

**THE RELATIONSHIP BETWEEN LIQUIDITY RISK AND
FAILURE OF COMMERCIAL BANKS IN KENYA**

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DECLARATION

This research project is my original work and has never been submitted elsewhere for award of a degree or diploma at the University of Nairobi or any other educational institution.

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DEDICATION

I dedicate this thesis to my parents Rev. Joel and Mary Omwoyo for their effort to ensure that I have excelled academically.

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ABBREVIATIONS AND ACRONYMS

AQ	Asset Quality
BB	Berger & Bouwman (2009) comprehensive measure of bank liquidity
BCBS	Basel Committee for Banking Supervision
CAMELS	Capital adequacy, Asset quality, Management capability, Earnings, Liquidity and Sensitivity.
CAMES	Capital adequacy, Asset quality, Management capability, Earnings, and Sensitivity.
CAR	Capital Adequacy Ratio
CBK	Central Bank Of Kenya
EBTEI	Net Income Before Taxes and Extraordinary Items
FDIC	Federal Deposit Insurance Corporation
HLCH	High Liquidity Creation Hypothesis
KDIC	Kenya Deposit Insurance Corporation
LAMES	Liquidity, Asset quality, Management quality, Earnings and Sensitivity to market
LCR	Liquidity Coverage Ratio
LSH	Liquidity Shortage Hypothesis
MQ	Management Quality
NSFR	Net Stable Funding Ratio
PLC	Public Limited Company
ROE	Return On Equity
SM	Sensitivity to Market
USA	United States Of America
WFH	Weak Fundamentals Hypothesis

ABSTRACT

The objective of this study was to establish the relationship between liquidity risk and failure of commercial banks in Kenya in the years 2013 to 2016. Additionally, the study endeavoured to establish the effect of capital adequacy, asset quality, management quality, earnings, sensitivity to market and size on the failure of banks in Kenya. To achieve this goal, secondary data was collected from the websites of operational banks while data for failed banks was collected from reports published by the central bank of Kenya, corroborated with publications in past years newspapers. The study covered a panel of 42 commercial banks whose financial statements were analysed from the year 2013 to 2016. A total of 157 bank years were analysed of which there were 7 failure observations and 150 survival observations. Panel logit regression was used to analyse the data using Eviews 9.5 student version. The results of the regression revealed that there was a positive and significant relationship between liquidity risk and bank failure, implying that liquidity increased the likelihood of failure. The study also found a positive and significant relationship between bank failure and asset quality and earnings indicating that they increased the likelihood of failure. The study found a negative and significant relationship between bank failure and management quality and sensitivity to market implying that they decreased the likelihood of bank failure. Capital adequacy and bank size were found to have insignificant relationship with the failure of commercial banks in Kenya. These findings are valuable to managers in understanding how the variables of the study increase or decrease the likelihood of failure so that they may come up with appropriate strategies for managing the various risks facing their banks. The findings are valuable to bank regulators in evaluating the relevance and potency of the indicators used in monitoring and evaluating the soundness of banks in Kenya. The findings are valuable to scholars who are interested on confirming and developing theories that explain bank failure. The study contributes to existing knowledge by highlighting the factors that significantly contributed to the failure of commercial banks in Kenya. The study contributes to the academic knowledge by providing empirical evidence on how the CAMELS offsite bank monitoring system can explain bank failure using Kenyan commercial banks data. The study recommends that bank managers adopt a management philosophy that discourages overemphasizing on short term profitability at the expense of future of the bank. The study suggest that a detailed case study of factors that contributed to the failure of each bank be carried out and that a prospective study predicting future bank failures be done as well.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Banks play an indispensable function in a country's financial system and economy as a whole through offering intermediary and liquidity services (Heffernan, 2005). The function of financial intermediation inherently exposes banks to liquidity risk through the activity of transforming the maturity of short-term liabilities and demand deposits into long term maturity assets in form of loans (Venkat & Baird, 2016). Farag, Harland, and Nixon (2013) define liquidity risk as the possibility of a colossal number of depositors and investors withdrawing amounts held in their accounts at once, thereby depleting a bank's funds thus prompting it to sell off its assets at unfavourably low prices in order to remain afloat. According to Kaufman (1996), a bank is deemed to be a failure if the market price of its assets is diminished to an extent that it is less than the market price of its liabilities. Daley, Matthews and Whitfield (2008) contend that bank failure includes closure, bankruptcy, supervised merger, or direct government assistance. Minamihashi (2011) consider a bank to be a failure if it suspends issuance of new loans or credit to its clients. According to Bennett and Unal (2015), liquidity, undercapitalization, safety, soundness, and fraud are some of causes of bank failure.

Theoretically, liquidity risk and bank failure can be linked through the following four theories selected from previous studies because purportedly they can explain the most proximate sources or reasons for failure of commercial banks. The liquidity preference theory, which posits that entities hold cash because they want to transact with it or because they speculate some opportunity which they wish to take advantage of or because they wish to be precautionary about some uncertain future (Keynes, 1936). The moral hazard theory which posits that when an entity is not obliged to bear fully the

consequences of its behaviour, it may be tempted to accept more risk than that which is necessary (Zeckhauser, 1970). The theory of herd behaviour which argue that individuals and even institution tend to mimic the behaviour, strategies and trade of others even when their common senses dictate that they should do otherwise (Banerjee, 1992). Lastly, the study is also anchored on the financial contagion theory, which argues that the failure of a single bank can precipitate failure of other banks that come into contact with it in normal business transactions thus occasioning a banking crisis (Kaufman, 1992).

Kenya had 43 commercial banks on 31st December 2012, which form the cohort population of this study (CBK, 2012). During the period under study, three banks were acquired and three others were put in receivership due to liquidity problems and malpractices (CBK, 2015a, 2015b and 2016). The number of fully functional banks in Kenya had reduced to 39 by the end of the study period on 31st December 2016. In the year 2017, Mayfair Bank and Dubai Islamic Bank were licensed (Central Bank of Kenya, 2017). Nonetheless, banking business in Kenya is robust with large banks controlling 80 percent of the market while small and medium bank share the remaining 20 percent (Deloitte, 2016). The fact that some banks have failed in Kenya during the period under study provide enough cases of failure and survival making it an opportune context to investigate failure of banks and liquidity risk.

1.1.1 Liquidity Risk

Pyle (1999) posit that banks face many risks including market risk, credit risk, operational risk, performance risk and liquidity risk. Liquidity risk has been defined by Wu and Hong (2012) as that risk resulting from a bank's inability to meet payment obligations promptly and cost-effectively. Banks (2005) expound liquidity risk as the

uncertainty that a bank may incur loss due to a lack of cash or its equivalents or that it may suffer economic loss in its attempt to procure the cash vital for its operations. According to Farag et al. (2013), liquidity risk can take two forms: Funding liquidity risk, which results from the bank having insufficient cash and collateral to settle debts owed to counterparties and customers immediately; and market liquidity risk which is the possibility that the bank's assets cannot be cashed quickly without incurring large discounts.

Liquidity is important to banks because it compensates for expected and unexpected fluctuations in their financial position besides providing funds for their growth (Van Greuning & Brajovic-Bratanovic, 2009). If a bank suffers from a liquidity shock and it fails to repay depositors and other creditors amounts owed to them punctually then it may be declared cash-flow insolvent (Farag et al., 2013). The importance of liquidity risk (both funding and market) is underscored by the fact that it has potential to cause severe liquidity spirals (Gomes & Khan, 2011). Severe liquidity crisis may arise when numerous depositors withdraw their savings at once leaving the bank without funds causing what is known as a bank run. Such bank runs can even cause "healthy" banks to fail affecting the entire economy (Diamond & Dybvig, 1983). Another reason why liquidity risk is important as observed by Acerbi and Scandolo (2008) is that it can explode market and credit risks in addition to transforming loss in one bank into a systemic and contagious crisis.

According to Banks (2005), the two most frequently used measures of liquidity risk are liquidity ratios and liquidity gaps. Empirical studies reviewed in this study reveal there is no single measure of liquidity risk that suits all studies. Wu and Hong (2012) used a combination of government securities ratio, brokered deposits ratio and the difference

between treasury bills rate and the interbank lending rate as proxies for liquidity risk. Liquidity coverage ratio and the net stable funding ratio have also been used to quantify liquidity risk by Cucinelli (2013) and Muriithi and Waweru (2017). Ogilo and Mugenyah (2015), and Wekesa (2016) adopted the loans to deposits ratio to measure the same. Berger and Bouwman (2009) propounded the Berger and Bouwman comprehensive liquidity measure (BB) which has been used by Fungacova, Turk and Weill (2015) and Zheng, Cheung, and Cronje (2016). Liquidity risk is measured in this study by ratio of loans to deposits.

1.1.2 Bank Failure

According to Kaufman (1996), a bank is deemed to be a failure if the market price of its assets is diminished to an extent that the market price of its assets is exceeded by that of its liabilities. Thomson (1992) and Heffernan (2005) posit that banks should be considered to be failures if they have been closed, declared bankrupt, have been forced to merge with a healthy bank, or have been directly assisted by the government. A bank is considered to be a failure if it is closed and it cannot redeem all its notes at par or face value (Rolnick and Weber, 1984).

Bank failure consequences can be financial, economic, and social or even political (Okeahalam, 1998). As stated in Ragalevsky and Ricardi (2009), bank failure can adversely affect its depositors with balances exceeding prescribed deposit insurance limits, vendors, staff, landlords, borrowers, other banks and its counterparties. Notwithstanding, it can damage the economy and erode public confidence on the entire banking sector. Additionally, Minamihashi (2011) postulate that bank failure affects client firms of failed banks since they cannot borrow from the failed banks causing them to suffer from a credit crunch something that may stagnate the activities of such

clients. According to Sarkar and Sriram (2001), bank failures tend to compromise investor confidence and deplete resource of deposit insurance Corporations. Müller and Trümpler (2004) opine that failure of banks precede a significant drop in output and an upsurge of unemployment. Macey and Miller (1988) argue that the government's stake in the financial stability of banks and the fact that many people perceive healthy banks as essential for a stable economy makes bank failure a matter of concern and hence important to study. Another reason why bank failure may warrant a study is the resultant losses. James (1991) found out that failed banks lose a substantial value of their assets averaging to about 30% while bank closure cost averaged to 10% of the banks' assets.

According to Bouvatier, Brei and Yang (2013), bank failure is measured by an indicator or dummy variable which indicates whether an event has or not happened. According to Skrivanek (2009), indicator variables are used in regression to assign either "1" or "0" to members of two mutually exclusive categories. This study will measure bank failure according to Zheng, Cheung, and Cronje (2016) where a binary performance variable is adopted to signify whether a bank fails in a particular financial year. As such a bank that fails within a period 12 months will be flagged failure and given a score of one, otherwise it is flagged surviving and given a score of zero.

1.1.3 Liquidity Risk and Failure of Commercial Banks

Matz (2011) postulate lack of liquidity to be the most immediate cause of bank failure alongside credit problems. He argues that overreliance of banks on short-term funding exposes them to liquidity risk and eventually contributing to bank failure. Banks (2005) concurs with the above view that many global bank failures of the past few decades have been attributed to the combined effects of credit risk and liquidity risk. Illiquidity follows insolvency and lack of sufficient funding liquidity is a sign of banks in serious

financial difficulties (CBK 2013a). Inadequate management of liquidity is attributable to the bank failure crisis of 2007 since many banks failed notwithstanding adequate capitalization (Basel Committee on Banking Supervision, 2013). Inadequate and untimely handling of liquidity risk in one bank can potentially trigger a crisis of confidence affecting the entire banking industry (CBK, 2013).

Wu and Hong (2012) explain that liquidity risk affects bank failures through both the idiosyncratic channel, through which banks fail due poor liquidity risk management practices and the systematic channel through which risk is inherent in the aggregate market and thus cannot be eliminated through diversification. According to Diamond and Rajan (2005), liquidity risk can also cause bank failure by shrinking the common pool of liquidity thereby creating or worsening aggregate liquidity shortages. Bank failure due to aggregate liquidity shortage stems from the fact that banks cannot finance their projects or operation through the interbank borrowing market because of insufficient amount of liquidity that has resulted in the destruction of existing lending relationship (Wagner, 2007). Theoretically failure of banks and illiquidity are related by theories like: bank contagion theory (Kaufman, 1992), herding behaviour theory (Banerjee, 1992), moral hazard theory, (Pauly, 1968) and liquidity preference theory (Keynes, 1936).

1.1.4 Commercial Banks in Kenya

As at 31st December 2016, Kenya had 39 operational banks down from 43 on the same date in December 2012 (CBK, 2012 & 2016b). In the year 2016 parliament passed a law capping interest rates to a maximum of 4% above the central bank rate effective 14th September 2016 (Banking (Amendment) Act No.25, 2016). This according to central bank of Kenya (2016b) has caused an upsurge on the demand for mortgage loans

though banks have introduced stringent credit standards hindering actual advancement of loans to meet the demand. The placement of Chase Bank of Kenya into receivership caused a panic among customers who copiously withdraw their money leaving the liquidity of seven banks below the CBK 20% minimum requirement (CBK, 2016b).

The following acquisitions took place during the study period: Fina Bank Limited was acquired by Guaranty Trust Bank Public Limited Company on 8th November 2013. K-Rep Bank Limited was acquired by Centum Limited on 29th October 2014. On 31st December 2014 Equatorial Commercial Bank Ltd was acquired by Mwalimu Sacco Society. As shown in appendix 2, banks that have failed during the study period include: Dubai Bank Limited which was affected by serious liquidity and capital deficiencies, Imperial Commercial Bank Limited that was placed in receivership due to inappropriate banking practices, and Chase Bank of Kenya Limited which was affected by liquidity issues.

Emerging issues in the Kenyan banking sector after 31st December 2016 that have been considered in this study include the acquisition of Fidelity commercial bank by SBM bank Mauritius, Giro commercial bank by I & M bank limited, and Habib bank Kenya limited by Diamond trust bank (CBK, 2017c, 2017d & 2017e). The central bank licensed Dubai Islamic Bank (DIB) on 13th April 2017 and Mayfair bank limited on 23rd June 2017. These developments provide a suitable context to examine how liquidity risk is associated with failure of commercial banks.

1.2 Research Problem

Commercial banks play a crucial role of creating liquidity for their clients by channelling funds from surplus units to deficit units (Madura, 2015). The creation of liquidity for clients through advancement of loans reduces the recipient's liquidity risk, but generates liquidity risk to the bank (Fiedler, 2011). This exposure to risk according to Matz (2011) emanates from banks' reliance on short-term deposits to finance long term loans. Yimer (2016) argues that as much as inadequate liquidity can cause bank failure through bankruptcy, excess liquidity can equally lead to bank failure because of poor profitability since liquid assets yield little or no interest income to the bank.

The banking sector in Kenya is currently undergoing turbulent moments with 6 of 43 banks failing in the last three years. Dubai bank joined the list of banks being liquidated, Imperial Bank Kenya limited and Chase bank Kenya limited fell into receivership and Fidelity Commercial bank limited, Giro commercial bank and Habib Bank limited have been acquired (KDIC, 2017a; CBK, 2015, 2015a, 2016, 2017c, 2017d & 2017e). These developments make Kenya a suitable ground for studying liquidity risk and bank failure.

Several studies have been done with a view to establishing the relationship between liquidity risk and bank failure. Hong and Wu (2013) found that systemic funding liquidity risk predicted the 2008 and 2009 banking crisis significantly. Fungacova, Turk and Weill (2015) found that creating excess liquidity increases the chances of bank failure. Zheng, Cheung and Cronje (2016) found a negative and significant relationship between failure risk and liquidity risk. Locally, Cheserek (2007) investigated determinants of bank failures in Kenya but did not consider liquidity risk as one of the determinants. Other local studies on liquidity risk such as Maaka (2013), Kibuchi

(2015), Muriithi and Waweru (2017) and Musembi, Ali and Kingi (2016) studied liquidity risk as it relates to financial performance. Another set of studies notably Ogilo and Mugenyah (2015) and Kimathi, Mugo, Njeje, and Otieno (2015) investigated the determinants of liquidity risk.

From the above studies the association between the concepts of liquidity risk and bank failure is mixed in that both inadequate and excessive liquidity can lead to bank failure through different channels. The review also shows that there is a contextual gap to be filled in that none of the local studies has examined how liquidity risk and bank failure are associated. This study seeks to fill these gaps by answering the question: Is there a relationship between liquidity risk and failure of commercial banks in Kenya?

1.3 Research Objective

To find out the relationship between liquidity risk and failure of commercial banks in Kenya the period 2013 to 2016.

1.4 Value of the Study

This study will be of value to bank managers and professional analysts in understanding the association between liquidity risk and commercial bank failures in Kenya. The study will help managers and professionals formulate liquidity risk management strategies that are informed with research. Such strategies will minimize bank failure due to liquidity issues.

In a situation where banks are failing rapidly like they are doing in Kenya, policies, regulations and statutes need to be scrutinized keenly to surmount such crisis. The study will be useful to policy makers and regulators in formulating comprehensive guidelines to banks on matters of liquidity to ensure a reduction or elimination of incidents of bank

failure. In particular it will help regulators in developing both offsite and onsite monitoring tools that cover liquidity risk in detail and from the assets, liabilities and off balance sheet activities.

This study will be beneficial to scholars in that it seeks to establish the relationship between liquidity risk and bank failure from a Kenyan context. This study will generate knowledge on the applicability of liquidity and bank failure theories originated in other countries to the local banking environment. The study will also be useful to local scholars in that it intends to use and popularize logit regression analysis of variables as an alternative to the overly used simple and multiple linear regression analysis.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the theoretical and empirical literature on liquidity risk and failure of commercial banks besides presenting the conceptual framework showing how the concepts relate with each other.

2.2 Theoretical Review

This section reviews some of the theories that explain how liquidity risk explains failure of banks as suggested by prior studies. In particular, we shall review herd behaviour, financial contagion, moral hazard, and liquidity preference theories.

2.2.1 Herding Behavior Theory

Banerjee (1992) defines herd behaviour as the act of everyone imitating what everyone else is doing, in spite of the fact that their private information may be suggesting that they should do something quite different. The rational herding theory explains liquidity risk and bank failure in two ways. Firstly it is the herding behaviour of depositors. This may happen when numerous depositors simultaneously apportion a very high probability to the bank potentially losing its assets and they resort to simultaneous withdrawing of their deposits exposing the bank to a run (Kaufman, 1987).

Secondly, herding behaviour can emanate from bank management when they make same or similar risk-taking, management, and asset holding decisions. Herding also can manifest at the time when these banks sharing the same information or facing similar circumstances end up making decisions that are similar, or when they mimic each other's lending behaviour (Liu, 2014). The effect of this managerial herding behaviour is that firms with similar trading strategies will plunge into similar perils during

liquidity crisis and no bank will be salvaged by counter party funds from the other bank. As a result there will be a systemic liquidity risk. Pedro (2014) argues that uncertainty and herd behaviour are causes of financial crises. Herd behaviour leads to asset bubbles and irrational panic that in turn lead to quick reduction of prices in the financial markets and as such banks in liquidity problems end up selling their assets at a loss which eventually leads to illiquidity and bank failure (Ionescu, 2012).

2.2.2 Bank Contagion Theory

Kaufman (1992) proposed the bank contagion theory with the following characteristics: it occur with fastness, then spreads more broadly within the industry, resulting in several failures thereby occasioning large losses to depositors and may even spread beyond the banking industry thereby damaging the financial system and the macro-economy as a whole. Masson (1998) postulates that the term contagion should be applied when a crisis situation at one point triggers a crisis at other points in a manner that macroeconomic fundamentals cannot explain it. Eichengreen, Rose, and Wyplosz (1996) established that contagion mostly affects banks that trade with each.

Calomiris and Mason (1997), posit that the contagion theory can explain bank failure in that when depositors lack information about the incidence of an observable shock across banks they may have motivation to withdraw their deposits and wait until such information asymmetry is resolved. This may precipitate aggregate disturbances that may collapse several banks or the whole banking system. As Diamond and Rajan (2005) posit bank failure leads to a reduction in the common pool of liquidity, thereby

precipitating or worsening aggregate liquidity shortages that could lead to a contagion of failures and a total breakdown financial system.

2.2.3 Moral Hazard Theory

The theory of moral hazard, attributed to Pauly (1968) but formalized by Zeckhauser (1970) refers to change of behaviour that takes place once financial consequences of possible peril have been shifted to another through insurance. According to Dowd (2009), moral hazard issues results from a situation where an agent is responsible for managing the interests of another, but the first party has inclination to foster his own interests first. Madura (2015) defines moral hazard for banks as the act of banks taking more risk simply because their depositors are protected by insurance and purports that that many of the banks that failed in the 1980s and 1990s were a result of taking excessive risks. As Umar and Sun (2016) indicate, moral hazard can also lead to bank failure through sales agents and bank manager taking excessive risk in lending in a bid to make commissions, improve performance and compete with other banks by advancing loans to clients resulting to higher non-performing loans (NPLs).

Zhang, Cai, Dickson and Kutan (2016) give two forms of moral hazard problems that can lead to bank failure. The first is managerial rent-seeking in which managers pursue their own benefits through investing in ‘pet projects’ by not monitoring loans sufficiently. The second type of moral hazard is a result of diverging interests of shareholders and creditors in which shareholders make risky loans but end up shifting the risk to depositors. The last moral hazard channel is where directors give themselves, other insiders and businesses or organizations associated to them huge loans, which in most cases will end up being nonperforming loans and consequently paralyzing the bank leading to its closure. This was presumed to be the case in the failure of Imperial

bank of Kenya. A strong relationship between loan growth rate and failure of banks indicates moral hazard problem in lending.

2.2.4 Liquidity Preference Theory

The liquidity preference theory (Keynes, 1936) holds that people need money because they have some expenditure to finance with it, that is the transaction motive, or because they speculate that interest rates may be higher in the future (the speculative motive) and wish to hold it until the interest rates have risen or because they are uncertain about the future (precautionary motive) and do not want to risk (de Carvalho, 1999). The precautionary motive theory (Keynes, 1936) argues that banks should hold cash balances for unforeseen contingencies. Thus banks should have extra cash and its equivalents over and above what is needed for day to day transactions so that in case there is an unanticipated demand for cash they can be able to surmount it without resorting to impromptu sale of assets which may lead to selling assets at unreasonably high and unbearable discount rates, nor to buying credit at uneconomically exorbitant interest.

2.3 Determinants of Bank Failure

This section reviews the determinants of failure of commercial bank. The study, based on reviewed studies, will utilize bank fundamental analysis factors such as asset quality, earnings, capital adequacy, management capability, liquidity and market sensitivity. In addition the study includes bank size since a number of studies reviewed have shown that bank size is significantly related to bank failure. In total seven determinants are reviewed as below:

The first determinant is liquidity risk which is the independent variable of the study. The liquidity shortage hypothesis of bank failure argues that banks fail because of a

liquidity shock that causes them to be unable to meet their contractual debt obligations as they fall due (Fungacova, et al. 2015). This illiquidity that impairs the ability of a bank to honour its obligations promptly is known as liquidity risk. The inclusion of this variable as a determinant is informed by studies such as Hong and Wu (2013), Wu and Hong (2012) and Ugoani (2015).

Another determinant of bank failures based of reviewed studies is capital adequacy which is included as the first control variable. A bank is said to have adequate capital if that capital is sufficient to absorb any shocks that it may suffer (Kibuchi, 2016). Besides, the capital base helps depositors assess the riskiness of the bank and signals the bank's continued ability to honour its obligations (State Bank of Pakistan, 2001). Adequate capital is important for banks because it affects the returns for its shareholders, and also because a certain minimum capital is required by regulatory authorities for banks to continue operating legally (Mishkin & Eakins, 2012). According to Kaufman (1996) when the capital base of a bank is diminished until it has a negative net worth then it should be deemed to be a failure. On the contrary banks with sufficient capital can absorb shocks due to large losses and their time to insolvency is long. Based on previous studies bank failure and capital adequacy are negatively related with each other. Capital adequacy will be measured by the ratio of equity to total assets.

Asset quality or the magnitude of loans and advances impairment makes our third determinant and is included as the second control variable. As Muriithi (2016) posit, a deterioration of asset quality increases credit risk which in turn reduces the banks' expected profits. Deteriorating value of asset value has far reaching effects as losses will eventually be written-off against the bank's capital base jeopardizing its earning

capacity leading to insolvency (State Bank of Pakistan, 2001). Waweru and Kalani (2009) found a significant relationship between nonperforming loans and bank failure.

Management capability, the fourth determinant, is the ability of the ‘board of directors and management of banks, in their respective roles, to identify, measure, monitor, and control risks to ensure the safety, soundness, and efficiency of an institution’s operations and comply with applicable laws and regulations (Federal Reserve System, 1996). The proxy used in this investigation is the ratio of total cost to total income in accordance with Zheng et al. (2016). Alternative measures include the ratios of total expenditure to total income and operating expense to total expense (State Bank of Pakistan, 2001).

The fifth determinant is earnings. Bank earnings represent a bank’s financial performance and increase the capital base of the bank besides supporting present and future operations (State Bank of Pakistan, 2001). Earning and failure of banks are negatively related based on previous studies. Banks that make losses end up depleting their capital exposing themselves to possible insolvency and bank failure. In line with previous studies such as Cheserek, 2007 and Babar & Zeb, 2011, this study will measure earning by using return on equity (ROE), that is, net income after taxes to total equity as its proxy.

Sensitivity to market is also included as determinant number. Sensitivity to market measures how a bank responds to unfavourable changes in interest rates, foreign exchange rate, and such like factors (Babar & Zeb, 2011). According to Federal Deposit Insurance Corporation (2007) market risk for a bank affects capital and earnings through changes in interest rates. These adverse changes in interest rate in turn reduce earnings which also affect a bank’s liquidity and capital adequacy negatively.

According to Babar & Zeb (2011), the ratio of total securities to total assets can be used to measure sensitivity to market risk and this is the measure adopted by this study.

Lastly we include bank size because according to Zheng et al. (2016), the relationship between bank failure and liquidity risk is influenced by bank size and it can be negative for large and positive for small. Zheng et al. posit that bank size can be used to test both the moral hazard theory and the precautionary motive of the liquidity preference theory, in that if the relationship between liquidity and bank failure is negative for large banks the moral hazard theory is confirmed and if the relationship between bank failure and liquidity risk is positive for small banks then the precautionary motive is confirmed. This study will measure bank size by natural logarithm of total assets in line with Zheng et al. (2016).

2.4 Empirical Review

Cheserek (2007) analysed determinants of bank failures by surveying commercial banks in Kenya for the five years between 1998 and 2005. The study sampled out 21 banks representing 50% of Kenyan banks and sought to determine what causes commercial banks in Kenya to fail. The study used capital adequacy, asset quality and earnings ratios as determinants of bank failure; and total equity, total assets, total loans and earnings after tax as bank failure predictor variables. The study found that bank failure had no significant relationship with the predictor variables. The study however established that bank failure had significant relationship with capital adequacy, asset quality and total asset.

Wu and Hong (2012) studied liquidity risk, market valuation, and bank failures using a discrete-time hazard model and a sample of 262,838 observations, of which 1,719 were failures. The study used bank data from U.S. for the years 1985 and 2004 to estimate a

forecasting model which was to forecast U.S. bank data for the period 2005 to 2011. A composite measure containing government securities ratio, brokered deposits ratio and the TED spread was used to measure liquidity risk. The study also found that systematic liquidity risk is a significant forecaster of bank failures in the years 2008 and 2009.

Cucinelli (2013) carried out a panel data ordinary least squares regression analysis of the relationship between liquidity risk and probability of default using a sample 575 Eurozone banks for the period 2006 to 2010. The study measured liquidity risk using the liquidity coverage ratio and the net stable funds ratio while probability of default, was measured by credit rating transformed into a quantitative measure points from 1 to 22, in which the highest rating AAA received 21 points while the lowest rating D was given a score of one. The study employed bank size, bank specialization, performance index, gross domestic product (GDP) and a dummy variable representing bank crisis as control variable. The results of the study showed that all variable were significantly related with liquidity coverage ratio (LCR). Bank size, GDP, performance index and the dummy variable had significant positive relationship, while bank rating and bank specialization had negative relationship.

Maaka (2013) investigated the relationship between liquidity risk and the financial performance of commercial banks in Kenya for the period 2008 to 2012. The study targeted all the 43 commercial banks but managed to get a sample only 33 commercial banks. The study employed multiple regressions to investigate the relationship between liquidity risk and bank profitability. Liquidity risk was measured as a function of the level customer deposits, amount of cash and balances at the central bank, liquidity gap, non-performing loans, and leverage while profitability was measured by profit before tax. The study results showed that profitability was negatively impacted by increase in

liquidity gap and leverage while it was positively related with the level of customer deposits. Nonperforming loans were found to be positively related to profitability contradicting earlier researches.

Canicio and Blessing (2014) investigated the determinants of bank failure in Zimbabwe under a multi-currency setting. The study used pooled logit regression to analyse data collected from a panel of 14 banks observed over four years from 2009 to 2012. The study grouped banks into two categories of those that failed and those that survived. Separate descriptive statistics were produced for each group and compared by statistical package Stata 11. The analysis showed that the sample of failed banks had greater risk of failure than the sample of surviving banks. The study found gross domestic product growth rate to exert significant influence on bank failure together with liquidity, earnings, loan to assets ratio, loans to deposit ratio, deposits to total assets ratio, gross revenue ratio, core capital to total risk weighted assets, bank size, management quality and nonperforming loans to total loans.

Fungacova et al. (2015) using Russian banks financial statements data for the years 2000 to 2007, propounded the High Liquidity Creation Hypothesis” (HLCH) which posit that rapid expansion of bank’s core liquidity creation activities tend to increase the probability for bank failure. Their aim was to investigate bank failures occurring under “normal” economic conditions when there are no exogenous shocks, but the banks are experiencing a proliferation of liquidity creation activities. Their sample covered over 33,000 bank-quarter observations. A total 230 failed banks spread over the whole period of study were identified from Central Bank of Russia list of failed banks. The study adopted the Berger and Bouwman (2009) comprehensive liquidity

creation measures as a proxy for liquidity risk and found that high liquidity creation significantly increases bank failure probability.

Ogilo and Mugenyah (2015) undertook a descriptive research study on the determinants of liquidity risk of commercial banks in Kenya for the period 2010 to 2014. All the 43 banks in Kenya formed the population of the study. The study used multiple regression analysis to analyse secondary data from financial statements of all 43 commercial banks collected from the central bank of Kenya or from the official websites of the banks. The ratio of loans to deposits was used to measure liquidity risk while the independent variable or determinants were measured by capital adequacy ratio, Liquid assets ratio, Ownership type, bank size and leverage. The results of the study showed that capital adequacy and leverage were significant determinants while the ratio of liquid asset, ownership and size were insignificant.

Zheng, Cheung, and Cronje (2016) examined the relationship between bank liquidity, bank failure risk and bank size testing the moral hazard and the precautionary motive theories. They used the comprehensive measures of bank liquidity propounded by Berger and Bouwman (2009) to analyse the relationships. The study sample size covered all USA Federal Deposit Insurance Corporation (FDIC) insured institutions over the period 2003-2014. The variables of their study were failure risk as the dependent variable and bank liquidity as the independent variable measured by the Berger & Bouwman's (2009) preferred liquidity creation measure (BB Measure). The logit regression results of the study showed that the relationship between liquidity and failure risk depends on the size of the bank. The empirical results supported both the moral hazard and precautionary motive theories. That is to say higher liquidity is associated with lower probability of bank failure for the moral hazard theory and high

liquidity may lead to higher probability for bank failure for large banks for the precautionary motive theory.

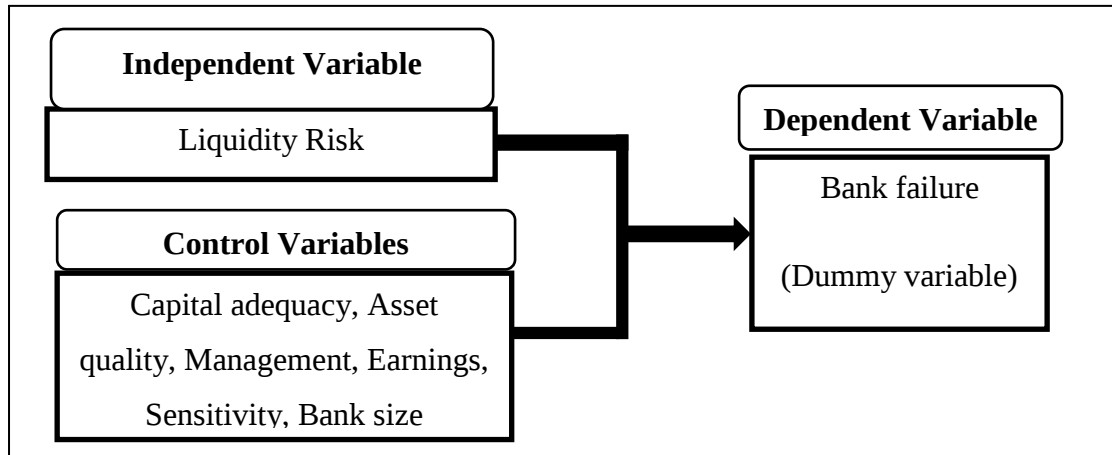
Muriithi and Waweru (2017) studied the effect of liquidity risk on financial performance of all 43 registered commercial banks in Kenya using secondary data from financial statements as available at the central bank of Kenya. They measured bank performance using return on equity ratio while liquidity risk was measured by the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR). Using random effects panel data analysis and generalized method of moments, the results indicated that NSFR was negatively correlated with profitability in both the short and long run. They also found out that LCR had insignificant effects on the performance of commercial banks in Kenya. They generalized that liquidity risk has a negative effect on performance of banks and as such managers should pay greater attention to liquidity risk management

2.5 Conceptual Framework

The conceptual model in figure 2.1 below shows how the independent variables, the control variable and the dependent variable are related. The dependent variable will be measured by the probability of bank failure will be either one if a bank fails or zero if it does not fail in a particular year. The independent variable, liquidity risk, is represented by the ratio of liquid assets to customer deposits. The control variables,

capital adequacy, asset quality, management capability, earnings, sensitivity and bank size are included to control for omitted variables error in the regression.

Figure 2.1 Conceptual Framework



Source: Author, 2017

2.6 Summary of the Literature Review

This chapter has reviewed literature related to liquidity risk and bank failure. From the reviews it can be established that there are several local studies that have investigated how liquidity risk associates with performance. There are also local studies that have explored the factors indicating high prevalence for banks to fail or determinants of bank failure. There are scarcely any known local studies that relate bank failure and liquidity risk, though studies of this type of investigations have been done in other countries like United States of America and United Kingdom. This study intends to fill this gap locally by exploring how liquidity risk may or may not have a relationship with failure of commercial banks in Kenya.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the strategy employed to investigate the relationship between liquidity risk and failure of commercial banks in Kenya for the years 2013 to 2016. It explains the research design, population, data collection methods and the analytical model.

3.2 Research Design

The study subscribed to a quantitative descriptive research design to investigate if there was a relationship between liquidity risk and failure of commercial banks in Kenya. A descriptive study according to Saunders, Lewis, and Thornhill (2011), seeks to give an accurate profile of events, persons, or situations by giving answers to who, what, where, when or how questions.

The study adopted a quantitative descriptive research design because the phenomena under scrutiny had already happened at the time of the study, and the researcher was not in control of the independent variables to manipulate them as is the case in experimental study. The second reason for choosing a descriptive approach was because the research objective was finding if there was a relationship between the liquidity risk and bank failure as opposed to whether the independent and control variables were the cause of the failures.

3.3 Population of the Study

The population of the study was all the 43 commercial banks licensed and operating in Kenya on 1st of January 2013. A census study approach was adopted because the total number of banks in Kenya is few compared with other countries such as USA that have

thousands of banks at any one point in time. A total of 42 commercial banks, whose accounts had been incorporated in the bank supervision annual report 2012 (CBK, 2012), were included in the study. Charterhouse Bank Limited was eliminated for being under statutory management. A panel data set comprising a cross section of 42 banks analysed longitudinally for four years yielded 42 times 4 or 168 bank years. However, observations were obtained for 157 years because failed banks were observed only for the years up to the point of failure and suffered attrition for 11 years that were after failure.

3.4 Data Collection

The study relied on secondary data extracted from the audited annual financial statements and other disclosures of all commercial banks licensed to operate in Kenya as posted in their respective websites or gleaned from the annual bank supervision reports of the central bank of Kenya, for the period 2013 to 2016. Secondary data was used because it is concrete, objective and does not change with time.

Data collected from each statement included book value of total assets, liquid assets, total equity, total deposits, total income, gross loans and advances to customers, gross nonperforming loans, total operating expenses, net profit or loss before tax, and total securities. The study used the secondary data collection form shown in appendix 3 to summarize data for each bank. This data was used to compute the various financial ratios shown in Appendix 4 that were then used for correlation and logit regression analysis.

3.5 Data Analysis

The study employed logistic (logit) regression analysis to establish the relationship between bank failure and liquidity risk. Logit regression was selected because of the

binary nature of the dependent variable bank failure. Secondly, multiple regression could not be used because the assumptions of assumptions of linearity, constant variance, absence of special causes, normality, and independence of the test data cannot be in met a binary variable like bank failure (Fang, 2013) .The study used Huber/White Quasi-Maximum Likelihood (QML) method to assess the standard errors of the logit regression. The data was analysed by Eviews 9.5 student edition.

3.5.1 Analytical Model

The analytical model of the study consists of bank failure as the dependent variable and liquidity as the independent variable. However to control for omitted variables regression error, capital adequacy, asset quality, management capability and sensitivity to market and bank size were used as control variables.

The logit regression model employed to analyse the effect of liquidity risk on bank failure is specified below.

$$\begin{aligned} \text{Prob (Bank failure indicator} = 1|X, Z) \\ = \Lambda (\alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} \\ + \beta_7 X_{7it}) \end{aligned}$$

$$\text{Where } \Lambda(Y) = \frac{e^Y}{1+e^Y} = \frac{\exp(Y)}{1+\exp(Y)}, Y = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \varepsilon_{it}$$

$$\text{Or } \text{logit}(p) = \alpha + \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \varepsilon_{it}$$

Where (p) is the probability of bank failure, Y is the dependent variable bank failure, Λ is the cumulative logistic distribution function and $X_1, X_2, \dots, X_7$ represent liquidity risk, capital adequacy, asset quality, management efficiency, earnings, sensitivity to market, and bank size respectively. In the model α is the intercept and $\beta_1, \beta_2, \dots, \beta_7$ are the respective coefficients of the independent variable and control variables. Lastly, i is the

individual bank ranging from 1 to 42, t is the time which can range from 1 to 4 and ε is the error term.

3.5.2 Tests of Significance

The significance of the coefficients was tested by the Wald test while goodness of fit and robustness were tested by the Huber-White method at 5% significance levels. P-values were used to discriminate significant and insignificant regression variables.

3.5.3 Operationalization of Variables

The table below show how the variables of the study were operationalized.

Table 3.1: Operationalization of Variables

Variable	Description/ Proxy	Empirical study adapted from	Expected Sign
Bank Failure	Dummy variable where failure is scored 1 otherwise 0	Zheng, Cheung & Cronje (2016)	
Liquidity Ratio	Total liquid assets to deposits	Ogilo & Mugenyah, (2015)	-
Capital Adequacy Ratio	Equity to total assets	Yirgu (2017)	-
Asset Quality	Gross non –performing loans and advances to Gross loans and advances to customers	Zheng, Cheung & Cronje (2016)	+
Management Capability	Total operating expenses to total income	State Bank of Pakistan (2001)	+
Earnings	Net income to total assets	Zheng, Cheung & Cronje (2016)	-
Sensitivity	Total securities to total assets	Babar & Zeb (2011)	+
Bank Size	Natural Logarithm (Ln) of Total Assets	Zheng, Cheung & Cronje (2016)	-

Source: Author, 2017

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter covers the analysis and findings of secondary data collected from the respective websites of commercial banks in Kenya and the Central of Kenya. The research project was designed and conducted to ascertain if there was a relationship between liquidity risk and failure of commercial banks in Kenya between the years 2013 and 2016. The study additionally endeavoured to establish if there was a relationship between bank failure and endogenous control variables viz. capital adequacy, asset quality, management quality, earnings and sensitivity to market (CAMES). This chapter presents the descriptive statistics, correlation analysis, regression analysis and discussion of the research findings.

4.2 Descriptive Statistics

Table 4.1 in the next page presents the descriptive statistics of the variables used to analyse the relationship between the dependent and the independent variables. The last row shows that the study covers a panel of 157 bank year observations. Below are narrations of each variable.

Column 2 of table 1 gives descriptive statistics for the dependent variable. The mean or probability of failure is 0.045 or 4.5 percent. The standard deviation is 0.207, skewness 4.413 and kurtosis 20.475. The number of failed banks is 7 as shown as the sum on the failure column.

Table 4.1: Descriptive Statistics

Date: 11/02/17 Time: 13:46								
Sample: 2013 2016								
	FAILURE	LAD	CAR	AQ	MQ	ROE	SM	ASSETS_MILI
Mean	0.045	0.418	0.166	0.096	0.448	0.147	0.228	75450
Median	0.000	0.374	0.163	0.073	0.416	0.195	0.191	24714
Maximum	1.000	0.993	0.383	0.514	1.402	0.436	0.636	504775
Minimum	0.000	0.017	0.070	0.000	0.116	-0.414	0.000	2927
Std. Dev.	0.207	0.167	0.050	0.084	0.219	0.171	0.135	96500
Skewness	4.413	1.187	1.208	1.923	1.475	-1.225	0.883	1.938
Kurtosis	20.475	4.531	6.012	7.814	6.588	4.382	3.893	6.875
Sum	7.000	65.676	26.115	15.080	70.317	23.054	35.724	11845607
Observations	157	157	157	157	157	157	157	157

Source: Author, 2017

Liquidity risk, shown in column 3 of Table 1 above, was computed as the ratio of liquid assets to deposits (LAD). The mean liquidity ratio of the 42 commercial bank in Kenya for the period 2013 to 2016 was 0.418 or 41.8 percent. The highest liquidity ratio reported in the span of 4 years was 0.993 or 99.3 percent and minimum liquidity ratio recorded is 0.017 or 1.7 percent. The standard deviation of liquidity was 0.1672 or 16.7 percent. The skewness of liquidity ratio is 1.187 and kurtosis is 4.531.

Column 4 of Table 1 summarizes the statistics of capital adequacy ratio (CAR) measured by equity to total assets. The mean and median of capital adequacy are 0.166 or 16.6 percent, and 0.163 or 16.3 percent respectively. Kenyan banks are required to maintain a statutory minimum ratio of 12 percent (CBK, 2013a). The maximum and

minimum capital adequacy ratios observed are 38.3 and 7 percent respectively. The standard deviation, skewness and kurtosis of capital adequacy are 5 percent, 1.208, and 6.012 respectively.

Asset quality (column 5 of Table 1) represented by the ratio of gross nonperforming loans to gross loans and advances had a mean of 0.096 or 9.6 percent. The maximum and minimum ratios were 51.4% and 0 respectively. The standard deviation of asset quality was 0.084 or 8.4 percent. The skewness of asset quality was 1.923 and 7.814 is the kurtosis.

Management quality shown on the sixth column of Table 1 and measured by the ratio of total operating expenses to total income had a mean and median of 0.448 and 0.416 respectively. The maximum and minimum ratios were 1.402 that is 140.2 percent, and 0.116 or 11.6 percent respectively. The standard deviation of management quality was 21.9 percent and skewness and kurtosis were 1.475 and 6.588 respectively.

Earnings quality, shown on column 7 of Table 1 and measured by the ratio of net profit (or loss) before tax to total equity (ROE), had a mean and median of 0.147 or 14.7 percent and 0.195 or 19.5 percent respectively. The maximum and minimum earnings observed were 0.436 or 43.6 percent and -0.414 or a loss of 41.4 percent respectively. The standard deviation, skewness and kurtosis for return on equity were 0.171, -1.225 and 4.382 respectively.

Sensitivity to market (SM), column 8 of Table 1, measured by the ratio of total securities to total assets, had a mean of 0.228 or 22.8 percent and a median of 0.191 or 19.1 percent. The maximum sensitivity to market observed was 0.636 or 63.6 percent

and the minimum observed was zero. The standard deviation was 13.5 percent and skewness of 0.883 and kurtosis of 3.893.

Column 9 of Table 1 shows total assets in Ksh. Million. Although the natural logarithm of total assets was used to measure bank size, the descriptive statistics presented are those of total assets. The average size of commercial banks in Kenyan is 75.45 billion. The maximum size observed was 504.78 billion and the smallest has a size of 2.9 billion. The standard deviation of size is 96.5 billion. Bank size has a skewness of 1.938 and kurtosis of 6.875.

4.3 Correlation Analysis

This section gives results of correlation analysis and shows the degree of linear association between independent and control variables to avoid duplication of variables. Table 4.2 below shows the result of Spearman Rank-Order correlation analysis. Note that the correlation coefficients are displayed together with their respective probabilities below them.

As shown on the second column of Table 4.2 the relationship between failure and the explanatory variables is low with the highest being -0.083 for failure and sensitivity to market and the lowest being 0.014 between failure and loan to deposit ratio (LAD). Column 3 of Table 4.2 shows the correlation between liquidity risk (LAD), and the other explanatory variable. The correlation between liquidity risk capital adequacy, asset quality, management quality, earnings, sensitivity to market and size (ASSETS) to three decimal places are 0.299, -0.352, -0.390, 0.248, 0.616, and -0.016 respectively. Capital adequacy has a correlation of -0.151, -0.132, -0.12, 0.185 and -0.199 with asset quality (AQ), management quality (MQ), earnings (ROA), sensitivity to market (SM), and size (ASSETS) respectively. Asset quality has a correlation of 0.462 with

management quality, -0.594 with earnings, -0.262 with sensitivity to market and -0.360 with size. Management quality has a correlation of negative (-) 0.532 with earnings, -0.5 with sensitivity to market, and -0.143 with size. Earnings (ROA) has a correlation of 0.181 with sensitivity to market, and 0.597 with size. Finally, sensitivity to market has a correlation of 0.005 with size.

Table 4.2: Spearman rank-Order

Covariance Analysis: Spearman rank-order								
Date: 11/02/17 Time: 14:12								
Sample: 2013 2016								
Included observations: 157								
Correlation								
Probability	FAILURE	LAD	CAR	AQ	MQ	ROE	SM	ASSETS_MILI
FAILURE	1.000							

LAD	0.014	1.000						
	0.866	-----						
CAR	0.038	0.299	1.000					
	0.635	0.000	-----					
AQ	0.046	-0.352	-0.151	1.000				
	0.565	0.000	0.059	-----				
MQ	-0.038	-0.390	-0.132	0.462	1.000			
	0.635	0.000	0.099	0.000	-----			
ROE	0.097	0.248	-0.012	-0.594	-0.532	1.000		
	0.228	0.002	0.878	0.000	0.000	-----		
SM	-0.083	0.616	0.185	-0.262	-0.500	0.181	1.000	
	0.301	0.000	0.020	0.001	0.000	0.024	-----	
ASSETS_MILI	-0.031	-0.016	-0.199	-0.360	-0.143	0.597	0.005	1.000
	0.697	0.838	0.013	0.000	0.073	0.000	0.947	-----

Source: Author, 2017

4.4 Regression Analysis

In order to find how the independent variables explain failure of commercial banks in Kenya over the study period panel logit regression analysis was carried out and the results are shown on Table 4.3 below.

Table 4.3: Logit Regression Analysis output

Dependent Variable: FAILURE				
Method: ML - Binary Logit (Newton-Raphson / Marquardt steps)				
Date: 11/02/17 Time: 14:21				
Sample: 2013 2016				
Included observations: 157				
Convergence achieved after 9 iterations				
Coefficient covariance computed using the Huber-White method				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
LAD	6.632	2.863	2.317	0.021
CAR	4.429	14.466	0.306	0.759
AQ	26.998	13.456	2.006	0.045
MQ	-9.760	2.995	-3.259	0.001
ROE	22.922	8.532	2.687	0.007
SM	-14.987	5.544	-2.703	0.007
LOG(ASSETS)	-0.484	0.328	-1.478	0.139
C	0.974	7.354	0.132	0.895
McFadden R-squared				
S.D. dependent var				
Akaike info criterion				
Schwarz criterion				
Hannan-Quinn criter.				
Restr. deviance				
LR statistic				
Prob(LR statistic)				
Obs with Dep=0				
Obs with Dep=1				
Total obs				

Source: Author, 2017

As shown in Table 4.3 the coefficient for liquidity risk or loans to deposit ratio (LAD) is 6.632, with Z statistics value of 2.317 and probability of 0.021. Capital adequacy ratio (CAR) has a coefficient of 4.429, Z-statistic of 0.306 and probability of 0.759. Asset quality (AQ) has a coefficient of 26.998, Z-statistic of 2.006 and probability of

0.045. Management quality (MQ), has a coefficient of -9.760, Z-statistic of -3.259 and probability of 0.001. Earnings (ROE), has a coefficient of 22.922, Z-statistic of 2.687 and probability of 0.007. Sensitivity to market has a coefficient of -14.987, Z-statistic of -2.703 and probability of 0.007. The natural logarithm of total assets (LOG (ASSETS)) has a coefficient of -0.484, Z-statistic of -1.478 and probability of 0.139. The constant (C) has an insignificant coefficient of 0.974, Z-statistic of 0.132 and probability of 0.895.

Model statistics indicate that the McFadden R-squared of the regression is 0.327, the likelihood ratio statistic is 18.719 with a probability of 0.009, deviance of 38.509 and restricted deviance of 57.228, Akaike information criterion of 0.347 and Schwartz criterion of 0.503.

4.5 Discussion of Research Findings

This section discusses the descriptive statistics, correlation and regression analyses presented above. It interprets and compares the findings with previous studies.

4.5.1 Descriptive statistics

The study findings indicate that the mean of liquidity risk is above the regulatory minimum ratio of 20 percent. This implies that a majority of Kenyan banks are compliant and hence the banking sector on overall does not suffer from liquidity risk problems despite some few banks having liquidity ratios below regulatory minimum. From theory, high liquidity can lead to bank failure through low profitability, while low liquidity may lead to failure through liquidity shortages and regulatory sanctions (Fungacova, et al., 2015). The four years mean of capital adequacy is also above the regulatory minimum of 14.5 percent. This suggests that on average Kenyan banks comply with the CBK capital requirement regulations. This indicates that the capital

adequacy of Kenyan commercial bank is health despite a few incidences of undercapitalization. CBK, (2016c) requires banks to comply with the ICAAP document and ensure that their total capital levels are adequate, consistent with their strategies, business plans, risk profiles and operating environment on a going concern bases. Banks with very low capital adequacy ratio face the risk of regulatory sanctions and excessive monitoring. A high ratio of capital adequacy implies that a bank can absorb large unexpected losses and hence faces less risk of closure due to bankruptcy. On the contrary a lower ratio indicates inability to absorb shocks in profitability and therefore has higher probability of closure due to bankruptcy risk (Kibuchi, 2015).

Notwithstanding, the 4 years asset quality ratio is higher than the 31st December 2016 rate indicating that Kenyan banks are in the process of reducing the rate of nonperforming loans. Waweru and Kalani (2009), in a previous study found that nonperforming loans were a major cause of bank failure. Equally, the four years mean of management quality (MQ) of is higher than that of the year ended 31st December 2016. The fact that the 2016 alone efficiency ratio is lower implies that banks are cutting on operating expenses hence improving on efficiency. Yirgu (2017) found management quality, proxied by operating expenses to total income, to be negatively and significantly related to bank distress. As argued by Canicio and Blessing (2014), the higher this ratio is the higher the likelihood of the bank to fail.

4.5.2 Correlation Analysis

There is a positive correlation between bank failure and liquidity risk, capital adequacy, asset quality, and earnings. This implies that increase in these variables increase the likelihood of bank failure. Similarly, a negative correlation between bank failure and

management quality, sensitivity to market and bank size implies that increase in these variables decreases the likelihood of bank failure.

A positive correlation between liquidity risk and capital adequacy, earnings, and sensitivity to market implies that as banks take more liquidity risk; capital adequacy, earnings and sensitivity to market tend to increase as well. On the other hand a negative correlation between liquidity risk and asset quality, management quality and bank size implies that as liquidity risk increases these variables tend to decrease. Spearman rank correlation also shows a positive correlation between capital adequacy and sensitivity to market which means that as capital adequacy increases so does sensitivity to market increase. Conversely, a negative correlation between capital adequacy and asset quality, management quality, earnings and size implies that as capital adequacy increases these variables also decrease. Similarly, a positive correlation between asset quality and management quality indicates as one of these variables increase so does the other. On the contrary a negative correlation between asset quality and earnings, sensitivity to market and bank size indicates that as asset quality (or nonperforming loans) increases earnings, sensitivity to market and size decreases as well.

Spearman rank correlation also shows a negative correlation between management quality and earnings, sensitivity to market and bank size implying that as management quality or operational costs increase earnings, sensitivity to market and bank size decrease. A positive correlation between earnings and sensitivity to market and bank size implies that as earnings increase sensitivity to market and bank size also increase.

Finally, a positive correlation between sensitivity to market and bank size means that as sensitivity to market increases bank size increases.

To summarize it all, the spearman correlation rank order analysis does not show any strong correlation between the variables that could alarmingly affect regression analysis. As such all variables were incorporated in the logit regression analysis.

4.5.3 Model Goodness of Fit

According to Gujarati and Porter (2009), in binary regression models what matters is the expected sign of the regression coefficients and their practical and statistical significance and model goodness of fit is secondary. According to Vatcheva, Lee, McCormick and Rahbar (2016), multicollinearity affects neither the overall fit nor the predictive power of the model. The lower panel of the Eviews regression result indicates that the model's likelihood ratio statistic and probability are significant indicating that overall model passes the goodness of fit test.

4.5.4 Regression Analysis

The fact that liquidity risk has a positive coefficient implies that increase in liquidity increases the likelihood of failure. According to Zheng et al. (2016), the relationship between liquidity risk and bank failure can be negative if failed banks suffer from the moral hazard problem or positive if the banks are pursuing the precautionary motive of the liquidity preference theory. The fact that the coefficient is positive and significant at 95% confidence level indicates that failed banks had stocked piled liquid asset for precautionary reasons. This finding is contrary to Canicio and Blessing (2014) and Yirgu (2017), who found liquidity to be significant and negatively correlated with bank crisis or failure. The finding is however consistent with the findings of Sahut and Mili (2011) and Pena (2016) who found liquidity to be positively correlated with banking

crisis, and Zheng et al. (2016) who found a positive correlation between failure of small banks and liquidity risk. The finding is also consistent with Berger and Bouwman (2014) who through trend analysis found that liquidity creation tends to be higher prior to financial crisis. Given that the banks that failed in Kenya were small banks, this finding is considered valid.

Capital adequacy has a positive coefficient implying that increase in equity in the capital structure of banks increases the likelihood of bank failure. The positive sign is inconsistent with the findings of Yirgu (2016), Canicio and Blessing (2014), Sahut and Mili (2011) and Zheng et al. (2017) who found capital adequacy to be significant and negatively correlated with failure. However, the insignificant probability implies that the capital adequacy has no significant effect on bank failure.

Asset quality has a positive coefficient indicating that it increases the likelihood of failure. Since the Z-statistic is more than 1.96 and the p-value is below 0.05 then asset quality has a significant influence on bank failure. This finding confirms previous empirical studies like Zheng et al. (2016), Bouvatier, et al. (2013), and Canicio and Blessing (2014) who found it both positive and significant, as well as Yirgu (2017) who found it positive but insignificant.

Management quality has a negative coefficient implying that it decreases the likelihood of bank failure. Nonetheless, its p-value of less than 0.05 signifies that it has significant relationship with bank failure. This finding is contrary to the results of Zheng et al. (2016), Bouvatier, et al. (2013), Canicio and Blessing (2014), and Yirgu (2017).

Earnings, measured by (ROE) has a positive coefficient implying that increase in profitability increases the likelihood of failure. The fact that the p-value of earnings is

less 0.05 indicates that profitability has a significant relationship with failure. This finding is inconsistent with the finding of Zheng et al. (2016), Bouvatier, et al. (2013), Canicio and Blessing (2014), and Yirgu (2017) who found the coefficient of earnings to be negative. However, it is consistent with the findings of Arabi (2013) who found earnings to be positive and significantly related to bank failure.

Sensitivity to market has a negative coefficient implying that having more securities decreases the likelihood of bank failure. The finding is consistent with Heyliger and Holdren (1981) who found this ratio to be negative and significant in predicting failure of small banks. Lastly, the natural logarithm of total assets has negative coefficient implying that increase in size reduces the likelihood of bank failure. The negative coefficient compares well with previous studies like Sahut and Mili (2011) and Zheng et al. (2016), but is nonetheless contrary to the findings of Bouvatier, et al. (2013) who found a positive correlation between size and bank failure. The regression shows an intercept of 0.974 though it is insignificant at 95 percent confidence level implying that it can be done away with in the final model.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary findings of the analyses done in chapter four, gives conclusions on the research objective set out in the first chapter, presents recommendations based on the finding, highlights the limitations of the study, and gives suggestions for further study.

5.2 Summary of Findings

The purpose of the study was to investigate the relationship between liquidity risk and failure of commercial banks in Kenya. Additionally, other variables that have been empirically established to have relationship with bank failure were included as control variables. Consequently, the relationships between bank failure and CAMES were also investigated.

The study found that there was a significant positive relationship between bank failure and liquidity risk implying that liquidity risk increased the likelihood of failure of commercial banks in Kenya in the years 2013 to 2016. This finding empirically supports the precautionary motive of the liquidity preference theory. The study also found a positive and significant relationship with asset quality and earnings indicating that they increased the likelihood of failure for the banks studied. The study found that management quality had a significant negative relationship with bank failure. This implies that management quality reduced the likelihood of bank failure. The study further found that sensitivity to market was negatively and significantly related to bank failure indicating that sensitivity to market reduced likelihood of bank failure. The study

however did not find a significant relationship between bank failure and two of the control variables viz. capital adequacy and bank size.

The Mcfadden R-squared of the regression was 0.327 indicating that jointly, liquidity risk, capital adequacy, asset quality, management quality, earnings, sensitivity to market and bank size explain 32.7 percent of failure.

5.3 Conclusion

The study found a positive and significant relationship between liquidity risk and bank failure. According Zheng et al. (2016) appositve relationship between liquidity risk and bank failure confirms that failed bank had pursued the precautionary motive of the liquidity preference theory. Asset quality had a positive and significant relationship with bank failure confirming the findings of Waweru and Kalani (2009) that nonperforming loans remain a leading cause of bank crisis in Kenya.

The study also found that management quality had a negative and significant relationship with bank failure. Since this was measured by the ratio of operating expenses to total income, then it implies that proper management of operating expenses has potential to reduce the chances of bank failure. As such, Kenyan commercial banks need to check on their efficiency in order to survive bank failure.

Earnings had a significant positive relationship with bank failure indicating that banks that failed were making profit prior to their failure. This indicates that bank managers need to understand the negative effect of pursuing short term profit as the main goal instead of pursuing shareholder wealth maximisation as discussed in the theory of the firm by Jensen and Meckling (1976). A positive and significant relationship between bank failure and earnings provides empirical support that bank managers of failed banks

had not pursued shareholders wealth maximization as the main goal of the firm but had rather sought to maximize short-term profits. This leads to the conclusion that just as making losses can lead to bank failure through bankruptcy risk, excess profits can equally cause bank failure through excessive loans default risk.

The study's regression results show that sensitivity to market had significant negative relationship with bank failures, implying that holding more securities reduced the likelihood of bank failure. Bank should therefore have more liquid securities to reduce their chances of failure. The fact that both earnings and asset quality had a significant positive coefficient implying that the two variables increased the likelihood of bank failure indicates that moral hazard problem played a major role in the failure of commercial banks in Kenya.

The regression however did not find a significant relationship between bank failure and capital adequacy and bank size. This implies that the banks that failed suffered their predicaments mainly for the way they managed their business and not on size and capitalization. Since capital adequacy was an insignificant variable in the regression, then we can infer that failed banks were not insolvent at the time of failure.

5.4 Recommendations

Given that the liquidity risk, asset quality, management quality, earnings and sensitivity to market showed a significant relationship with bank failure, the study recommends that bank managers emphasize on this variables in their day to day management practices. Further, given that the coefficient of earning is positive implying that profitability increased the likelihood of bank failure, the study suggest that managers of banks should be risk sensitive instead of endeavouring to make short-term profits that increase the chances of bank failure. Further, Since liquidity risk has been identified

as significant factor related to bank failure the study recommends that the central bank of Kenya implements the Basel III accord to enhance a more detailed reporting on liquidity especially the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR).

Since asset quality has been found to have a significant relationship with failure of commercial banks in Kenya, this may be an indication of weakness in the credit standards used to screen borrowers. The study recommends that bank managers reassess their current credit standards and consider replacing them with more comprehensive standards. These new and comprehensive credit standards will reduce nonperforming loans and save banks from impending failures.

Further as management quality has a negative and significant relationship with failure of commercial banks. The study recommends that banks should study and find an optimal level of operating expenses that can help in reducing the likelihood of failure.

5.5 Limitations of the Study

The main limitation of the study was that it relied on observations spanning over the four years 2013 to 2016 and hence likely to suffer from the small sample bias. This limitation was overcome by doing a census study that incorporated all commercial banks in Kenya. The study was also limited by the fact that at the time of the study the websites of all failed banks were closed hence limiting the availability of financial statements in a timely manner. This limitation was overcome by searching for the financial statement in past newspapers. Further annual reports of one the failed banks

for the year 2015 were not incorporated in the analysis for lack of integrity as the auditors had qualified it.

A further limitation of the study is that it was designed to be a descriptive investigation. As such even if the study found significant relationships between bank failure and LAMES no conclusion can be made that these variables were indeed cause of bank failure. This means that to establish the causality of the variables another study need to be done with the objective of finding the causes of bank failures.

Nonetheless, the relationship of bank failure with macroeconomic variables like inflation, unemployment, interest rate and gross domestic product growth rate were not investigated in this study. Since empirical studies show that these factors can contribute to bank failure, these factors are left for future studies.

5.6 Suggestions for Further Research

Since the Mcfadden R-squared is low it means that some explanatory variables were not included in the regression. As such the study should be replicated with additional non-financial determinants of bank failure such corporate governance, corruption and macroeconomic factors. Since the study relied on annual financial statements, it is suggested that the study be replicated with biannual or quarterly financial to capture the effects of the CAMELS on bank failure more proximately. The study concentrated on a narrow window of only four years. The study makes suggestion that a study covering all previous bank failures be done because it might yield more insightful results than those found by this study. A further suggestion is that detailed case studies of each

failed bank be carried out to delve into factors that prompted failure of commercial banks in Kenya beyond the CAMELS factors.

The study suggests that a sequel study be carried out to establish whether the relationships shown in this study were also causal in nature or not. It is suggested that a study be carried out that will control for the effect of distressed banks on the relationship between bank failure and the independent variables. Finally this study was retrospective in nature. It is suggested that a prospective study predicting or forecasting bank failures in Kenya be carried out to complement the findings of this study and to provide proactive managerial action.

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APPENDICES

Appendix 1: List of Acquired Banks

Acquiree	Acquirer	Date of Acquisition	Name after Acquisition
Giro Commercial Bank Ltd	I&M Bank Ltd	13.02.2017	I&M Bank Ltd
Fidelity Commercial Bank Ltd	SBM Bank Kenya Ltd	10.05.2017	SBM Bank Kenya Ltd
Habib Bank Kenya Ltd	Diamond Trust Bank Kenya Ltd	01.08.2017	Diamond Trust Bank Kenya Ltd
Source: https://www.centralbank.go.ke/commercial-banks/mergers-and-acquisitions			

Appendix 2: List of Failed Banks

Bank	Date Failed	Nature of Failure
Dubai Bank Kenya Ltd.	August 18th 2015	Liquidation
Imperial Bank Limited	October 13th 2015	Receivership
Chase Bank Kenya Limited	7th April 2016	Receivership

Appendix 3 Secondary Data Collection Form

Bank				
Name.....	YEAR			
Book Value in Ksh. 000	2013	2014	2015	2016
Liquid Assets				
Total Deposits				
Gross loans and Advances to Customers				
Gross nonperforming loans				
Total Income				
Total Operating Expenses				
Net income before Taxes				
Equity				
Total Assets				

Appendix 4: Raw data of the study

BANK	YEAR	FAIL	LAD	CAR	AQ	MQ	ROE	SM	ASSETS Million
KCB	2013	0	0.333	0.193	0.074	0.476	0.284	0.205	323312
KCB	2014	0	0.313	0.191	0.052	0.438	0.31	0.19	376969
KCB	2015	0	0.3	0.173	0.059	0.396	0.29	0.165	467741
KCB	2016	0	0.303	0.16	0.076	0.416	0.352	0.18	504775
EQB	2013	1	0.34	0.213	0.052	0.434	0.36	0.138	238194
CoopB	2013	0	0.326	0.156	0.044	0.503	0.3	0.171	228874
CoopB	2014	0	0.338	0.15	0.044	0.478	0.264	0.161	282689
CoopB	2015	0	0.361	0.145	0.038	0.419	0.285	0.19	339550
CoopB	2016	0	0.332	0.172	0.047	0.428	0.3	0.176	349998
SCBK	2013	0	0.38	0.163	0.029	0.364	0.37	0.244	220524
SCBK	2014	0	0.46	0.182	0.084	0.387	0.354	0.25	222636
SCBK	2015	0	0.537	0.175	0.12	0.539	0.219	0.29	234131
SCBK	2016	0	0.589	0.175	0.113	0.431	0.291	0.328	250274
BBK	2013	0	0.42	0.156	0.03	0.527	0.344	0.23	207010
BBK	2014	0	0.442	0.169	0.048	0.506	0.322	0.226	226118
BBK	2015	0	0.341	0.165	0.036	0.506	0.304	0.19	241153
BBK	2016	0	0.283	0.162	0.065	0.561	0.248	0.188	259498
CFC	2013	0	0.679	0.131	0.029	0.472	0.313	0.148	170726
CFC	2014	0	0.414	0.155	0.038	0.457	0.277	0.164	171347
CFC	2015	0	0.737	0.142	0.047	0.425	0.251	0.163	198578
CFC	2016	0	0.546	0.148	0.059	0.447	0.2	0.18	204895
CBA	2013	0	0.411	0.11	0.04	0.356	0.325	0.282	124882
CBA	2014	0	0.34	0.102	0.041	0.36	0.286	0.266	175809
CBA	2015	0	0.367	0.114	0.044	0.302	0.274	0.241	198484
CBA	2016	0	0.451	0.13	0.071	0.362	0.276	0.239	210878
DTB	2013	0	0.326	0.163	0.014	0.303	0.3	0.156	114136
DTB	2014	0	0.356	0.183	0.013	0.283	0.245	0.161	141176
DTB	2015	0	0.39	0.157	0.029	0.301	0.235	0.18	190948
DTB	2016	0	0.502	0.149	0.039	0.287	0.244	0.305	244124
I&MB	2013	0	0.34	0.186	0.014	0.234	0.295	0.19	110316
I&MB	2014	0	0.305	0.159	0.021	0.232	0.355	0.239	137299
I&MB	2015	0	0.335	0.177	0.049	0.228	0.32	0.212	147846
I&MB	2016	0	0.373	0.191	0.074	0.321	0.276	0.258	164116
NIC	2013	0	0.285	0.156	0.063	0.304	0.296	0.141	112917
NIC	2014	0	0.331	0.17	0.06	0.272	0.261	0.12	137087
NIC	2015	0	0.298	0.169	0.119	0.317	0.237	0.16	156762
NIC	2016	0	0.385	0.187	0.112	0.416	0.196	0.169	161847
NBK	2013	0	0.42	0.128	0.102	0.607	0.15	0.298	92493
NBK	2014	0	0.315	0.099	0.106	0.545	0.099	0.246	122865

BANK	YEAR	FAIL	LAD	CAR	AQ	MQ	ROE	SM	ASSETS Million
NBK	2015	0	0.307	0.087	0.161	0.727	-0.154	0.218	125295
NBK	2016	0	0.297	0.096	0.437	0.707	0.015	0.302	115114
Citibank	2013	0	0.625	0.224	0.018	0.288	0.312	0.377	71243
Citibank	2014	0	0.798	0.231	0.036	0.368	0.226	0.351	79398
Citibank	2015	0	0.761	0.22	0.064	0.306	0.287	0.321	88147
Citibank	2016	0	0.948	0.19	0.028	0.292	0.307	0.383	103324
Chase	2013	0	0.405	0.098	0.049	0.391	0.301	0.111	76569
Chase	2014	1	0.464	0.103	0.057	0.378	0.298	0.109	107112
BBK	2013	0	0.606	0.145	0.025	0.128	0.331	0.471	52022
BBK	2014	0	0.605	0.159	0.037	0.133	0.273	0.463	61945
BBK	2015	0	0.615	0.165	0.073	0.197	0.22	0.475	68178
BBK	2016	0	0.652	0.172	0.089	0.149	0.272	0.499	82907
BoAK	2013	0	0.345	0.124	0.043	0.344	0.157	0.181	52683
BoAK	2014	0	0.283	0.127	0.061	0.476	0.026	0.116	62212
BoAK	2015	0	0.415	0.123	0.237	0.684	-0.169	0.102	69280
BoAK	2016	0	0.422	0.15	0.288	0.521	-0.002	0.105	55996
Prime	2013	0	0.424	0.118	0.026	0.256	0.325	0.329	49461
Prime	2014	0	0.375	0.141	0.019	0.243	0.297	0.277	54918
Prime	2015	0	0.374	0.134	0.024	0.236	0.297	0.255	65001
Prime	2016	0	0.395	0.166	0.046	0.258	0.216	0.271	65335
FAMIL	2013	0	0.365	0.137	0.079	0.628	0.295	0.124	43501
FAMIL	2014	0	0.408	0.172	0.072	0.548	0.247	0.118	61813
FAMIL	2015	0	0.308	0.147	0.061	0.492	0.242	0.113	81190
FAMIL	2016	0	0.144	0.182	0.131	0.638	0.05	0.084	69432
Imper	2013	0	0.338	0.133	0.058	0.333	0.436	0.255	43006
Imper	2014	1	0.442	0.132	0.063	0.35	0.36	0.269	56599
INDIA	2013	0	0.752	0.166	0.01	0.116	0.246	0.594	30721
INDIA	2014	0	0.742	0.177	0.006	0.121	0.211	0.58	34370
INDIA	2015	0	0.565	0.17	0.02	0.143	0.205	0.504	42163
INDIA	2016	0	0.61	0.199	0.014	0.121	0.229	0.512	47815
Eco	2013	0	0.318	0.092	0.11	0.818	-0.363	0.224	36907
Eco	2014	0	0.399	0.17	0.102	0.641	-0.064	0.216	45934
Eco	2015	0	0.4	0.144	0.079	0.552	0.012	0.175	52427
Eco	2016	0	0.335	0.155	0.196	1.17	-0.395	0.18	47124
GTB	2013	0	0.65	0.238	0.043	0.44	0.068	0.24	25638
GTB	2014	0	0.493	0.217	0.037	0.389	0.096	0.312	32992
GTB	2015	0	0.476	0.269	0.044	0.454	0.069	0.356	29374
GTB	2016	0	0.569	0.282	0.074	0.442	0.079	0.287	29619
ABC	2013	0	0.38	0.125	0.056	0.351	0.236	0.248	19639
ABC	2014	0	0.306	0.122	0.065	0.45	0.121	0.23	21439
ABC	2015	0	0.214	0.129	0.172	0.389	0.125	0.177	22058
ABC	2016	0	0.271	0.134	0.189	0.365	0.074	0.153	22422
GABL	2013	0	0.338	0.167	0.064	0.628	0.161	0	16054

BANK	YEAR	FAIL	LAD	CAR	AQ	MQ	ROE	SM	ASSETS Million
GABL	2014	0	0.287	0.159	0.073	0.57	0.195	0	19754
GABL	2015	0	0.358	0.157	0.088	0.534	0.282	0	24714
GABL	2016	0	0.41	0.161	0.097	0.581	0.172	0	27156
EQTOR	2013	0	0.346	0.088	0.143	0.464	0.082	0.177	15562
EQTOR	2014	0	0.278	0.07	0.262	0.725	-0.399	0.166	16589
EQTOR	2015	0	0.275	0.143	0.326	0.766	-0.235	0.18	14470
EQTOR	2016	0	0.227	0.132	0.159	1.001	-0.414	0.209	13802
Giro	2013	0	0.505	0.153	0.054	0.269	0.184	0.343	13623
Giro	2014	0	0.517	0.161	0.032	0.246	0.195	0.304	15082
Giro	2015	0	0.457	0.179	0.02	0.247	0.169	0.267	15810
Giro	2016	1	0.5	0.188	0.021	0.26	0.19	0.242	16247
VCB	2013	0	0.308	0.185	0	0.251	0.232	0.147	13644
VCB	2014	0	0.326	0.167	0	0.22	0.221	0.157	17244
VCB	2015	0	0.271	0.175	0	0.227	0.262	0.167	20020
VCB	2016	0	0.314	0.226	0	0.228	0.157	0.15	22403
CBoK	2013	0	0.275	0.074	0.14	0.598	-0.115	0.199	16779
CBoK	2014	0	0.361	0.104	0.261	0.656	-0.175	0.187	15077
CBoK	2015	0	0.328	0.114	0.193	0.666	0.03	0.19	14136
CBoK	2016	0	0.258	0.101	0.197	0.707	-0.197	0.191	13918
DBoK	2013	0	0.386	0.117	0.136	0.222	0.15	0.291	15581
DBoK	2014	0	0.338	0.163	0.142	0.209	0.115	0.376	16954
DBoK	2015	0	0.431	0.168	0.206	0.19	0.063	0.344	16943
DBoK	2016	0	0.017	0.177	0.257	0.273	0.033	0.355	16418
KRep	2013	0	0.311	0.141	0.082	0.562	0.298	0.16	13199
KRep	2014	0	0.368	0.154	0.07	0.518	0.3	0.118	15801
KRep	2015	0	0.322	0.201	0.121	0.529	0.135	0.124	19107
KRep	2016	0	0.255	0.185	0.17	0.66	0.016	0.121	20875
GuaB	2013	0	0.334	0.116	0.079	0.293	0.257	0.171	12835
GuaB	2014	0	0.344	0.12	0.076	0.326	0.215	0.161	14571
GuaB	2015	0	0.374	0.136	0.104	0.382	0.166	0.168	14609
GuaB	2016	0	0.407	0.151	0.082	0.416	0.136	0.2	14705
FIDEL	2013	0	0.426	0.11	0.108	0.32	0.224	0.189	12779
FIDEL	2014	0	0.25	0.104	0.077	0.306	0.173	0.012	16515
FIDEL	2015	1	0.136	0.116	0.16	0.402	0.154	0.006	15025
HBAGZ	2013	0	0.824	0.167	0.03	0.27	0.257	0.606	11009
HBAGZ	2014	0	0.848	0.185	0.024	0.271	0.286	0.606	12147
HBAGZ	2015	0	0.703	0.178	0.022	0.311	0.198	0.54	14440
HBAGZ	2016	0	0.781	0.174	0.029	0.296	0.21	0.636	17033
FCOMBL	2013	0	0.287	0.107	0.074	0.721	0.166	0	11305
FCOMBL	2014	0	0.296	0.099	0.152	0.841	0.067	0	15278
FCOMBL	2015	0	0.224	0.11	0.241	0.825	0.007	0	14613
FCOMBL	2016	0	0.242	0.104	0.323	0.87	-0.027	0	14962
TNBL	2013	0	0.496	0.194	0.119	0.527	0.12	0.247	9658

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TNBL	2014	0	0.404	0.187	0.08	0.533	0.1	0.224	10240
TNBL	2015	0	0.339	0.193	0.1	0.5	0.124	0.201	10533
TNBL	2016	0	0.366	0.198	0.127	0.561	0.077	0.185	10465
HBL	2013	0	0.63	0.206	0.092	0.261	0.3	0.441	8078
HBL	2014	0	0.606	0.205	0.073	0.223	0.274	0.43	9449
HBL	2015	0	0.714	0.21	0.096	0.295	0.226	0.493	10230
HBL	2016	1	0.8	0.196	0.188	0.262	0.201	0.545	12508
JBB	2013	0	0.424	0.321	0.071	0.678	0.04	0.047	7010
JBB	2014	0	0.494	0.237	0.093	0.605	0.031	0.067	13118
JBB	2015	0	0.23	0.188	0.072	0.481	0.012	0.069	16782
JBB	2016	0	0.202	0.228	0.204	0.651	-0.137	0.068	15724
ParaBL	2013	0	0.63	0.153	0.234	0.231	0.081	0.377	8029
ParaBL	2014	0	0.566	0.132	0.197	0.266	0.099	0.387	10402
ParaBL	2015	0	0.42	0.146	0.126	0.265	0.11	0.145	10526
ParaBL	2016	0	0.43	0.174	0.125	0.274	0.064	0.257	9427
OR-MOB	2013	0	0.444	0.218	0.103	0.343	0.117	0.159	7007
OR-MOB	2014	0	0.426	0.203	0.109	0.39	0.053	0.213	7858
OR-MOB	2015	0	0.431	0.264	0.149	0.392	0.019	0.167	8496
OR-MOB	2016	0	0.393	0.296	0.12	0.531	0.012	0.15	9920
CBL	2013	0	0.367	0.169	0.076	0.557	0.059	0.245	7309
CBL	2014	0	0.322	0.13	0.1	0.653	-0.078	0.186	8865
CBL	2015	0	0.165	0.135	0.07	0.703	-0.128	0.125	10287
CBL	2016	0	0.327	0.202	0.081	0.537	0.064	0.181	12202
MEBL	2013	0	0.23	0.204	0.177	0.426	0.069	0.195	5766
MEBL	2014	0	0.394	0.208	0.3	0.397	0.062	0.242	5937
MEBL	2015	0	0.326	0.223	0.273	0.4	0.034	0.196	5678
MEBL	2016	0	0.311	0.228	0.297	0.618	-0.085	0.13	5234
UBA	2013	0	0.966	0.285	0.019	1.375	-0.262	0.395	3710
UBA	2014	0	0.993	0.239	0.067	1.402	-0.291	0.31	4756
UBA	2015	0	0.521	0.144	0.021	1.014	-0.272	0.18	7781
UBA	2016	0	0.344	0.383	0.022	0.604	0.023	0.303	5601
DBKL	2013	1	0.215	0.354	0.514	0.831	0.015	0	2927