

**EFFECTS OF INCOME DIVERSIFICATION AND NON-PERFORMING ASSETS ON
INTEREST RATE SPREAD IN THE KENYAN BANKING SECTOR**

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DECLARATION

This research is my original work and has not been presented for award of a degree in any other university or any other award.

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DEDICATION

This project I dedicated to my dear wife Agnes and to my son Blaize.

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ABBREVIATIONS

CBK	Central Bank of Kenya
OMO	Open Market Operations
NBFI	Non-Bank Financial Institutions
BOP	Balance of Payment
CR	Cash Ratio
LR	Liquidity Ration
DPF	Deposit Protection Funds
FCD	Foreign Currency Deposit
GDP	Gross Domestic Product
REPO	Repurchase Agreement
MPC	Monetary Policy Committee
CBR	Central Bank Rate
IPO	Initial Public Offer
CRB	Credit Reference Bureau
KNBS	Kenya National Bureau of Statistics
KBRR	Kenya Bank's Reference Rate
APR	Annual Percent Rate
EMH	Efficiency Market Hypothesis
HHI	Herfindahl-Hirschman Index
KBA	Kenya Bankers Association
IFRS	International Financial Reporting Standards

OPERATIONAL DEFINITION OF TERMS

Budget deficit: A situation where government expenditure exceed its receipts.

Balance of payment (BOP): Is a statement of a country's economic transactions with the rest of the world for a given period of time.

Central Bank Rate (CBR): It is the Central Bank's indicative rate and acts as a base rate for all monetary policy operations.

Cash Reserves Ratio (CRR): Is the proportion of total deposit in a commercial bank that must be deposited at the Central Bank (CBK).

Cointegration: Refers to long-run economic relationship between variables.

Financial Intermediation: The process of taking in of deposits from depositors and using them to give loans to borrowers.

Fiscal policy: Policy stance that targets taxation, expenditure and borrowing to stimulate economic and social development by government.

Horizontal Repos: Borrowing and lending among commercial banks using government securities as collateral, and have negotiated yields and tenors.

Interest rate spread: The difference between lending rate and deposit rate in commercial banks' financial intermediation processes.

Investment: Refers to the addition of capital stock in an economy or by a company.

Kenya Banks' Reference Rate (KBRR): It is the base rate for all commercial and microfinance banks' lending.

Market Liberalization: Refers to deregulation or relaxation of government restrictions markets.

Monetary policy: The policy stance that controls money supply by central bank by targeting interest rate, inflation or exchange rate among others.

Open Market Operations (OMO): Refers to actions by the CBK through purchases and sales of eligible securities to regulate the money supply and the credit conditions in the economy.

Public expenditure: Refers to the amount spent by government as it provides public goods such as goods and services, capital investment and public debt servicing.

Repurchase Agreements (Repos): Entail the sale of eligible securities by the CBK to reduce commercial banks' deposits held at CBK.

Tax: Is statutory contribution imposed to persons under certain tax jurisdiction by the relevant public authority.

Term Auction Deposit (TAD): The TAD is used when the securities held by the CBK for Repo purposes are exhausted or when CBK considers it desirable to offer longer tenor options

Tiers of Bank: Used to categorize bank based on the size of the balance sheet.

Tier I – Banks with balance sheet of more than Ksh. 150 Billion as at the end of 2014.

Tier II – Bank with balance sheet between Ksh. 50 and 150 Billion as at the end of 2014.

Tier III – Banks with a balance sheet between Ksh. 15 and 50 Billion as at the end of 2014.

Tier IV – Banks with a balance sheet less than Ksh. 15 Billion as at the end of 2014.

ABSTRACT

Various structural changes intended to lower interest rate spread were initiated by the Central Bank of Kenya (CBK) since interest rate liberalization in early 1990s, but as documented in various *Monetary Policy Statement* issues and acknowledged by the Industry players and policy makers, interest rate spread remained high. High interest rate spread denotes intermediation inefficiencies leading to disincentive to investment through poor reallocation of resources and lowers effectiveness of economy's monetary tools. Nevertheless, commercial banks continued had undergone a lot of changes characterized by new business models anchored on enhanced technologies and innovativeness. While only a few studies had been conducted in this subject, none captured the post economic crisis period in a broad way. Further, income diversifications, a product of commercial bank evolution in the period under study, received little attention. Under Kenya Banks' Reference Rate initiated by CBK in consultation with Kenya Bankers Association (KBA) to improve transparency in loan pricing, risk premium was a major component of price of loans. As such, this study sought to establish the trend of non-performing assets provisions as a component of interest rate spread and the effect of non-performing assets and income diversification on interest rate spread using quarterly bank-specific, industry specific and macroeconomic data between 2004 and 2014. Interest spread decomposition model and random effect regression analysis were used to meet the objectives. *Hausman* test was used to discriminate between random and fixed effect panel regression analysis. Apart from the variables *Risk Appetite* and *Market Concentration* that were stationary at first difference, the rest were stationary at level. Interest spread decomposition indicated a low loan loss provisions component between 2009 and 2013 and a general spread range of between 1.0 and 1.5 percent. Non-interest income, a measure of income diversification, accounted for 5 percent of spread on average. Regression results indicated a 0.11 percent fall in spread following a 1 percent increase in the proportion of non-interest income to total income. Relationship between spread and non-performing assets was positive but insignificant. Positive relationship also existed with respect to market concentration and operational costs. On the other hand, increased illiquidity in commercial banks reduced spread. The study recommends focus on operational efficiency, income diversification, market competition, reduced return's appetite and scaled credit information sharing.

CHAPTER ONE

INTRODUCTION

1.1 Background

Agents in the financial sector play a critical role in amelioration of difficulties created by information asymmetry in financial markets. Financial intermediation involves savings mobilization, pooling and diversification of risks and provision of loans through allocations to various sectors of an economy. However, the unsynchronized deposit mobilization and loans provision results to particular costs accruing to intermediary institutions. In this process, they pay interest rate for deposits and charge interest on loans in the uncertain environment. The difference between interest charged on loans and deposits gives the interest rate spread. Interest rate spread can be examined ex-ante or ex-post. Ex-ante approach draws inferences by considering the difference between deposited rate and lending rates as per the contracts. Ex-post uses income statement and balance sheet components to determine the effective rate earned from loans and effective rate paid on deposit. It's a measure of efficiency in intermediation process in the financial sector. A major goal in financial sector deepening and financial liberalization is the narrowing down of interest spread (Folawewo and Tennant, 2008).

The global banking industry has been undergoing tremendous changes characterised by income, regional and counterparties diversifications. This diversification has been spurred by deregulations and sector liberalization observed in the last two decades (Kiweu, 2012). Further, competition pressure has increased, both among the banks and from non-banking institutions. As such, gains from intermediation process have been squeezed and cost efficiency reduced. In

effort to overcome competition pressure and dwindling intermediation margins, banks have resulted to income diversification (Kiweu, 2012).

In absence of competitive environment, particularly through control policy regime, the growth of financial assets and diversifications are limited. Consequently, the semi-diversified financial market result to huge idiosyncratic risks for which premium has to be paid over and above systematic risks premiums, thus increasing the interest rate spread. As such, reduction in the levels of risk in the intermediation process catalysis investments and savings. Key to risks and costs in the financial sector arises from information asymmetry. Integral to inefficiency systems arising from information asymmetry is weak legal system that introduces ambiguity in contractual enforcement and rule of law. Major concerns in banking sector involves restriction on diversions of borrowed funds, constitution of enforceable contracts and lack of full disclosures that leads to both adverse selection and moral hazards in banking intermediation processes. To caution against these risks, banks results to high risk premiums that translates to high interest rate spread. High interest rate spread denies savers returns for their savings while leading to high cost of investment through costly borrowed funds (Grenade, 2007).

The effect of high cost of loans and high interest rate spread has become a key policy and political issue. The Central Bank of Kenya (CBK) in conjunction with Kenya Bankers Association (KBA) introduced Kenya Banks' Reference Rate (KBRR) as a form of improving transparency in loan pricing in effort to contain interest rate spread that they have severally been considered to be quite high. However, the banks still maintained higher margins citing internal factors and customers risk profiles (CBK, 2015). The perceived high interest rate has seen increased political pressure to control commercial banks' interest rates. These efforts eventually yielded in September 2016 when law capping interest rate was approved. The law capped

lending rate at 4% above the Central Bank Rate (CBR) while the minimum interest rate on deposit was capped at 70% of the CBR. However, a World Bank Policy Research Paper by Maimbo and Henriquez (2014) finds no evidence of positive impact of interest capping among 76 countries where some form of interest rate controls are practiced.

In most of the developing countries, financial liberalization has not yielded into lower spread. Interest rate spread remains high in Latin American, the Caribbean countries and Africa compared to the OECD countries. This denotes less efficient financial markets (Chirwa and Mlachila, 2004; Brock and Rojas-Suárez, 2000; Crowley, 2007; Gelos, 2006). Chirwa and Mlachila (2004) suggest a more robust structural changes in the developing countries if any progress towards efficient financial systems is to be achieved.

1.2 Reforms in the Kenyan Financial Sector

1.2.1 Policy Reforms and Implications

Before 1974, the major goal of Central Bank of Kenya (CBK) was to encourage investment in the country through low interest rate. To avoid introducing uncertainty among investors, interest rate remained unchanged for the period before 1974. However, the Balance of Payment (BoP) crisis experienced in 1971 and 1972 led to inflationary pressure that resulted to negative real interest rate. To contain the inflationary pressure, the CBK introduced a 5 percent cash ratio (CR) alongside tightened credit controls particularly on imported consumer durables. In 1972, the CR was withdrawn and instead, the 12.5 percent liquidity ratio (LR) was increased to 15 percent (CBK, 1974).

The inflationary pressure arising from oil crisis in 1973 led to variation in interest rate for the first time in June 1974. Following 1976-1977 coffee boom and expansionary fiscal policy, liquidity ratio was adjusted upwards and cash ratio re-introduced in 1978 (Ngugi, 2001). Inflation arising from oil crisis in the late 1970s and expansionary fiscal policy necessitated re-introduction of cash ratio at 6 percent and raising of liquidity ratio to 20 percent in 1986. It was difficult, though, to contain inflationary pressure due to expansionary fiscal policies in the mid-1980s (Ngugi, 2001). To control market and credit risks, NBFIs were subjected to a more stringent operating, regulatory and licensing framework. Further, deposit protection fund (DPF) was introduced to guard against losses to depositors (CBK, 1990).

Market forces were expected to lower interest rate spread in 1991 following interest liberalization. This didn't happen. In particular, prerequisite for interest rate liberalization were not in place. This included worsening economic environment, inflationary pressure and internal borrowing by government. For the first time, treasury bills were auctioned in primary market in 1991, providing avenue for reserve changes in monetary policies through OMO (CBK, 1991). Liberalization of exchange rate was effected in October 1993. This posed a serious challenge to the CBK through loss in foreign exchange reserve owing to capital outflows. However use of treasury bills in the money market resulted to high interest differential that attracted inflows of capital back to the country (CBK, 1994).

The Central Bank Act was reviewed in 1996 to ensure focus on price stability, liquidity, solvency and well-functioning market-based financial system. A monetary policy statement was to be prepared every six months, forwarded to Minister of Finance detailing policy and policy instrument to be used to achieve specific targets, rationale behind the policies as well as the assessment of progress of the previous policies relating to the preceding policy statement.

In May 2006, there was a sharp rise in interbank rate from 7.79 percent in January to 8.12 percent owing to KenGen Initial Public Offer (IPO). The bank collecting upfront payments drained liquidity from the other banks and thus had to engage in interbank market for redistribution (CBK, 2006). Horizontal (inter-bank) repurchase agreements was introduced in September 2008 to enable banks access credit from each other to meet liquidity needs using treasury bills as collateral (CBK, 2008). The REPO threshold was reduced to Ksh 20 million from 50 million and later to 10 million to increase Participation. In September 2007, a late REPO window from 2.00 pm to 2.30 pm was introduced to mop liquidity after first window closure (CBK, 2007).

In July 2010, Credit Reference Bureaus (CRB) were operationalized. Currency centres were opened in Nakuru and Nyeri to lower Cash in Transit costs. Following amendment to the Banking Act 2010, commercial banks were allowed to operate agency banking. There was a general drop in government security yields as investors absorbed effects of a change of inflation computation from arithmetic mean to geometric mean by Kenya National Bureau of Statistics (KNBS) between December 2009 and September 2010.

The year 2011 was characterized by inflationary pressure from the rising fuel and food prices. The Eurozone crises resulted to exchange volatility and increasing balance of payment deficit. To improve bank resilience in stress events, CBK introduced additional capital buffers in 2012. Core capital to risk weighted assets and total capital to risk weighted assets were increased to 10.5 percent and 14.5 percent respectively.

Accumulation of deposits in government accounts before the establishment of payment structures for county governments led to tightened liquidity in July 2013. Similar liquidity

challenges were experienced in September 2013 owing to low absorption of devolved funds, hence a rise in interbank rate. This was controlled by CBK redeeming Repo securities by commercial bank as well as issuing reverse Repos in the August 2013 (CBK, 2013). The liquidity pressure at the beginning of 2014/15 fiscal year as government department and ministries firmed up their expenditure plans was addressed using reverse Repo. The KBRR and Annual Percent Rate (APR) framework was introduced in July 2014. KBRR was computed and set at 9.13 percent, and by 28th December 2014, a total of Ksh. 732.2 billion worth of loans had been converted into KBRR framework. Among other post-2008 economic crisis developments include risk based capital requirements issued by Basel Committee on Banking Regulations (In Mendoza, 2015) and IFRS9 reporting standards that require risk based and forward looking provisions for the banks’ financial assets (International Accounting Standards Board., & IFRS Foundation, 2013).

1.2.2 Changes in interest rate spread

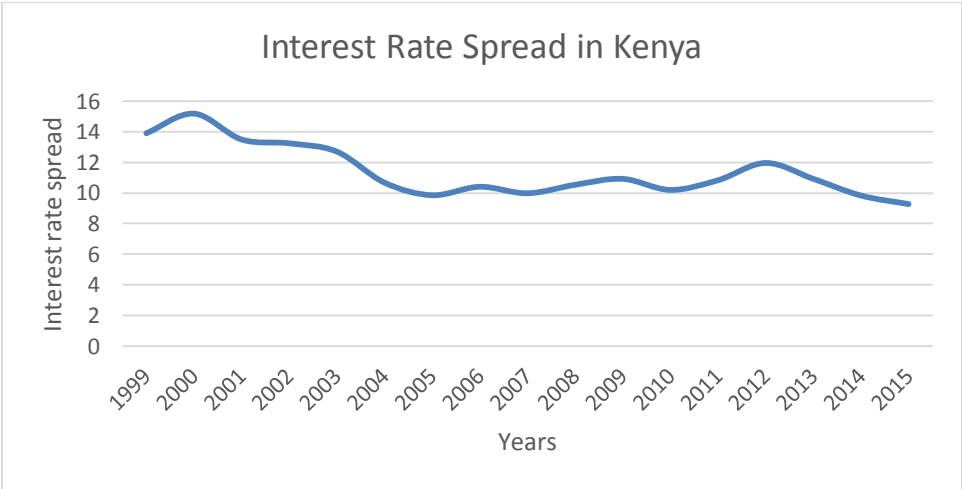


Figure 1.0 The Kenyan interest rate spread from 1999 to 2013
 Source: CBK

Increased demand of Treasury bills and domestic borrowing due delayed external budgetary support under Poverty Reduction and Growth Facility lowered interest rate spread in 2000 and was compounded by looming uncertainty from amendment of CBK Act 2000. However, this was ameliorated by increased food production and stable exchange rate in 2001 (CBK, 2001). In 2003, CBK reduced the cash reserve ratio from 10 percent to 6 percent lowering interest rate spread to 10.2 percent from 10.9 percent, which the CBK considered to be extremely high (CBK, 2003).

In 2005, easing oil prices, increased food supplies and strengthening of the Kenyan shilling lowered inflation. As such, M3 was revised to 10 percent from 7.8 percent in October 2005. Increasing money supply and inflationary pressure led to upward review of CBR from 9.75 to 10 percent in August 2006. There was an increase in lending rate as well as the interest spread (CBK, 2006). In August 2007, the REPO threshold was reduced to Ksh. 20 million from 50 million, and later to Ksh 10 million. There was, however, an increase in interest rate spread to 9.00 percent from 8.96 in December and June 2007 respectively (CBK, 2007).

In 2008, CBK rate was lowered to 8.5 percent from 9.0 percent. Cash requirement ratio (CRR) was lowered to 5.0 percent from 6.0 percent in December the same year. The CRR was lowered further in July 2009 to 4.5 percent. Further, the auction days for 182 and 91-day Treasury bills were separated into alternating weeks to improve efficiency. Due to intermediation structural rigidities, interest rate spread increased by 0.1 percent in the same period (CBK, 2009).

Inflationary pressure from rising food prices and shilling volatilities arising from Eurozone crisis led to increase in CBR to 18.0 percent by December 2011. There was liquid strain in the interbank market resulting to rise in interbank rate, lending rate and deposit rate. Interest rate

spread increased to 13.0 percent by December 2011 (CBK, 2011). The high CBR rate was lowered to 13.0 percent in September 2012, and later to 9.5 percent by December the same year. Interest spread reduced from 12.41 percent to 11.34 percent in June and December 2012 respectively (CBK, 2012).

In May 2013, MPC reduced the CBR from 9.50 percent to 8.50 percent and this was retained for the rest of 2013. Accumulation of government deposits during the rollout of devolved system of government led to liquidity constraints. This was controlled by CBK redeeming Repo securities by commercial bank as well as issuing reverse Repos in the August 2013. Average lending rate reduced marginally while deposit rate increased lowering the spread from 11.19 to 10.42 in the same period. The Kenya Bank's Reference Rate (KBRR) and Annual Percent Rate (APR) framework was introduced in July 2014. Lending rate continued to decline while deposit rate increased hence continued fall in the spread to 9.18 percent in December 2014 from 10.33 percent in July 2014 (CBK, 2014).

Anchored on supportive regulatory environment, high profitability in the banking sector and advancement global technological capabilities, Kenya banking sector has been in the forefront of innovative diversifications. These diversification have further been pushed by enhanced competition by indigenous and international banks owing to general stability and Kenyan profile as East and Central Africa's financial hub. Such diversification are evident from mobile banking, agency banking, trade fiancé and products tailored for various market segments. This diversifies income sources other than intermediation process, effectively stabilizing income growths and associated risks (Alam *et al*, 2011).

1.2.3 Interest Rate Spread and Economy

Banking institutions play a major role in a country's and global economy. An efficient financial intermediation has a direct impact on effectiveness of investable resource mobilization, and thus, economic development. A major indicator of efficiency in banking sector is the interest rate spread (Brock and Rojas-Suárez, 2000). Additionally, interest rate spread indicates the level of financial sector's development.

Interest rate on deposit reflects returns on deposit. Quaden (2004) observed that higher expected returns for on savings acts as incentives for savers with financial surpluses. On the other hand, interest on loans is a cost of investment in an economy. Lower borrowing costs allow external financing for new project. That way, lower interest rate benefits real economy (Quaden, 2004). According to Ndung'u and Ngugi, (2000), higher interest rate spread limits financing for potential investors while discouraging potential borrowers. High interest rate spread reduces confidence on effectiveness of monetary policies through bank-lending channels (Folawewo and Tenant, 2008). This may raise questions on CBK's ability in contingency management in the sector and economy at large. This can lower foreign investment, and also domestic, particularly when investor perceive more uncertainties about the future business environment.

Valverde *et al.* (2004) elucidated that intermediation costs determines bank's assets profile. A high cost of intermediation suggest a less stable fund for banks given that savers have no incentives to hold their deposit with banks for long. This result to limited stable deposits and hence only a small proportion of the mobilized savings are used for investment. The major reason for this is to avoid liquidity problem arising from liability-asset mismatch under possible stressed scenarios. To bridge the limited investable funds, banks end-up approaching other

institutions, mostly internationally, for long term lending. While this may be cheap, it raises concern for a country vulnerability to exchange rate variations. To hedge against this, the swaps, forwards, future and options among other derivative markets must be well developed to reduce the risk premium on cost of capital. For banks that may not access enough funding, they result to short-term financing that's expensive and risky. As such, improving financial intermediation efficiency, particularly for less developed and developed economies, will drive economic growth and development.

1.3 Statement of the Research Problem

High interest spread impedes economic growth by working against financial intermediation (Grenade, 2007). The far reaching effects arise from disincentive to savers as well as discouraging investments. It also reduces confidence on effectiveness of monetary policies through bank-lending channels by rendering the channel inefficient (Folawewo and Tenant, 2008). CBK and KBA have acknowledged existence of high interest rate spread for many years. Its persistence remains a policy concern to both analyst and policy makers.

Despite the significance and the dynamic nature of the banking sector, only a few studies captures post 2008-economic crisis data except for such studies as Samahiya and Kaakunga (2012) that collected information from 2004 to 2011 and Were and Wambua (2013) 2002 to 2011. Post 2008 represents a more restricted commercial bank's environment on capitalization, liquidity management and prudential practices for banks (In Mendoza, 2015). Further, most studies such as Kiptui (2014) and Were and Wambua (2013) organized determinants of interest rate spread into bank-specific, industry-specific and macroeconomic determinants. However, such variables as degree of risk aversions and income diversification miss in many studies.

Nearly all studies acknowledge the negative and significant relationship between the spread and non-performing loans. However, only a few, such as Perez (2011), have gone further to show the trend of the components of interest rate spread. In the light of continued high interest rate spread, associated economic implications, failure to consider rising diversification that has characterised the banking sector and the continued justification of non-performing loans (NPL) as a reason for the high spread, this study sought to establish the effects of income diversification and non-performing assets on interest rate spread in the Kenya banking sector.

1.4 Research Questions

The study sought to answer the following questions:

- i. What has been the trend of non-performing assets' contribution to interest rate spread charged by the Kenya commercial banks?
- ii. What are the effects of income diversification and non-performing assets on interest rate spread among the Kenyan commercial banks?

1.5 Research Objectives

The overall objective of this study was to establish the effects of income diversification and non-performing assets on interest rate spread in the Kenya banking sector. Specifically, the study objectives were:

- i. To find out the trend of non-performing assets' contribution to interest rate spread charged by the Kenya commercial banks.
- ii. To find out the effect of income diversification and non-performing assets on interest rate spread among the Kenya commercial banks.

1.6 Significance of the study

With increased competition in domestic and international financial market, efficiency in banking sector is paramount. This study sought to provide much needed information on the effects of income diversification and NPL on interest rate spread in the Kenyan banking sector. It contributes to the existing literature on intermediation reforms in Kenya. It also provides insights on appropriate policy mix that will encourage saving and investments and hence stimulate production, employment and economic growth. By providing avenues of lowering interest spread, the study provides even more monetary policy targets that can complement fiscal policy to improve the standards of living. Indeed, by ensuring efficiency in the financial sector, policy interventions would become more effective and would increase confidence among various economic agents.

1.7 Scope and Organization of Study

This study uses banks' quarterly data from the period 2004 to 2014 for two major reasons. One, the probability of getting relevant data is high because most of the banks existing today were in existence in 2004. Secondly, it captures the post-economic-crisis period that has seen global attention, full implementation of Basel II and Basel III requirements consideration. The study is organized in five chapters. The forgoing chapter provides background to the study, study problem and the objectives. Chapter two captures the relevant literature review, research design and methodology in chapter three, chapter four contains results and discussion while chapter five provides conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the theoretic and empirical literature relating to determinants of interest rate spreads in banks. The first part contains the theoretical literature that provides foundation for empirical studies. The second part outlines the empirical literature both in Kenyan banking and sector and internationally, while the last part outlines the literature overview.

2.2 Theoretical Literature

2.2.1 Theory of the Firm

The theory of the firm indicates that firms choose inputs, production techniques, prices and quantity of outputs so as to maximise profits. Profit is represented as the difference between total revenue (TR) and total costs (TC). The theory indicates that, firms produce goods up to the point where marginal revenue equates to marginal costs, and employs factors of production to the point that marginal revenue product equals the cost of employing the inputs. This theory forms the basis of other theories such as price and the production theory of the firm. As the most critical objective in a firm, profit maximization informs firm's behaviour in different internal and external business environment (Varian, 1992).

In the banking intermediation process, banks generate revenues from sale of loans at price, in this case interest on loans, to generate assets. On the other hand, direct cost of intermediation arises from the cost of funds. This majorly arises from interest rate paid on deposits. As such, the

difference between lending rate and deposit rate represent a profit margin in the intermediation process. According to the theory of the firm thus, banks would seek to maximise net yields on assets.

2.2.2 The Klein Monti Model of Monopoly

This model takes profit maximization concept further by considering how the profit maximization condition for a monopoly bank would look like. Profit is given as follows:

$$\pi = r_L L + rM - r_d D - C(D, L) \quad \dots\dots\dots 2.1$$

$$M = (1 - \alpha)D - L \quad \dots\dots\dots 2.2$$

Where L is the amount of loans, r_l interest on loans, D amount of deposits, $r_d D$ interest on deposit α is the central bank reserve ratio and M is the amount of reserves with the central bank.

Loans have a downward sloping function $L(r_l)$ while deposits have an upward sloping function $D(r_d)$. The bank decides the amount of loans and deposit to take, and thus the corresponding interest rate. Substituting equation 2.2, profit function becomes;

$$\pi = (r_l(L) - r)L + (r(1 - \alpha) - r_d(D))D - C(D, L) \quad \dots\dots\dots 2.3$$

The first order conditions

$$\frac{\partial \pi}{\partial L} = r'_L(L)L + r_L - r - C'_L(D, L) = 0 \quad \dots\dots\dots 2.4$$

$$\frac{\partial \pi}{\partial D} = -r'_d(D)D + r(1 - \alpha) - r_d - C'_d(D, L) = 0 \quad \dots\dots\dots 2.5$$

Elasticity of loans (demand) and deposits (supply).

$$\varepsilon_L = -\frac{r_L L'(r_L)}{L(r_L)} > 0 \quad \text{and} \quad \varepsilon_d = \frac{r_d D'(r_d)}{D(r_d)} > 0$$

Rearranged elasticity solutions

$$\frac{r_L^* - (r + C'_L)}{r_L^*} = \frac{1}{\varepsilon_L(r_L^*)} \quad \dots\dots\dots 2.6$$

$$\frac{r(1 - \alpha) - C'_d - r_d^*}{r_d^*} = \frac{1}{\varepsilon_d(r_d^*)} \quad \dots\dots\dots 2.7$$

Equation 2.6 and 2.7 gives the equality between the inverse elasticity and the learner equations. The greater the market power a bank has, the lower the elasticity and the higher the lerner index denoting higher intermediation margins. Market power in the deposit market would result to lower interest on deposit while market power in the loans market would result to higher interest rate on loans. In this study, market power was pegged on the extent of market concentration based on asset size of each bank.

2.2.3 Dealership Model of Ho and Saunders

This model was developed by Ho and Saunders in 1981. In the model, banks are considered as risk averse dealers between suppliers and demanders of funds. Intermediation is characterised by two forms of uncertainties; mismatch between loan and deposits and risk of default. The net interest spread is given as follows:

$$S = R_L - R_d = (a + b) \dots\dots\dots 2.8$$

Where R_L is interest rate on loans, R_d interest rate on deposits, a immediacy of liquidity service fee and b risk premium.

Ho and Sounders represent the optimal spread as follows:

$$S = (a + b) = \frac{\alpha}{\beta} + \frac{1}{2} R \delta_L^2 Q \dots\dots\dots$$

2.9

Where α and β are intercept and slope of symmetric deposit and loan arrival functions respectively, $\frac{\alpha}{\beta}$ the required net interest spread by a risk-neutral bank, R management coefficient of risk aversion for a bank, δ_L^2 variance of loan and deposit interest rates and Q bank transaction size.

The model suggests that optimal interest rate spread depends on bank risk aversion, interest rate risk, market competition and the average transaction size.

2.2.4 Structure-Conduct-Performance (SCP) Theory

This is an analytical framework relating market structure, conduct and performance, and was developed by Joe S. Brain Jr. in 1959. The SCP theory suggests a positive relationship between market concentration and inefficiency. Structure helps a firm deviate perfect competition path and such strength arise from supply concentration, product differentiation and demand concentration and other strategic behaviours (Tushaj, 2010). A firm’s structure is highly dependent on technology available and nature of product.

2.2.5 Efficient Market Hypothesis (EMH)

This theory was developed by Eugene Fama in 1960. It states that in a liquid market, financial markets always reflect the available information. EMH may exist in strong form, where non-public information is available for pricing in financial markets, semi-strong or weak form. Market are assumed to be efficient given that they use all available information and thus outperforming the market in financial returns; a game of chance as opposed to skills. However, the theory acknowledges the role of economies of scale in firm operation and product pricing. It suggests that, bigger banks would have smaller interest rate spread.

2.2.6 Interest Rate Spread Decomposition Model

This approach was postulated by Randall (1998). The methodology provides an accounting framework that indicates how interest rate spread is distributed among various underlying bank specific factors as contained in commercial banks' balance sheet and income statements. In the model, profit is the sum of interest and non-interest income less interest and non-interest expense and loan loss provisions. Interest rate margin is the difference between interest income and interest expense. Decomposition over time indicates how proportions of components of spread have changed over time. It reflects microeconomic decisions in a bank as management seeks to maximise and diversify bank's income.

2.3 Empirical Literature

Demirguc-Kunt and Huizinga (1999) sought evidence on determinants of banks profitability, tying such profitability to interest rate spread. He used panel regression analysis to analyse bank-level data for 80 countries between 1988 and 1995. The authors indicated that profitability is the

margin of intermediation and is the difference between costs of deposits and return on bank's assets. To ensure correct definition, banks also incorporate transaction costs and taxation to obtain profit. As such, the authors found interest rate spread as a measure of efficiency on how resources are allocated in a financial system. Specifically, they sought to establish how financial system structures, tax system and financial regulation relate to interest rate spread. Apart from including taxes, the study also incorporated GDP per capita weighted variables to factor in development differentials across countries. The results indicated that banks with small banking income and those dependent on deposit funds maintained higher interest margins because they had to operate many subsidiaries. The findings indicated that foreign banks had higher interest rate margin and profit in developing countries than the domestic ones. Further, there was a positive relationship between interest rate spread and inflation. Such a relationship was observed with respect to foreign ownership and those with higher market concentration.

Demirguc-Kunt *et al.* (2004) sought to establish how market structure, regulatory framework and institution characteristic affect financial intermediation costs. The study used panel regression analysis for bank-level data for 72 countries. Findings indicated that bank-specific factors explained considerable part of cost of intermediation. Large intermediation margins were associated with banks with lower liquidity ratios, banks with low capital levels, low service revenue banks, small banks and those with large market share. While result relating to market share was consistent with Klein Monti model of monopoly, the rest of the findings were consistent with the efficiency market theory on benefits of economies of scale. This introduced some aspects of inconsistency given that small banks were also expected to charge higher interest rate spread, hence the need for further studies. The author also found that strict regulatory environment results to higher interest margins.

Grenade (2007) conducted a panel data analysis to measure the relevance of macro and micro factors in determining interest rate spread in the Eastern Caribbean Currency Union. The study variables included regulated saving deposit rate, CRR, opportunity cost, operating efficiency, market power and GDP. There was a positive relationship between interest rate spread and liquidity risks. This was consistent with the hypothesis by Ho and Saunders as well as empirical studies by Ghosh (2008) and Ngugi (2001). Additionally, foreign banks maintained higher interest rate spread compared the indigenous ones. The finding was consistent with that by Gelos (2006), who in 14 Latin American Countries, established positive and significant relationship between foreign ownership and interest spread. Positive relationship also existed with respect to regulated saving deposit rates, market concentration, operating costs and non-performing loans. Finding on bank market concentration was similar to that by Martinez Peria and Mody (2004) who observed a positive correlation, but contradicted that by Crowley (2007). Despite the study being not one of the recent, it ignored such macroeconomic variables as inflations and exchange rates that were likely to have had implications on banks' pricing models.

Folawewo and Tennant (2008) used dynamic panel data analysis to establish determinants of interest rate spread in 33 Sub-Saharan Africa. The study included bank and sector specific variables, macroeconomic variables and macro policy variables that incorporated public sector crowding out, broad money growth, money supply activities and deficit financing by government from 1988 to 2005. A negative relationship is established between interest rate spread and inflation, real GDP per capita, population, Treasury bill rate and the ratio of M2 to GDP. On the other hand, banking sector development measures, central bank discounting rates, exchange rate volatility, reserve requirement and crowding out effect of public borrowing was observed to have a positive effect on the spreads. Significant variables in the study findings included government

crowding out in each country, inflation, deficit financing by governments, money supply levels, CRR, country's economic growth rate and population. As opposed to some other studies, it used ex-ante interest rate spread by subtracting average deposit rate from average lending rate. However, challenges in obtaining ex-ante data resulted to use of aggregate interest data on deposit and loans. Further, the study did not capture recent developments that have shaped global financial markets following global economic crisis in 2008.

Perez (2011) used data for bank-specific variables, industry specific variables and macro-economic variables for the period between 2001 and 2009 to establish determinants of interest rate spread in Belize. The study used both the accounting decomposition model and panel econometric model. Major determinants of interest rate spread were found to be non-performing loans and market share. Results also indicated a positive relationship between the spread and operating costs, this was consistent with the findings by Beck and Hesse (2006). Other significant determinants included non-interest income, concentration of deposits and excess liquidity. He linked the determinants to few market players, credit market information asymmetry and limited investment securities in financial institutions. However, the study failed to consider opportunity costs such as returns on government securities. As opposed to Kenyan case, Belize operated a fixed exchange regime for the period covered by the study.

Georgievska *et al.*, (2011) analysed determinants of interest rate spread in Greece by considering 17 commercial banks. The study collected data from 2001 and 2009 and used both interest rate decomposition and fixed effect approach of panel data analysis. Contrary to the finding by Grenade (2007), the study established negative relationship between interest rate spread and foreign ownership. Non-performing loans were insignificant while the effect of liquidity, operating costs and capital adequacy were significant. The effect of change in interest

computation methodology in 2005 on the spread was significant. From interest rate spread decomposition, operating cost and loan impairment were the largest components of the spread, and remained relatively high compared to those of other countries.

Samahiya and Kaakunga (2012) conducted an econometric exploration on determinants on interest rate spread in Namibia's commercial banks. The study employed panel data analysis for deposit market share, measured using the ratio of banks' deposits to total industry's deposit; liquidity levels, tax, operation costs, captured as a ratio of non-interest operating expenses to total income; capital ratio and non-performing loans, the percentage of non-performing loans (in arrears for 90 days and above) to total loans, between 2004 and 2011. The Klein (1971) monopoly model was used as a basis of how firms' characteristics determine business operations. Major determinants of interest rate spread were found to include operating costs, deposit market share and liquidity levels. On the other hand, effect of taxation and non-performing loans were found to be insignificant.

Were, M., and Wambua (2013) assessed determinants of interest rate spread in Kenyan banking sector. The study categorised dependent variable into bank specific factors and time-specific variables collected between 2002 and 2011. Panel data was used to capture bank specific effects. Independent variables in the study included banks size, log of banks' assets; market concentration, Herfindahl-Hirschman based on size of loans and advances for each bank; credit risk, indicated by the ratio of non-performing loans; operating costs, ratio of operating cost to net operating income; liquidity risk, ratio of liquid assets to total assets; return on average assets; inflation rate and real GDP growth rate. The result showed that bank specific factors such as credit risk, liquidity, bank size, net interest income to total income ratio and return on average assets to be significant determinants of interest rate spreads. They established a positive

relationship between spread and bank size. This was contrary to efficiency market theory on economies of scale but could denote inefficiencies that may arise from monopoly power as hypothesised by Klein Monti monopoly model. As such, further studies on relationship between bank size and interest rate spread are necessary. The study also ignored important variables as technology and product diversifications. The Kenya banking sector has remained dynamic more recent studies would help update decision making frameworks for banks and hence the needs for continuous studies.

Sarpong *et al.*, (2013) determined the factors underlying the wide interest rate spread in Ghana using panel estimated generalized least square method from 2005 to 2009 for 21 banks. Interest spread was determined as a ratio of the different between interest income and interest expense to total assets. Independent variables included non-performing loans, ratio of non-performing loans to total loans; operating costs, ratio of operating cost to total assets; market share, based on deposit size; liquidity reserve requirement; exchange rate, real GDP; one year Treasury bill rates and log of consumer price index. The findings indicated that operation costs, previous year's non-performing loans and market share were behind the wide interest rate spread. However, market concentration, inflation GDP, exchange rate and treasury bills rate were insignificant factors. Further, the study indicated that banks increased the margin with increase in reserve requirements. This was consistent with finding by Folawewo and Tennant (2008) and Grenade (2007). While the study considered such macroeconomic factor as inflation, exchange rate, real GDP and treasury bill rates, it ignored some regulatory and firm's specific factors as capital regulations, risk appetite and bank size.

Kiptui (2014) sought empirical evidence for determinants of interest rate spread in the Kenyan banking sector by considering data between 1999 and 2008 for 39 banks. He categorised

independent variables into bank-specific, market structure and macro-economic variables. Bank and industry specific variables included the ratio of non-performing loans, efficiency given by the ratio of operating cost to total assets, market share given by banks' share of market deposits, liquidity given by the ratio of liquid assets to total assets, market concentration based on deposit herfindahl index and intermediation given by the ratio of loans to total liabilities. The study used interest rate decomposition and fixed effect approach of panel data analysis. Interest rate spread decomposition indicated that 7 to 10 percent of the spread was attributable to operating costs. A positive relationship was observed between interest rate spread and operating cost, non-performing loans, Treasury bill rates and GDP growth. Relationship with default risk was consistent with the theory hypothesised by Ho and Saunders. However, a negative relationship with degree of intermediation as captured by loans-liability ratio was observed. The findings underscored banking sector efficiency, general macroeconomic stability and handling of non-performing loans. A lot of developments have taken place starting with economic crisis in 2008 which has changed how banks are being regulated and risk appetites. The study also failed to factor in the degree of risk aversion.

Rebei and International Monetary Fund (2014) conducted a study in Solomon Island to establish the determinants of interest spreads, ratio of net interest income to total assets, for the commercial banks. The study considered data for bank specific, industry specific, macroeconomic variables and legal variables collected between 2000 and 2009. Independent variables included cost of staff, the ratio of salary and wages to total assets; loan growth; cost of capital, ratio of cost occupancy and depreciation to total assets; risk aversion, ratio of equity to total assets; credit risk, ratio of non-performing loans to total loans; concentration, loan based Herfindahl-Hirschman index; inflation, Treasury bill rates and real GDP growth. The study used

panel data pooled regression analysis. The first model considered bank-specific variables, the second one included bank-specific and sector specific, the third included macroeconomic variables while the fourth one added legal and economic environment variables to the third model. A positive relationship was observed between interest rate spread and overhead costs, bank size, market concentration and bank power and central bank lending rate. The finding on overhead costs was consistent with that by Ngugi (2001) and Randall (1998) as a major factor in developing countries. Further, less supportive economic and legal environment also inhibited lower interest margins but the effect was not significant. The author included such variables as risk aversion, growth of loans and cost capital that were ignored in most of other studies. However, the definition of interest rate spread may have been restrictive in the sense that not all assets generate interest rate. An observation of lower spread may not necessarily have meant higher efficiency but rather could have been lack of balance sheet optimization or diversification. To address this, this study limited asset consideration in determination of spread to assets that yield interest rate rather than total assets.

2.4 Overview of Literature Review

Most of the empirical studies employed one or more than one aspects of the theoretical model suggested namely, the Klein Monti model of monopoly, dealership model of Ho and Saunders, structure-conduct-performance (SCP) theory and efficient market hypothesis. In most cases, independent variables were categorized into macroeconomic, industry-related and bank specific factors. Mainly, panel data analysis for around eight to fifteen years was used for country or cross-country evaluations of factor underlying interest rate spreads. For a number of studies, authors acknowledged the extent to which internal banking structures and environment inhibits efficiency. Accounting interest rate decomposition approach was also used alongside regression

analysis to strengthen the study findings in some studies (Perez, 2011; Kipkurui, 2010, Georgievska *et al.*, 2011). Findings in different countries tended to differ with some inconsistent in terms of magnitude and direction of relationships between interest rate spread and underlying factors. Some variables such as degree of risk aversions, capital adequacy and income diversification were missing in most of the studies. Despite such studies, there still remained paucity in empirical studies in African countries and particular Kenya. This was despite the persistence of high interest rate spread. In the light of continued high interest rate spread, public concerns, associated economic implications and limited studies, this study sought to establish the effect of non-performing assets and income diversification on interest rate spread in the Kenyan banking sector.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This section outlines the research design, theoretical framework and empirical model used in the study. It defines the variables used as well as their measurement. The data, data sources and the methods used in analysis are discussed.

3.2 Research Design

This study used panel research design. Quantitative approach was used to achieve the study's objective as posed in Chapter 1. The study used panel data for 38 Kenya commercial banks operating between the year 2004 and 2014. Commercial banks' balance sheets and income statements were collected on quarterly basis for bank-specific and industry-specific variables. Additional variables included GDP, foreign exchange volatility, Treasury bill rates and Inflation. Apart from panel regression analysis, the study also decomposed interest rate spread into its various components in the banking sector as proposed by Randall (1998). The consistency of the two approaches was used as a check and balance for the accuracy of the study.

3.3 Theoretical Model

The profit maximization theory indicates that firms choose inputs and outputs so as to maximise profits. Profit is represented as the difference between total revenue (TR) and total costs (TC):

$$\pi = TR - TC = PQ - CQ \dots\dots\dots 3.1$$

The profit equation of the firm can be modified to fit financial intermediation by banks as represented by Shaffer (1993) and later replicated by Barajas *et al.*, (1999). Bank's income is given by the product of interest on loans and loans while bank's cost is divided into financial expense and a net non-financial cost. A net non-financial cost depends on the fixed costs and the volume of loans given.

$$\pi = i * L - r * D - C(L, w) \dots\dots\dots 3.2$$

Where i is interest rate on loans, r interest rate on deposits, L Loans granted, D deposits level, C net non-financial cost and w - fixed cost.

Taking the first order condition with respect to loans (L)

$$\frac{\partial \pi}{\partial L} = i + \frac{\partial i}{\partial L} * L - r * \frac{\partial D}{\partial L} - D * \frac{\partial r}{\partial L} - \frac{\partial C}{\partial L} \dots\dots\dots 3.3$$

Given that banks are required to maintain reserve ratio of a particular level by the regulator, assumption can be made that $\frac{dD}{dL}$ tends to unit value. Considering this and re-arranging the above equation;

$$i - r = -\frac{\partial i}{\partial L} L + \frac{\partial r}{\partial L} D + \frac{\partial C}{\partial L} \dots\dots\dots 3.4$$

Where, $i - r$ represent financial spread in a financial bank. The econometric form of the above equation may be represented as;

$$\gamma = \beta_0 + \beta_1 L + \beta_2 D + \beta_3 \frac{\partial C}{\partial L} \dots\dots\dots 3.5$$

Where γ is the interest rate spread

3.4 Empirical Models

Employing the empirical work on determinant of interest rates, the profit equation of financial intermediation by banks as represented by Shaffer (1993) and Barajas *et al.*, (1999) can be improved by incorporating proxies and factors influencing deposit levels, loans granted and fixed costs. The theoretical motivated determinants of interest rate spread include credit risk, operating costs, liquidity risks, managerial risk appetite, bank size, interest rate risk, and market structure. Incorporating these variables in equation 3.5, the empirical model can be represented as follows;

$$\gamma = \beta_0 + \beta_1 L(x_1, x_2, x_3 \dots x_n) + \beta_2 D(y_1, y_2, y_3 \dots y_n) + \beta_3 \frac{\partial C}{\partial L}(z_1, z_2, z_3 \dots z_n) \dots \dots \dots 3.6$$

Where x_i , y_i and z_i represents factor affecting intermediation costs and returns for commercial banks. Consideration of internal and external factor affecting supply of deposit demand of loans and internal operation will help evaluate relationships between bank-specific, industry specific and macro-economic factors and interest rate spread. Equation 3.6 can be summarised as follows:

$$\gamma = \beta_0 + \sum_i \beta_i F(x_i y_i z_i) \dots \dots \dots 3.7$$

Based on literature review, variables x_i , y_i and z_i , model 3.7 may be captured as,

$$\gamma = \beta_0 + \sum_i \beta_i F(\text{prov}, \text{OC}, \text{Conc}, \text{Liq}, \text{RiskA}, \text{InterM}, \text{ROA}, \text{Div}, \text{I}, \text{GDP}, \text{Tbill}) \dots \dots \dots 3.8$$

Where γ is the interest rate spread, *Prov* is loan loss provisions, *OC* is cost of operations, *Conc* is market concentration, *Liq* is liquidity, *RiskA* is risk aversion, *InterM* is intermediation, *ROA* is return on assets, *Div* diversification of income and funds, *I* is inflation, *GDP* is gross domestic product and *Tbill* is treasury bill rate.

3.5 Accounting Interest Rate Spread Decomposition

The study also involved interest rate decomposition. The methodology provides an accounting framework that indicates how interest rate spread is distributed among various underlying bank specific factors as contained in commercial banks' balance sheet and income statements. A bank's profit takes the following form;

$$\pi = (TII + NII) - (TIE + TOE) - LLP \quad \dots\dots\dots 3.9$$

Where π is the operating profit, TII – Total interest income, NII – Non-interest income, TIE – Total interest Expense, TOE – Total operating expense and LLP – Loan loss provisions.

Equation 3.9 indicates that profit is equal to total income less total expense and total loan loss provisions. The equation can be re-arranged to obtain interest rate spread as the difference between total interest income and total interest expense.

$$TII - TIE = \pi + TOE + LLP - NII \quad \dots\dots\dots 3.10$$

Using assets (A) and loans (L), everything is divided by deposits

$$TII * \frac{L}{L * D} - \frac{TIE}{D} = \frac{\pi}{A} * \frac{A}{D} + \frac{TOE}{D} + \frac{LLP}{D} - \frac{NII}{D} \quad \dots\dots\dots 3.11$$

Where return on asset is represented by $\frac{\pi}{A}$. Randall (1998) states that one less the required

reserve ratio (rr) yields loan to deposit ratio (L/D) as shown below:

$$\frac{TII}{L} * (1 - rr) - \frac{TIE}{D} = ROA * \frac{A}{D} + \frac{TOE}{D} + \frac{LLP}{D} - \frac{NII}{D} \dots\dots\dots 3.12$$

Hence

$$\frac{TII}{L} - \frac{TIE}{D} = rr * \frac{TII}{L} + ROA * \frac{A}{D} + \frac{TOE}{D} + \frac{LLP}{D} - \frac{NII}{D} \dots\dots\dots 3.13$$

Where $1 - rr = \frac{L}{D}$, $\frac{TII}{L} - \frac{TIE}{D}$ is the implicit average interest rate margin, $\frac{TII}{L}$ is implicit average

lending rate while $\frac{TIE}{D}$ is implicit average deposit rate.

Equation 3.13 gives decomposition of interest rate spread. Computation of decomposition was done in a tabular format on quarterly basis over the period covered by the study. This showed how interest rate margin had been shared among its' profit & loss and balance sheet components.

3.6 Definition and measurement of the variables

Interest rate spread: It is the difference between interest on loans and cost of deposits by commercial banks in Kenya as contained in the balance sheet and income statements. Interest on loans was computed as the ratio of interest income from loans to average loans while cost of deposits was computed as the ratio of interest expense on deposits to average deposits.

Loan loss provisions: This is an inverse indicator of the quality of bank's assets. It was obtained from non-performing loans as a ratio of total loans. This captured the credit risks faced by the banks.

Cost of operation: This was captured using the ratio of total operating cost to total assets. Administration ease from introduction of Credit Reference Bureau and gradual improvements in security registrations was hypothesized to have contributed to a reduction in the cost of operation.

Market Concentration: The study used total assets Herfindal-Hirschman Index (HHI) as a common measure of market concentration. High competition results to competitive pricing hence a positive relationship between market concentration and the spread.

Illiquidity: Liquidity reflects the ability of a bank to honour short term liabilities that are falling due. It may be held as per regulation requirement but may also be self-imposed for prudential reasons. Liquidity requirement is a cost to a bank and thus a positive relationship with the spread is expected. Illiquidity was captured as the ratio of Loans (Illiquid assets) to deposits.

Risk Appetite (RiskA) – Different options of asset creation presents different risks options. Government securities are the safest and contribute nothing to the risk weighted assets (RWA) of the Kenyan banks. Based on the client risk profile, industry, and securities used, loans have different risk weights. The higher the risk weight, the higher risk premium the banks would demand. Risk appetite was captured by the ration of RWA to total assets.

Intermediation: This was captured as the ratio of total loans to total liabilities. A higher intermediation means that the bank is willing to compete more for loans in the market and thus likely to charge a lower spread.

Return on average assets: This is a better measure of profitability of assets by a firm relative to other firms in a particular industry. It was obtained by dividing net income by total average assets. A positive correlation with interest spread was hypothesized.

Diversification: This took two forms; income diversification and funding diversification. Income diversification was proxied by the ratio of non-interest income to total income. Funding diversification was estimated by the ratio of borrowed funds to total liabilities. A bank with more diversified sources of income was hypothesized to charge lower spread, while spread based on fund diversification would depend on costs of funds for various sources of funds.

Inflation: Increase in the general prices of goods and services in an economy. The data was extracted from economic surveys. It was measured in percentage. Inflation may affect the intermediation costs hence affecting interest rate spread.

Real Gross Domestic Product: The real value of a country's output per year. It was measured in percentage. Economic performance determines credit rating and risks and this is reflected in banks credit pricing.

Volatility of exchange rate: Exchange rate volatility tends to reflect on externally borrowed funds costs and create uncertainty in monetary policy environment. As such, such volatility may impact positively on the spread. This was captured using Kenya Shillings/ United State Dollar exchange rate standard deviation on quarterly basis.

Treasury bill rate: This refers to the interest rates earned on treasury bills and is given on annual basis. It was used as a proxy for opportunity cost for fund held in loans. A positive relationship with the interest rate spread was hypothesised.

3.7 Data Type and Sources

This study used secondary data. Commercial banks financial statements were used to get bank specific data that was critical in this study. CBK and Kenya Bureau of Statistics website were important sources of macroeconomic data.

3.8 Data Collection

This study used data from the year 2004 to 2014. Annual data from 38 Kenya commercial banks operational between 2004 and 2014 were used. Banks were organized into four Tiers based on the size of the balance sheets. Given that banking institutions' financial results corresponds to calendar year, all other data were collected in this form.

3.9 Data Processing and Analysis

This study used panel regression analysis. This approach was premised on the need for both heterogeneity and temporal effects consideration among the Kenyan banks. The size of the Kenya commercial banks varied in a great way and hence different microeconomic environments. Both the fixed effect and random effect panel regression were considered.

3.10 Statistical Tests

To ensure meaningfulness of the results obtained, Hausman test and Panel Unit Root Tests were conducted.

3.10.1 Hausman Test

This was used to decide whether to use random or fixed effect panel model. The test basically evaluated correlation between the regressors and the unique errors terms (μ_i). The null hypothesis was that there were no such correlations, meaning random model was preferred while the alternative hypothesis preferred fixed effect model (Lee & Schmidt, 1996).

3.10.2 Panel Unit Root Test

This study used the panel unit root tests by Levin, Lin and Chu (LLC) to test stationarity of various variables. LLC assumed cross sectional independence. The null hypothesis stated that the time series has a common unit root process.

CHAPTER FOUR

EMPIRICAL RESULTS

4.1 Introduction

This chapter presents the discussion of the data characteristics using summary of descriptive statistics, model estimation and analytical findings.

4.2 Descriptive Statistics

Table 4.1 represents mean and standard deviation of interest on loans, cost of deposits and spread for the Kenyan banks.

Table.4.1: Mean and Standard Deviations of Interest Rate Spread for 38 Kenyan Banks

Year	All Banks					
	Mean			Std. Dev		
	Yield on loans	Cost of funds	Spread	Yield on loans	Cost of funds	Spread
2004	13.0%	2.6%	10.4%	4.5%	2.1%	4.0%
2005	13.7%	3.6%	10.2%	4.3%	2.2%	3.9%
2006	14.6%	4.2%	9.6%	4.0%	2.3%	3.6%
2007	14.6%	4.3%	10.4%	4.8%	2.6%	4.4%
2008	14.8%	4.3%	10.5%	4.3%	2.2%	3.9%
2009	14.3%	4.4%	9.9%	3.7%	2.2%	3.7%
2010	14.0%	4.1%	9.9%	3.0%	2.1%	3.4%
2011	14.9%	4.4%	10.4%	3.2%	2.3%	3.4%
2012	19.1%	8.3%	10.8%	4.4%	3.6%	4.4%
2013	15.9%	5.8%	10.1%	3.6%	2.8%	3.6%
2014	15.1%	6.0%	9.0%	3.3%	3.0%	3.4%

Source: Author's calculations

The mean indicated a general rise in interest on loans and costs of deposits. However, there three seasons of high interest rate spread, where spread exceeded 10%, were observed. The first season

was between 2004 and 2005, second between 2007 and 2008 and the third season between 2011 and 2013. Standard deviation indicated a general convergence in the interest paid on loans. However, ease of raising deposits appeared to increasingly become more divergent among the banks as indicated by increasing standard deviation from 2.1% in 2004 to 3.0% in 2014.

Table 4.2: Bank Tiers' Comparative Analysis

Year	Tier I Banks						Tier II Banks					
	Mean			Std. Dev			Mean			Std. Dev		
	Yield on loans	Cost of funds	Spread	Yield on loans	Cost of funds	Spread	Yield on loans	Cost of funds	Spread	Yield on loans	Cost of funds	Spread
2004	10.3%	1.0%	9.3%	3.8%	0.9%	3.8%	14.1%	3.6%	10.5%	5.1%	3.2%	2.4%
2005	11.6%	2.0%	9.6%	2.7%	1.6%	2.5%	15.1%	4.9%	10.4%	6.4%	3.0%	4.1%
2006	11.8%	2.2%	9.6%	0.8%	1.3%	1.5%	16.6%	5.6%	10.1%	5.4%	2.9%	4.8%
2007	12.3%	2.2%	10.1%	1.5%	1.4%	2.2%	14.7%	5.2%	9.5%	5.4%	3.0%	3.6%
2008	13.2%	2.5%	10.7%	1.8%	0.9%	2.5%	16.4%	5.3%	11.1%	5.4%	2.7%	4.3%
2009	12.8%	2.4%	10.4%	1.9%	0.9%	2.8%	15.8%	5.7%	10.0%	4.6%	2.4%	4.0%
2010	12.4%	1.8%	10.7%	2.5%	0.6%	2.8%	14.9%	4.5%	10.3%	3.9%	1.6%	3.9%
2011	13.4%	1.9%	11.5%	2.0%	0.9%	2.5%	16.1%	4.9%	11.2%	4.8%	1.9%	4.2%
2012	17.0%	4.3%	12.7%	2.9%	1.7%	3.2%	21.0%	9.5%	11.5%	5.7%	2.5%	5.2%
2013	14.0%	2.7%	11.3%	2.3%	1.0%	2.7%	17.1%	5.8%	11.3%	4.9%	1.9%	4.4%
2014	13.5%	2.8%	10.7%	2.0%	1.2%	2.6%	15.8%	5.7%	10.1%	3.8%	1.3%	3.7%
Overall Mean	13.0%	2.3%	10.6%	2.2%	1.1%	2.6%	16.1%	5.5%	10.5%	5.0%	2.4%	4.0%
Year	Tier III						Tier IV					
	Mean			Std. Dev			Mean			Std. Dev		
	Yield on loans	Cost of funds	Spread	Yield on loans	Cost of funds	Spread	Yield on loans	Cost of funds	Spread	Yield on loans	Cost of funds	Spread
2004	13.1%	3.0%	10.1%	3.6%	1.0%	4.0%	14.0%	2.3%	11.7%	5.0%	1.6%	5.5%
2005	13.7%	4.0%	9.7%	3.2%	1.6%	4.1%	14.2%	3.3%	11.0%	3.9%	1.6%	4.8%
2006	15.9%	4.8%	9.3%	4.1%	1.9%	4.3%	13.3%	3.7%	9.6%	2.5%	1.6%	3.1%
2007	17.5%	5.3%	12.3%	6.5%	2.8%	7.1%	13.5%	3.8%	9.7%	2.3%	1.6%	3.0%
2008	14.3%	4.7%	9.6%	5.0%	2.1%	4.4%	15.0%	4.1%	10.9%	3.2%	2.0%	4.0%
2009	13.9%	4.4%	9.4%	3.9%	2.1%	4.5%	14.4%	4.5%	9.9%	3.1%	2.0%	3.0%
2010	14.3%	4.5%	9.8%	2.3%	2.3%	3.8%	13.8%	4.8%	9.0%	2.9%	2.2%	2.8%
2011	14.7%	5.0%	9.7%	2.7%	2.4%	3.8%	14.9%	5.2%	9.7%	2.5%	2.4%	2.8%
2012	18.6%	8.9%	9.7%	4.1%	4.0%	4.5%	19.4%	9.5%	9.8%	3.9%	3.3%	4.1%
2013	16.0%	6.9%	9.1%	3.0%	3.2%	3.8%	15.8%	6.7%	9.1%	3.3%	2.3%	2.6%
2014	15.4%	7.3%	8.1%	3.4%	3.8%	3.7%	15.0%	7.2%	7.8%	3.3%	2.2%	2.9%
Overall Mean	15.2%	5.3%	9.7%	3.8%	2.5%	4.4%	14.9%	5.0%	9.8%	3.3%	2.1%	3.5%

Source: Author's computation

The operating environment at the bank level appeared different uniquely dependent on the size of the bank as indicated by Tier classification as at the end of 2014. Interest on loans was least in

Tier I banks at 13.0 percent and highest in Tier II banks at 16.1 percent. It was however, relatively high in Tier III and IV at 15.2 and 14.9 percent respectively as indicated in table 4.2. Similar observations were made for cost of deposits. Interest on deposits was over twice as much in Tier II, III and IV compared to 2.3 percent for the Tier I banks. This was highest in Tier II at 5.5 percent. However, the net effect of cost of deposits and yield on loans resulted to unique levels. The high level of interest rate spread was observed in Tier I and Tier II banks at 10.6 and 10.5 percent respectively. Low interest rate spread was observed in Tier III and Tier IV banks at 9.7 and 9.8 percent respectively as indicated in Table 4.2.

4.3 Interest rate Spread Decomposition

Interest rate decomposition is an accounting model used to break down interest rate spread into different underlying components as contained in bank's financial statements as discussed in section 3.5 of the study. The model was proposed by Randal (1998) and is used in the study to meet the first objective; the trend of non-performing asset's contribution into the interest spread charged by banks. Results for interest rate decompositions are given in Table 4.3.

Table 4.3: Interest rate Decomposition Results

	Overhead Costs	Loan Provisions	ROA*Assets /Deposits	Non-Interest Income	Reserves	Residual
2004	4.7%	2.0%	7.1%	8.6%	3.5%	1.7%
2005	4.7%	0.2%	4.4%	4.4%	5.5%	3.1%
2006	4.7%	1.4%	3.6%	5.1%	5.0%	-0.2%
2007	4.3%	1.4%	5.3%	6.2%	5.1%	0.6%
2008	4.6%	1.5%	3.7%	5.3%	4.6%	1.5%
2009	4.9%	1.1%	3.3%	8.6%	4.2%	4.9%
2010	4.2%	1.1%	5.3%	6.2%	4.5%	1.0%
2011	4.2%	0.9%	4.8%	4.7%	4.7%	0.7%
2012	5.1%	1.1%	4.1%	4.8%	5.6%	-0.1%
2013	4.6%	1.0%	4.5%	4.0%	4.3%	0.1%
2014	4.4%	1.3%	4.2%	4.1%	3.5%	-0.2%

Source: Author's Computation
 ROA: Return on Assets

Table 4.3 indicates that overhead and the product of ROA and the ratio of assets to deposits were the major components of interest rate spread. The large component of overheads in the spread is consistent with the findings by Kiptui (2010) and Georgievska *et al.*, (2011). Non-interest income indicates pressure relief on the need for higher spread and has a negative effect on the spread. Loan loss provisions had the minimum contribution to interest rate spread. The loan loss provisions in interest rate spread remained between 1.0 and 1.5 percent for the most of the period covered by the study.

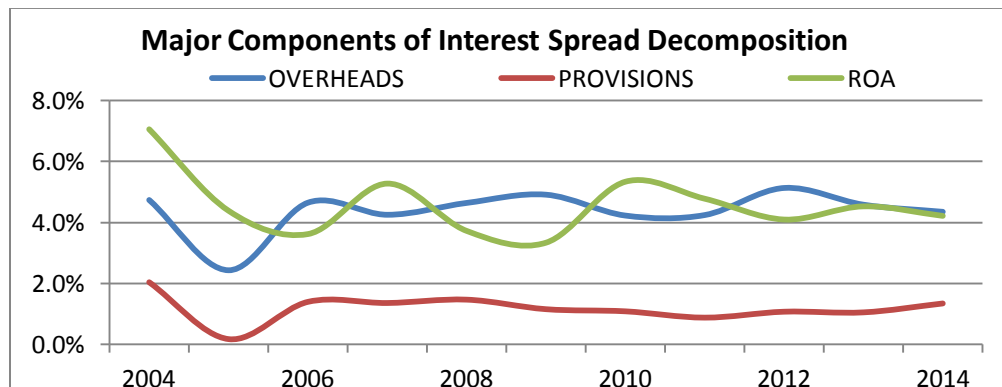


Figure 4.1: Loan Loss Provisions in Interest Rate Spread

Source: Author's computations

The period between 2009 and 2013 recorded generally low provisions with the minimum in that season being 0.9 percent in 2011. However, the trend appeared to reverse towards the end of 2014. As indicated in Figure 4.1.

Components of interest rate spread differed significantly based on the size of the bank size as classified into different tiers.

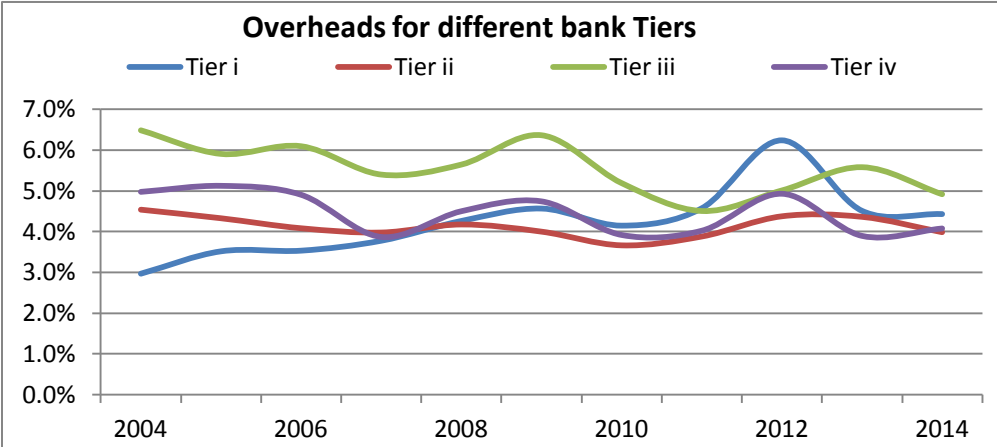


Figure 4.2: Overhead Component in Interest Spread across Banks
 Source: Author’s computations

From Figure 4.2, Tier III banks recorded the highest component of overheads in their interest rate spread. However, this component was seen to fall gradually over time in the period covered by the study. On the other hand, Tier I banks recorded the highest growth in the overhead component of their spread from the least in 2004 to the second highest in 2014. For the Tier II and IV, the overhead component of the spread remained stable oscillating slightly above 4 percent.

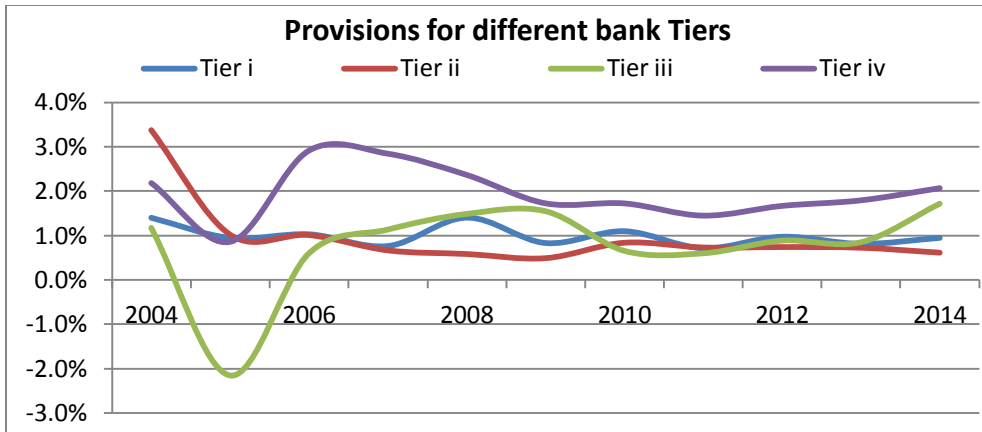


Figure 4.3: Provisions Component in Interest Spread across Banks
Source: Author's computations

Loan quality in Tier IV was the worst compared to the rest of the banks as indicated by the provisions component of their spread. Tier II recorded the least component of overhead in their spread while Tier I banks recorded a slight improvement between 2011 and 2014 compared to period before 2011. The spread decomposition indicates a rise of provisions component in Tier III banks beginning from 2011 as indicated in Figure 4.3.

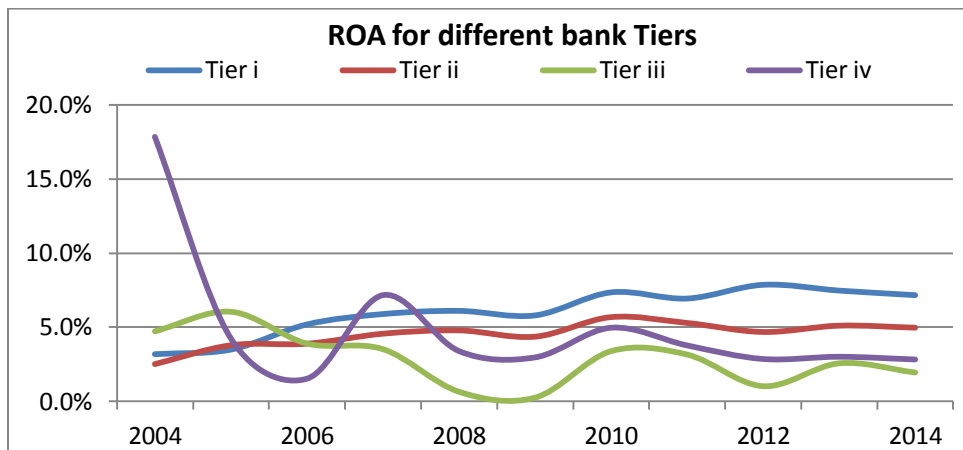


Figure 4.4: ROA Component in Interest Spread across Banks
Source: Author's computations

The product of ROA and the ratio of assets to deposits is a major component of the spread for the banks in all tiers. Tier I banks had the greatest ROA in their interest rate spread as indicated in Figure 4.4. ROA component had been on the rise, recording nearly 8 percent at the beginning of

2010 compared to a low of 4 percent in 2004 and 2005. While this may denote efficiency arising from economies of scale, the rising trend also compared with high relative growth interest generating assets in the period under study. Tier II banks also experienced higher ROA component and whose trend compared to that of Tier I banks. Tier III and IV ROA were the most volatile and in a downward trend. This not only indicated a possible loss of business to Tier I and II banks, but also corresponded to their high and rising non-performing assets provisions.

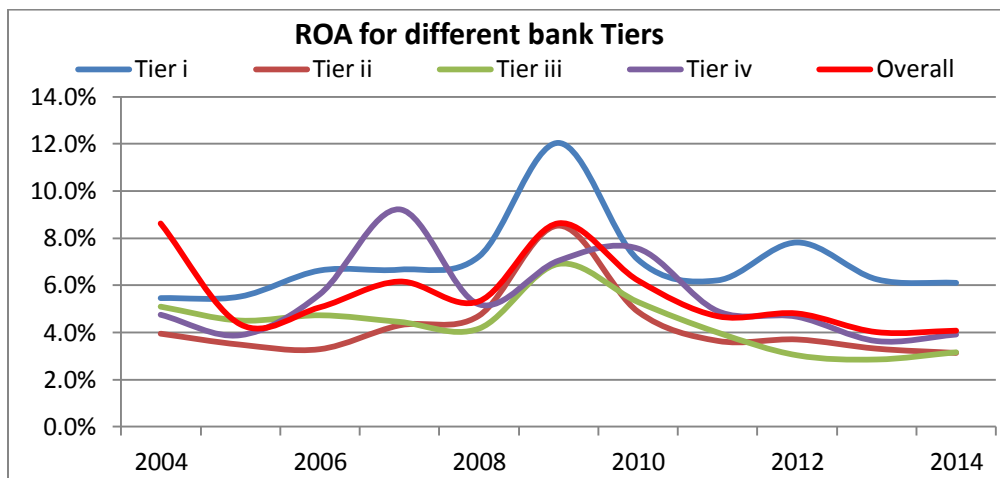


Figure 4.5: ROA Component in Interest Spread across Banks
 Source: Author's computations

As a component of interest rate spread decomposition, non-interest income (NII) reduces spread. The overall NII component of interest rate spread had been dropping since 2009 as indicated in Figure 4.5. Tier II and III recorded the least NII components in their spreads for the period under study. On the other hand, Tier I banks benefited the most from NII component, having recorded the highest and generally rising NII.

4.4 Regression Results

Regression analysis was used to establish the relationships between interest rate spread and the underlying factors. The analysis was used to achieve the second objective of the study; to find out the effect on income diversification and non-performing loans on interest rate spread.

The study considered both the fixed and random panel regression analysis. To discriminate the model, Hausman test was used. The test basically evaluated correlation between the regressors and the unique errors terms. The Hausman test results, as captured in Appendix 2, indicated that random panel regression analysis was preferred.

The study also evaluated stationarity of the data to ensure consistent results. This study used the panel unit root tests by Levin, Lin and Chu (LLC) to test stationarity of various variables. LLC assumed cross sectional independence. The null hypothesis stated that the time series has a common unit root process. Market concentration and risk appetite were found to be integrated of order one, as indicated in Appendix 3 and 4, while the rest of the variables were stationary at levels. The panel regression results are given in the Table 4.5.

Table 1.4: Regression Analysis Results

Dependent Variable: Interest rate spread				
	Estimate	Std. Error	t-value	Pr(> t)
(Intercept)	-4.69E-03	2.68E-03	-1.7504	0.080955 .
Income Diversification	-1.07E-01	1.96E-02	-5.4432	1.009e-07 ***
NPL	6.43E-03	2.10E-02	0.3069	0.759097
Risk Appetite	1.02E-02	1.39E-02	0.7354	0.462581
Intermediation	3.03E-02	3.06E-02	0.9879	0.323902
Funding Diversification	-5.09E-04	3.90E-03	-0.1303	0.896388
ROA	5.05E-01	9.93E-02	5.0802	6.256e-07 ***
Liquidity	-1.14E-01	3.56E-02	-3.203	0.001490 **
Cost of Operation	7.65E-01	1.20E-01	6.3842	5.707e-10 ***
Inflation	5.92E-02	1.44E-01	0.4101	0.681991
Treasury Bills	8.74E-02	9.29E-02	0.9399	0.347926
Real GDP	2.29E-01	1.66E-01	1.3836	0.167396
Exchange rate volatility	7.15E-04	2.09E-03	0.3425	0.732155
Market Concentration	2.45E-04	9.36E-05	2.6231	0.009109 **
Total Sum of Squares:	58%			F-statistic: 7.35155 on 13 and 337 DF
Residual Sum of Squares:	45%			p-value: 1.02E-12
R-Squared:	22%			
Adj. R-Squared:	21%			

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Source: Author's computations

The study found that bank and industry-specific factor are the most significant determinants on interest rate spread. Income diversification, return on assets, liquidity, cost of operation and market concentration were the significant determinants of spread. The findings were consistent to that by Demircuc-Kunt *et al.* (2004) and Were and Wambua (2013).

A strongly significant negative correlation was found between income diversification and spread. The results suggested that increase of the proportion of non-interest income to total income by 1 percent reduces spread by 0.11 percent. Income diversification indicated the extent to which the bank relied on interest income. As bank diversifies sources of income, earnings become less volatile and create capacity to scale total earnings. Possible bundle products that may be provided together with loan products such as insurance, custodial services and trade finance creates incentives for banks to lower spread. However, there was no evidence from the study that

diversification of sources of funds was a significant determinant of spread. This indicated possibility of access to cheap or similar-cost sources of funds by commercial banks and hence defeating source-of-funds based pricing strategies. The findings were consistent to those by Demirguc-Kunt *et al.* (2004) for bank-level data for 72 countries.

The coefficient of cost of operation was positive and statistically significant at 0.1 percent. This was as hypothesised by Efficient Market Hypothesis (EMH). A 1 percent increase in the proportion of cost of operation to total assets increased the spread by 0.77 percent. This spoke to the need of enhanced operational efficiencies by commercial banks. A shift towards virtual banking from brick and mortar through use of mobile technology, agency banking and other electronic channels is bound to change the commercial banks cost structures. In addition, the scale of banking business is key in a bank's operational efficiencies. These results were consistent to those by Ndung'u and Ngugi, (2000), Ngugi, (2001) and Kiptui (2014) in Kenya.

Return on asset (ROA) was a major strategic objective by most of the commercial banks. The coefficient of ROA was found to be positive and statistically significant at 0.1 percent significance level. A 1 percent increase in ROA corresponds to a 0.5 percent increase in spread. This was in agreement with the theory of the firm that would look at banks as entity with a sole purpose of maximizing profits. The result was consistent to that interest rate decomposition where ROA was seen as a major component of spread. To ensure that a bank maintains high return on assets, banks create assets that yields higher returns. The positive relationship spoke to the inability of the banks to raise non-funded income as well as the convenience that existed in maintaining higher ROA by increasing spreads.

Liquidity attracts a lot of attention in commercial banks asset and liability management due to its potential devastating effects. Buwamia *et al.* (2005) considered liquidity reserve requirement as a form of taxation by generating a carrying cost by banks. To caution against failing to meet the liquidity requirement, banks tend to charge for liquidity risk in loan pricing increasing the spread. As such, a positive relationship between illiquidity and spread was expected. On the contrary, the study projected a negative relationship with spread and coefficient statistically significant at 1 percent significant level. A 1 percent increase in illiquidity reduced spread by 0.11 percent. These results were consistent to findings by Ngugi (2001) and the Dealership Theory of Ho and Saunders. Similar results were observed by Ghosh (2008) in India, Grenade (2007) in Eastern Caribbean and Demirguc-Kunt *et al.* (2004) in 72 countries across the globe. This communicated the need by the bank to optimize their balance sheet. The Kenyan commercial banks thus, appeared not to suffer from liquidity problems, to reduce forgone income they were willing to provide extra loans even at a lower yield.

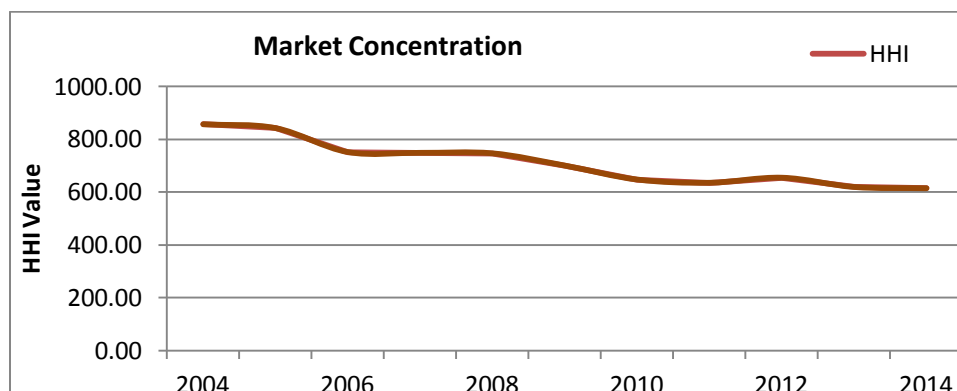


Figure 4.6 HHI for the Kenya Banking industry
Source: Author's Computation

The Kenya commercial bank has experienced a gradual fall in market concentration throughout the period covered by the study as indicated in figure 4.6. The study projected a positive relationship between spread and market concentration. The HHI index coefficient was

statistically significant at 1 percent significant level. This was not surprising because, as the market became more competitive, banks were expected to lose capacity for charging coordinated higher spreads on loans as stipulated in Klein Monti model of monopoly. This is a departure from insignificant HHI index by Kiptui M. (2014) in Kenya and Sarpong *et al.* (2013) in Ghana and a negative relationship observation by Central Bank of Solomon Island in 2007 in Solomon Island.

Results from majority of studies conducted on factors underlying interest rate spread had confirmed the assertions that banks charge higher spread to cover for non-performing loan and advances. This study established a positive relationship between bad loans provisions and spread. This was consistent with the Dealership Theory of Ho and Sauders, Grenade (2007) and Kipkurui (2010). However, consistent with observations by Samahiya and Kaakunga (2012), the findings were insignificant. This observation was consistent to that of risk appetite where the coefficient was positive but insignificant relationship was observed. As such, credit risk arising from market segments served or proportion of risk free assets considerations did not find way into the credit pricing strategy in a significant manner.

There was a positive relationship between spread and macroeconomic factors considered in the study: real GDP, exchange rate volatility, 91 day Treasury bill rates and inflation. A 1 percent increase in real GDP, 91 day Treasury bill rates and inflation would increase spread by 0.23, 0.09 and 0.06 percent respectively. However, these factors had no material effect on spread as opposed to the bank-specific and industry specific factors given that the coefficients were insignificant. This was consistent with the finding by Sarpong *et al.* (2013) in Ghana. It's however a departure from Ngugi, R. (2001) and Kiptui M. (2014) in Kenya who finds Treasury bills rates to be significant determinant.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study, highlighting the main findings and making conclusions based on the findings. Section 5.2 discusses the summary of the main findings, section 5.3, conclusions and policy implications and areas for further findings in section 5.4 and 5.5 respectively.

5.2 Summary

This study sought to establish the trend of non-performing assets contribution in interest spread as well as the effect of income diversification and non-performing loans on interest rate spread. The study was inspired by the consistent high interest rate spread that characterized the Kenyan bank sector for many years. Central bank had, on various *Monetary Policy Statement* (MPS) issues, highlighted this concern. The industry, through KBA, acknowledged this situation but consistently associated such spread with market realities within which the industry was operating. To address the structural issues that would have been associated with the high spread, several initiatives and reforms had been started by the CBK. These included licensing of mobile banking, agency banking, credit reference bureaus as well as establishing cash centers to address operating cost and improve flexibility of commercial banks' operating models. Further, CBK established monetary tools and often adjusted them to address challenges that would limit banks operations such as liquidity ratios, cash reserve ratios, horizontal market operations as well as

other OMO tools. In addition to other fiscal tools at its disposal as the Kenyan government's fiscal agent, CBK didn't manage to bring down interest rate spread.

Eventually, CBK introduced the KBRR and Annual Percent Rate (APR) framework in July 2014. This framework was intended to improve transparency in banks' credit pricing. Not even this reduced lending rate, and thus the spread. Rather, the framework only enabled the borrower understand why they were being charged a particular lending rate. One major consideration as highlighted in MPS reports following the introduction of the framework was credit risk premiums. On the other hand in Parliament, the country's legislative organ, attempts were being made to control interest given the failure of market based mechanism. This came to fruition in August 2016. Lending rate was capped at a maximum of 4% above the CBR and deposit rate at a minimum of 70% of the CBR.

The need to provide a background for design of solutions that would lower interest rate spread and thus improve intermediation efficiency inspired this study. This study was different from the other studies conducted in Kenya in the sense that it considered post 2008 economic crisis that is characterised with cautiousness in business risk management and changes in business models. The second difference was in that banks' risk appetites were taken into consideration. A bank that is risk averse would be conservative in creating risky assets and won't mind lower margins rather than underwrite risky assets. This was captured as a ratio of risk weighted assets to total assets. The third difference was by including more recent interest rate spread decompositions.

To achieve the first objective on trend of non-performing assets contribution to spread, this study performed spread decomposition. Effect of income diversification and non-performing assets, as the second objective, was achieved using random effect panel regression analysis. Bank-specific,

industry-specific and macroeconomic variables were used in the study. The study collected quarterly data for period between 2004 and 2014.

Interest decomposition indicated that return on assets and operational costs accounted for between 4 and 5 percent in the interest rate spread each. These represented the highest proportions of the spread. While ROA and overheads increase spread, non-interest income (NII) eases pressure for the need of higher spreads. NII was observed to be a volatile component of the spread. The highest NII component of 8 percent was recorded in 2009, but this had since gradually dropped to 4 percent in 2014.

Regression analysis yielded consistent results to those of spread decomposition. Returns on assets, operating costs, income diversification, liquidity and market concentration coefficients were found to be significant. The relation between spread and non-performing loan provisions was observed to be insignificant. The study found macroeconomic factors; inflation, exchange rate volatility and real GDP coefficients to be insignificant. Reducing market concentration had led to a reduced spread over time. Further, as banks deployed more of their funds into illiquid assets (loans), the spread charged dropped denoting competition in the loans market.

The first objective of the study was to establish the trend of the non-performing assets in the interest rate spread. The new risk based capital requirement as per the Basel III and the requirement for risk based provisions as per the new International Financial Reporting Standards ahead of January 2019 and 2018 implementation date respectively were expected to have a bearing on the type of assets created by banks and provisioning made. This objective was achieved using spread decomposition.

The loan loss provisions in interest rate spread remained between 1.0 and 1.5 percent for the most of the period covered by the study. The period between 2009 and 2013 recorded generally low provisions with the minimum in that season being 0.9 percent in 2011. However, the trend appeared to reverse towards the end of 2014. Provisions differed significantly across bank Tiers' Tier IV recording the highest provisions. Tier II recorded the least component of provisions in their spread while Tier I banks recorded a slight improvement between 2011 and 2014 compared to period before 2011. The spread decomposition indicates a rise of provisions component in Tier III banks beginning from 2011.

The second objective of this study was to find out the effect of income diversifications and non-performing assets on spread among the Kenyan commercial banks. Interest decomposition indicated non-interest income as a major component of interest rate spread accounting on average above 5 percent. It was observed as a volatile component of the spread recording a high of 8 percent in 2009, but this later gradually dropped to 4 percent in 2014. The component appeared to depend on the banks size with clear variations across tiers. Tier II and III recorded the least NII components in their spreads for the period under study. On the other hand, Tier I banks benefited the most from NII component, having recorded the highest and generally rising NII. This was consistent with panel regression results that indicated that increase in the proportion of non-interest income to total income by 1 percent reduces spread by 0.11 percent. It was a clear indication that commercial banks were enjoying diversification benefits that allowed them room for reduced margins on their costs of funds.

Banks incur expenses in form of provisions based on the value of non-performing assets. While the accounting standards in the past dependent on the incurred losses, in future, banks will be expected to provide based on projected bad debt. Section 9 of International Financial Reporting

Standards (IFRS 9) which will be implemented in January 2018 require banks to project 12 month and life time probabilities of default for their borrowers and provide accordingly. Provisions on non-performing loans accounted for around 1.1 percent of the spread on average. Regression analysis results indicated a positive relationship between non-performing assets and spread. However, the coefficient was insignificant. This is inconsistent with the findings by Ngugi, R. (2001) and Kiptui M. (2014). However, the results were consistent with Dealership model of Ho and Saunders, Georgievska *et al.*, (2011) and Samahiya and Kaakunga (2012). This meant that, risky markets served by banks would not necessary justify higher spread and thus high lending rates by commercial banks.

5.3 Conclusions

The study concludes that income diversification reduces interest rate spread. It was also observed as a major component of spread accounting above 5%, on average, of the spread in the period under study. This underscore the ability of banks to diversify income sources as an enabler to lower spread. This ability was prominent in large banks whose NII contribution in the spread remained above the peers in other tiers.

While risk premium has been blamed for the high interest rate charged on loans and thus spread, the study establish a positive but insignificant relationship. The risk appetite coefficient was positive but also insignificant. This meant that the high spread had little to do with risk profile of the assets created. Interest rate provisions according to interest rate decomposition results remained oscillated around 1% of the interest rate spread.

5.4 Policy implications

One of the major role of CBK is to ensure a stable market based financial sector. Reforms in the banking industry have allowed improved efficiency and competition. In the recent past, banks have been developing mobile applications and partnering with telecommunication companies to improve access to wide range of banking services. More asset and liability management tools such as inter-bank Repo and longer tenor Repo have been availed by the CBK to the commercial banks. Following the September 2016 approval of a law regulating interest rates, it will be interesting to see how such regulation will affect spread as well as banking businesses.

The study emphasized on the need for increased efficiency in the banking industry as well as increased competition among the commercial banks. Structural development such as the introduction of credit bureaus, licensing of agency banking, improvement of collateral registration and introduction of cash centers has helped improve efficiency for the industry. However, operational costs remained one of the biggest components of interest rate spread. Increased support of automation of banking services would go a long way in ensuring that banks lower operation costs. Of importance would be an adequate legal framework and supportive operational environment for virtual banking. CBK needed to further pursue the possibility of infrastructural sharing among banks such as automated teller machines (ATMs). This would help optimize on existing infrastructure without the need for additional costs.

Credit risks and associated capital charge has been a factor contributing to overall costs and provisions for non-performing assets. Improvements in collateral administrations have eased lowered credit facility risks. However, accurate borrower risk assessment remains an elusive objective. Banks had had to contend with inefficient credit scoring and rating system based on

the credit rating data available in the market. Such data are highly dependent on historical bank-customer credit relationship, which is never sufficient or available for every potential clients. A possibility of data sharing between government agencies such as the Kenya Revenue Authority (KRA) and commercial banks on the updated client incomes status would go a long way in clearing uncertainty arising from credit information asymmetry. This would lower the cautionary risk premium charged on loans, which according to the study has been found to be not necessarily justifiable.

Spread differs across banks depending on bank's competitiveness in the deposit market. Big banks are competitive in deposits market and thus are able to raise cheap funds. On the other hand, small banks must be willing to pay more to attract deposit. Innovativeness by CBK is necessary in ensuring that cheap funds are available to all banks. Recent introduction of a 21 day reverse repo by the CBK from the traditional 7-day is one such innovativeness. In addition, CBK need to develop the repo market further to allow commercial bank comfortably use their government securities as collateral to raise funds domestically and internationally. While government securities can be used as security against borrowing in the interbank market, ownership doesn't change. As such, the lending bank will have to queue according to the priority of payment during liquidation in case of borrower's failure hence raising credit risk. Addressing this would allow even liquidity distribution in the banking industry.

Diversification has seen the large bank shed-off pressure of increasing spread. The banks management need to advance their innovativeness in income diversification. Some leading banks have scaled up their businesses into non-banking subsidiaries such as insurance agencies and brokerages. Others have increased the scope of their business that generate non-funded income such as treasury activities and trading finance. Effectively, this has reduced some banks

dependency on interest income. For a more stable income, commercial banks' boards must be willing to try new business that reduces income vulnerability. CBK needs to be lenient in approval of innovative products but be firm on control of inherent risks of new products for stable and resilient sources of non-interest income.

To wrap it, ROA is observed as a major driver for the spread. The public perception that drove the interest rate caps was that banks were making too much profit at the expense of other sectors of the economy. While the increase in spread as banks took more risky assets was insignificant, public perceptions has been that that banks charge higher risk premiums than the risks taken. The study finding supported such sentiments in that ROA was seen as one of the major components of the spread and was also a significant determinant from regression analysis. While this may not justify interest capping, commercial banks may need to price less the perceived risks or accepts less returns. The banks' management need to lower appetites for higher returns and make their projected growth consistent with projected economic cycles that determine credit obligor risks and future collateral values. In the long-run, this will ensure a sustained growth and thus translates into a stable financial sector.

5.5 Areas for Further Studies

This study was not able to capture the effect of the new law capping interest rate on loan at 4% above the CBR while deposit interest floor at 70% of the CBR. Effectively, this reduces the interest rate spread charged by the commercial banks. However, the exact effect may take other forms resulting from various changes in banking operating models, pricing strategy, innovativeness, process optimization, client profiling and changes in risk appetites. As such,

effect on spread may take various shapes and may vary across banks. Research on this may provide additional insights that would help further improve the banking sector.

Secondly, there is rising access by commercial bank on international capital and credit markets. The rising focus on SME and corporate banking has also increased demand for dollar loans due to the international nature of such organizations. Such sources of funds and assets created thereof tend to have significantly different cost and revenue structure and pricing. While banks do not file dollar based balance sheet and income statements, explorations needs to continue on how to conduct a similar study at currency levels for a clear picture.

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APPENDICES

Appendix 1: Interest Rate Decomposition

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Interest Spread	10.4%	11.2%	9.6%	10.4%	10.5%	9.9%	9.9%	10.4%	10.8%	10.1%	9.0%
Operating Cost/Deposit	4.9%	2.5%	4.7%	4.3%	4.7%	5.0%	4.3%	4.2%	5.1%	4.7%	4.4%
PROVISIONS on loan & Advances losses	2.0%	0.1%	1.4%	1.4%	1.4%	1.2%	1.0%	0.9%	1.0%	1.0%	1.4%
ROA*ASSETS/DEPOSITS	7.1%	4.5%	3.5%	5.2%	3.4%	3.0%	5.1%	4.5%	3.7%	4.2%	3.9%
Non-Interest Income	-8.6%	-4.3%	-5.0%	-6.1%	-5.1%	-8.3%	-6.1%	-4.5%	-4.5%	-3.8%	-3.9%
RESERVES	3.4%	5.4%	5.1%	5.1%	4.6%	4.2%	4.6%	4.7%	5.7%	4.3%	3.5%
RESIDUE	1.6%	3.1%	-0.1%	0.5%	1.5%	4.7%	0.9%	0.6%	-0.2%	0.2%	-0.3%

Appendix 2: Hausman Test

Hausman Test

data: $y \sim x$

chisq = 9.7936, df = 13, p-value = **0.7107**

alternative hypothesis: one model is inconsistent

Appendix 3: Market Concentration Stationarity

Based on raw data

Null Hypothesis: Unit root (common unit root process)								
Series: Market Concentration								
Date: 10/17/16 Time: 09:04								
Sample: 2004 2014								
Exogenous variables: Individual effects, individual linear trends								
User-specified lags: 0								
Newey-West automatic bandwidth selection and Bartlett kernel								
Total number of observations: 362								
Cross-sections included: 37 (1 dropped)								
<hr/>								
Method								
Statistic								
Prob.**								
Levin, Lin & Chu t*								
15.9282								
1.0000								
<hr/>								
** Probabilities are computed assuming asymptotic normality								
Intermediate results on HHI2								
<hr/>								
	Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Bandwidth	Obs
	1	-0.76803	530.88	82.858	0	0	6.0	10
	2	-0.76803	530.88	82.858	0	0	6.0	10
	3	-0.76803	530.88	82.858	0	0	6.0	10
	4	-0.76803	530.88	82.858	0	0	6.0	10
	5	-0.76803	530.88	82.858	0	0	6.0	10
	6	-0.76803	530.88	82.858	0	0	6.0	10
	7	-0.76803	530.88	82.858	0	0	6.0	10
	8	-0.36663	4685.9	676.14	0	0	9.0	10
	9	-0.36663	4685.9	676.14	0	0	9.0	10
	10	-0.36663	4685.9	676.14	0	0	9.0	10
	11	-0.28232	1829.8	291.39	0	0	9.0	10
	12	-0.77435	4225.9	1226.8	0	0	9.0	10
	13	-0.77435	4225.9	1226.8	0	0	9.0	10
	14	-0.77435	4225.9	1226.8	0	0	9.0	10
	15	-0.77435	4225.9	1226.8	0	0	9.0	10
	16	-0.77435	4225.9	1226.8	0	0	9.0	10
	17	-0.77435	4225.9	1226.8	0	0	9.0	10
	18	-0.77435	4225.9	1226.8	0	0	9.0	10
	19	-0.77435	4225.9	1226.8	0	0	9.0	10
	20	-0.77435	4225.9	1226.8	0	0	9.0	10
	21	-0.90634	1363.9	380.24	0	0	9.0	10
	22	-0.61945	3819.2	999.43	0	0	9.0	10
	23	-0.61945	3819.2	999.43	0	0	9.0	10
	24	-0.65171	5432.4	1108.7	0	0	9.0	10
	25	-0.51121	1849.5	267.20	0	0	9.0	10
	26	-0.67094	4873.6	1049.7	0	0	9.0	10
	27	-0.67094	4873.6	1049.7	0	0	9.0	10
	28	-0.67094	4873.6	1049.7	0	0	9.0	10
	29	-0.67094	4873.6	1049.7	0	0	9.0	10
	30	-0.67094	4873.6	1049.7	0	0	9.0	10
	31	-0.67094	4873.6	1049.7	0	0	9.0	10
	32	-0.67094	4873.6	1049.7	0	0	9.0	10
	33	-0.67094	4873.6	1049.7	0	0	9.0	10
	34	-0.44644	2003.0	1714.3	0	0	3.0	10
	35	-0.48819	5150.5	873.99	0	0	8.0	10
	36	-0.48819	5150.5	873.99	0	0	8.0	10
	37	0.43050	3.E-27	2.E-24	0	0	0.0	2
	38	Dropped from Test						
		Coefficient	t-Stat	SE Reg	mu*	sig*	Obs	
	Pooled	0.31488	13.006	1.476	-0.703	1.003	362	
<hr/>								

Appendix 4: Risk Appetite Stationarity

Based on raw data

Null Hypothesis: Unit root (common unit root process)							
Series: Risk Appetite							
Date: 10/17/16 Time: 09:15							
Sample: 2004 2014							
Exogenous variables: Individual effects, individual linear trends							
User-specified lags: 0							
Newey-West automatic bandwidth selection and Bartlett kernel							
Total number of observations: 362							
Cross-sections included: 37 (1 dropped)							
Method	Statistic					Prob.**	
Levin, Lin & Chu t*	5.32145					1.0000	
** Probabilities are computed assuming asymptotic normality							
Intermediate results on RISKAPP							
Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Bandwidth	Obs
1	-1.37231	0.0393	0.0128	0	0	9.0	10
2	-0.24032	0.0038	0.0007	0	0	9.0	10
3	-0.41909	0.0033	0.0007	0	0	9.0	10
4	-1.48485	0.0091	0.0061	0	0	9.0	10
5	-1.27612	0.0045	0.0014	0	0	9.0	10
6	-1.16395	0.0025	0.0007	0	0	6.0	10
7	-0.97621	0.0029	0.0006	0	0	7.0	10
8	-0.74744	0.0066	0.0033	0	0	3.0	10
9	-0.91583	0.0022	0.0005	0	0	9.0	10
10	-2.46619	0.0231	0.0119	0	0	7.0	10
11	-0.81380	0.0059	0.0033	0	0	5.0	10
12	-1.35658	0.0008	0.0006	0	0	6.0	10
13	-1.13284	0.0072	0.0016	0	0	9.0	10
14	-0.62386	0.0264	0.0163	0	0	1.0	10
15	-0.59188	0.0082	0.0017	0	0	9.0	10
16	-1.09834	0.0043	0.0010	0	0	7.0	10
17	-1.51756	0.0021	0.0007	0	0	8.0	10
18	-1.08307	0.0145	0.0038	0	0	9.0	10
19	-0.88791	0.0032	0.0034	0	0	4.0	10
20	-1.10941	0.0119	0.0029	0	0	7.0	10
21	-0.94453	0.0062	0.0019	0	0	9.0	10
22	-1.07178	0.0025	0.0010	0	0	7.0	10
23	-1.22043	0.0011	0.0004	0	0	6.0	10
24	-1.07314	0.0061	0.0013	0	0	9.0	10
25	0.04888	0.0022	0.0013	0	0	1.0	10
26	-0.70297	0.0140	0.0022	0	0	9.0	10
27	-0.39071	0.0061	0.0052	0	0	2.0	10
28	-0.98084	0.0044	0.0010	0	0	8.0	10
29	-1.47340	0.0033	0.0039	0	0	1.0	10
30	-0.84264	0.1505	0.0332	0	0	9.0	10
31	-0.76425	0.0091	0.0044	0	0	5.0	10
32	-0.93293	0.0064	0.0014	0	0	9.0	10
33	-0.23764	0.0039	0.0008	0	0	7.0	10
34	-0.45260	0.0055	0.0034	0	0	3.0	10
35	-1.12051	0.0019	0.0019	0	0	2.0	10
36	-0.41192	0.0032	0.0005	0	0	9.0	10
37	3.65517	3.E-32	3.E-29	0	0	0.0	2
38	Dropped from Test						
	Coefficient	t-Stat	SE Reg	mu*	sig*	Obs	
Pooled	-0.02014	-0.188	2.466	-0.703	1.003	362	

After First Difference

Null Hypothesis: Unit root (common unit root process)							
Series: D(RISKAPP)							
Date: 10/17/16 Time: 09:22							
Sample: 2004 2014							
Exogenous variables: Individual effects, individual linear trends							
User-specified lags: 0							
Newey-West automatic bandwidth selection and Bartlett kernel							
Total (balanced) observations: 324							
Cross-sections included: 36 (2 dropped)							
Method		Statistic			Prob.**		
Levin, Lin & Chu t*		-23.0607			0.0000		
** Probabilities are computed assuming asymptotic normality							
Intermediate results on D(RISKAPP)							
Cross section	2nd Stage Coefficient	Variance of Reg	HAC of Dep.	Lag	Max Lag	Bandwidth	Obs
1	-1.47239	0.0362	0.0945	0	0	5.0	9
2	-1.08825	0.0035	0.0010	0	0	6.0	9
3	-1.08960	0.0037	0.0016	0	0	8.0	9
4	-1.42975	0.0068	0.0433	0	0	4.0	9
5	-1.30237	0.0109	0.0026	0	0	8.0	9
6	-1.57676	0.0042	0.0062	0	0	1.0	9
7	-1.66937	0.0024	0.0012	0	0	8.0	9
8	-1.61838	0.0079	0.0104	0	0	3.0	9
9	-1.10609	0.0026	0.0059	0	0	1.0	9
10	-2.09017	0.0431	0.0173	0	0	8.0	9
11	-1.17558	0.0088	0.0022	0	0	6.0	9
12	-1.51275	0.0017	0.0013	0	0	8.0	9
13	-1.40947	0.0158	0.0042	0	0	8.0	9
14	-1.62222	0.0237	0.0333	0	0	1.0	9
15	-0.96580	0.0124	0.0028	0	0	8.0	9
16	-1.53057	0.0079	0.0025	0	0	8.0	9
17	-1.57742	0.0058	0.0019	0	0	8.0	9
18	-1.37732	0.0300	0.0095	0	0	6.0	9
19	-1.29712	0.0064	0.0016	0	0	8.0	9
20	-1.32197	0.0256	0.0076	0	0	7.0	9
21	-1.26747	0.0130	0.0052	0	0	5.0	9
22	-1.35896	0.0057	0.0017	0	0	7.0	9
23	-1.48109	0.0025	0.0013	0	0	6.0	9
24	-1.45219	0.0122	0.0035	0	0	8.0	9
25	-1.51955	0.0018	0.0005	0	0	7.0	9
26	-1.30738	0.0195	0.0059	0	0	8.0	9
27	-1.20367	0.0071	0.0024	0	0	6.0	9
28	-1.47798	0.0083	0.0027	0	0	7.0	9
29	-1.69255	0.0072	0.0092	0	0	1.0	9
30	-1.20512	0.2830	0.0667	0	0	8.0	9
31	-1.16850	0.0150	0.0036	0	0	8.0	9
32	-1.26748	0.0127	0.0042	0	0	6.0	9
33	-1.21048	0.0039	0.0013	0	0	8.0	9
34	-1.20829	0.0073	0.0032	0	0	5.0	9
35	-1.85889	0.0023	0.0048	0	0	2.0	9
36	-1.63766	0.0031	0.0016	0	0	7.0	9
37		Dropped from Test					
38		Dropped from Test					
Pooled		Coefficient	t-Stat	SE Reg	mu*	sig*	Obs
Pooled		-1.42065	-30.842	1.029	-0.703	1.003	324