

**EFFECT OF MACROECONOMIC FACTORS ON COMMERCIAL BANKS
LIQUIDITY IN KENYA**

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DECLARATION

I, the undersigned, declare that this is my original work and that it has not been submitted to any other college, institution or university other than the University of Nairobi for academic credit.

Signed _____

Date _____

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APPROVAL

Supervisor

This project has been presented for examination with my approval as the appointed supervisor

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ABSTRACT

The study aimed at establishing the effect of macroeconomic factors on commercial banks liquidity in Kenya for the period 2005-2017 and controlling for a few bank specific factors. To do so, the study used a sample of 30 commercial banks that had traded consistently for the entire study period. The study use a panel regression model to determine the effects of macroeconomic variables on liquidity. Through a random effect model, the study found that cost of funds, loan loss provisions interest rates, inflation rates, and profitability positively influenced liquidity while gross domestic product negatively influenced the liquidity of commercial banks in Kenya. The study concluded that bank managers and policymakers have to always consider both macroeconomic and bank specific factors in making liquidity related decisions.

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CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

Commercial bank liquidity refers to the ratio of liquid assets to customer deposits and short-term funding (Delechat, et al., 2014). Commercial bank liquidity is also defined as the ratio of banks liquid assets to its total assets. Commercial bank liquidity is crucial because it enables banks to carry out its functions and particularly helps banks to meets its obligations in cases of expected or unexpected monetary demands by clients (Singh & Sharma, 2016).

Prudent management of bank liquidity is critical for the proper functioning of a financial system in an economy. In policy circles, liquidity in commercial banks is considered a channel for facilitating financial intermediation process by providing loans to illiquid borrowers and liquidity on demand to depositors (Diamond & Rajan, 2001). Liquidity in banks is important since it can help in transforming illiquid assets into the liquid through demand deposits thus providing liquidity insurance to depositors(Diamond & Dybvig, 1983). Banks liquidity can act as a mechanism for monetary policy transmission that is aimed at influencing economic activity in the economy. It is also an important indicator of stability in the financial system since it measures the ability of banks to fund their purchases and meet their obligations (Agenor & El Aynaoui, 2010).

The role of sound and properly managed bank liquidity in the financial system can, however, be hampered in the events of crisis where banks liquidity dries up due to bank runs and huge demand of liquidity by borrowers (Diamond & Dybvig, 1983). This is because banks in a financial system tend to be interconnected and that liquidity problems in one bank can have a contagion effect to the entire financial system thereby inhibiting monetary policy ability to affect economic activity.

Over a decade, the debate on the importance of bank liquidity on the economy was renewed as a result of the 2008 global financial crisis¹. The US originated financial crisis exposed the lapses of the principles of sound bank liquidity risk management that led to profound difficulties² in many

¹This was a US generated financial crisis that led to the crash of credit quality of US subprime residential mortgages.

²Vodova (2012) asserts that 2008 financial crisis led to some banks being forced into mergers as others required resolution.

banks around the world (Bank for International Settlements, 2010). Owing to the debilitating effects of the 2008 financial crisis on banks liquidity, financial sector, and the entire economy, policymakers initiated a number of policy regulatory framework that would help mitigate banks liquidity crisis. The Case in point being the 2010 Basel III framework crafted by the Basel Committee on Banking Supervision (BCBS) that required banks to have liquidity buffers that would help avert a crisis (BCBS, 2010; De Waal, et al., 2013). In Kenya, a minimum liquidity ratio of 20 percent was required to be observed at all times by all commercial banks (CBK, 2013).

The role of macroeconomic environment in explaining banks liquidity is not yet well understood particularly in Kenya, empirical evidence indicates that the banking liquidity crisis can be caused by a bank-specific factor (Roman and Sargu, 2015), macroeconomic factors (Aspachs, Nier and Tiesset, 2005; Trenca, Petria and Corovei, 2015) or a combination of both (Singh and Sharma, 2016). With respect to macroeconomic factors, it is considered that macroeconomic factors play a substantive role in explaining commercial banks liquidity management and crisis. Cornett et al., (2011) observes that banks liquidity crisis can be caused by a systemic increase in demand for liquidity from borrowers and withdrawals from depositors as well as effects from the external market conditions. Similarly, Llewellyn (2002) notes that macroeconomic factors can lead to a liquidity crisis since banks often act as a linkage of numerous economic activities in an economy. The evidence further indicates that macroeconomic factors and commercial banks liquidity can be countercyclical (Aspachs et al., 2005). Aspachs et al., (2005) observes that banks are likely to hold higher liquidity buffers during the period of low economic growth as opposed to a period of higher economic growth.

Acharya and Naqvi (2012) also similar evidence on the critical role of macroeconomic factors on bank liquidity. Acharya and Naqvi (2012) observe that in cases of high macroeconomic risks, bank liquidity tends to be high since investors tend to avoid direct risky investments and therefore consider depositing their money with banks since it is considered safe. Singh and Sharma, (2016) also argue that GDP which acts as a proxy for economic performance and inflation significantly affects banks liquidity. In Kenya, on the concept of commercial banks liquidity, studies have either examined the effects of bank capitalization on liquidity (Bowa, 2015), financial performance (Maaka, 2013) or the determinants of bank liquidity risk from bank-specific perspective. To my

knowledge, studies that examine the effects of macroeconomic factors on commercial bank liquidity in Kenya are scarce. This study, therefore, sought to fill this knowledge gap.

1.1 Overview of Kenya's Banking Sector

Kenya's banking sector is the most advanced compared to its counterparts in East Africa (Alter and Yontcheva, 2015). Kenya's banking sector comprises of CBK as regulatory body, forty-three commercial banks, 13 microfinance banks (MFBs), three credit reference bureaus (CRBs), seventy-seven foreign exchange bureaus and seventeen money remittance providers (MRPs). Of the 40 privately owned commercial banks, twenty-five were domestically owned while fifteen were foreign-owned (CBK, 2016). Further, Kenya's banking sector is overseen by the CBK Act, Companies Act, the Banking act among other legislations that is tailored to maintain a strong and efficient bank and financial system.

Kenya's banking sector has experienced a number of bank failures. In 1984, the Rural Urban Credit Finance, the first indigenous financial institution in the country collapsed due to poor management and inadequate capitalization. The collapse of Rural Urban Credit Finance was shortly followed by the collapse of the Union Bank in 1986 again due to mismanagement (Waiyaki, 2017). To avert this problem, in 1989, eight financial institutions namely, Estate Finance Company of Kenya, Estate Building society, Union Bank of Kenya, Jimba credit corporation, Kenya Savings and Mortgages, Nationwide Finance Company and Home Savings, Business Finance company, Citizen Building Society and Mortgages Limited were merged and taken over by the Consolidated Bank of Kenya. Another bank failure occurred in 1998 where the Bullion Bank, Prudential Bank, Reliance Bank and Trust Bank also collapsed in was attributed to mismanagement.

To avert the rising number of the banking crisis, strengthen supervision and ensure financial stability in the country, legislations were put in place by the CBK and the Kenyan government. For example, the CBK started to issue quarterly and annuals supervision reports on the state of affairs of the banking sector in the country. In 2012, the Kenya Deposit Insurance Act was formulated to offer protection to depositors and guarantee deposits of up to one hundred shillings (Republic of Kenya, 2012). This legislation was followed by the CBK's prudential guidelines (2013) that applies to all banks licensed to conduct banking and its related activities in Kenya to observe a minimum liquidity ratio of 20 percent of all its deposit liabilities, matured and short-

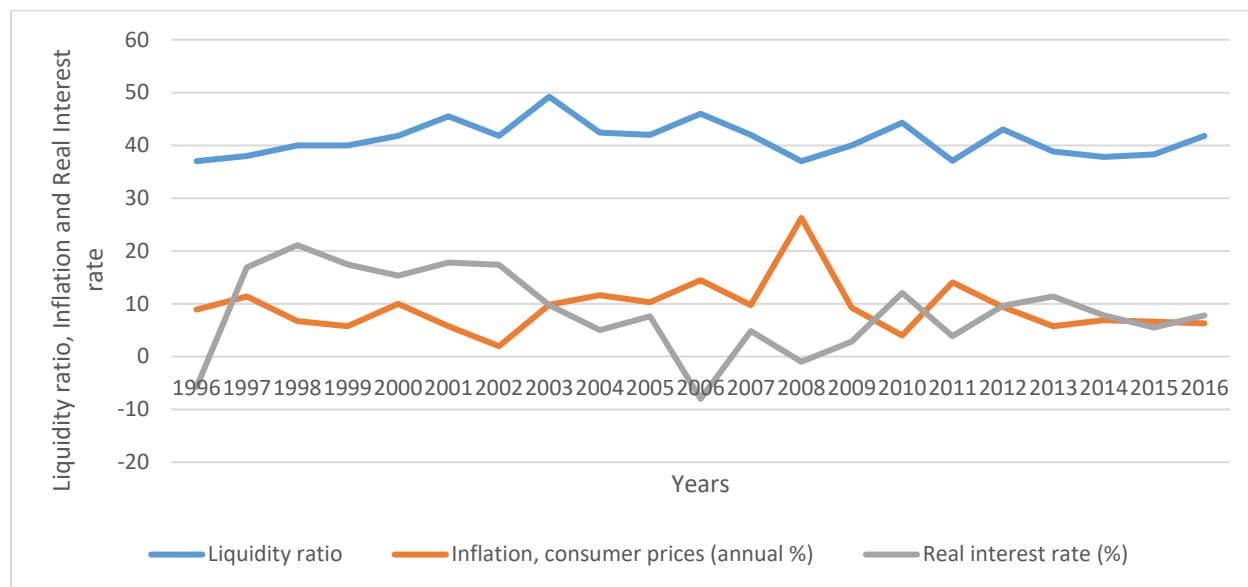
term liabilities in liquid assets. It is worth noticing that in 2016 the Kenyan government further introduced the interest rate capping regime in September 2016 by the enactment of the Banking Amendment Act of 2016. The Banking Amendment Act of 2016 requires that banks should set up interest rate up to four percentage points of Central Bank Rate (CBR).

1.2 Liquidity Trends of Kenyan Banks

The CBK as part of its mandate strives to ensure and foster liquidity and solvency in Kenya's financial system. To achieve this objective, the CBK under the statutory requirement of section 19 of the Banking Act, Chapter 488 requires commercial banks to maintain liquidity buffers at the rate determined by CBK. According to the CBK 2013 prudential guidelines, CBK allows commercial banks to observe a minimum liquidity ratio of 20 percent of all its deposit liabilities, matured and short-term liabilities in liquid assets (CBK, 2013). The CBK prudential guidelines further require banks to submit their liquidity statements after each 10-working day period to the CBK.

The CBK's regulatory guidelines and toolkits have tried to enhance bank's compliance with the liquidity prudential requirements albeit challenges in the recent years. According to the annual Bank supervision reports, on average, Kenyan banks have tried to meet the minimum stipulated liquidity requirement threshold of 20 percent despite Dubai and Chase Banks being put under receivership in the year 2015 and 2016 respectively partly because of liquidity challenges. A plot of the movements of the average bank's liquidity ratio calculated as the ratio of net liquid assets to total deposits indicates a very unsteady trend as shown in figure 1. It is observed in Figure 1, that on average, commercial banks in Kenya hold declining liquidity ratio in some years bringing up the hypothesis of whether macroeconomic factors affects commercial banks liquidity ratios.

Figure 1: Trend on Average Liquidity ratio for commercial banks in Kenya and some Macroeconomic variables



Source: Central Bank Supervision Reports, various years and World Development Indicators (WDI).

1.3 Statement of the Problem

Sound and proper management of commercial banks liquidity are critical to the well-functioning of the financial system and the economy as a whole. It is argued that sound management of banks liquidity promotes financial intermediation process, facilitates monetary policy transmission and also acts as an indicator of stability in the financial system in the economy. The Central Bank of Kenya (CBK) also holds the view that banks' liquidity management is crucial to the efficient functioning of the financial system.

In particular, section 19 of the Banking Act, Chapter 488 requires that commercial banks maintain liquidity buffers currently held at 20 percent of the bank's deposit liabilities with the Central Bank. The CBK'S prudential guidelines (2013) also requires banks to regularly file their liquidity statements to the Central Bank's Supervision Department (BSD) after a period of 10 working days. Commercial banks support the economy by providing financial services and intermediate all the transactions carried in the economy. Commercial banks play critical role of transforming illiquid assets into liquid through demand deposits. However, an unexpected rise in liquidity demand

forces commercial banks to sell their illiquid assets at lower prices resulting in losses and increased risk.

Despite the CBK's regulatory frameworks and efforts to ensure sound liquidity for banks, some banks in Kenya continue to struggle to attain the minimum threshold set at 20 percent of the bank's deposit liabilities with the Central Bank. In particular, on 14th August 2015, Dubai Bank was put into receivership due to liquidity crisis that made the bank unable to meet customer demands. This was again followed by Chase Bank being put under the receivership in 2016 partly because of liquidity deficiencies (CBK 2015). The inability of some banks to attain the set thresholds of liquidity buffers begs for an empirical investigation on factors affecting commercial banks liquidity in Kenya.

Existing studies on Kenya have only examined the bank-specific factors on banks liquidity particularly the bank capitalization (Bowa, 2015) and financial performance factors (Maaka, 2013). This study sought to empirically examine the effects of macroeconomic factors for example, interest rates, inflation, and GDP rates on commercial banks liquidity. Consistent with the research problem this study was determined to address the following research questions; what are the effects of macroeconomic factors on commercial banks' liquidity in Kenya? What policy implications can be drawn from the study findings?

1.4 Objectives of the Study

The main objective of this study was to investigate the effects of macroeconomic factors on commercial banks liquidity in Kenya. Specifically, this study seeks to;

- i. Determine the interest rates on the liquidity of commercial banks.
- ii. Establish the effects of GDP growth rates on the liquidity of commercial banks.
- iii. Investigate the effect of inflation rates on the liquidity of commercial banks.
- iv. Draw policy implications from the study.

1.5 Significance of the Study

This study was important because, first, it sought to add to the body of knowledge on the factors influencing commercial banks liquidity in Kenya. Most of the studies done in Kenya narrowed their analysis on the effects of bank-specific factors such as bank capitalization and performance

on banks liquidity without controlling for the macroeconomic factors (see for example; Mugenyah, 2015). This study deviated from examining the bank-specific factors and examine the effects of macro-factors on commercial banks liquidity. Secondly, this study aimed to provide important information and insights to policymakers on how best they can design macroeconomic policies in order to promote sound and proper management of commercial banks liquidity. Particularly the study will be of help managers of bans to develop necessary measures to uphold adequate liquidity while incurring lowest level of losses.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section examined the literature on the commercial bank's liquidity. In the theoretical literature review section, the study examined the theories that explain the rationale for banks to hold liquidity. The empirical literature section presented a review of previous studies from other researchers on the effects of different factors on commercial banks liquidity and lastly an overview section that offers the summary of the previous literature and existing gaps the study aimed at filling.

2.1 Theoretical Literature

The first strand of theoretical literature provides that creation of liquidity exposes commercial banks to risks. According to Diamond and Dybvig (1983), commercial banks generate liquidity by transforming liquid deposits into illiquid assets. In this theory, by banks financing illiquid assets with relative assets leaves banks to banks to runs. This basically means that the increases in the liquidity level rises the likelihood and severity of losses linked with having to sell-off illiquid assets so as to cater for customer demand.

Diamond and Rajan (2001) also support the idea of keeping optimal liquidity to insure the commercial banks against liquidity risk that may originate from surprise deposit withdrawal that might be expensive for commercial banks to counter on short notice. This is because often commercial banks generate liquidity and transform assets by investing into illiquid loans funded by liquid deposits. This act in itself create risk linked with financing illiquid loans with short term deposits. Diamond and Rajan (2001) argue that from individual banks' point of view holding adequate liquidity is required to insure against liquidity risk. Since loans are consider to be relatively illiquid, unexpected deposit withdrawals can cause insolvency as it may be too costly or impossible to raise liquidity on short notice, due to imperfections in the capital market. Distinguin, et al., (2013) also argue that banks face risk when the liabilities invested in illiquid assets are claimed at short notice and as such banks should hold liquidity buffers to respond to the needs of their customers.

In the second strand, Von Thadden (2004) provides that banks capital absorbs risk and enlarges their risk-bearing capacity According to the risk absorption hypothesis, larger ratios of capital are positively linked to liquidity which stimulates the capacity of commercial banks to create liquidity. In this theory, it is argued that the main aim of banks to hold capital is absorbed risk that includes liquidity risks and the protection of the against bank runs. It is further argued that larger capital stimulates the capacity of commercial banks to absorb more risks and thereby create more liquidity Berger and Bouwman (2009) note that this risk absorption hypothesis mainly applies to the larger banks since they are exposed to scrutiny such as part of its risk management strategies, they increase the value of capital and therefore create liquidity.

2.2 Empirical Literature

A study by Roman and Sargu (2015) examined the effects of bank-specific factors on bank' liquidity in GEE countries that includes; Poland, the Lithuania, Bulgaria, Czech Republic, Hungary, Latvia, and Romania 2004 and 2011. By measuring bank liquidity by the ratio of total loans to total banking assets, the study finds that depreciation of loans had negative effects on banks' liquidity in the GEE countries. In the study, Roman and Sargu (2015) controlled for the bank's capital ratio, the ratio of interest expense to bank's total deposits, return on assets and return on equity. The study used Ordinary Least Squares (OLS) in their analysis.

In yet another study, Trenca et al., (2015) examined the effects of macroeconomic factors on forty banks liquidity in Greece, Portugal, Spain, Italy, Croatia, and Cyprus. In particular, the authors examined the effects of GDP, inflation, unemployment and budget deficit on the liquidity of banks. The study found that increase all the macroeconomic factors reduces the liquidity of banks. In particular, the study obtained that GDP had the little adverse effect on the bank liquidity while the inflation had the most negative. The study also controlled for the bank-specific factors that included, the logarithm of total bank assets, return on equity and the provisions for loans losses. The study used the traditional panel data estimation approach together with Generalized Methods of Moments (GMM) for analysis.

Examining the determinants of banks liquidity in twenty-seven banks in Romania between 2002 to 2010. Munteanu, (2012) established that loan loss provisions and funding cost had enhancing effects on commercial bank liquidity while inflation and credit risk rate had negative effects. Even

though Munteanu, (2012) included both macro and micro factors in the regression model, the author failed to account for endogeneity which might be a serious problem in analyzing the determinants of commercial banks liquidity.

In Poland, Vodova (2012) examined the determinants of commercial banks liquidity from 2001 to 2010. In the study, Vodova (2012) observed that an increase in bank profitability reduced bank liquidity holdings. Further, higher interest rate margins and larger bank sizes had also negative effects on a bank's liquidity ratios. However, the share of non-performing loans, capital adequacy ratios and the interest rate on interbank transactions and loans had positive and significant effects on commercial banks liquidity in Poland. Vodova (2011) also studied factors influencing bank's liquidity in the Czech Republic from 2001 to 2009. By using panel data estimation techniques, the study found that higher capital ratio, the share of non-performing loans and the interest rate on interbank transactions and loans had positive and significant effects on commercial banks liquidity in the Czech Republic. In this study however, Vodova (2012) failed to account for the possible endogeneity that could result to biased estimates.

Singh and Sharma (2016) studied the effects of bank and macro effects on commercial bank liquidity of 59 Indian banks from 2000 to 2013. In particular, the authors examined the effects of cost of funding which captures the fee paid by banks for funds, bank profitability measured by the return on assets (ROA) ratio, bank size, GDP, inflation and the unemployment on banks liquidity. Singh and Sharma (2016) observed that GDP and bank size adversely affected bank liquidity while bank profitability, capital adequacy ratios, and inflation positively affected the bank's liquidity values. Singh and Sharma (2016) used panel data estimation techniques in their analysis and in particular, pooled OLS, random effect and fixed effects techniques. The regression results in this study, however, failed to account for potential endogeneity that might be present in estimating the effects of macroeconomic and bank-specific effects on commercial bank liquidity.

In Kenya, Bowa (2015) studied the effects of bank capitalization on the liquidity of 42 banks for the period 2010 to 2014. By use of the traditional panel estimations technique, Bowa (2015) observed that capital asset ratio, bank size, and asset quality had positive and significant effects in enhancing bank liquidity. In yet another study on bank liquidity, Mugenyah (2015) examined the factors influencing liquidity risk of commercial banks in Kenya for the period 2010 to 2014. In the

study, by using the Ordinary Least Squares (OLS) the author found that capital adequacy has positive and significant influence on bank liquidity whereas bank leverage negatively influences bank liquidity risk. The study further obtained that bank ownership and the ratio of liquid assets have negative but insignificant effects on banks liquidity risk. The reviewed studies done in Kenya failed to only relied on the OLS estimation technique. In this study, panel data estimation technique was used and particularly random effect model was ran.

2.3 Overview of the Literature

The reviewed theoretical literature indicates that there are two strands that explain liquidity creation. In the first strand, Diamond and Dybvig (1983) note that commercial banks create liquidity by transforming liquid deposits into illiquid assets while in the other strand, Von Thadden, (2004) argues that by banks holding higher capital, they increase their capacity to create liquidity.

The empirical literature reviewed indicates that macroeconomic and bank-specific factors or a combination of both can affect commercial banks liquidity. With respect to macroeconomic factors, it is considered that macroeconomic factors, studies indicate GDP, unemployment, and inflation influences commercial banks liquidity levels despite the effects being varied among economies (see for instance; Aspachs, et al., 2005; Trenca, et al., 2015). Concerning banks specific factors, studies also indicate that ROA, cost of funding, capital adequacy ratios among other bank relevant variables affects bank liquidity buffers (see for example; Roman and Sargu, 2015). In Kenya, and to the best of our knowledge, only Bowa (2015) and Mugenyah (2015) have examined the effect of a bank-specific factor, i.e bank capitalization on the commercial bank's liquidity. The studies, however, failed to control for the effects of macroeconomic environment. The empirical literature reviewed indicates that except for the study by Trenca et al., (2015) no other study has accounted for the potential endogeneity in examining factor affected commercial banks liquidity. Failure by the most studies to account for endogeneity issues in their analysis and the fact that no study in Kenya has examined the effects of macro factors in commercial banks liquidity presents a research gap that this study endeavored to fill by examining how macroeconomic factors affect commercial banks liquidity in Kenya.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the research methodology undertaken in this study. The chapter outlines the theoretical framework of the study, empirical model, definition and measurement of variables which is followed by econometric approach and sources of data respectively.

3.1 Theoretical framework

Theoretical literature has identified two main theories of liquidity creation by commercial banks. In the first strand, commercial banks generate liquidity by transforming liquid deposits into illiquid assets. The transformation of the illiquid assets with relative assets leaves banks to banks to runs increasing the likelihood and severity of losses related with having to sell-off illiquid assets so as to cater for client's demand. In the second strand, banks capital absorbs risk and expands banks' risk-bearing capacity and that the main aim of banks to hold capital is absorbed risk that includes liquidity risks and the protection of the against bank runs. This theory further provides that larger capital stimulates the capacity of commercial banks to absorb more risks and thereby create more liquidity.

Consistent with the theories of liquidity creation, we can hypothesize that banks internal and specific factors such as its loan loss provision, cost of funds, profitability as well as external macro factors can explain the liquidity creation and liquidity buffers hold by commercial banks. Based on these theories, we can therefore express a general framework with the assumption that commercial banks set their liquidity targets depending on the prevailing macroeconomic factors as well as its bank-specific factors. We can, therefore, in a general form write the bank's liquidity function as:

$$L_{it} = f(M_t, Z_{it}) \quad (1)$$

Where L_{it} is commercial bank's i liquidity ratio at time t , M_t is the vector of macroeconomic factors at time t and Z_{it} is set of the individual bank-specific factors at time t .

3.2 Empirical Model

In order to examine the effects of macroeconomic factors on the liquidity of commercial banks, the empirical model is specified as;

$$L_{it} = \alpha + \sum_{m=1}^m \beta_m X^m_t + \varepsilon_{it} \quad (2)$$

Where α the regression is constant, X^m_t denotes a vector of macroeconomic factors m at time t as discussed in section 3.3, and ε_{it} relates to the idiosyncratic error term.

Now since bank liquidity is also affected by the bank-specific factors, we include a vector of bank-specific factors in our basic estimable model. Equation (2) is therefore modified as follows;

$$L_{it} = \alpha + \sum_{m=1}^m \beta_m X^m_t + \sum_{z=1}^z \beta_z Z^z_{it} + \varepsilon_{it} \quad (3)$$

Where Z^z_{it} denotes a set of bank specific factors for bank i at time t as discussed in section 3.3. Notice that in equation 3, there might be unobserved factors that might have taken place during the study period implying that these factors can be present in the idiosyncratic error term. We therefore account for this unobserved effects by decomposing the error term into unobserved units of individual effects and the random error term i.e. $\varepsilon_{it} = v_{it} + u_{it}$. We therefore, can write our model specification as:

$$L_{it} = \alpha + \sum_{m=1}^m \beta_m X^m_t + \sum_{z=1}^z \beta_z Z^z_{it} + v_{it} + u_{it} \quad (4)$$

3.3 Definition and Measurement of Variables

The dependent variable in this study was the liquidity of commercial banks. Liquidity is measured by following the Central Bank of Kenya prudential guidelines on the definition of liquidity as the ratio of deposit liabilities, matured and short-term liabilities to liquid assets.

For the macroeconomic factors, the study used the variable annual real GDP to capture the level of economic activity and the real business cycle in the economy. Empirical studies indicate that GDP can have contradictory effects on banks liquidity levels. Some studies suggest that rise in GDP levels increases banks liquidity levels (Moussa, 2015) while others observe that increase in economic activity reduces banks liquidity levels (see for example; Vodova, 2011; Singh and Sharma, 2016). We therefore predicted an indeterminate relationship between GDP and banks

liquidity. The study also included inflation levels in the economy measured by the changes in consumer price indices (CPI). Studies indicate that increases in inflation levels tend to reduce bank's liquidity levels in the economy (Bhati and De Zoysa, 2012; Moussa, 2015). Further, real interest rate was included as a variable in the model to capture the effects of monetary policy on commercial banks holding of liquidity. Previous studies indicated that real interest rate reduces the amount of liquidity hold by commercial banks (Aspachs, et al., 2005). Therefore, the study predicted that an increase in interest rates reduces the liquidity levels.

For the bank specific factors, loan loss provisions and cost of funds were included. These two factors have been found to positively affect liquidity (Bonner & Eijffinger, 2012; Munteanu, 2012). The study, therefore, predicted a positive relationship with liquidity. Further, bank's financial performance was included, proxied by the ROA in the model to capture the effects of bank's profitability on their liquidity levels. Past research studies suggest that banks' profitability positively affects the liquidity levels of banks (see for example; Lartey, et al, 2013). Consistent with previous studies, the study expected bank profitability to raise commercial banks liquidity levels.

3.4 Econometric Approach

The study employed panel data econometric techniques to examine the effects of macroeconomic factors on the banks liquidity. Panel data estimation techniques is used unlike other techniques because it allows incorporation of cross-sectional and time series dimension of data for analysis. Panel data is also preferred over cross-sectional analysis since it allows us to account for the heterogeneity that might be present in our regression. In particular, this study, used the random effects results and not the fixed effect results. The fixed effects model assumes that there's heterogeneity across individual firms and as such we control for the time-invariant unobserved effect by decomposing the error term into bank-specific effects and the random error terms. The fixed effects model assumes that the correlation between the decomposed bank-specific effects and the random error term exists. While for the random effects model, it is assumed that the correlation between the decomposed bank effects and the random error term does not exist and therefore it ignores the time-invariant component in the error term correlation in the error term.

3.5 Sources of Data

The study used annual secondary data to determine the effects of macroeconomic factors in commercial banks liquidity in Kenya. The study used data from 30 commercial banks in Kenya for the period 2005 to 2017. With regards to bank-related data, the study obtained data from audited bank's financial statements. For the macroeconomic variables, the study obtained data from various statistical abstracts and surveys prepared by the KNBS.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

This chapter presents the empirical findings. This includes summary statistics, correlation statistics and Hausman test and post estimation tests results. The study used panel data for the period 2005-2017 which consisted of 30 commercial banks in Kenya.

4.2 Descriptive Statistics

This study considered 30 banks that had consistent data for the period, 2005-2017. This resulted to a total of 390 observations. Table 1 presents the summary statistics of the study variables.

Table 1: Descriptive Statistics

Variable	Obs.	Mean.	Std.Dev.	Min.	Max.	Skewness	Kurtosis
Liquidity Ratio	390	0.5120	0.7650	0	10.67	12.041	159.67
Cost of Funds	390	0.0280	0.0192	-0.0271	0.256	4.768	54.17
GDP	390	5.27	1.903	0.232	8.406	-1.233	4.722
Loan Loss Provisions	390	0.0991	0.162	-0.0780	1.569	5.030	35.31
Interest Rates	390	5.764	5.342	-8.010	12.03	-1.181	3.943
Inflation Rates	390	10.07	5.517	3.961	26.24	1.807	5.948
ROA	390	0.0282	0.0387	-0.137	0.589	7.324	115.37

Source: *Author's computation*

Overall, the data did not have major skewness and especially considering that it considered the variables across different banks in Kenya with different financial capabilities. The mean liquidity of the banks is 0.512 and can go to a maximum of 1.287 showing a strong ability of commercial banks meeting their liquidity needs. The cost of funds was at average of 2.8 percent with possibility of reaching 25.6 percent and this could be attributed to the reduced cost of borrowing especially in Kenya as financial liberalization continues to take root. The GDP growth rate averaged 5.27 percent for the entire study period with the highest GDP rate being 8.406 percent in the year 2010 when the Kenyan economy stabilised especially after the post-election violence of 2007 and 2008.

The loan loss provision by commercial banks had a mean of 0.0991 with a deviation 0.162. Loan loss provision help banks cushion themselves in the events of defaults and late payments of loans. The maximum interest rates charged in the study period was 12.03 percent while the lowest was 5.764 percent. The variations in the interest rates for the entire study period stood at 5.342 showing that there were a bit of instabilities in the banking industry due to changing macroeconomic variables.

The average inflation rate was 10.07 percent with an all high inflation rate of 26.24 percent experienced in the year 2008 after an electioneering period and as the Kenyan economy was recovering from the 2007 and 2008 post-election violence. The return on assets for commercial banks averaged 0.0282 with an all high return 0.589 and had minimal deviations across the study period.

4.3 Correlation Matrix

Correlation analysis helps one understand the relationship between and among variables of the model(s) used in the study (Wooldridge, 2013). Correlation ranges between -1 and 1 indicating strong negative and positive correlations respectively. Correlation values may vary across variables indicating strong or weak correlation between variables

Table 2 shows that there exists a negative correlation between liquidity ratio and the level of GDP. This is against economic theory that believes that high liquidity by banks drives up economic growth as banks are able to lend more easily and at affordable prices to the investor. Interest rates were equally negatively related to liquidity. This indicated that real interest rate reduces the amount of liquidity hold by commercial banks (Aspachs, et al., 2005). The results also indicates a very weak positive correlation between cost of funds and liquidity. This may partially be explained by the facts that, as banks hike the cost of borrowing, they create money and hence the positive correlation.

Profitability and liquidity show a weak negative correlation. This is indicated by the negative ROA value. This shows that as profitability grows then the liquidity falls and this depends on the nature of assets that a bank holds (Bordeleau, & Graham, 2010; Lartey, et al, 2013).

The results also indicates a negative relationship between liquidity and interest rates. This is because, as interest rates increases, commercial banks become averse from borrowing more from their central banks. This is seconded by the fact that, borrowers also find it hard to borrow expensively from banks and banks are equally not likely to lend because the borrowers may not have enough collateral (Bhati & De Zoysa, 2012; Moussa, 2015).

The findings indicates a negative relationship between liquidity and inflation rates. This could be attributed to the fact that an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource Allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment (Audo, 2014).

Table 2: Correlation Analysis Results

	Liquidity ratio	Cost of funds	GDP growth rates	Loan loss provisions	Interest rates	Inflation rates	ROA
Liquidity Ratio	1						
Cost of Funds	0.1475	1					
GDP Growth Rates	-0.0137	0.0650	1				
Loan Loss Provisions	0.0579	-0.1571	0.0018	1			
Interest Rates	0.0644	0.1527	0.3176	-0.0931	1		
Inflation Rates	-0.0256	-0.1471	-0.7048	0.0618	-0.6874	1	
ROA	-0.0275	-0.1545	-0.0006	-0.3026	0.0418	0.00340	1

Source: *Author's computation*

4.4 Hausman Specification Test

The test was performed on panel data regression model to determine the most appropriate model for the study. To do this, both the fixed and random effects models were run first and the Hausman test conducted. If the p-value was to be found less than critical value, then a fixed effect model was to the appropriate model, otherwise random effect model was to be ran. The fixed effect results showed that the variables of the model are not equals to zero as F-statistic is not more than 5%.

To decide which model was appropriate a Hausman test is run. Then using the Hausman test we set null hypothesis that random effect is appropriate otherwise fixed effect model. Then results are shown in Table 3. Since the p-value is very high, 76.44%, the study cannot reject the null hypothesis hence random effect is the most appropriate.

Table 3: Hausman Specification Test Results

Coefficients				
	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_bV_B)) S.E
cof	9.200359	6.826684	2.373674	1.310841
gdp_g	0.0135765	0.005365	0.0082113	0.0044465
llp	0.4956406	0.449819	0.0458216	0.1318302
interestrates	0.0125567	0.011999	0.0005575	0.0005062
inflationrate	0.0119094	0.008399	0.0035095	0.0018815
roaa	0.1613045	0.3846131	-0.5459176	0.5963053

Source: Author's computation

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \chi^2(6) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 3.35 \end{aligned}$$

$$Prob > \chi^2 = 0.7644$$

(V_b-V_B is not positive definite)

4.5 Regression Analysis Results

Table 4: Random Effect Model Regression Analysis Results

Variable	Random Effects Model
Cost of Funds	5.969*** (2.58)
GDP Growth Rate	-0.267 (-0.94)
Loan Loss	0.462* (1.76)
Interest Rate	0.0273 (0.41)
Inflation Rate	0.0128 (0.26)
ROA	0.109 (0.10)
Constant	1.450 (0.75)
Observations	390
R^2	
Adj. R^2	
Hausman test	3.35 (P-value 0.7644)

Source: Author's computation

*Note: (i) Liquidity is the dependent variable (ii) t statistics in parentheses (iii) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ significance at 10, 5 and 1 percent, (iv) in all models, year effects have been controlled for*

The regression results of the factors affecting the liquidity of listed commercial banks in Kenya are as shown in Table 4. The study estimated results are based on using a random effect model of

the modified empirical model (Equation 4) in the empirical section of chapter 3 of this study. Taking liquidity as the dependent variable, the results indicate that cost of funds, loan loss provisions interest rates, inflation rates, and return on assets positively influenced liquidity while gross domestic product negatively influenced commercial banks' liquidity.

The estimated results indicated that cost of funds was positively related to liquidity. This shows that an increase in bank liquidity translates into increased levels of business transactions by commercial banks and this increases the costs associated with increased interest expenses as well as transfer costs. This coincides with a priori expectations and is in line with Bonner and Eijffinger (2012), who highlighted that liquidity requirement increases banks' funding costs in the interbank money market, and it would not suffice to pass these costs to the consumers.

The study found a negative relationship between GDP growth rate and bank liquidity. A priori, the study had predicted an indeterminate relationship between GDP and banks liquidity. This because, depending on an economy, GDP growth rate has been found to have mixed results. The results shows a negative relationship just like what Vodova (2011), Singh and Sharma (2016) found. These results are however, contrary with other studies (Gurley & Shaw, 1955; Goldsmith, 1969; McKinnon & Shaw, 1973) who found positive relationships between economic growth and growth of bank liquidity. It is expected that depending on the bank size, and market share decreased bank liquidity could slow down economic growth and especially when depositors are aware of illiquidity of a bank and run to withdraw their cash.

Loan loss provisions were found to have positive effect on liquidity. This is attributed to the fact that as liquidity grows, banks are able to meet their liquidity and hence must cover themselves against losses. This is done to mitigate risks and cushion banks against losses from their loan portfolios (Ul et. al., 2012; Ozili & Outa, 2017). This finding was in an agreement with Munteanu (2012) in Romania who highlighted the need for banks to have high levels of loan loss provisions in the event of unexpected losses.

Interest rates were found to be positively related to liquidity. This was contrary with studies by Aspachs, et al. (2005) who found that as interest rate increases, the bank liquidity decreases and vice versa. Equally this, was against the expectations of the study. This could be attributed to the

fact that due to increased interest rates, banks look for excess reserves to be able to still lend to its customers because increased interest rates scare away borrowers and crowd out investments.

Similarly, inflation rate positively influenced liquidity. Increased inflation reduces the ability of banks to allocate financial resources and especially in meeting its obligations like lending and investments. As such, as general price level increases, banks must seek for more liquidity to remain consistent in their operations. The findings are contrary to other studies indicating that increases in inflation levels tend to reduce bank's liquidity levels in the economy (Bhati and De Zoysa, 2012; Moussa, 2015).

Return on assets (ROA), proxy for profitability showed that profitability of commercial banks is positively related to liquidity. This means that as bank profitability rises, commercial banks liquidity levels also rise because banks have enough earnings to meet short-term and long term obligations (Lartey, et al, 2013). However, other studies (Marques & Braga, 1995; Blatt, 2001; Eljelly, 2004) found a negative relationship between profitability and liquidity.

CHAPTER FIVE

CONCLUSION

5.1 Introduction

The main objective of this study was to investigate the effects of macroeconomic factors on commercial banks liquidity in Kenya for the period 2005 and 2017. Specifically, this study sought to investigate the effects of macroeconomic factors on commercial banks' lending, and from there draw policy conclusions. The study used a sample of 30 commercial banks that had traded consistently for the period 2005 and 2017. Moreover, these banks entered the final sample on the basis that they had consistent data for all the variables of the study.

5.2 Summary of the Key Findings

Estimation results revealed that that cost of funds, loan loss provisions, interest rates, inflation rates, and return on assets positively influenced liquidity while gross domestic product negatively influenced the liquidity of commercial banks in Kenya.

The GDP growth rate showed that as the economy grows, this negatively affects the banks liquidity. The study also expected that interest rates would negatively affect the banks liquidity in Kenya. However, this was contrary to the study findings. This could be attributed to the fact that due to increased interest rates, banks use excess reserves to be able to still lend to its customers because increased interest rates scare away borrowers and crowd out investments.

5.3 Policy Implications

From the research findings, it is evident that commercial banks in Kenya must factor in macroeconomic variables such as interest rates, inflation, and economic growth as well firm specific factors such as loan loss provisions and banks profitability in making liquidity related decisions.

The existence of a negative relationship between GDP growth rate and banks' liquidity is a crucial one. Banks in Kenya must therefore take cognizant the fact that, as much as the economy is growing, this will not always translate to the need for funds by depositors and investors. This

means that even during economic growth, banks must work hard to make sure that they have enough liquidity to cushion themselves against losing business.

The study finding that as interest rates increases, the bank's liquidity increases is equally important. This means that bank managers must focus maintaining high liquidity levels of banks amidst increasing cost of borrowing in a bid to remain competitive. There are now changes in the way interest rates in Kenya are managed and especially with the new capping regime by the CBK. This calls for sound management of liquidity across commercial banks in Kenya.

Therefore, in making liquidity decisions, bank managers must factor in the costs of funds, GDP growth rate, prevailing inflation rates, the interest rates, profitability of banks, and loan loss provisions among other factors in making decisions on the levels of liquidity that their respective banks should hold.

5.4 Conclusion

This study concludes that the liquidity of commercial banks in Kenya is affected by macroeconomic variables like GDP growth rates, interest rates, and inflation rates. Firms specific factors like profitability, cost of funds, and loan loss provisions were also key determinants of liquidities held by banks. This means that macroeconomic variables and bank specific factors should be considered when making liquidity-related decisions.

5.5 Areas for Further Research

The ability of commercial banks to meet their financial obligations is highly dependent on their levels of liquidities that they hold. This means that banks pay a lot attention in making sure that liquidity is always maintained. Therefore, in making liquidity related decisions, commercial banks in Kenya must factor in key determinants of liquidity. Though this study focused solely on few macroeconomic and bank specific factors, further research can explore in depth other factors like the CBK role in determining liquidity of banks, performance of banks, the growth of banks, and the prevailing business and political environments. These factors have a big role to play as far commercial banks' liquidities are concerned. By doing so, more valid and comprehensive inferences could be drawn and this would contribute to sound policies in managing liquidity in Kenya.

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