results below. This indicates that a positive change in non-performing loans ratio leads to a decrease in credit growth. This is most possibly a supply side reaction from banks, where a noted drop in the asset quality of the bank deters them from issuing additional credit. Higher levels of non-performing loans (lower asset quality) inhibit the bank's ability and willingness to extend more credit. The bank ideally takes a more cautious stance in their issue of credit and concentrates on improving its current loan portfolio

Table 5: Two-Step System GMM: Dependent Variable: Credit Growth

			F(7, 42) = 19.9		No of obs = 526	
			Prob > F = 0		No of groups = 243	
	Coefficient	Corrected Std Error	t-statistic	P>|t|	95% Confidence Interval	
Credit Growth (t-1)	0.1657**	0.0800	2.0700	0.0450	0.0042	0.3273
ΔNPL/Total Loan (t)	-0.7587**	0.3184	-2.3800	0.0220	-1.4013	-0.1162
ΔNPL\Total Loan (t-1)	0.4918**	0.2186	2.2500	0.0300	0.0507	0.9329
Δ Size	0.7172***	0.0869	8.2500	0.0000	0.5417	0.8926
Δ Intermediation Spread	0.1556	0.1366	1.1400	0.2610	-0.1201	0.4313
ΔROA	-0.0543	0.5129	-0.1100	0.9160	-1.0894	0.9808
GDPG	-0.3028	0.4164	-0.7300	0.4710	-1.1431	0.5376
constant	0.0476	0.0267	1.7800	0.0820	-0.0063	0.1015
Arellano-Bond test for AR(1) in first differences: z = -3.62 Pr > z = 0.000						
Arellano-Bond test for AR(2) in first differences: z = -1.28 Pr > z = 0.199						
Sargan test of overid. restrictions: chi2(381) = 358.54 Prob > chi2 = 0.7900						
(Not robust, but not weakened by many instruments.)						
Hansen test of overid. restrictions: chi2(381) = 36.59 Prob > chi2 = 1.000						
(Robust, but weakened by many instruments.)						
*Significance levels of 10% **Significance levels of 5%. ***Significance levels of 1%.						

In a study by Tan (2012), the coefficient for the lagged distressed asset ratio was found to be statistically significant with an expected negative sign. Espinoza and Prasad (2010) carried out panel GMM estimations on 80 banks in the Gulf Cooperative Council countries over the 1995-2008 period and found that the lagged logit transformed NPL ratio results in a diminished credit growth. These findings all supports Bernanke et al (1991) credit crunch theory which suggest that non-performing loans make it difficult for borrowers (both firms and households) to obtain credit due to restricted bank lending behaviour

The results from the System GMM also suggest that change in size has a positive and significant effect on credit growth.

Model 4

The results of Model 4 are presented in Table 6 below. The coefficients highlight that growth in deposits is significantly affected by the asset quality of the bank, contemporaneously. The results imply that a positive change in the non-performing loans ratio (decrease in asset quality) would result in a decrease in deposit growth. This result is acquainted with the recent history seen in the Kenyan Banking sector, where banks with relatively poor asset quality indicators had customers flee once news hit the market

Table 6: Two-Step System GMM: Dependent Variable: Deposit Growth

		F(7, 42) = 41.98			No of obs = 526	
		Prob > F = 0			No of groups = 43	
	Coefficient	Corrected Std Error	t-statistic	P>|t|	95% Confidence Interval	
Deposit Growth (t-1)	-0.0247	0.0463	-0.5300	0.5970	-0.1182	0.0688
ΔNPL Ratio (t)	-0.2881**	0.1094	-2.6300	0.0120	-0.5088	-0.0674
ΔNPL Ratio (t-1)	0.0894	0.1228	0.7300	0.4700	-0.1583	0.3372
Δ Size	0.9686***	0.0725	13.3500	0.0000	0.8221	1.1150
Δ Intermediation Spread	-0.1324**	0.0488	-2.7100	0.0100	-0.2310	-0.0339
ΔROA	0.0026	0.3281	0.0100	0.9940	-0.6597	0.6648

		F(7, 42) = 41.98			No of obs = 526	
		Prob > F = 0			No of groups = 43	
	Coefficient	Corrected Std Error	t-statistic	P>|t|	95% Confidence Interval	
GDPG	-0.1971	0.1845	-1.0700	0.2910	-0.5694	0.1751
constant	0.0225	0.0146	1.5500	0.1300	-0.0069	0.0519
Arellano-Bond test for AR(1) in first differences: z = -3.14 Pr > z = 0.002						
Arellano-Bond test for AR(2) in first differences: z = -1.48 Pr > z = 0.138						
Sargan test of overid. restrictions: chi2(381) = 408.1 Prob > chi2 = 0.181						
(Not robust, but not weakened by many instruments.)						
Hansen test of overid. restrictions: chi2(381) = 30.66 Prob > chi2 = 1.000						
(Robust, but weakened by many instruments.)						
*Significance levels of 10% **Significance levels of 5%. ***Significance levels of 1%.						

Change in Size also positively affects the level of deposits in banks, such that an increase increases the growth of deposit. This indicates that a growing and expanding attracts mobilization of deposits by individuals and firms. The change in Intermediation spread also comes in significantly, positing a negative relationship with growth in deposits, i.e. an increase in the intermediation spread would result in a decrease in deposit growth in the bank.

5.0 Concluding Remarks and Policy Implications

This study explores the feedback between financial stability and, financial inclusion as proxied by level of customer credit and customer savings/deposits in Kenyan Banks.

This relationship is posed by the idea that credit growth could diminish or increase/maintain bank soundness. Similarly, we investigate the effect that levels of deposits have on the financial soundness of banks and conversely, the effect bank stability has on the level of deposits. The analysis is carried out controlling for bank specific covariates and GDP growth in Kenya.

The analysis indicates significant relationships between bank stability, credit growth and deposits growth. Particularly, lagged credit growth has a positive significant effect on change in the non-performing loans ratio (impacts asset quality negatively). This would mean that asset quality has a delayed negative reaction to credit growth from the previous period. There is a noted significant effect of asset quality on credit growth such that a positive change in non-performing loans ratio leads to a decrease in credit growth.

The noted negative effect of lagged credit growth on asset quality highlights the need of well-developed credit referencing bureaus to reduce information asymmetries between lenders and private sector borrowers, especially households. The relatively small credit reference arena in Kenya could be attributed to the noted persistence of non-performing loan ratios of most banks.

The negative and significant effect of Non-Performing Loans Ratio on credit growth can be more accurately considered from the supply side, being that higher NPL Ratios deter banks from issuing more credit in a bid to avoid information asymmetries present in the market from further lowering the soundness of the banks.

However, as earlier pointed out in the literature reviewed above, such increased emphasis on financial stability, especially by banks themselves, could bring about involuntary financial exclusion. Policies are required to circumvent this dilemma (stability vs inclusion) focusing on provision of alternative platforms for access to basic financial services. The role of the regulator comes to play here with the need for 'calibrating' friendly regulations aimed at promoting the efficiency, stability and coverage of innovative services such as M-Pesa and Mobile Money Platforms, among others.

There is a noted negative contemporaneous effect of deposits growth on non-performing loans ratio; indicating higher asset quality due to higher deposit levels. The Banking sector should strive to take advantage of such simple synergies and promote wider use of bank deposits. On the macro-level, savings mobilisation should not only be viewed in the context of poverty alleviation and economic development, as posited from economic development theories, but additionally as a complementary strategy to macro-prudential and regulatory frameworks in promoting financial stability of banks. The uptake of initiatives in Kenya such as M-Pesa provide a good starting point for such mobilisation. With improved regulation, oversight and a collaborative structure with banks in place, such a platform could serve as a window to further increasing the access and usage of bank deposit accounts.

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