The effect of market structure on the level of non-performing loans among commercial banks in Kenya

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Abstract

This study was done to establish how market structure affects the level of non-performing loans in the banking industry in Kenya. Empirical evidence show conflicting results and thus it was important to investigate how market structure affected non-performing loans in Kenya. A descriptive research design involving a census of all banks operating in Kenya between 2006 and 2013 was used. The results shows that market structure affect non-performing loans. Credit growth and capital positively affects non-performing loans. Bank risk appetite negatively affected non-performing loan spointing to overreliance on traditional banking practices to generate revenues while profitability does not affect the growth of non-performing loans. The study concludes that commercial banks in Kenya have to undertake business model innovation to move from traditional banking practices. Secondly, central bank should control liquidity since increase in capital positively affects non-performing loans.

Key words
Non-performing loans, banking, market structure, risk-taking
1. Background
The banking industry in any economy suffers unique risks in the course of its business operations. These industry specific risks occur as a result of the nature of operations undertaken by the industry players, regulatory influence in the industry, number and size of firms in the industry among other reasons. The size of a bank has an impact on its overall performance. Kiyota (2009) explains that the smaller the bank, the higher the profit efficiency while larger banks tend to be more cost efficient. Compared to large banks, small banks in developed countries serve smaller, mostly local customers and provide retail financial services Berger and Udell (2004). Large banks on the other hand have a comparative advantage in lending technologies including lending based on hard information.

Growth in Non-performing loans (NPL) is a common indicator of possible financial crisis and ultimately bank failure. NPLs are a big threat to stability of the banking system and eventually the whole economy. According to Kroszner (1999) NPL are closely associated with banking crises. Sultana (2002) links the Japanese financial crisis to NPL. Chang (1999) defines non-performing loans as undesirable outputs or costs to a bank, which decrease the bank’s performance, expected revenues and profitability. Prudential management of NPLs is very important for both the performance of an individual bank (Akhigbe, McNulty, & Verbrugge, 2001) and the industry’s operating environment.

The literature on market structure is extensive Sutton (2006). There are two main strands of market structure, whereby Gibrat (1931) propose the size distribution of firms and Bain (1956) pioneered the structure-conduct-performance tradition. According to Witteloostuijn and Boone (2004) market structure refers to the number and size of the firms that supply a well-defined set of products to a client group. These researchers explain that market structure is comprised of two key concepts: market concentration and organizational density. Market concentration pertains to the relative importance of the aggregate size of the larger firms in a market while organizational density refers to the number count of firms in a market Witteloostuijn and Boone (2004).

When market concentration is high, competition is low and firms enjoy high profits. The few large firms operating in the industry can collude (Sutton, 2006) to set prices very high. This will limit the number of buyers of the product put in the market holding other factors constant. This means that in the banking industry, there will be no incentive to lend to individuals who may default repayment as determined by a bank loan officer’s due diligence. The level of NPLs will most probably be lower. If new firms enter the market and the level of concentration reduces, firms operating in that industry will have to do their best to maintain their market power and in so doing they will compete for any available customers. This may lead to credit risk exposure and NPLs are most likely to occur. Increased competition in the banking industry can be disastrous, Chan, Greenbaum and Thakor (1986). When there is high competition, the surplus that banks would earn in a lesser competitive environment are eroded. Increased competition in the banking industry will negatively affect the aggregate credit-worthiness of the banking industry, Broecker (1990). This means high competition in the banking industry leads to increased risk-taking in the banking industry. Boyd and De Nicolo (2005) postulate that increased competition in the banking industry would lead to reduction in the level of risk taking. Martinez-Miera and Repullo (2007) proposes a U-shaped relationship between competition and risk-taking in the banking industry.
The state of the market of banking industry in Kenya is very competitive. The actions and strategies adopted by any bank sends ripples in the whole industry and other banks in the economy may not have an alternative but to respond quickly to the actions of its competitors. Banks with larger capital base are able to undertake advertising, research and new products development that are tailor-made to attract and maintain customers and maintain their market power. Banks with smaller capital base have to be more creative and innovative to remain relevant in the market. With advanced information technology, the costs of doing business may get lower but the monitoring costs may expose banks to excessive risk-taking. The market structure of the banking industry in Kenya is composed of forty two commercial banks CBK (2012). The Kenyan banking industry can be categorized into three classes, which include the regulator (CBK), the players in the industry (Banks) and the customers. The regulator has the responsibility to license any firm planning to conduct banking business, monitors the activities of the players in the industry, protect the interest of the customers and makes policies which affect the performance of the players. The players in the industry are expected to fully observe the rules set by the regulator.

1.1 Statement of the problem
NPLs in the banking industry in Kenya have remained high for the period under study, 2006 to 2013. High NPLs often lead to financial crisis and ultimately bank failure. Financial institutions play a critical role in stability of economies and failure of a bank will have negative effects on the economy. Available literature gives conflicting results on how market structure affects NPLs, Chan, Greenbaum and Thakor (1986), Broecker (1990), Boyd and De Nicolo (2005) Martinez-Miera and Repullo (2007). This dilemma can have far reaching consequences in absence of an empirical study being undertaken to establish the relationship between market structure and NPLs. The operations of commercial banks in Kenya are closely regulated by the Central Bank. The banking industry regulator’s actions may increase or decrease the level of risk taking resulting to growth of NPLs by altering market structure. This study, therefore, sought to investigate the effect of market structure on the level of NPL among commercial banks in Kenya.

1.2 Objectives of the study
The general objective for this study was to investigate the effect of market structure on the level of NPL among the commercial banks in Kenya.

The specific objectives were:

- To determine the effect of credit growth on the level on NPL among commercial banks in Kenya.
- To establish the effect of bank size on the level of NPL among commercial banks in Kenya.
- To establish the effect of bank risk appetite on the level of NPL among commercial banks in Kenya
- To determine the effect of bank profitability on the level of NPL among commercial banks in Kenya

1.3 Research hypothesis
In this study, the following hypotheses were tested to arrive at empirical grounds to make a conclusion on the effect of market structure on the level of NPL among commercial banks operating in Kenya.

- HA1 Credit growth affects the level of NPL among commercial banks in Kenya.
- HA2 Bank size affects the level of NPL among commercial banks in Kenya.
- HA3 Bank risk appetite affects the level of NPL among commercial banks in Kenya.
- HA4 Banks profitability affects the level of NPL among commercial banks in Kenya.
1.4 Significance of the study
It is very critical that all stakeholders in the banking industry share a common understanding as pertains to the effect market structure has on risk-taking. Conflicting results on the effect of market structure on level of NPLs makes it difficult to understand how actions by the regulator or one of the banks will eventually alter market structure. This research work will benefit different stakeholders in the banking industry including bank managers, investors, customers, suppliers, policy makers, and regulator(s). Banking business includes risk taking on a day-to-day basis and the rewards of successful risk taking forms a major part of banks revenue. However, excessive or poorly managed portfolio of risky assets by a bank may lead to major losses through NPLs and eventually bring about bank failure which constitutes a financial crisis. Investors will have confidence that they will get a good return for their investments.

Policy makers and regulators will be better of knowing the effect of market structure on the level of NPLs by banks as they develop and implement new or enforce existing policies. Relevant legislations, regulations and other control measures will be more effective if made with clear knowledge and understanding of the probable consequences they have on the level of risk taking. Customers purely depend on trust when they leave their money in the banks. When this trust is eroded, it may take long for depositors to accept to leave their monies in the banks. If depositors are aware of the underlying risk involved in a certain bank, or they are suspicious that the level of risks may jeopardize their deposits, assuming rationality, they will fail to deposit their funds there and will not encounter losses in case the bank becomes insolvent.

1.5 Scope of the study
The study took a census of all commercial banks operating in Kenya between 2006 and 2013. There were forty three commercial banks operating in Kenya CBK (2013). One of the commercial banks was put under statutory management in mid-2006 and was excluded from the study. The researcher collected financial statements from all the operating commercial banks for period 2006 to 2013. The financial statements collected were the audited balance sheet for each bank and profit and loss account statements for each bank for the same period 2006 to 2013.

2 Literature review
The relationship between market structure and NPLs can be explained theoretically by examination of the reasons as to why bank managers might be lured to lend to customers who will default repayment. Market structure has a direct influence on the performance and conduct of firms in that specific industry Bain (1956). This research considered the principal-agent theory and expected utility theory to explain how market structure can affect the growth on NPLs.

The principal-agent theory, as defined by Jensen and Meckling (1976) is contract under which one or more persons (principal) engages another person (agent) to perform some service on their behalf which involves delegating some decision making authority to the agent. Fama and Jensen (1983) argue that an organization is a “nexus of contracts” which results into a number of agency relationships. Both the principal and the agent are seen as rational decision makers who seek to maximize their utility. The needs of these two parties (agent and the principal) are not the same and this forces the agent, who should act on the best interest of principal to divert into his own interest in an attempt to maximize his own utility. According to Goetz (2010) a bank’s
organizational structure affects its lending behavior and hence its own risk taking behavior and the risk taking behavior of the competing banks. Using the principal-agent theory Goetz (2010) takes the bank manager as the principal and the loan officers as the agents. The loan officers choose a certain level of risk, acting on behalf of the managers. There arises a moral hazard in such a case, and two types of information are identified: hard information which is quantitative and verifiable and soft information which is qualitative and non-verifiable Peterson (2004). The soft information, for example, the relationships between a loan officer and a borrower, is hard to communicate and may not be transferred.

Lopez (2010) established that there existed a link between lending, the organizational structure of the bank and NPLs. In order to make good sales and earn high commissions, the loan officer (agent) with soft information may fail to communicate their gathered due diligence to the credit manager that a borrower does not qualify for a loan. Although there is delegation of authority, the responsibility for the actions of the agent is borne by the principal. This may complicate the whole lending business because the loan officer may act less careful because he will not bear ultimate responsibility if the borrower defaults the loan.

Acharya and Naqvi (2011) introduce a new dimension of the agency issues in the banking industry. They argue that when there is excess liquidity in the banks, the managers will have an incentive to misprice the loans based on the underlying risk. This happens because the probability of experiencing liquidity shortage is very low. This ultimately leads to excessive lending which is based on under-estimation of the underlying risks. Excess liquidity aggravates risk-taking by commercial banks through excessive lending and asset price bubbles Acharya and Naqvi (2011). With excessive lending (in this case associated with underpricing of risks), there is excess demand for assets in the real sector which leads to prices rising above their fundamental values. This is what is referred to as a price bubble Acharya and Naqvi (2011). The emergence of the price bubbles makes depositors to prefer to save their money in bank deposits which are perceived to be safer rather than invest in the real sector. This marks the beginning of crisis in the financial sector.

Expected utility theory (EUT) states that a decision maker chooses between risky prospects by comparing their expected values Mongin (1997). The banking business involves making a choice between many risky alternatives. Every loan advanced by a bank to a borrower involves a certain level of risk. Although the borrower may certainly be creditworthy, which means that credit risk is not part of the bargain, other risks may form part of the factors to consider before the loan is given or they may form part of the pricing mechanisms adopted by a bank. The EUT is measured by summing up the weighted utility values of outcomes multiplied by their respective probabilities. Utility is the level of satisfaction derived from consumption of a product (a good or service). This theory in its simplest undertakes to look into the level of satisfaction derived by a decision maker when they make choice between risky alternatives. Usually, consumers (decision maker) are assumed to be rational and therefore will seek to maximize utility. The alternative chosen will be the one that will bring maximum satisfaction, assuming rationality of the decision maker.

The perception of a decision maker or the intuitive character they possess may determine the outcome. In a highly competitive market structure, the pressure to generate revenues may induce a bank manager to take risky decisions. The bank manager may accept to advance credit to a borrower who will default in repayment of the loan. On the same setting, a bank may not be able to charge maximum interest which will cover total loan cost. The market structure forces may push banks into risky activities which will lead to excess risk
taking. For a concentrated market structure, Berger and Hannan (1989) found that United States of America (USA) banks charged higher rates on SME loans and pay lower rates on retail deposits and that their deposit rates were slow to respond to changes in open-market interest rates. The quality of decisions made by a bank manager and the opportunity cost have a bearing on the bank’s exposure to NPLs among other risks. This study was of the thought that a bank manager’s decisions regarding risk are a hybrid of both objective and subjective probabilities. On the objective aspect, that there existed some facts categorized as hard information (facts which are quantifiable and verifiable Petersen (2004) and soft information which is qualitative and non-verifiable. To make decision based on soft information, a decision maker will be subjective. Studies by Goetz (2010) and Lopez et al (2007) show that as banks grow in size, they shift from relying on soft information to hard information.

2.1 Empirical review
The study adopted four parameters as indicators of market structure and empirical review focused on the four parameters: credit growth, size of bank, bank risk appetite, and bank profitability. Growth of credit has a direct impact on risk-taking in the banking industry, Altunbas, Manganelli and Marques-Ibanez (2011), Foos, Norden and Weber (2010), Jimenez, Lopez and Saurina (2007). This makes credit growth an important determinant of NPLs. Kohler (2012) found evidence that banks with high growth of credit were more risky. Kohler argues that banks may reduce their lending standards to grow credit and as such they may attract risky customers who have been denied loans by other banks. The commercial banks in Kenya rely heavily on loan advances, which accounted for 78.72% in 2012 to generate revenues. Aggregate credit growth in the banking industry was found to be positive across the period under study. As per the CBK bank supervision report (2012) the amount of gross loan advanced to households was highest (24.6%) and the corresponding NPL was highest in the same category (33.2%). The top three sectors which have been classified as major source of NPLs were personal/households, trade, and manufacturing sectors, (CBK 2009) and they accounted for 63.9% of the gross NPLs in the banking industry.

A study by Stein (2002) found out that organizational structure affects the lending behavior of banks. This is because of the different information levels - soft information and hard information Peterson (2004) that existed from the time a borrower applies for a loan to the time a loan is credited to their account. Soft information originates from a loan officer’s interaction with a borrower and is qualitative. Soft information is not verifiable and is harder to communicate between a loan officer and the bank manager. Most banks in Kenya have a team dedicated to selling their products. The loan sales team interaction with the potential borrowers is classified as soft information. Goetz (2010) and Lopez et al (2007) suggested that as banks grow, they should shift from soft information and rely more on hard information. Large banks have complex organizational structures and are better placed to lend to borrowers based on hard information.

The size of a firm determines the influence it has on that industry. Hellmann, Murdock and Stiglitz (2000) expressed the view that financial market liberalization in Japan in the 1990s increased competition and reduced profitability of commercial banks. This has been suggested as one of the factors which led to the East Asian financial crisis and a weaker financial system in Japan (Jimenez, Lopez and Saurina 2007). In the Spanish financial system, Salas and Saurina (2003) replicated Keeley (1990) arguments that financial system liberalization reduces banks’ revenues and therefore banks will be left with only one alternative: pursuing
riskier lending policies to maintain their former profits. Salas and Saurina (2003) found that greater market power was correlated with higher bank solvency ratios and lower credit risk.

Bank’s capital structure affects liquidity creation and credit creation functions in addition to its stability Douglass (2000). This means that an optimal capital structure is necessary for efficient operations of any bank. There exists a debate as to the effect capital has on the level of non-performing loans by banks. Some researchers have argued that higher bank capital will eventually reduce the level of NPLs. Morrison and White (2005) focus on the moral hazard. They argue that if banks do not have enough equity at stake, they may be tempted to make risky loans, meaning higher capital levels reduces moral hazard and therefore lowers risk-taking behavior in the banking sector. Other supporters of this proposition are Holmstrom and Tirole (1997) who focused on strengthened bank monitoring incentives that accompany higher bank capital. On the contrary, some researchers argue that higher bank capital may be accompanied by an increase in the level of NPLs. This may occur if banks react to higher capital by shifting into riskier loan portfolios and are not prevented from doing so by the regulators, Koehn and Santomero (1980). Allen and Santomero (1998), Allen and Gale (2004) argue that liquidity creation exposes banks to risk and that higher capital improves banks’ ability to absorb risk. Repullo (2004), Von Thadden (2004) argued that high capital levels may allow banks to create more liquidity. In the banking industry in Kenya, bank capital has been increased as a regulatory requirement from Kenya shillings 350 million in 2009 to one billion shillings in 2012.

Goetz (2010) in his model of risk-taking showed that the expected loan returns are concave with respect to information, meaning lending to soft-information borrowers provides a higher return than lending to hard information borrowers. This occurs because the cost associated with lending based on hard information is lower and the decision is based on quantitative data and facts. Interest charged will therefore be lower as compared to lending based on soft information. This study adopted loan to asset ratio as a measure of banks risk appetite as suggested by Khemraj and Sukrishnalall, (2010), Sinkey and Greenwalt (1991). Past studies suggested a strong positive relationship between NPLs and bank’s risk appetite as measured by the ratio of loans to assets. Banks that value profitability more than the cost of higher risk are likely to incur greater levels on NPLs, Altunbas, Manganelli and David (2011). A higher level of loan to assets ratio indicates higher levels of risk taking. A study by Sinkey and Greenwalt (1991) found out that a bank’s risk appetite affects non-performing loans. Risk appetite was measured as a ratio of total loans to total assets. The return on assets (ROA) was used to establish whether banks with high profits hide NPLs Altunbas, Manganelli and David (2011).

Banks that makes huge profits maybe celebrate their achievement and adjust their strict lending rules which may expose them to NPLs. Boyd, De Nicolo and Al Jalal (2006) applied the risk shifting model where they used the Z-score based on banks returns on assets (ROA), its dispersion and the ratio of equity to total assets as a measure of risk. They also applied Herfindahl-Hirscmann Index (HHI) as a measure of market concentration and their final findings clearly showed that there was a positive and significant relationship between Z-score and HHI, which meant that high concentration in the banking industry was associated with greater risks.
3 Research methodology
This study was based on descriptive research design data was analyzed to uncover new facts. Quantitative data was analyzed to provide an account of elements under consideration and there was no experimental manipulation to the elements. Descriptive research design describes the current status with respect to variables or conditions in a situation and therefore providing information on characteristics of a phenomenon. In this research work a census of all commercial banks operating in Kenya between 2006 and 2013 was considered.

The secondary data used in the research was collected from audited financial statements: balance sheet and profit and loss account statements for each bank for the period 2006 to 2013. All relevant data was extracted from the above documents and recorded in a data collection excel sheet for each bank for the period under study. Four commercial banks had not operated over the whole period because they started operations in between 2006 and 2013. Fung (2006) postulates that in handling missing data it is necessary to estimate the missing values as this will provide a more accurate results. Based on this argument, the research applied extrapolation method to estimate the missing data for the four commercial banks. This being panel data it was necessary to decide between fixed effects (FE) model and random effects (RE) model. To establish which model was appropriate, Hausman test was done. Diagnostic tests were performed before regression analysis. Diagnostic tests done were unit root test (test for stationarity), serial correlation test and homoscedasticity test. The tools used for analysis was Stataversion 14 and Microsoft Excel.

The parameters used in this study were measured as follows:

Credit growth (X₁): change in total loans between current period t previous and t-1 with a lag t-2. The actual value was computed as: Credit growth1 (Cg₁) = (Total loans i, t - Total loans i, t-1) / Total loans i, t-1} *100.

Bank size (X₂): measured as bank’s core capital for bank i in period t

Bank risk appetite (X₃): measured as ratio of loans to assets for bank i in period t

Profitability (X₄): measured as profit before tax for the bank i for period t

NPLs (Y): Z-scores computed as \( Z-score = \frac{[ROA + (EquityAsset)]}{(ROA)} \)

The general regression equation was as follows:

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \]

\( \varepsilon \) is the error term.
4 Results and discussion

4.1 Data analysis and findings
Panel data analysis is done using fixed effects (FE) model or random effects (RE) model. The estimation of FE was done and results show F-statistic was 0.0007 (see appendix V) while RE model result showed Chi-square 0.0439, see appendix IV. In determining which model was appropriate between the FE and RE, Hausman test was done. The null hypothesis was RE is appropriate while the alternative hypothesis was FE is appropriate. Hausman test results are in appendix III and the probability Chi-Square was 0.0134. At five percent (5%) confidence level, the null hypothesis was rejected and concluded that FE model was appropriate.

Test for heteroskedasticity was done using Modified Wald test for GroupWise heteroskedasticity in fixed effect regression model. The probability Chi square was 0.0000 meaning there was indeed heteroskedasticity, see appendix II. The data was tested for serial correlation and the results showed that probability F = 0.0343, see appendix II. This meant that the data had serial correlation. In order to correct for heteroskedasticity and autocorrelation, the estimation was done using robust standard errors as postulated by Driscoll and Kraay (1998), Gon Áalves (2011). The fixed effects model was estimated using the robust standard errors and results are in appendix I. Unit root tests were done for each variable and they were found to be stationary.

4.2 Correlation results
Correlation analysis was done to establish the strength of relationship between variables and results are shown below.

Table 1: Correlation results

<table>
<thead>
<tr>
<th></th>
<th>Z_SCORE</th>
<th>C_CAPITAL</th>
<th>CGROWTH1</th>
<th>CGROWTH2</th>
<th>LA_RATIO</th>
<th>PROFIT_B4_TX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z_SCORE</td>
<td>1.0000</td>
<td>0.0562</td>
<td>0.0937</td>
<td>0.0546</td>
<td>-0.0013</td>
<td>0.0768</td>
</tr>
<tr>
<td>C_CAPITAL</td>
<td>0.0562</td>
<td>1.0000</td>
<td>-0.1023</td>
<td>-0.0654</td>
<td>0.1659</td>
<td>0.9636</td>
</tr>
<tr>
<td>CGROWTH1</td>
<td>0.0937</td>
<td>-0.1023</td>
<td>1.0000</td>
<td>0.3163</td>
<td>-0.0482</td>
<td>-0.1134</td>
</tr>
<tr>
<td>CGROWTH2</td>
<td>0.0546</td>
<td>-0.0654</td>
<td>0.3163</td>
<td>1.0000</td>
<td>-0.0332</td>
<td>-0.0810</td>
</tr>
<tr>
<td>LA_RATIO</td>
<td>-0.0013</td>
<td>0.1659</td>
<td>-0.0482</td>
<td>-0.0332</td>
<td>1.0000</td>
<td>0.1803</td>
</tr>
<tr>
<td>PROFIT_B4_TX</td>
<td>0.0768</td>
<td>0.9636</td>
<td>-0.1134</td>
<td>-0.0810</td>
<td>0.1803</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

Z-score was found to be positively to capital, credit growth and profitability and negatively related to bank risk appetite. This means that growth of NPLs is positively influenced by capital, credit growth and profitability. However, bank risk appetite showed inverse relation meaning that increase in bank risk appetite reduced NPLs.
4.3 Regression results

The estimation was done using robust standard errors in FE model. Credit growth for all banks was found to be 28.67% and standard deviation of 0.3189. The minimum value was -70.39% while the highest was 333.44%. Previous studies had indicated that high rates of credit growth directly impacted risk-taking in the banking industry; Kohler (2012), Altunbas, Manganelli and Marques-Ibanez (2011), Foos, Norden and Weber (2010), Jimenez, Lopez and Saurina(2007). This study sought to establish how credit growth affects the level of NPLs in the banking industry in Kenya. The regression analysis was done using Driscoll-Kraay standard errors with a lag of 7 and found that credit growth\(1\) had a positive coefficient of 6.7968 while credit growth\(2\) had a positive coefficient of 2.4248, see appendix I. Null hypothesis for this test was credit growth does not affect the level of NPL among commercial banks in Kenya. At five percent significance level, probability result was found to be 0.043 for \(Cg_1\) and 0.161 for \(Cg_2\), see appendix I. Based on these results, null hypothesis for \(Cg_1\) was rejected and concluded that credit growth1 directly affects the level of NPLs in Kenya. For lagged credit growth (t-2), the null hypothesis was not rejected and therefore concluded that credit growth2 did not affect the level of NPLs in Kenyan banking industry. These findings mean that commercial banks in Kenya are increasing their risk taking as credit grows from one period to the next. This requires commercial banks to establish an optimal level for credit growth to minimize risk-taking and ultimately the level of NPLs.

Aggregate bank capital continued to increase over the period under study and aggregate mean value was 225493 million with standard deviation of 113492. This was as a result of banks’ compliance with regulatory requirements for commercial banks in Kenya. Correlation analysis found that Z-score and core capital had a positive relationship with a 0.0562 coefficient, see table 1 above. Regression analysis found that capital had a positive coefficient of 0.0006632 and a probability value of 0.000, see appendix I. The null hypothesis was capital did not affect the level of NPLs in Kenya. At five percent significance level, the null hypothesis was rejected and concluded that core capital affects the level of risk taking in the banking industry in Kenya. This study results agrees with studies by Allen and Gale (2004), Repullo (2004), Von Thadden (2004), Allen and Santomero (1998), and Koehn and Santomero (1980) who showed that increase in capital lead to increase in risk-taking and ultimately the level NPLs. The study results show that commercial banks in Kenya have responded to mandatory increase in capital to in two main ways; first increase in capital increases banks liquidity and as a result banks are finding themselves with excess cash available to lend. Secondly, in order to generate returns from this excess liquidity, commercial banks in Kenya are accumulating risky loan portfolios which are ultimately increasing the level on NPLs. To tame increase in NPLs, commercial banks need to exercise caution in lending based on soft information, Peterson (2004).

Banks had the highest total loans in the year 2013 which recorded a total loan of KES 1497171 million and the lowest total loans in the year 2006 which had a total loan of KES381540 million. The highest banks’ total assets was also recorded in the year 2013 which had a total asset value of KES 2656639 million and the lowest total asset in the year 2006 which had KES 731998 million. This study found that total loans and total assets in the banking industry in Kenya have been rising in the period under study. Descriptive statistics found out that the mean of bank risk appetite was 0.5038 and standard deviation of 0.1348. The maximum value for the variable was 0.7564 and the minimum was 0.1181. Correlation analysis results show that Z-score and bank risk appetite had a negative coefficient of - 0.0013, see table 1.Regression analysis showed that bank risk appetite had a negative coefficient of -45.53013, see appendix I. The regression estimation was done at five
percent (5%) significance level and results show that bank risk appetite had a probability value of 0.007. The null hypothesis was rejected and concluded that bank risk appetite negatively affected the level of NPLs among commercial banks in Kenya. Altunbas, Manganelli and David (2011) showed a positive relationship between the risk-taking and loans to assets ratio. According to Altunbas et al. (2011) loans to asset ratio is a measure of bank’s asset structure and show to what extent a commercial bank is involved in traditional lending activities. Traditional banking business is a process that involves borrowing for short-term and lending for long, Mishkin and Edwards (1995). The study results means commercial banks in Kenya need to diversify their operations from traditional banking to modern banking activities in order to minimize risk-taking and ultimately lower the level of NPLs in Kenya.

Commercial banks in Kenya have witnessed continued growth in aggregate profitability from KES 84411M in 2006 to KES 411908M in 2013. The mean for bank profitability was 68174 while standard deviation was 35950.25. The lowest profit value was a loss of KES 1534M in 2012 and a maximum profit of KES 18233M in 2013. This study sought to establish how banks respond to increase in profitability in regard to risk-taking. Do commercial banks in Kenya lower lending terms when the profits go up or do they tighten the terms when they make losses? De Nicolo and Loukoianova (2007) and Boyd, De Nicolo and Al Jalal (2006) had showed that there was a positive relationship between market concentration and risk-taking. The correlation analysis found that there was a positive relationship (0.0768) between the Z-scores and banks profitability, see table 1. Regression analysis results show a negative coefficient of -0.0006098. However, the probability value was 0.127, see appendix I. The null hypothesis was not rejected and therefore concluded that banks’ profitability does not affect the level of NPLs in the commercial banking industry in Kenya.

5 Conclusion
This study was done to establish how market structure affected the NPLs among commercial banks in Kenya for period 2006 to 2013. The analysis showed that market structure affects the level of NPLs in the commercial banking industry in Kenya. The study results agrees with some of the previous researchers who found out that less competition among commercial banks increased risk taking. The researchers argued that as the banking market structure changed, banks increased the loan interest rates therefore taking more risks which ultimately lead to riskier loan portfolio. Both small and large commercial banks in Kenya are affected by the market structure forces and have NPLs. Banks’ capital plays critical roles in absorbing risks but introduces moral hazard issues. Commercial banks in Kenya are regulated by the CBK and each bank is required to comply with capital requirements as per legal provisions. Commercial banks with huge capital base may “feel” they are too large to fail and continue to accumulate risky loan portfolio. To reduce the level of NPLs in Kenya, commercial banks have to re-examine the quality of their assets. Both bank risk appetite and credit growth affect the level of NPLs among commercial banks in Kenya and both touch on the banks” assets. Diversification from the traditional banking activities as well as optimal balance between capital growth and lending will yield positive results in minimizing the level of NPLs in Kenya banking industry.

The evidence in this research work has two main conclusions: first; commercial banks in Kenya have to rethink their business models. Overreliance on traditional banking practices are big contributor to banks high level of NPLs. Traditional practices lead to accumulation of risky loan portfolio and hence the growth of NPLs. Risk management in the banking industry needs to be revamped to minimize exposure to NPLs and other
related risks. Secondly, the regulatory capital increase has led to increase in liquidity and commercial banks are trying to lend the excess cash available to generate a return and create wealth for the investors. The increase in capital was meant to cushion banks from shocks in the market but it appears to be exposing the banks to more risks. The regulator should engage with commercial banks in better way to control liquidity and reduce exposure to NPLs.

References
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**Appendix I: Fixed effects model with Driscoll-Kraay standard errors**

Regression with Driscoll-Kraay standard errors  Number of obs = 336  
Method: Fixed-effects regression  Number of groups = 42  
Group variable (i): Bank  F(  5,  7) = 147.68  
maximum lag: 7  Prob> F = 0.0000  
within R-squared = 0.0706

|             Drisc/Kraay |     Coef.   Std. Err.   t    P>|t|   [95% Conf. Interval] |
|------------------------|-------------|----------|------|-------------------|------------------|
| Cap                    | 0.0006632   | 0.0001057|  6.27| 0.000         | 0.0004132-0.0009131 |
| Pbt                    | -0.0006098  | 0.0003527| -1.73| 0.127         | -0.0014437-0.0002241 |
| LA                     | -45.53013   | 12.21974 | -3.73| 0.007         | -74.42523-16.63504 |
| Cg1                    |  6.79468    | 2.753192 |  2.47| 0.043         | 0.284165-13.30494 |
| Cg2                    |  2.424767   | 1.545203 |  1.57| 0.161         | -1.229059-6.078593 |
| _cons                  |  37.4561    | 5.577693 |  6.72| 0.000         | 24.26695-50.64525 |

**Appendix II: Diagnostic tests**

*xttest3*

Modified Wald test for **groupwise heteroskedasticity** in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

\[ \chi^2(42) = 2.5e+05 \]

Prob> \chi^2 = 0.0000  

*xtserial $ylist $xlist*

Wooldridge test for **autocorrelation** in panel data  
H0: no first order autocorrelation  
F(  1,  41) = 4.792  
Prob> F = 0.0343

**Appendix III: Hausman test**

\[
\begin{array}{cccc}
 & \text{(b)} & \text{(B)} & \text{(b-B)} & \sqrt{\text{diag}(V_b-V_B)} \\
\hline
\text{Cap} & 0.0006632 & 0.0002804 & 0.0003827 & 0.000203 \\
\text{Pbt} & -0.0006098 & 4.68e-06 & -0.0006241 & 0.0004923 \\
\text{LA} & -45.53013 & -21.76605 & -23.76408 & 7.509537 \\
\text{Cg1} & 6.79468 & 5.336059 & 1.458621 & 0.7770684 \\
\text{Cg2} & 2.424767 & 1.508223 & 0.916545 & 0.5899138 \\
\end{array}
\]

\[ b = \text{consistent under Ho and Ha; obtained from xtreg} \]

\[ B = \text{inconsistent under Ha, efficient under Ho; obtained from xtreg} \]

Test: Ho: difference in coefficients not systematic

\[ \chi^2(3) = \text{(b-B)}'[(V_b-V_B)^{-1}](b-B) = 10.71 \]

Prob>\chi2 = 0.0134  
(V_b-V_B is not positive definite)
Appendix IV: Random effects estimation

.xtreg $ylist $xlist, re

Random-effects GLS regression
Group variable: Bank

Number of obs = 336
Number of groups = 42

R-sq:
within = 0.0642
between = 0.0009
overall = 0.0068

Wald chi2(5) = 11.40
Prob> chi2 = 0.0439

corr(u_i, X) = 0 (assumed)

| Zscore | Coef. | Std. Err. | z    | P>|z| | [95% Conf. Interval] |
|--------|-------|-----------|------|------|----------------------|
| Cap    | 0.0002804 | 0.0004608 | 0.61 | 0.543 | -0.0006228 - 0.0011836 |
| Pbt   | 4.68e-06 | 0.001113 | 0.00 | 0.997 | -0.0021767 - 0.002186 |
| LA    | -21.76605 | 8.855256 | -2.46 | 0.014 | -39.12203 - 4.410067 |
| Cg1   | 5.336059 | 2.607642 | 2.05 | 0.041 | 0.2251743 10.44694 |
| Cg2   | 1.508223 | 2.375978 | 0.63 | 0.526 | -3.148608 6.165053 |
| _cons | 26.94805 | 4.693281 | 5.74 | 0.000 | 17.74939 36.14671 |

sigma_u | 9.0473595
sigma_e | 12.758985
rho     | 0.33458375 (fraction of variance due to u_i)

Appendix V: Fixed effects estimation

.xtreg $ylist $xlist, fe

Fixed-effects (within) regression
Group variable: Bank

Number of obs = 336
Number of groups = 42

R-sq:
within = 0.0706
between = 0.0055
overall = 0.0032

F(5, 289) = 4.39
Prob> F = 0.0007

corr(u_i, Xb) = -0.4970

| Zscore | Coef. | Std. Err. | t     | P>|t| | [95% Conf. Interval] |
|--------|-------|-----------|-------|------|----------------------|
| Cap    | 0.0006632 | 0.0005036 | 1.32  | 0.189 | -0.0003279 - 0.0016543 |
| Pbt   | -0.0006999 | 0.0011217 | -0.50 | 0.617 | -.0030051 -.0017855 |
| LA    | -45.53013 | 11.61072 | -3.92 | 0.000 | -68.38242 -22.67785 |
| Cg1   | 6.79468 | 2.720962 | 2.50  | 0.013 | 1.439266 12.15009 |
| Cg2   | 2.424767 | 2.448115 | 0.99  | 0.323 | -2.393629 7.243163 |
| _cons | 37.4561 | 5.66919 | 6.61  | 0.000 | 26.29796 48.61424 |

sigma_u | 12.177901
sigma_e | 12.758985
rho     | 0.47671047 (fraction of variance due to u_i)

F test that all u_i=0: F(41, 289) = 5.24
Prob> F = 0.0000