

Effect of Basel Liquidity Rules on the Interbank Money Market Lending Rates in Kenya: A Survey of Commercial Banks in Kenya

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Abstract- Interbank money market plays a major role solving temporary liquidity problems in the financial sector. Because of the importance of interbank this study aims to find out the effects of Basel Liquidity accords on interbank money market lending rates in Kenya. The study investigated particularly the effects of core capital requirement, loan to deposit ratio requirement, reserve requirement and liquidity ratio requirement on interbank lending rate. The study adopted a descriptive survey design. The design is considered suitable as it allows an in-depth study of the challenges effects of Basel liquidity regulations on interbank money market and this data can be collected largely with ease from a variety of people working in commercial Banks. The target population for this study was all commercial banks in Kenya. According to the Central Bank of Kenya (CBK), there are 43 commercial banks, 31 are locally owned and 12 foreign owned. However, one commercial bank which was under receivership for the entire period under study was dropped since it did not participate in interbank money market. The study used census survey of all commercial banks and collected data from CBK and World Bank. Data gathered from the secondary data templates were analyzed quantitatively using E-views. Descriptive statistics such as the mean and standard deviation was used to present the characteristics of the variables under study. Inferential statistics; regression coefficient and bivariate correlation were used to analyze the relationship of the dependent variable and the independent variables which are; core capital requirement, liquidity ratio, reserve requirement and loan to deposit ratio requirement. The findings of the study showed that there was an insignificant relationship between the core capital requirement and interbank lending rates. The findings further revealed that there was a significant relationship between the liquidity ratio requirement and interbank lending rates. The findings also revealed an insignificant relationship between the reserve ratio requirement and interbank lending rates. Finally, the findings showed that there was significant relationship between the loan to deposits ratio requirement and interbank lending rates. The study concluded that Basel regulations on liquidity and loans to deposit ratio affected the interbank lending rate among commercial banks in Kenya. The study recommended that monetary policy makers should carry out appropriate scenario planning and impact assessment to ensure the development of successful capital, liquidity and reserve strategy. Further the study recommended that stakeholders in banking industry should ensure understanding of liquidity positions in sufficient details and possession of knowledge of where the stress points originate to effectively plan in advance.

Index Terms- Interbank money market, Liquidity, Reserve requirements

I. INTRODUCTION

The interbank money market reallocates the liquidity originally supplied by the central bank. One reason for this reallocation is the offset of anticipated and non-anticipated daily liquidity imbalances. Furthermore, banks are motivated to participate in the interbank market for speculative purposes. With a view on the euro area, however, we derive an additional reason for the reallocation: a heterogeneous banking sector. In the euro area, this heterogeneity results from different costs banks face when borrowing from the central bank.

Financial institutions sometimes face an expected or unexpected shortage or surplus on their accounts. Banks are exposed to so-called 'liquidity shocks' arising from unexpected changes in liquidity demand. Allen et al. (2009) distinguish between two types of uncertainty concerning banks' liquidity needs. These unexpected liquidity fluctuations not only affect the banks' liquidity management, but also impact the smooth operations of payments and RTGS systems (Iori et al., 2008). The interbank market is therefore an important place for an efficiently functioning financial system. The interbank market is therefore an important element for an efficiently functioning financial system.

A money market is part of the financial market in which liquid financial assets with short-term disposability are traded. The interest rate and the issuer's credit solvency are the main price determinants of these financial assets, and are their basic sources of price volatility. Interbank money market in developing countries is not properly organized as in developed countries. Vukajlović-Grba, (2007) conducted a study on the money market in Montenegro, his findings showed that the money market in Montenegro is still in its early stages of development, and is characterized by a narrow scope of trading material and by a relatively narrow variety of participants.

South Africa Reserve Bank (2010) conducted a study on the international banking crisis and domestic financial intermediation in emerging market economies in South Africa. The study findings showed that South Africa has not been directly affected by the financial crisis due to a mixture of historical, fundamental and circumstantial factors. In general,

South African financial institutions have had fairly limited exposure to foreign structured finance products, and have been subjected to fairly conservative financial regulation and risk management practices, within the context of sound macroeconomic policies.

Unlike in other developed money markets where interbank loans have different maturity profiles, the market in Kenya only trades funds on an overnight basis, uncollateralized and all in domestic currency. The market is used by banks to smooth out payments as it allows them to clear maturing cash obligations of both customers and other commercial banks as well as provide a source of funds to meet the statutory requirements on cash reserves.

Anecdotal evidence shows that the ability of the interbank market in Kenya to withstand liquidity shocks has been hampered by segmentation of the market. For instance the Safaricom IPO which closed in June 2008 led to acute liquidity crunch after an over. Despite the importance of the interbank market, there is limited research on it in Kenya. Green et al. (2012) studied the interbank market in Kenya and found no segmentation. However, this is inconsistent with what has been observed in Kenya and there is need to explore varied measures of segmentation on the Kenyan interbank market. The aim of this paper is to investigate the effect of Basel liquidity rules on interbank money market lending rates in Kenya.

Currently 41 out of the 43 banks in Kenya trade in the interbank market. Lending and borrowing agreements are not open to all banks but rather there are limited established lines of credit. This is a strong indicator of existence of market segmentation. These lines of credit are created through a credit profiling process that banks conduct on each other i.e. assessing the creditworthiness of the other banks. It is largely done on the basis of, among other factors, size of bank (considering parent company if it is a subsidiary), asset sizes and also ownership (either foreign, local private or local public). Banks with relationship at ownership levels would have open credit lines even if their asset bases are not strong enough. The credit lines establish lending and borrowing limits for other banks both in terms of volumes it can trade and whether or not the bank can actually trade.

In a bid to improve the financial soundness of financial sector, the minimum core capital requirement for banks is set to increase from Kshs 1 billion to Kshs 5 billion by 2018. Strong capital requirements and liquidity base are a necessary condition for banking sector stability reinforced through robust supervisory standards. The Basel Committee has introduced internationally harmonized capital and liquidity standards establishing minimum requirements to promote financial stability globally. These standards have been developed to promote resilience of a bank's liquidity risk profile by ensuring that it has sufficient high quality liquid resources to survive financial stress scenario.

Roughly half of Kenyan banks have less than Kshs 5 billion of equity and will need to increase their core capital. This may lead to some banks either merging or shutting down. Through the interbank money markets small banks can therefore borrow from large banks to meet financial needs hence affecting interbank lending rates. Large banks may take advantage of the small banks since they dictate the interbank money market. The

interbank money market has been highly volatile as shown by the fluctuation of the interbank market lending rates.

The motivating issue of this topic is that volatility may have been partly caused by the implementation of Basel liquidity rules. However, none of the identified studies focus on the impact of Basel Liquidity rules on the interbank money market lending rates in Kenya. Therefore, by focusing on this study makes this study very important to all stakeholders in the banking industry. This study will provide an effective knowledge discovery in the Kenya money market as well as adding knowledge to the available literature. It is for this reason that this study attempted to bridge this gap.

With an efficient interbank market, banks hit by liquidity shocks would have an incentive to borrow from those with surplus liquidity in order to meet liquidity obligations that fall due. This will enable them not to prematurely liquidate interest-earning assets (Duffie *et al.*, 2005). Liquidity available is limited and dependent so much on government deposits. There is limited interconnectedness between banks as has been evidenced in the earlier sections. This is especially the case between the small and large banks. Large banks hold most of the liquidity and thus control activity in the interbank market. The large banks tend to discriminate against relatively smaller banks in terms of credit they can extend to them and the interest rate they charge (usually higher rate than that charged on their peers).

Ngugi (2001) investigated determinants of interbank lending rates spread in Kenya using a profit maximizing model to capture features of the market structure, two of the independent variables under consideration were official policy namely liquidity requirement and core capital requirement. The paper established a co integrating relationship between liquidity requirement and interbank lending rates spread, the result also signaled existence of asymmetry in adjustment, the study notes that the interbank lending rate spread increased because of the increase in liquidity requirement. The study also established the same trend when core capital requirement increases (Ngugi, 2001). Interbank lending rates are an important determinant that provides insight on bank pricing behavior.

The main objective of this study was to investigate the effect of Basel Liquidity accords on interbank money market lending rates in Kenya. The study was aided by the following specific objectives: to establish the effect of core capital requirements on the interbank lending rate, to determine the effect of liquidity ratio requirements on the interbank lending rate, to investigate the effect of reserve requirements on the interbank lending rate and to establish the effect of loan to deposit ratio requirement on the interbank lending rate.

The study focused on the effects of Basel liquidity accords on interbank money market lending rates in Kenya. The study therefore assessed whether core capital requirements, liquidity ratio requirements, minimum reserve requirements and loan to deposit ratio requirements affect the operation of interbank money market in Kenya. The study was conducted in Kenya and the year of study will be 2015. The study focused on all the 43 commercial banks according to the Central Bank of Kenya (CBK) that operate in Kenya

The study was limited in that all the data used in this study were quarterly averages while interbank lending changes on daily basis according to demand. This was one of the delimitation the

study encountered. The study also faced limitations in terms of collecting data on study variables from commercial banks. This was overcome by collecting the quarterly averages from the Central Bank of Kenya.

II. LITERATURE REVIEW

2.1 Empirical Literature

Martynova (2015) in his findings on effect of bank capital requirements on economic growth suggests that under Basel III, banks will face stricter capital requirements implying that the ratio of equity to risk-weighted assets should increase to 8-12% which will in turn have an impact on the bank's engagement in interbank market. The aim of more stringent capital regulation is to increase banks' resilience to future financial downturns. Currently, there is a debate whether such an increase in capital requirements will benefit the economy as a whole. The basic concern is that banks' response to new capital regulation will be to reduce credit and increase lending rates, which may deepen the economic recession. His study findings further states that there is little evidence of a direct effect; research focuses on the indirect effects of capital requirements on credit supply, bank asset risk, and cost of bank capital, which in turn can affect economic growth. Banks facing higher capital requirements can reduce credit supply as well as decrease credit demand by raising lending rates which may slow down economic growth. However, having better capitalized banks enhances financial stability by reducing bank risk-taking incentives and increasing banks' buffers against losses.

Ability of bank to participate as lenders in interbank market depends on bargaining power which is dictated by core capital the bank holds. Allen, Chapman, Shum and Echenique, (2012) in their study showed that bargaining power tilted sharply towards borrowers as the financial crisis progressed, and towards riskier borrowers.

Gambacorta and Mistrulli (2014) conducted a study on effects of liquidity, capitalization, funding structure and the bank-firm relationship on lending rate. The study used descriptive research design. The study findings showed that well-capitalized, liquid banks and those engaged mainly in traditional lending business were insulated from the financial crisis and tend to have low lending rates.

KPMG (2011) conducted a research on issues and implications of Basel III. The study used survey research design. The findings indicate that increased capital requirements will increase cost of funding, and the need to reorganize and deal with regulatory reform which will put pressure on margins and operating capacity. Investor returns will likely decrease at a time when firms need to encourage enhanced investment to rebuild and restore buffers. The report also showed that although the extended implementation time line is intended to mitigate the impact, significant increases to capital and liquidity requirements may lead to a reduction in the capacity for banking activity or, at the very least, a significant increase in the cost of provision of such lending.

Martín-Oliver, Ruano and Salas-Fumás (2012) investigated effects of equity capital on the interest rate and the demand for credit. They used econometric estimations of the determinants of equity capital ratios and lending rates with

simulations of market equilibrium results for loan interest rates and the demand for bank credit, based on a parameterized model of the Spanish banking industry. The findings showed the existence of gap between the target and the actual capital ratio is reduced by around 40% every year, mainly with retained earnings. The study also found that raising the equity capital ratio by one percentage point increases bank lending rates by 4.2 basis points. Finally, the simulation exercise shows that the estimated increase in the cost of funds for banks associated with a one percentage point increase in the equity capital ratio leads to a fall of 0.8% in the total demand for bank credit. These results suggest that the social cost of higher equity capital requirements for banks are expected to be greater in the transition period, when banks are adjusting to the new standards, than in the steady state of the new industry equilibrium, when all banks comply with the new ratio

Liquidity ratio requirement as stipulated Basel III plays a major role in interbank lending. Keister and Bech (2012) conducted a study on the liquidity coverage ratio and monetary policy implementation. The study analysed Basel III introduction of the first global framework for bank liquidity regulation. As monetary policy typically involves targeting the interest rate on interbank loans of the most liquid asset and central bank reserves, it is important to understand how this new requirement will impact the efficacy of current operational frameworks. The study used a standard model of monetary policy implementation in a corridor system to include the new liquidity regulation. Based on the study model, the findings indicated that the regulation does not impair central banks' ability to implement monetary policy, but operational frameworks may need to adjust to accommodate aspect of interbank lending rate.

Bonner and Eijffinger (2012) conducted a study on impacts of the Basel III liquidity coverage ratio (LCR) on unsecured interbank money market. The study combined two unique datasets, the findings showed that banks which are just above/below their short-term regulatory liquidity requirement pay and charge higher interest rates for unsecured interbank loans. The effect is larger for longer maturities. During a crisis, being close to the minimum liquidity requirement induces banks to decrease lending volumes, even when controlling for relationship lending and the solvency of borrowing counterparts. Given the high importance of a well-functioning interbank money market, the results suggest that despite its positive effect on financial stability, the current design of the LCR is likely to dampen the effectiveness of monetary policy.

Bonner (2012) did a study on liquidity regulation, funding costs and corporate lending. The study analyzed the impact of a liquidity requirement similar to the Basel III LCR on banks' funding costs and corporate lending rates. Using a dataset of 26 Dutch banks from January 2008 to December 2011, the study found that banks which are just above/below their quantitative liquidity requirement do not charge higher interest rates for corporate lending. This effect is caused by banks being not able to pass on their increased funding costs in the interbank market to private sector clients, implying that banks do not have pricing power. The results are robust to including demand effects, solvency and loan characteristics. The analysis in this paper suggests that the current design of the LCR is unlikely to have a major impact on corporate lending rates.

Takeda, Rocha and Nakane (2005) discuss the effects reserve requirement has on interbank lending. Disaggregated monthly data of the Brazilian banks balance sheets from December 1994 to December 2001 were analyzed. In addition to the short-term interest rate, the study considered the effects of another monetary policy instrument frequently used in Brazil, represented by reserve requirements on overall banks deposits, demand, savings and time deposits. Dynamic panel data techniques were employed. The results showed that impact of reserve requirements is relevant and stronger for big banks loans. Killick and Mweha (1990) in their study established that CBR, cash reserve ratio, open market operation and uncertainty caused by possible outcomes caused by monetary policy changes influences lending behaviour by commercial banks in Kenya. The finding also suggests that banks with higher stable reserves are likely to participate more in the interbank money market.

Gray (2011) studied the role of reserve stored by commercial banks. His conclusion highlighted three predominant roles of reserve requirements which are prudential, monetary control and liquidity management and suggests best practice for the structure of a reserves regime. If reserve requirement is purposed to manage liquidity then it has a significant role in determination of interbank lending rate as suggested by Gray.

Ma, Xiandong and Xi (2013) conducted a study on the China's evolving reserve requirements. The study findings showed that China's reserve requirement system has also become more complex and been used to address a range of other policy objectives, not least being macroeconomic management, financial stability and credit policy. These finding further illustrates the role reserve requirement play in determining lending rate which encompasses the interbank market lending rate.

Pérez-Forero and Vega (2014) also conducted a study on dynamic effects of reserve requirement. The study quantified the dynamic macroeconomic effects derived from both; shocks to conventional monetary policy and shocks to reserve requirement ratios applied to bank deposits in Peru. The analysis tackles reserve requirements on domestic as well as foreign currency deposits. Structural Vector Autoregressive (SVAR) models were identified through a mixture of zero and sign restrictions for the period 1995-2013. The findings showed Contractionary monetary policy shocks generate a negative effect on aggregate credit and a positive effect on bank spreads between loan and deposit rates. Likewise, shocks to the two reserve requirement ratios produce a negative effect on aggregate credit in their corresponding currencies and a mild effect on both aggregate real economic activity and the price level.

Glocker and Towbin (2012) conducted a study on reserve requirements for price and financial stability. The study investigated the circumstances under which reserve requirements become an appropriate policy tool for price or financial stability. The study considered a small open-economy model with sticky prices, financial frictions, and a banking sector that is subject to legal reserve requirements and computed optimal interest rate and reserve requirement rules. The results indicated that reserve requirements can support the price stability objective only if financial frictions are important and lead to substantial improvements if there is a financial stability objective. Contrary

to a conventional interest rate policy, reserve requirements become more effective determinant of interbank lending rates.

Van den End (2014) studied a macroprudential approach to address liquidity risk with the Loans to Deposits ratio. The study maps the empirical features of the Loans to Deposits ratio with an eye on using it in macroprudential policy to mitigate liquidity risk. The study also inspected the Loans to Deposits ratio trends and cycles of 11 euro area countries by filtering methods and analyzed the interaction between loans and deposits. The study proposed that the trend of the Loans to Deposits ratio is maintained within an upper and lower bound to avoid bad equilibria. To manage the Loans to Deposits ratio between the boundaries then formulated two macroprudential rules. One that stimulates banks to issue retail deposits in an upturn and one that incentivizes banks to create loanable funds to support lending in a downturn, facilitated by a sufficiently long adjustment period. The findings indicated that Loans to Deposits ratio is a core indicator for liquidity mismatch risk. The Loans to Deposits ratio measures the coverage of loans with stable funding, usually deposits from households and non-financial companies. When loans exceed the deposit base, banks face a funding gap for which they have to access interbank markets.

Berg (1998) suggests in his study that less deposit funding and more market funding is widely seen as negative for financial stability. Market funding requires that the bank continually rolls over bill and bond issues and renews borrowings from other financial institutions, in general depending on both domestic and foreign investors. These funding sources have proved to be less stable than customer deposits, and reliance on market funding has thus made the banks' liquidity positions more vulnerable to external shocks. The importance of this vulnerability was evident during the recent financial crisis from 2008. Therefore from the findings loan to deposits ratio is essential as far as maintaining or keeping liquidity in check.

Christensen, Lopez and Rudebusch (2014) in their investigation on whether Central Bank liquidity facilities affect interbank lending rates in US suggested that there was impact of Central Bank actions on lowering the liquidity premiums in terms of interbank rates. Central Bank actions include increasing reserve ratio, adjusting core capital requirements among other actions. Since Central Banks actions resonates with Basel II requirements the authors suggestions imply that there was no significant relationship between Basel Regulations and activities of interbank money market.

A review of literature indicates that several conceptual and contextual research gaps exist. For instance, Martynova (2015) in his findings on effect of bank capital requirements on economic growth suggests that under Basel III banks will face stricter capital requirements implying that the ratio of equity to risk-weighted assets should increase to 8-12% which will in turn have an impact on the bank's engagement in interbank market. The findings of this study do not conclusively reflect factors that influence interbank money market. The current study having a wider scope will effectively give a variety of variables that affect the interbank market in Kenya.

Bonner (2012) conducted a study on liquidity regulation, funding costs and corporate lending and interbank market. The study analyzed the impact of a liquidity requirement similar to the Basel III Liquidity Coverage Ratio (LCR) on banks' funding

costs and corporate lending rates. The study used a dataset of 26 Dutch banks from January 2008 to December 2011. This study does not reflect the effect of liquidity regulation in Kenyan context since this was conducted on Dutch banks. The current study will be conducted in Kenya therefore it is well placed to explain the effects of liquidity regulations on Kenyan interbank market.

Reserve requirement for commercial banks is among the key pillars pivot to bank operations. For instance Glocker and Towbin (2012) conducted a study on reserve requirements for price and financial stability. This kind of study is advantageous to the current economy since it informs the economy players on how a factor that can easily be assumed influences price and financial instability however this study has a number of limitations. Starting from geographical limitations to objective limitation, therefore, this study does not properly explain effects of Basel III accords to interbank markets in Kenya. The current study will explain the topic under study in a better way.

Takeda, Rocha and Nakane (2005) discuss the effects reserve requirement has on interbank lending. This study also doesn't include core capital, liquidity ratio and loans on deposits ratio. Failure to include these variables is a likely indication of the limitations of this study which will be addressed by the current study.

III. RESEARCH METHODOLOGY

This study adopted a descriptive survey design. According to Upagade and Shende (2013) a descriptive survey is mainly concerned with description of facts only. It is a self-report that requires the collection of equitable information from sample (Orodho, 2005). Descriptive survey was appropriate for this study whose intention was to present a situation, what people currently believe in, what people are doing at the moment and so forth (Baumgartner, Strong and Hensley, 2002) with no control of the variables under investigation which is a limitation.

The target population for this study included all commercial banks in Kenya. According to the Central Bank of Kenya (CBK), there are 43 commercial banks, 31 are locally owned and 12 foreign owned. However, one commercial bank which was under receivership for the entire period under study was dropped since it did not participate in interbank money market. Secondary data of the 42 commercial banks in Kenya was collected from the Central Bank of Kenya.

The study conducted a survey on all the commercial banks in Kenya. However, one commercial bank which was under receivership for the entire period under study was dropped since it did not participate in interbank money market.

Secondary data collected using collection template from Central Bank of Kenya was used in this study. Secondary data gathered using the collection templates was analyzed quantitatively using E-views software. Descriptive statistics such as the maximum and minimum, mean and standard deviation was used to capture the characteristics of the variables under study. Inferential statistics; regression coefficient and bivariate correlation was used to analyze the relationship of the dependent variable and the independent variables which are; core capital requirement, liquidity ratio, reserve requirement and loan to deposit ratio requirement.

The hypotheses were tested at confidence interval of 95% therefore decision levels were based on the level of significance of 0.05. The following regression model was used in determination of coefficients of the independent variables in relation to the dependent variable. The multivariate model is as follows;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu$$

Where;

Y = interbank money market lending rates

X₁ = core capital requirement

X₂ = liquidity ratio requirement

X₃ = reserve ratio

X₄ = loan to deposit ratio

μ = Error term

In the model,

β₀ = the constant term.

Coefficient β_i, i= 1...4 was used to measure the sensitivity of the dependent variable (Y) to unit change in the predictor variables.

μ is the error term which captures the unexplained variations in the model.

Time series analysis methodology was used since the data had a time series component (quarters).

IV. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Descriptive statistics of the study variables was conducted to measure the central tendency of the study variables. These measures included mean, median, maximum, minimum, standard deviation, skewness and kurtosis.

From the results it was established that interbank lending rate had a mean of 7.448% during the period of between 2008 and 2014. The maximum and minimum values for interbank lending rate during the same period were 22.07% and 6.81% respectively which were recorded in the 4th quarter in 2011 and 4th quarter in 2010 respectively. Lending rate had a standard deviation of 5.16 and this is an indication of high volatility in interbank lending rate during the study period. The values of skewness indicate that the distribution is right skewed meaning extreme values are found on the right of the distribution while kurtosis indicate that the distribution is leptokurtic implying that its sharper than the normal distribution.

Descriptive analysis of core capital indicates that the mean for core capital requirement for Kenya commercial banks was 18.46% for the period between 2008 and 2014. The minimum core capital requirement expressed as a percentage of risk weighted assets in Kenya is 8%. The maximum and minimum values for core capital requirement were 21.5% and 15% respectively. The distribution of core capital was negatively skewed and platykurtic as shown by the results of skewness and kurtosis.

Liquidity ratio is measured by the ratio of liquid assets to liabilities of the bank. In the period of between 2008 and 2014 commercial banks had a mean liquidity ratio of 39.5%. In the same period the maximum and minimum liquidity ratios

recorded were 47.3% and 29%. The commercial banks recorded lowest liquidity in the 1st quarter of 2008 during financial crisis which provided basis for implementation of Basel II regulation on liquidity. The results also indicate that banks liquidity ratio has been very volatile during the study period.

Loans to deposit ratio is obtained by dividing total loans by total customer deposits. The mean for loans to deposits recorded in the study period was 75.7% while the maximum and minimum values were 86% and 62% respectively. The deviation from the

mean value was also very small as accounted for by the value of the standard deviation. The distribution of the loans to deposits ratio was normal.

Reserve ratio requirement is the minimum fraction of the customer deposits that a bank must not lend out and keep as reserve. The mean of reserve ratio requirement was 20.5% which implies that banks kept 20% of the total deposits as reserves. The maximum and minimum reserve ratio was 22% and 18% respectively. The Central Bank minimum reserve ratio is 5.25%.

Table 4.1 Descriptive Statistics of Study Variables

	INTERBANK LENDING RATE	CORE CAPITAL	LIQUIDITY RATIO	LOANS DEPOSIT RATIO	RESERVE RATIO
Mean	7.45	18.46	39.51	0.76	0.21
Median	6.81	18.70	39.05	0.76	0.21
Maximum	22.07	21.50	47.30	0.86	0.22
Minimum	1.10	15.00	29.00	0.62	0.18
Std. Dev.	5.16	1.57	3.61	0.05	0.01
Skewness	1.37	-0.39	-0.35	-0.32	-0.30
Kurtosis	4.82	2.64	4.26	3.02	1.77
Observations	28	28	28	28	28

4.2 Trend Analysis

This section provides analysis of trends of the study variables across the study period. These quarterly trends were computed using E-views 7. Trends of Lending rates, liquidity ratio requirement, core capital requirement, reserve requirement and finally loans to deposit ratio requirement were analyzed. The findings are presented in the figures below.

4.2.1 Trend Analysis of Lending Rates

The results in the figure below show that the interbank lending rate was about 7% in the 1st quarter of 2008. This was during the 2008 financial crisis where most banks suffered from low liquidity. Therefore, the rate of interbank borrowing and lending was significantly low across the banking sectors worldwide. The results indicate that interbank lending rates decreased reaching its lowest in the 1st quarter of 2011. During this period most banks were recovering from liquidity shocks from the financial crisis and also commercial banks were implementing the Basel II regulation which came into place in

2008. Basel II, initially published in June 2004, was intended to amend international standards that controlled how much capital commercial banks needed to hold to guard against the financial and operational risks banks face. These rules sought to ensure that the greater the risk to which a bank is exposed, the greater the amount of capital the bank needs to hold to safeguard its solvency and economic stability (Yetis, 2008). Basel II attempted to accomplish this by establishing risk and capital management requirements to ensure that a bank has adequate capital for the risk the bank exposes itself to through its lending, investment and trading activities. One focus was to maintain sufficient consistency of regulations so as to limit competitive inequality amongst internationally active banks (Yetis, 2008).

Interbank lending rates steadily increased from 2011 reaching the highest level of about 22% in first quarter of 2012. The increase was later followed by a fall in interbank lending in the period of between December 2011 and December 2012. The interbank lending rate remains stable form 2012 to 2014 as shown in the results below.

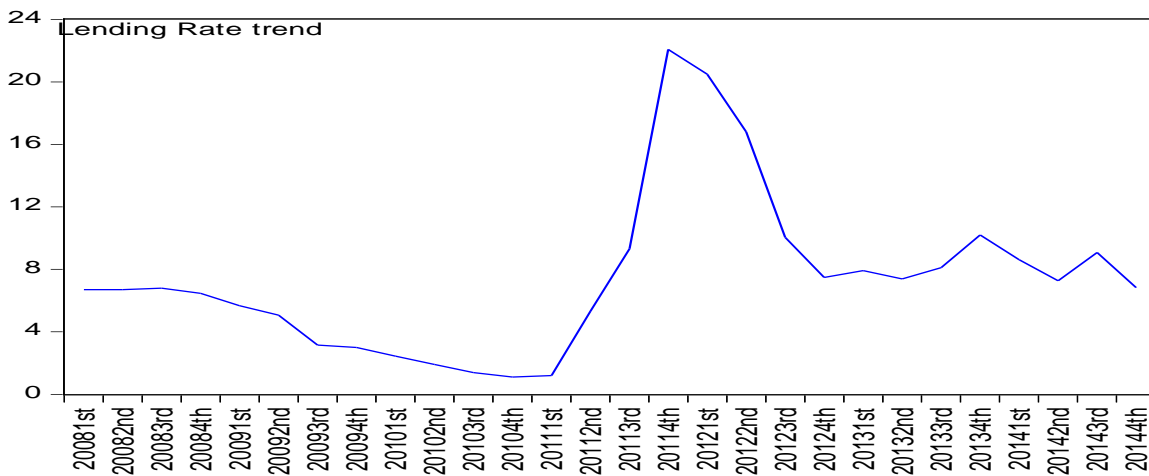


Figure 4.1 showing trends in interbank lending rate between 2008 and 2014

4.2.2 Trend Analysis for Liquidity Ratio Requirement

The results indicate that the liquidity ratio of commercial banks in Kenya was increasing from 2008 to 2014. The liquidity ratio was lowest during the 2008 at about 29% and this can be attributed to 2007 to 2008 financial crisis that affected the financial sector worldwide. After the 1st quarter of 2008 the

liquidity ratio increased exponentially to about 42% up to the 4th quarter of 2008 thereafter reduced to about 37% in the 4th quarter of 2008. The liquidity ratio in commercial banks reached its highest in 2010 before it fell to about 36% in 2011. The trend also shows a high peak in 2013 and consequent decrease in subsequent years.

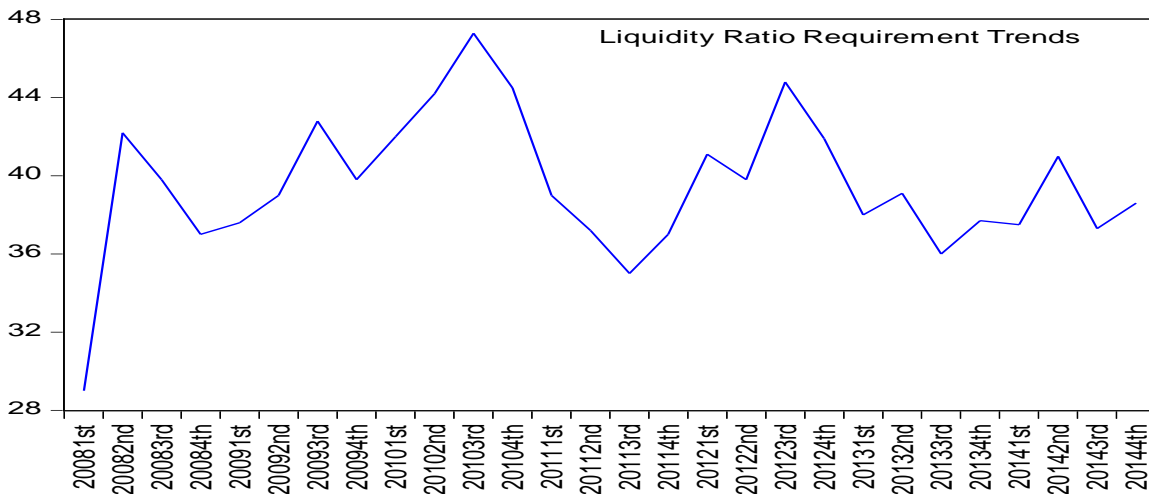


Figure 4.2 Trends for Liquidity Ratio Requirement between 2008 And 2014

The study found that the liquidity of commercial banks in Kenya was fluctuating over the years. According to Vinals et al. (2010), the essence of the requirement for liquid assets lies on the foundation that pressures faced by banks are in line with customer deposits'. Banks are expected to have a lot more assets in liquid for covering liabilities for wholesale that mature in thirty days as opposed to deposits done in retail. This is because liabilities done in wholesale have less stability compared to deposits of retail. To meet the liquidity requirements, banks participate in the interbank money market where banks with high liquids become lenders to those with low liquids.

4.2.3 Trend Analysis for Reserve Ratio Requirement

An assessment of the average reserve ratio requirement of commercial banks in Kenya was conducted. Figure 4.3 shows the quarterly trend of reserve ratio requirement of commercial banks. The findings indicate that reserve ratio was volatile during the period of study. The reserve ratio requirement was lowest in 2008 with a slight shock in the last quarter of 2008 before steadily increasing in the following year. Reserve ratio requirement remained volatile for the remaining years of the study period.

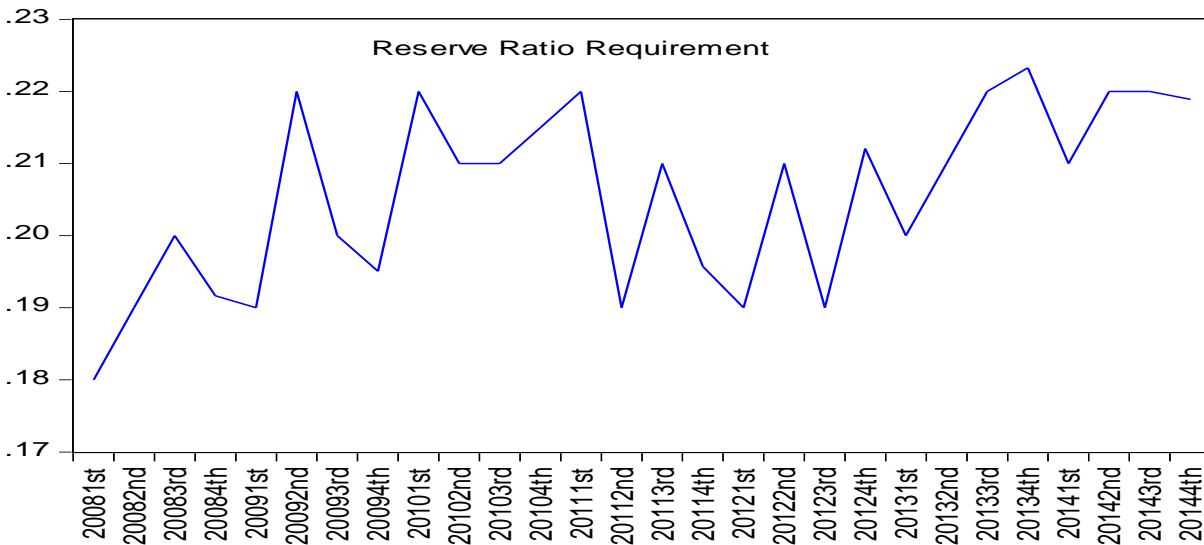


Figure 4.3 Trends for Reserve Ratio Requirement between 2008 And 2014

Tesfai, (2015) study also found out that capital adequacy of Kenyan commercial banks was fluctuating in the years from 2008 to 2014. The highest figure was in 2010 (55.7%) and the lowest figure was in 2014 (29.10). The study also found that there is a positive significant relationship between capital adequacy ratio and lending rate. According to Greuning and Sonja (2003), capital adequacy is measured in commercial banks in relation to the relative risk weight whose assignment is on a dissimilar assets category which is held on along with off in controlling the incentives, taking on excessive as well as for the absorption of reasonable amounts of losses. Exposure to credit occurs at the time of bank's activity of lending money to a willing borrower or buying financial-based assets like commercial bills which any company or a bank would issue.

4.2.4 Trend Analysis for loans-to-deposit ratio requirement

The trend analysis indicates that loans to deposits had been fluctuating over the years. The highest loans to deposit ratio was experienced in 2008 which coincides with the time when the financial sector was hit by a liquidity crisis. The loan-to-deposit (LTD) ratio of the Kenyan banking industry has risen significantly in recent years, reflecting a change in domestic liquidity conditions, from previously an overly abundant level to a more normal level. The impact on different types of domestic interest rates varied.

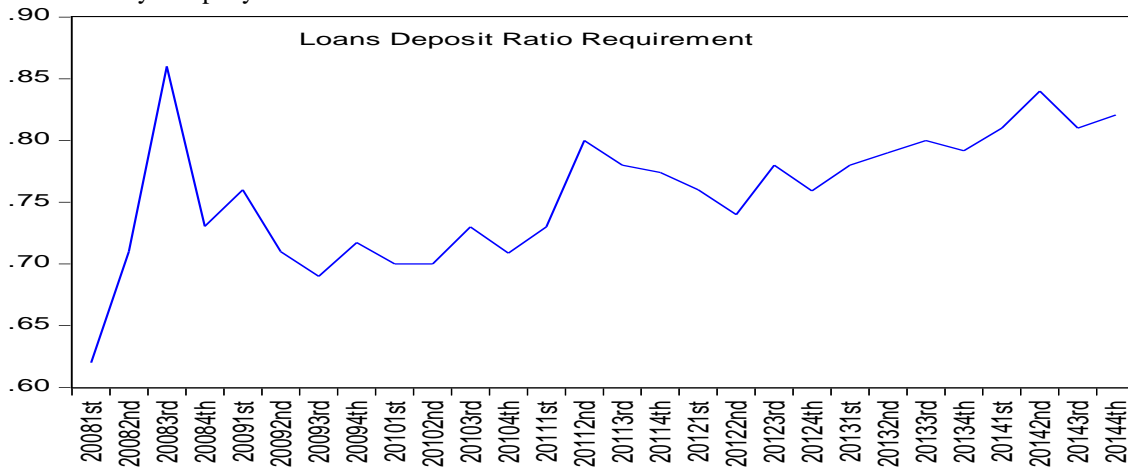


Figure 4.4 Trends for Loan to Deposits Ratio between 2008 And 2014

Domestic transmission of financial shocks is the subject of several studies in the banking literature. One of the channels identified is the transmission of liquidity shocks from large banks' balance sheets to small bank's lending activity. Previous studies find that small banks rely heavily on the use of capital that may result in propagation of domestic liquidity shocks and reduced lending (Peek and Rosengren, 2000). Recent research that investigates

the influence of the loans to deposit ratio on interbank lending rate on commercial banks confirms the existing results and documents that commercial banks with reduced low loan to deposits ratio indeed reduced their lending (Popov and Udell, 2010).

4.2.5 Multiple Trend Analysis for Study Variables

A multiple trend analysis was conducted to see the variation in the trend for all the study variables. The figure

indicates as the liquidity ratio decreases the interbank lending rate increases. For instance between 2010 and 2011 there was a fall in liquidity ratio which coincided with an increase in interbank lending rate. Similarly, the trend indicates that there exist a relationship between loan to deposit ratio and interbank lending rate. When commercial banks have high deposit compared to loans disbursed this will imply that the banks will

have enough liquidity and hence will participate less in the interbank money market. Less participation in the interbank money market will imply that the interest rates charge will also have to reduce in line with the theory of demand. From the figure core capital requirement and reserve ratio requirements do not exhibit any kind of significant relationship.

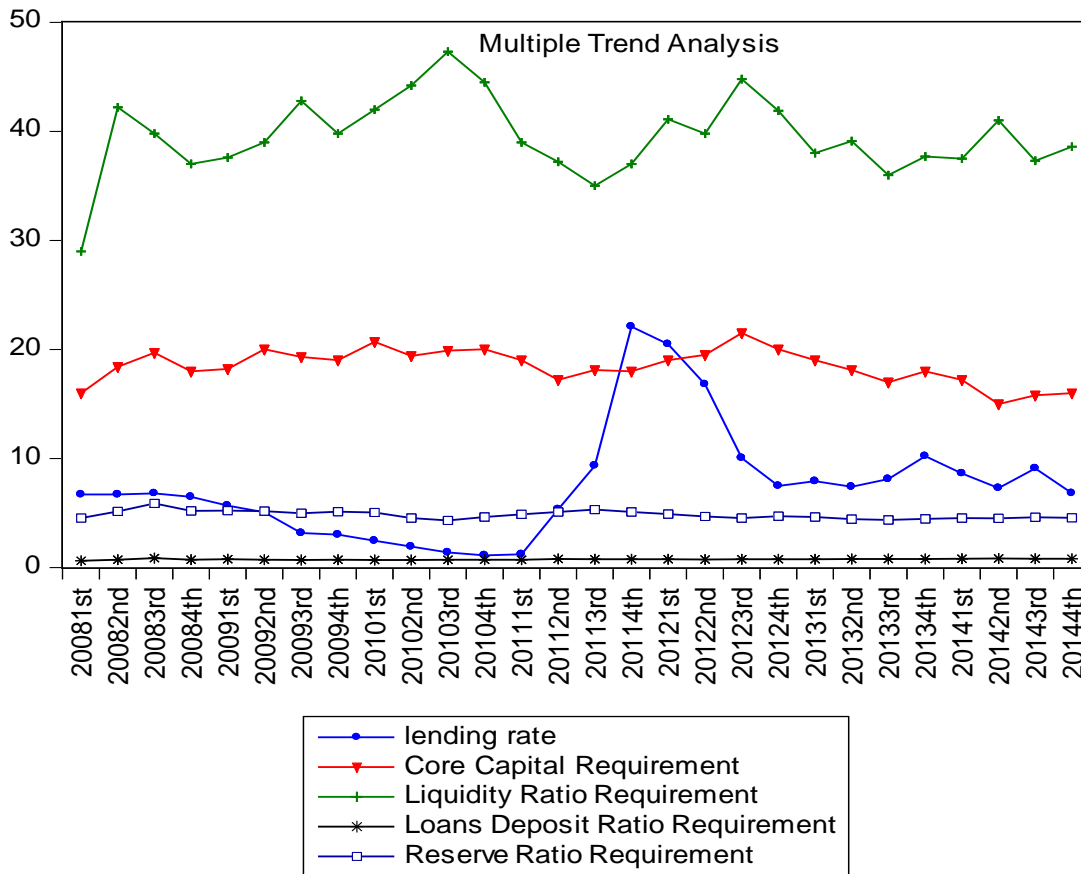


Figure 4.5 Multiple Trends study variables between 2008 and 2014

4.3 Inferential Statistics

Correlation and regression tests were conducted to ascertain the relationship between independent variables and dependent variable. The results of these tests are presented in the section below.

4.3.1 Correlation Test

The results of correlation indicate that there was a strong correlation between interbank lending rate and both loan to deposit ratio (0.26) and liquidity ratio (0.308) as compared to other variables. Further the findings show that the association between interbank lending rate and liquidity ratio was negative. This implies that when liquidity reduces it will have a

corresponding increase on the interbank lending rate since banks with liquidity shocks will borrow in the interbank money market to increase their liquidity. On the other hands, the findings indicate that loans to deposits ratio has a positive association with interbank lending rate. A higher loan to deposit ratio imply that loans are higher than the deposits which further implies that bank with higher loans than deposits will be more exposed to liquidity shocks hence they may borrow from the interbank money market to cushion against the liquidity shocks. More borrowing from the interbank money market will lead to increased lending rates due to increased demand. The association between interbank lending rate and core capital and reserve was weak as shown by the finding in Table 4.2 below.

Table 4.2 Correlation Test

	LENDING RATE	CORE CAPITAL	LIQUIDITY RATIO	LOANS DEPOSIT	RESERVE RATIO
LENDING RATE	1				
CORE CAPITAL	-0.1446	1			
LIQUIDITY RATIO	-0.2652	0.628	1		
LOANS DEPOSIT RATIO	0.3084	-0.323	-0.036	1	
RESERVE_RATIO	0.0277	0.223	-0.130	0.029	1

4.3.2 Regression Analysis

The study used ordinary least squares regression model to test the relationship between independent variables and dependent variables. The results of the regression analysis are shown in table 4.3 below.

Table 4.3 Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CORE CAPITAL REQUIREMENT	0.922551	0.521451	1.769199	0.0901
LIQUIDITY RATIO REQUIREM	-0.63058	0.220091	-2.86507	0.0088
LOANS DEPOSIT RATIO REQU	37.64141	10.47388	3.593835	0.0015
RESERVE RATIO REQUIREMEN	1.460388	2.1305	0.685467	0.4999
C	6.10975	13.94541	0.43812	0.6654

Optimal Model;

Interbank Lending Rate = 6.10975 + 0.922551 (Core Capital Requirement) - 0.63058 (Liquidity Ratio) + 37.64141 (Loans To Deposits ratio) + 1.460388 (Reserve Ratio) +μ

Model Summary

The results in the model show that independent variables accounts for 19.24% of the variation in dependent variable. The results of F-statistics also show that the model used to test the relationship between independent variables and dependent variable was significant.

Core Capital Requirement

Regulators use the Tier 1 capital ratio to grade a firm's capital adequacy as one of the following rankings: well-capitalized, adequately capitalized, undercapitalized, significantly undercapitalized, and critically undercapitalized. A firm must have a Tier 1 capital ratio of 6% or greater, and not

pay any dividends or distributions that would affect its capital, to be classified as well-capitalized. Firms that are ranked undercapitalized or below are prohibited from paying any dividends or management fees. In addition, they are required to file a capital restoration plan. This study sought to find out whether this core capital requirement affected interbank lending rates and the findings showed that there was an insignificant relationship ($B=0.922551$ $p=0.0901$) between the core capital requirement and interbank lending rates.

The findings of this study do not agree with those of Martín-Oliver, Ruano and Salas-Fumás, (2012) who investigated effects of equity capital on the interest rate and the demand for credit. The study found that raising the equity capital ratio by one percentage point increases bank lending rates by 4.2 units. Woo (2003) also found out that shortage of bank capital caused credit slowdown in Japan in 1997.

Liquidity Ratio Requirement

This is a central bank regulation employed by most of the world's central banks, that sets the minimum fraction of customer deposits and notes that each commercial bank must hold as reserves in line with the Basel Regulation. The study sought to find out if such requirement on liquidity affects the interbank's lending rate. The findings indicate a negative and significant relationship ($B=0.630576$, $p=0.0088$) between liquidity ratio requirements and interbank lending rate. This implies that when deposits retained by the banks is high bank will have more liquidity hence reducing dependency on interbank money market therefore reduction in demand will cause a reduction in lending rates.

These findings concur with those of Mags (2010) who assessed the macroeconomic impact of tighter capital and liquidity requirements during the transition phase. The study findings showed that under tight liquidity regulation banks will seek to improve their efficiency and therefore cutting non-interest expenses, which in turn might lower the lending spreads. On the other hand, the increased demand for liquid assets could possibly increase the price and therefore the costs to meet the liquidity rules.

Christensen, Lopez and Rudebusch, (2014) also conducted a study to investigate whether Central Bank liquidity facilities affected interbank lending rates in United States of America. The study findings showed that central bank liquidity operations did help to lower term interbank lending rates. Christensen, Lopez and Rudebusch, (2014) findings contradict the finding of the current study. This disparity may be as result of different economic environment.

Loans to Deposit Ratio

The loan-to-deposit (LTD) ratio of the Kenyan banking industry has risen significantly in recent years. If the ratio is too high, it means that banks might not have enough liquidity to cover any unforeseen fund requirements; if the ratio is too low, banks may not be earning as much as they could be. These ratios are used by policy makers to determine the lending practices of financial institutions. The study sought to investigate whether LTD ratios affect interbank lending rates and the findings indicate that there was a positive significant relationship ($B=37.64141$, $p=0.0015$) between interbank lending rate and LTD. Compared to other variables in the study LTD accounted for most variation in interbank lending rates. The result implies that a unit change in LTD requirement will cause a change of 37.64 units in interbank lending rate.

The findings of this study concur with those of Van den End, (2014) who studied a macro prudential approach to address liquidity risk with the Loan-to-Deposit ratio. The findings showed that when loans exceed the deposit base, banks face a funding gap for which they have to access interbank markets. So a high funding gap implies a high dependence on interbank market funding, which can be more volatile and/or expensive than retail funding, in particular if it concerns unsecured market funding.

Similarly Wong and Wong, (2012) study on the effects of the loan-to-deposit ratio of the Hong Kong banking sector on domestic interest rates indicated that tighter liquidity conditions, measured by a higher Hong Kong dollar LTD ratio, would exert upward pressures on local interest rates. Berg (1998) also

suggested that less deposit funding and more market funding was widely seen as negative for financial stability. These funding sources have proved to be less stable than customer deposits, and reliance on market funding has thus made the banks' liquidity positions more vulnerable to external shocks. The importance of this vulnerability was evident during the recent financial crisis from 2008. Therefore from the findings loan to deposits ratio is essential as far as maintaining or keeping liquidity in check. LTD directly has a significant on interbank money market.

Reserve Ratio Requirement

Reserve ratio is a fraction of total deposits that commercial banks are not supposed to lent out but keep as reserves. This study sought to find out whether reserve ratio requirement affect interbank lending rates. The findings in Table 4.3 above show that reserve ratio was insignificantly ($B=1.460388$, $p=0.4999$) related to interbank bank lending rates for the period of between 2008 and 2014.

The findings of this study disagree with those of Killick and Mwege (1990) whose finding suggested that banks with higher stable reserves are likely to participate more in the interbank money market. Takeda, Rocha and Nakane, (2005) also studied the effects reserve requirement has on interbank lending. The results suggested that the impact of reserve requirements is relevant and stronger for larger banks loans.

4.4 Chapter Summary

This chapter provided data analysis, results presentation and discussion of the major findings. The results in this chapter were presented in forms of tables and figures. The findings of the study showed that liquidity ratio and loans to deposits was significantly related to interbank lending rate while core capital and reserve ratio was insignificantly related to interbank lending rate.

V. SUMMARY, CONCLUSIONS & RECOMMENDATIONS

5.1 The Summary of Major Findings

This section provides a summary of key findings of the study. The summary is provided based on the study objectives.

5.1.1 Core Capital Requirements and Interbank Lending Rate

The study sought to establish the effects of core capital requirements on the interbank lending rate in Kenya banking industry. The findings of regression analysis showed that there was an insignificant relationship ($B=0.922551$ $p=0.0901$) between the core capital requirement and interbank lending rates. Similarly correlation showed that there is a negative association between interbank lending rate and core capital requirement.

The findings of this study do not agree with those of Martín-Oliver, Ruano and Salas-Fumás, (2012) who investigated effects of equity capital on the interest rate and the demand for credit. The study found that raising the equity capital ratio by one percentage point increases bank lending rates by 4.2 units. Woo (2003) also found out that shortage of bank capital caused credit slowdown in Japan in 1997.

5.1.2 Liquidity Ratio Requirements and Interbank Lending Rate

The study sought to establish the effects of liquidity ratio requirements on the interbank lending rate in Kenya banking industry. The findings of regression analysis showed that there was a significant relationship ($B=-0.630576$, $p=0.0088$) between the liquidity ratio requirement and interbank lending rates. Similarly correlation showed that there a negative association between interbank lending rate and liquidity ratio requirement.

These findings concur with those of Mags (2010) who assessed the macroeconomic impact of tighter capital and liquidity requirements during the transition phase. The study findings showed that under tight liquidity regulation banks will seek to improve their efficiency and therefore cutting non-interest expenses, which in turn might lower the lending spreads. On the other hand, the increased demand for liquid assets could possibly increase the price and therefore the costs to meet the liquidity rules.

Christensen, Lopez and Rudebusch, (2014) also conducted a study to investigate whether Central Bank liquidity facilities affected interbank lending rates in United States of America. The study findings showed that central bank liquidity operations did help to lower term interbank lending rates. Christensen, Lopez and Rudebusch, (2014) findings contradict the finding of the current study. This disparity may be as result of different economic environment.

5.1.3 Reserve Ratio Requirements and Interbank Lending Rate

The study sought to establish the effects of reserve ratio requirements on the interbank lending rate in Kenya banking industry. The findings of regression analysis showed that there was an insignificant relationship ($B=1.460388$, $p=0.4999$) between the reserve ratio requirement and interbank lending rates. Similarly correlation showed that there is a positive association between interbank lending rate and reserve ratio requirement.

The findings of this study agree those of Killick and Mwea (1990) whose finding suggested that banks with higher stable reserves are likely to participate more in the interbank money market. Takeda, Rocha and Nakane, (2005) also studied the effects reserve requirement has on interbank lending. The results suggested that the impact of reserve requirements is relevant and stronger for larger banks loans.

5.1.4 Loan to Deposits Ratio Requirements and Interbank Lending Rate

The study sought to establish the effects of loan to deposits ratio requirements on the interbank lending rate in Kenya banking industry. The findings of regression analysis showed that there was significant relationship ($B=37.64141$, $p=0.0015$) between the loan to deposits ratio requirement and interbank lending rates. Similarly correlation showed that there is a strong positive association between interbank lending rate and loan to deposits ratio requirement.

The findings of this study concur with those of Van den End, (2014) who studied a macro prudential approach to address liquidity risk with the Loans to Deposits ratio. The findings showed that when loans exceed the deposit base, banks face a funding gap for which they have to access interbank markets. So a high funding gap implies a high dependence on interbank market funding, which can be more volatile and/or expensive

than retail funding, in particular if it concerns unsecured market funding.

Similarly Wong and Wong, (2012) study on the effects of the loan-to-deposit ratio of the Hong Kong banking sector on domestic interest rates indicated that tighter liquidity conditions, measured by a higher Hong Kong dollar Loans to Deposits ratio, would exert upward pressures on local interest rates. Berg (1998) also suggested that less deposit funding and more market funding was widely seen as negative for financial stability. These funding sources have proved to be less stable than customer deposits, and reliance on market funding has thus made the banks' liquidity positions more vulnerable to external shocks. The importance of this vulnerability was evident during the recent financial crisis from 2008. Therefore from the findings loan to deposits ratio is essential as far as maintaining or keeping liquidity in check. Loans to Deposits ratio directly have a significant on interbank money market.

5.2 Conclusions

Based on the major findings of the study the study concluded that in Kenyan banking industry core capital requirement have insignificant relationship with interbank lending rates. The study further concluded that liquidity ratio requirement and loans to deposits requirement have a significant relationship with interbank lending rate. From the study findings, it was concluded that reserve ratio requirement insignificantly affect interbank lending rate. The findings of the study show that Basel regulations on liquidity and loans to deposit ratio affected the interbank lending rate among commercial banks in Kenya.

5.3 Recommendations

Banking industry should ensure they understand liquidity and risk management in sufficient details to effectively plan in advance. Commercial Banks should mobilize long-term stable funds as opposed to relying on short-term less stable funds from the interbank money markets. Stakeholders in the banking industry should check that liquidity planning, governance and modeling are in line with leading industry practice. Stakeholders in banking industry should also ensure that Basel regulations are implemented for new business and consider how old ones should be revisited.

5.4 Areas for Further Studies

The study sought to determine the effects of Basel regulation on the interbank lending rates of commercial banks in Kenya and therefore the study recommends that a similar study can be done on bank performance with emphasis on examining other variables such as; the state of return on equity, money markets, and other variables not included in this study. Due to the increasing number of banks there is need for further research to carry out a case study on effects of Basel regulation on a specific bank for comparison purposes. Similarly this study can also be done to take into account the other Sub-Saharan African countries.

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APPENDICES

Appendix I: Introduction Letter

Date.....

Dear Sir,

RE: VOLUNTARY PARTICIPATION IN DATA COLLECTION

My name is Daniel Mburu Ngata, MBA (Finance) student from Jomo Kenyatta University of Agriculture and Technology. I am conducting a study on the effects of Basel Liquidity regulations framework on interbank lending rate in Kenya. Your feedback and views on this topic will help in compiling my research. The data collected is for research purposes only which should take no more than 15 minutes of your time. All responses received are anonymous and information collected will not be distributed to any other party.

Thank you for taking time to complete this survey.

Yours Sincerely,

Daniel Mburu Ngata

Appendix II: Secondary Data template

Quarterly data	Core Capital	Liquidity Ratio	Reserve Ratio	Loans Deposit Ratio	lending rate
20081st	16	29	0.18	0.62	6.7
20082nd	18.4	42.2	0.19	0.71	6.7
20083rd	19.7	39.8	0.2	0.86	6.8
20084th	18	37	0.19	0.73	6.47
20091st	18.2	37.6	0.19	0.76	5.67
20092nd	20	39	0.22	0.71	5.07
20093rd	19.3	42.8	0.2	0.69	3.15
20094th	19	39.8	0.20	0.72	3.00
20101st	20.7	42	0.22	0.7	2.45
20102nd	19.4	44.2	0.21	0.7	1.91
20103rd	19.9	47.3	0.21	0.73	1.39
20104th	20	44.5	0.21	0.71	1.10
20111st	19	39	0.22	0.73	1.21
20112nd	17.2	37.2	0.19	0.8	5.33
20113rd	18.1	35	0.21	0.78	9.32
20114th	18	37	0.20	0.77	22.07
20121st	19	41.1	0.19	0.76	20.49
20122nd	19.5	39.8	0.21	0.74	16.80
20123rd	21.5	44.8	0.19	0.78	10.05
20124th	20	41.9	0.21	0.76	7.48
20131st	19	38	0.2	0.78	7.91
20132nd	18.1	39.1	0.21	0.79	7.39
20133rd	17	36	0.22	0.8	8.10
20134th	18	37.7	0.22	0.79	10.20
20141st	17.2	37.5	0.21	0.81	8.62
20142nd	15	41	0.22	0.84	7.27
20143rd	15.8	37.3	0.22	0.81	9.08
20144th	16	38.6	0.22	0.82	6.83

Appendix III: Regression Results

Dependent Variable: LENDING_RATE

Method: Least Squares
 Date: 09/18/15 Time: 10:43
 Sample: 1 28
 Included observations: 28
 White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CORE_CAPITAL_REQUIREME				
NT	0.922551	0.521451	1.769199	0.0901
LIQUIDITY_RATIO_REQUIRE				
M	-0.630576	0.220091	-2.865072	0.0088
LOANS_DEPOSIT_RATIO_REQ				
U	37.64141	10.47388	3.593835	0.0015
RESERVE_RATIO_REQUIREM				
EN	1.460388	2.130500	0.685467	0.4999
C	-6.109749	13.94541	-0.438119	0.6654
R-squared	0.192434	Mean dependent var	7.448230	
Adjusted R-squared	0.151987	S.D. dependent var	5.164081	
S.E. of regression	5.028057	Akaike info criterion	6.228377	
Sum squared resid	581.4711	Schwarz criterion	6.466270	
Log likelihood	-82.19727	Hannan-Quinn criter.	6.301103	
F-statistic	11.37058	Durbin-Watson stat	1.999426	
Prob (F-statistic)	0.004500			

Appendix IV: Descriptive Analysis Table

	INTERBANK LENDING RATE	CORE CAPITAL	LIQUIDITY RATIO	LOANS DEPOSIT RATIO	RESERVE RATIO
Mean	7.448230	18.46429	39.50714	0.757215	0.205772
Median	6.813760	18.70000	39.05000	0.760000	0.210000
Maximum	22.07452	21.50000	47.30000	0.860000	0.223272
Minimum	1.102963	15.00000	29.00000	0.620000	0.180000
Std. Dev.	5.164081	1.566363	3.606776	0.052909	0.012689
Skewness	1.369724	-0.392796	-0.348431	-0.315519	-0.295305
Kurtosis	4.822879	2.641392	4.258161	3.021400	1.773214
Jarque-Bera Probability	12.63204 0.001807	0.870048 0.647249	2.413350 0.299190	0.465111 0.792506	2.162795 0.339121
Sum	208.5505	517.0000	1106.200	21.20203	5.761618
Sum Sq. Dev.	720.0289	66.24429	351.2386	0.075584	0.004347
Observations	28	28	28	28	28