COLLEGE OF HUMANITIES

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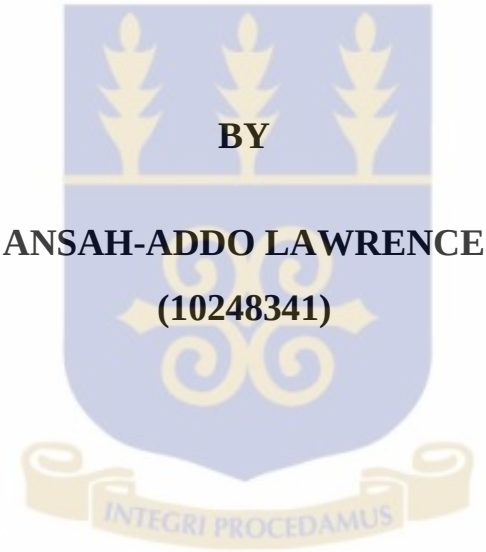
DOES NON-INTEREST INCOME MAKE BANKS MORE RISKY? RETAIL VS INVESTMENT BANKING ACTIVITIES IN AFRICA.



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THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF AN MPHIL FINANCE DEGREE.

JULY 2015

DECLARATION

I do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other University. All references used in the work have been fully acknowledged.

I bear sole responsibility for any shortcomings.

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CERTIFICATION

I do hereby certify that this thesis was supervised in accordance with procedures laid down by the University.

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DR. GODFRED A. BOKPIN DATE

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(CO-SUPERVISOR)

DEDICATION

This work is dedicated to Almighty God for His grace given me during the academic period, because all that is contained in this paper would not have been possible if not for the grace of God.

I also dedicate this work to family, friends and loved ones whose love and encouragements shown me have brought this study thus far.

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KEYWORDS AND DEFINITIONS

Income Diversification: Earning from loans and other income portfolio of banks.

Non-Interest Income: Income from other non-traditional bank earning sources other than from bank loans.

Fees and Commission Income: Income from bank commissions, service charges and other fees/commissions.

Trading Income: Incomes from the gains or losses from trading government securities, private debt/equity securities, and financial futures, options, gains or losses from foreign exchange, gains or losses from gold trading and profit or loss on sale of redemption of investments.

Retail Activities: Banking activities that requires banks to issue more than 50% of their total assets as loans to customers.

Investment Activities: Banking activities that requires banks to issue less than 50% of their total assets as loans to customers.

LIST OF ABBREVIATIONS

BLUE	Best Linear Unbiased Estimates
OLS	Ordinary Least Square
CAR	Capital Ratio
FCI	Fees and commissions income
LIQ	Liquidity
LZSCORE	Logarithm of the Z-score
NII	Net total interest income
NNI	Net non-interest income
RAROA	Risk-adjusted return on assets
SIZE	Asset Size
TI	Trading income
LLP	Loan Loss Provision
LOANASS	Loan-to-Asset Ratio
ROA	Return on Asset

ABSTRACT

The study examines how increasing the shares of fees and commissions, trading income and total non-interest income makes African banks more risky, for banks that specialize in either retail or investment banking activities.

The study used financial information obtained from the Bankscope database to construct a panel of African banks from 2008 to 2012. The study used the Ordinary Least Square (OLS) regression model with Newey – West standard errors, robust for heteroskedascity and autocorrelation.

The findings indicate that when non-interest income interact with bank assets (size), it was revealed that as banks grow in size, they become more aggressive in their earnings and increase risk exposure from earning from fees and commissions' income and trading income. Thus large banks must reduce earnings from non-interest activities; fees and commissions' income and trading income, in order to reduce risks and become more stable. Smaller banks can also reduce risk and become more stable from increasing earnings from non-interest income. Findings along retail and investment activities indicated that trading income significantly increase risks and makes banks unstable for both retail and investment activities, because earnings for trading activities is based on speculations and are highly volatile.

On the whole, the study found evidence to suggest that banks that diversify into fees and commissions' income as well as trading income, in relation to their asset size, make banks more risky and increases the instability of the bank. For sustainable business practices, banks are advised to design new products for their retail activities, to enhance opportunities for generating fees and commissions' income, in order to become more stable through income diversification.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Traces of the changing structure of banking activities around the globe in recent years have spurred research into the phenomenon. Discussions on the topic seem to trace this phenomenon to some recommendations and reforms that took place in the USA and other European countries like Germany and the UK. In the USA for instance, the abolishing of the Glass-Steagall Act of 1933, which separated commercial banking from investment banking, gave way for the adoption of the Gramm-Leach-Bliley Act of 1999 which introduced a universal banking model (Stiroh, 2004; Demirgüç-kunt & Huizinga, 2010). In Germany, the recommendation of the Gessler Commission in 1974 set the pace for a universal banking methodology, which abolished the ring-fencing of commercial and investment banking models in Germany (Casserly, Harle & Macdonald, 2008). The adoption of the universal banking model has provided banks with the opportunity to diversify their earnings into both commercial and investment activities.

Extant studies have argued that the changing structure of banking models in the last decade was as a result of the instability of banking incomes, in relation to weaknesses in the commercial and investment banking methodologies. For instance, Demirgüç-kunt and Huizinga (2010) opine that the 2007 financial crisis exposed the danger of over-reliance on bank incomes from its loan portfolios. Casserly et al. (2008) maintain that affected banks in Germany and UK after the financial crisis in 2008 were those banks that had little or no retail operations but had investment operations with highly leveraged investments in securities and other financial instruments. In recent times, the argument about other causes of the changing structure of banking activities have

been diverse; ranging from regulation, competition in the banking sector, stability of banks, risk taking behaviour of banks to bank performance (Boyd & Gertler, 1994; Lepetit, Nys, Rous & Tarazi, 2008; Calmes & Liu, 2009; Demirgüç-kunt & Huizinga, 2010; Hidayat, Kakinaka & Miyamoto, 2012; Kohler, 2013). These studies have expressed concerns about the changing income structure in relation to the general stability of banks.

Concerns for the stability of banking operations is of grave importance to economies, given that banks play very significant roles in the financial systems of global economies. Their enhancement is inextricably linked to the financial performance of most economies, especially in developing economies. Unlike developed countries that have well-developed capital and bank markets, Africa has a relatively stronger banking market; making bank crisis and failures in Africa very costly to African economies (Beck & Cull, 2013).

Again, literature on the stability of banks in withstanding shocks and other economic challenges in the past, coupled with the recent financial crisis, has re-ignited a strand of arguments relating to bank risk taking (Saunders & Walter, 1994; Kwan & Laderman, 1999; Stiroh, 2004; De Jonghe, 2008; Lepetit et al., 2008; Kohler, 2013). Issues of bank instability have been linked to a bank's income generating activities. While some studies identify the loan portfolio of banks to increase risks and bank instability (Stiroh, 2004; Kohler, 2013; Abedifar, Molyneux & Tarazi, 2014), others attribute bank risk and general bank instability to the non-interest income component of bank incomes (DeYoung & Roland, 2001; Stiroh, 2006; De Jonghe, 2008; Demirgüç-kunt & Huizinga, 2010); hence more attention is being placed on the diversification of bank income sources to include non-interest income-yielding activities. Arguments against banks that diversify their income sources into non-interest yielding activities seem to suggest that the non-traditional

incomes of banks expose banks to more risks (Stiroh, 2006; Lepetit et al., 2008; Kohler, 2013; Meslier, Tacneng & Tarazi, 2014). Following diversification theory in finance, empirical literature find optimal diversification benefits of risk reduction from diversifying into unrelated activities, as is the case with interest and non-interest income of banks (Stiroh, 2004; Leaven & Levine 2007; Wolfe & Sanya, 2011).

In spite of concerns about the general riskiness and stability of bank non-interest income activities, the benefits of risk reduction from bank income diversification noted in literature is enormous (Bodnar, Tang & Weintrop, 1997; Huang & Ratnovski, 2008; Elsas, Hackethal & Holzhäuser, 2010; Kohler, 2013). Ratnovski and Huang (2009) provide evidence to show that where wholesale financiers withdraw funding on the basis of bad signals of bank solvency, a diversified banks may have access to other financing sources, such as core deposits from customers, which are more reliable source of financing than wholesale and other short-term deposits. Kohler (2013) add to the argument by noting that bank diversification provides stability to banks where banks' loan portfolio fail due to economic conditions. Finally, another strand of studies have argued that banks that diversify have cost advantage over their specialized counterparts because the existing assets of the bank could be used in diversifying into other related financial services without additional costs but with benefits of scope economies (Bodnar et al., 1997; Elsas et al., 2010).

Recent arguments about stability and bank risks are not made in isolation, but take into consideration factors such as the size of banks and classification of banking activities into retail and investment banking activities (De Jonghe, 2008; Hidayat et al., 2013; Kohler, 2013; Meslier, et al., 2014). One of such arguments is presented by Kohler (2013) who reported that retail banks are generally unstable and exposed to much more risk from non-interest income than investment

banks. On the other hand, investment banks are generally unstable and exposed to increased risks from interest income generating activities, compared with retail banks. Kohler (2014) also note how the size of a bank moderate the results. Hence the suggestion from Kohler (2013) that larger and more investment-oriented banks should increase their share of interest income to become more stable, while on the contrary, in order for retail-oriented banks to become stable should increase their share of non-interest income.

African countries over the last decade are either adopting the universal banking model or abolishing the universal banking model due to adverse impacts on its banking industry experienced in the 2007 – 2009 financial crises, from the universal banking models used by banks in Africa (Caruana, 2011; Olaniwun, 2010; Agbaeze & Onwuka, 2014). For instance, Agbaeze and Onwuka (2014) show a move in 2010 to abolish the universal banking model because it offered no risk reduction benefit from income diversification in Nigeria. Kiweu (2012) also note no diversification benefit of reduced risk for banks in Kenya because of strong positive correlation between interest and non-interest income. The implication for Kenya is that interest and non-interest earning activities are related and hence does not provide risk reduction benefits but increases earnings volatility and generally increases the riskiness of Kenyan banks.

This study is aimed at contributing to ongoing arguments about prospects that retail and investment banking activities hold for the general riskiness and stability of the banking sector in Africa.

1.2 Statement of the Problem

Ongoing studies about bank income diversification, stemming from the universal banking methodology of banks around the globe, have spurred research into the area of the general riskiness and stability of bank income sources. As a result, researchers have either presented arguments for or against the general riskiness and stability for diversifying into non-interest activities around the globe. Extant studies show that majority of studies related with diversification of non-interest income are examined from the perspective of advanced economies (Rajan, 1996; Saunders and Walter, 1994; Stein, 2002; Stiroh, 2004; Stiroh and Rumble, 2006; Lepetit et al., 2008; Demirgüç-kunt & Huizinga, 2009; Elsas et al., 2010), with only few papers conducted for emerging economies (Huang & Chen, 2006; Berger et al., 2010; Hidayat et al., 2012; Meslier, et al., 2014).

Also, empirically papers from developed economies report findings from the USA (Rajan, 1996; Saunders and Walter, 1994; Stein, 2002; Stiroh, 2004:2006; Calmes and Liu, 2009), other European countries such as UK and Germany (Lepetit et al., 2008; Baele, De Jonghe & Vennet, 2007; Kohler, 2013) and from a cross-section of countries (Demirgüç-kunt & Huizinga, 2010; Elsas et al., 2010). Studies from developing economies seem to have been neglected on empirical results into the stability of African banks, from diversifying into non-traditional income sources. This particularly creates a huge gap in literature considering the absence of results following the deregulation of most banking institutions in developing economies, which has promoted the banking practice of earning from both traditional and non-traditional earning sources. Also, because developing economies, such as African economies, felt huge impacts from the recent financial crisis resulting from bank earning activities. However, the few studies that examine the African case seem to argue for either the adoption or the abolishment of the universal banking methodology because diversifying into non-interest sources increased the overall riskiness of

banks. For instance in Nigeria, owing to the adverse impacts from the 2008 financial crisis, the literature argued that the earnings from non-interest income accounted for the significant bank instability felt during the crisis (Olaniwun, 2010; Agbaeze & Onwuka, 2014).

This study is thus conducted to provide empirics for African banks for three main reasons.

First, banks in Africa play intermediary roles that ensure a well-functioning financial market in Africa. Without banks, the capital markets in most African economies would not be able to function and would be less developed. The banking sector play an intermediary roles of underwriting, brokerage and dealership which enables the capital market to function and the trading of capital securities.

Secondly, banks provide a major source of capital for the African market. Compared to the capital market, the banking sector is more developed (Andrianaivo & Yartey, 2010), although capital markets maintain different sophistications, banks provide a significant aspect of capital to economic agents in Africa.

Finally, insurance companies, pension funds and other financial companies remain underdeveloped and offer only a limited array of financial instruments to a limited set of clients. As financial companies become more interlinked with banks, the potential for financial business lines to develop further to better serve the needs of their clients is very high. The study is conducted to bridge the gap in literature for Africa, considering very few studies exist about diversifying into non-interest income and its impact on bank risks and the general stability of banks in Africa.

Again, on one hand of studies about bank diversification into non-interest income sources, is the general assessment of bank diversification from the universal banking perspective (Rajan, 1996;

Saunders & Walter, 1994; Stein, 2002; Stiroh, 2004; Stiroh & Rumble, 2006; Lepetit et al., 2008; Hidayat et al., 2012; Meslier, et al., 2014); while on the other hand studies assess bank riskiness and stability from the perspective of retail and investment banking methodologies (Demirgüç-kunt & Huizinga, 2010; Elsas et al., 2010; Kohler, 2013). Results and conclusions related with examining the phenomenon of bank income diversification seem too skewed to studies that have not examined the phenomenon under different banking activities. For instance; such studies conclude that non-interest income for banks are very risky and result in the general instability of banks (DeYoung & Roland, 2001; Nicoló, Bartholomew, Zaman & Zephirin, 2004; De Jonghe, 2008; Stiroh, 2004: 2006; Demirgüç-kunt & Huizinga, 2010). A decomposed analysis of non-interest income sources of commercial and investment banks, according to Kohler (2013), reveals that non-interest incomes sources are more risky and unstable incomes sources for commercial banks than for investment banks. The divergence of conclusions stem from the levels of analyses of empirical studies, to which very few have examined the phenomenon from the retail and investment banking perspective. Hence, this paper contribute to existing conclusions by literature into bank non-interest income diversification from the investment and commercial banking perspective. The study is thus conducted to add to empirical results for how the commercial and investment banking activities influence bank riskiness and general stability, especially for Africa with two very important implications. Firstly, whether the universal banking methodology have had adverse or misleading influence on the earning generating activities for banks in Africa. Finally, whether non-interest income from the retail and investment banking activities, increases bank risks and the general instability for African banks.

1.3 Objectives of the Study

The purpose of the study is to examine whether the share of non-interest income make banks in Africa more risky, for banks that undertake retail and commercial banking activities. The specific objectives of the study thus addresses the following.

1. To examine the impact of non-interest income variables on risk of banks in Africa.
2. To examine whether non-interest income impacts risk for retail and investment banking activities in Africa.
3. To examine whether non-interest income of banks interact with the size of a bank to influence risks for African banks.

1.4 Arguments and Research Hypotheses

The study propose arguments or hypotheses for the study, in pursuit of the specific objectives set for this study, following studies from Kohler (2013) and Hidayat et al. (2012).

Firstly, the study argue that banks with a higher share of their earnings from non-interest income activities are more risky and highly unstable because non-interest incomes are highly volatile compared to interest income, following empirical results of Kohler (2013).

The study further argue that non-interest income impacts on bank risk and stability, and may depend on the retail or investment banking methodologies used by banks. The differences occur because investment banks have a higher share of their earnings generated from non-interest income while retail banks have a higher share of earnings from interest income sources. Hence, increasing the shares of non-interest income for retail-oriented banks exposes them to higher risks and make

them more unstable, while non-interest income reduces risk for banks that undertake investment activities.

Finally, the study hypothesize that risk is significantly influenced with the degree of bank size in assets, following Hidayat et al. (2012). The study argue that large banks that increase their share of non-interest income are exposed to higher risks than smaller banks. Hence, large banks are more risky and unstable when they increase earnings from non-interest income, while small banks are more stable and less risky from increasing earnings from non-interest income.

Thus, the null hypotheses for the study have been stated as follows.

$\boldsymbol{H_1}$**:** There is no significant relationship between non-interest income shares and bank risk for banks risk in Africa.

$\boldsymbol{H_2}$**:** There is no significant relationship between non-interest income shares and bank risk For banks that undertake retail and investment banking activities in Africa.

$\boldsymbol{H_3}$**:** There is no significant relationship between the shares of non-interest income, interacting with bank size, and bank risk for African banks.

1.5 Significance of the Study

The findings of the study have implications for the regulation of banking activities and the design of bank products for banks in Africa.

In the first instance, the study provides insights into how the banking sector can benefit with respect to diversifying their activities in order to reduce the general stability of banks. Contemporary and a fresh perspective to the argument is beneficial at this point in time because of the divergence in banking methodologies adopted across the African continent.

While some African countries call for the adoption of the universal banking methodology, in spite of Basel Committee's (Basel III) call for the abolishment of the universal banking methodology, after much adverse impacts were recorded during the recent economic challenges, especially in Nigeria; other countries seem not to agree with calls for abolishing the universal banking model. Among some of the reasons stated by the Basel Committee in support of calls for abolishing universal banking are, "quality of banks, financial system stability and evolution of a healthy financial sector, ensuring the protection of depositor funds by ring-fencing banking from non-banking businesses" (Agbaeze & Onwuka, 2014: pg. 1).

It seem to suggest that the Basel Committee is suggesting ring-fencing banking activities under investment and commercial banking activities. The divergence in banking models used in Africa seem to suggest that different African countries enjoy some benefits from different banking methodologies; in relation to the risks and stability of those banks. Hence, the study is timely because it seeks to identify the risks of each type of banking methodology; retail, investment and universal banks and how they are exposed to risks from the share of non-interest income; and the general stability of such banks.

On the other hand, cues from this study are essential in helping banks in the design of their products; either to include either incomes generated from their loan portfolio or from other non-traditional banking sources.

Finally, the study add to the current debate on non-interest income and bank stability, by providing empirical findings from Africa. Additional literature for academic discussions on bank risk and stability has become necessary because Africa equally receive shocks and turmoil when advanced economies are faced with economic crisis. Hence, a need for an African study is far overdue.

1.6 Scope of the Study

The study scope is banks in Africa, with specific emphasis on retail and investment banks. The study is focused on the banking market of Africa for two main reasons.

First, results for no one African country can provide sufficient generalization for Africa because of the difference in regulation of African countries.

Secondly, there is skewness in the number of investment banks that African countries have. Some African countries have more investment banks than others which may influence the risks of banks in such African countries than those that have very few investment banks. Hence, studying African banks is beneficial in identifying the heterogeneity of banking activities on the continent.

1.7 Arrangement of Chapters

The entire study is arranged into five main chapters.

Chapter one of the study is an introduction to the research topic. The chapter presents a background of the study and proceeds to state the problem underlying the conduct of the study. Other sections discussed under the chapter are the objectives, hypothesis, significance and scope of the study. Chapter two of the study provides the empirical review of the study by reviewing literature into

bank methodologies, income diversification, risk taking and stability of banks in both emerging and developed economies. Chapter three of the study examine the methodology used by identifying the data type and sources, measurement of variables, the specified model and method for data analysis of the study. Chapter four of the study provide the results of the study. Then on a discussions of the results are outlined in this chapter in order to bring out the key findings of the study. Finally, the chapter five present summary of the findings, concludes the study based on the findings and propose recommendations from findings of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction of Chapter

The chapter presents theoretical and empirical review of bank risk taking. The chapter provides evidence of factors that led to the shift in income from the traditional and non-traditional sources through deregulation of banking sectors around the globe. The chapter further provides insight in diversification in the banking sector, by noting the various sources of a bank's diversified earnings. Going forward, the chapter examines the underlying theory of risk taking in banking, which stems from information asymmetry before and after banking transactions, resulting in adverse selection and moral.

2.2 Changing Income Structure of Banks

The recent 2007 financial crisis has been seen to expose the danger of over-reliance on bank incomes from its loan portfolios, a view that is maintained by most researchers (Demirgüç-kunt & Huizinga, 2010). More importantly, the financial crisis revealed the weaknesses of the banking models around the globe, with much emphasis on the sources of incomes to the various banking models. Extant studies maintain that the changing structure of bank incomes is as a result of regulatory changes or deregulation and high competition in the banking sector which has declined the interest margins of banks (Davis & Touri, 2000; Lepetit et al., 2008; Calmes & Liu, 2009).

Other reasons attributed to the changing structure of banking activities include technological change, increased scope of cross border financial activity (Davis & Touri, 2000). Studies that

argued that the changing shifts of banks' income was due to regulatory changes suggest a changing view of banking models (Boyd & Gertler, 1994; Lepetit et al., 2008; Calmes & Liu, 2009).

Evidence from the US shows the abolishing of the Glass-Steagall Act of 1933 which separates commercial banking from investment banking to the adoption of the Gramm-Leach-Bliley Act of 1999 which introduced a universal banking model, in 2008 (Stiroh, 2004; Demirgüç-kunt & Huizinga, 2010). The same phenomena in regulatory changes is seen in Germany (Kohler, 2013), Canada (Calmes & Liu, 2009), European and other countries around the globe (Rajan, Servaes & Zingales, 2000; De Jonghe, 2008). In Europe, deregulation of the banking sector was facilitated by the Second Banking Directive in 1989, which allowed the combination of banking, insurance and other financial services (Baele, De Jonghe & Vennet, 2007; De Jonghe, 2008). The universal banking model allows banks to perform a wide range of financial services, such as, commercial banking, investment banking and insurance (Lepetit et al., 2008; Demirgüç-kunt & Huizinga, 2010); which has been argued to be a more desirable structure due to its resilience to adverse shocks of the financial crisis (Demirgüç-kunt & Huizinga, 2010). The universal banking methodology has been widely adopted and used around the globe today, Ghana is no exception.

The adoption of the universal banking model has given rise for banks to supplement interest incomes with other non-interest incomes such as fees, commissions, trading incomes, brokerage, among others (Rajan, 1996; Saunders & Walter, 1994; and Stein, 2002). To some extent, the use of both interest and non-interest incomes has been argued to boost bank performance (Demirgüç-kunt & Huizinga, 2010), while on the other hand Jensen (1986) maintain that agency problems may arise if the size and scope of the bank becomes too complex. Ratnovski and Huang (2009) also provide evidence to show that the challenge of relying on wholesale funding may cause banks to fail when wholesale financiers withdraw funding on the basis of bad signals of bank solvency.

Arguments in support that the changing structure of bank incomes is due to competition have posited that the technological developments in the banking industry lately has spurred competition (Davis & Touri, 2000). According to these studies, technological development has enhanced the provision of different types of financial services through information processing. Hence, technological developments have made information gathering, risk assessment and cost reduction of financial services possible.

Stiroh (2006) maintain that the non-interest income component of a bank's income structure is gradually becoming a significant aspect of their revenue base; some studies maintain the growth of non-interest activities has grown much faster than interest activities (Calmes & Liu, 2009). More importantly, Stiroh (2006) argued that the shift in attention to non-interest income sources provides an avenue which ensures diversification and general stability of banking industries. On the contrary, DeYoung and Roland (2001) argued that increased reliance on non-interest income increases volatility of profits without an increase in average profits. Demirgüç-kunt and Huizinga (2010) also find that bank income generated from non-interest is very risky and reduces the overall bank performance.

2.3 Diversification of Bank Incomes

Diversification of the incomes of banks involves the offering of wider range of financial services to its clients. Income diversification has become possible and very popular around the world today after regulators deregulated the banking sectors around the globe (Lepetit et al., 2008; Demirgüç-kunt & Huizinga, 2010; Hidayat et al., 2012; Kohler, 2013). References for the commencement of worldwide banking diversification usually cite the Gramm-Leach-Bliley Act of 1999 of the US and the Second Banking Directive of 1989 for European countries. Elsas et al. (2010) maintain

that traditional banks typically diversify into fees and commission related activities while non-traditional banks with fee-based income usually diversify into trading activities.

Researchers have highlighted the good and bad of bank diversification. Studies that report on the good of bank diversification provide the following arguments. Firstly, bank diversification provides stability to banks where their loan portfolio fail due to economic conditions, which might result in a financial crises (Kohler, 2013). Kohler (2013) further noted that bank resilience from diversification can only be achieved when banks do not depend heavily on either interest or non-interest income. Secondly, banks that diversify have cost advantage over their specialized counterparts, especially when they operate with very high operational leverage (Bodnar, Tang and Weintrop, 1997; Elsas et al., 2010). According to Elsas et al. (2010), the existing assets of the bank could be used in diversifying into other related financial services without additional costs but with benefits of scope economies. Thirdly, diversification of banking activities has been studied from the perspective of the non-traditional banking activities of financial institutions by most researchers.

The effect of diversification of banking activities have been focused on bank riskiness (Stiroh, 2004; Stiroh and Rumble, 2006; Hidayat et al., 2012), performance (Puri, 1996; Boyd et al., 1998), stability (DeYoung and Roland, 2001; Stiroh, 2004; Stiroh and Rumble, 2006; Lepetit et al., 2008; De Jonghe, 2010; Demirguc-Kunt and Huizinga, 2010; DeYoung & Torna, 2013), lending activities (Carbo and Rodriguez, 2007; Lepetit et al., 2008; Hellmann, Lindsey and Puri, 2008) among others.

Results about bank diversification and the riskiness of banking activities have provided mixed results. A large strand of studies have reported that bank diversification increases the risk exposure

of banks while others argue otherwise. The strand of literature that examine the risk exposure of banks in normal economic conditions have produced mixed results.

Earlier results from the US seem to opine that expanding banking activities through diversification of banking activities may reduce the risk of banks (Saunders and Walter, 1994; Kwan and Laderman, 1999). These studies opine that risk reduction in the banking sectors are largely driven by insurance activities rather than activities related to securitization.

However, contrary to these studies, more current results from the US were found to be contradictory. De Jonghe (2008) report that increased non-interest income activities increase bank riskiness with no equivalence in bank profitability. What the result seem to suggest is that banks expose their operations to much more risks than they would have originally planned for by engaging in off-balance sheet activities. However, the risks the banks are exposed to are not adequately compensated for by the earnings from off-balance sheet activities. Stiroh (2006) arrived at the same conclusion using information from listed banks by observing the incomes of banks from a portfolio standpoint. According to Stiroh (2006) diversification of banking activities towards non-interest income has not provided sufficient returns to compensate for risks exposed by US banks. Similar results are reported by Stiroh and Rumble (2006), while Stiroh (2004) maintain that increasing risks of bank earnings arise usually from trading activities.

In Europe, similar results are reported; such that risks are highly correlated with fee-based activities other than trading activities as reported in the US (Lepetit et al., 2008; Kohler, 2013). Other studies seem to agree with the assertion that diversified banks take higher risks than non-diversified banks (De Jonghe, 2008; Nicolo et al., 2004).

Literature also opine that non-interest income or non-traditional activities of banks increase lending activities of banks (Carbo and Rodriguez, 2007; Lepetit et al., 2008; Abedifar et al., 2014). For instance, Carbo and Rodriguez (2007) maintain that subsidies granted to non-interest activities influence net interest margins of banks. They seem to argue that lower rates and fees on non-traditional banking activities provides signals of low interest spreads of such banks. Lepetit et al. (2008) banks may underprice on loans if they anticipate additional income sources from borrowers in the form of fees and commissions. As a result of these findings, Abedifar et al. (2014) call for sound monitoring and pricing of loans for ensuring soundness in the banking industry. Abedifar et al. (2014) opine that biasedness in loan pricing, loan screening, monitoring and conveyance of information on the quality of borrowers in the banking industry may be compromised from incentives from non-interest activities.

The advantages of diversified banks is their ability to collect customer-specific information beyond what may be publicly available (Berger, 1999; Boot, 2000; Elsas et al., 2010). Boot (2000) argues further by opining that bank diversification can expand the scope of lending services to reach prospective clients; and build stronger relationships with clients (Abedifar et al., 2014). Evidence exist to show that diversified banks that build strong relationships with customers reduce default rate (Puri et al., 2011) and reduce interest rates of banks significantly, due to expanded scope of activities with the customer (Degryse & Van Cayseele, 2000). On the contrary, extant literature has argued that bank diversification causes managers to lose focus on lending activities and cause managers to be less conservative in their loan granting activities (Abedifar et al., 2014).

2.4 Theoretical Review

The main theories underlying risk taking has been attributed to, among other theories, the theory of information asymmetry, which gives rise to adverse selection and moral hazard theories in finance.

2.4.1 Theory of Information Asymmetry

Information asymmetry exist where both parties to a transaction do not possess full or sufficient knowledge of each other. A significant contribution to this theory was made by Akerlof (1970) about the information asymmetry existing in the purchase of a used car. According to Akerlof (1970) the seller of a used car may have very good information about the quality of the car than the buyer. Thus, information asymmetry may exist at both ends of a transaction. In banking, banks as lenders may have peculiar information and earn profits by having better information about investments than their depositors, likewise a borrower might have information about their financial condition and their future financial prospects than the banks as lenders.

Researchers have noted that information asymmetry exposes parties to any transaction to two main types of risks; adverse selection and moral hazard. According to literature, adverse selection is the risk exposure as a result of information asymmetry before a transaction between parties, while moral hazard is where the information asymmetry occurs after an agreement is obtained between parties (Akerlof, 1970; Spence, 1973; Rothschild & Stiglitz, 1976).

A greater part of the adverse selection theory in banking, is the determination of who to lend money to, in a way that reduces the risk of lending. Drawing from findings of Akerlof (1970) suggest that, if banks offer an average interest rate on loans or services, customers with lower risks would rather opt to lend or patronize services lower than the average price, while more risky customers will

borrow at the average price, resulting in adverse selection. Explanation offered implies that, without information, banks would have to sell their products at an average price.

On the other hand, moral hazard is the risk that borrowers will misappropriate funds and would not use it for intended use through excessive risk taking activities. A contribution to this theory is by Mirrlees (1999) who cite an insurance transaction as a moral hazard problem. According to Mirrlees (1999) when a driver from an insurance company, a moral hazard occurs when after signing the insurance contract, the insurance company is unable to observe whether the driver is careful or not in incurring liabilities.

According to Myers's (1984), information asymmetry could be solved using a hierarchical funding approach of cash flow, debt and stock issuance. According to Myers (1984), cash flow help reduce information asymmetry by strengthening the financial structure to support a business development. The cash flow mechanism of reducing information asymmetry involves resorting to getting indebted to financial institutions, which according to Bernanke and Gertler (1990) encourages banks to invest in risky projects and increases the debt-related agency costs. Thus, external monitoring helps banks to undertake less risky transactions. As such as debt arises, it helps to reduce information asymmetry between managers and investors through supervision of investments by managers through obligations on the debt. Finally, the use of equity motivates the reinvestment of earnings, limit dividend distribution and reduce cost of re-issue of equity capital.

In the case of bank income diversification, the equity holders and bank depositors of banks are exposed largely to moral hazards because they are not able to monitor the apportioning of their funding and the level of risks undertaken by banks. Thus, the earning structure and the associated risks incurred by banks are moral hazards that fund providers face, based on the decisions of the banks in their earning generation.

2.5 Empirical Evidence of Non-Interest Income and Bank Risk Taking Activities

Empirical results on the impact of non-interest income and bank risk is unclear and largely remain contested. While a set of literature suggest that increasing non-interest income makes banks more risky (Stiroh, 2006), others argue that increasing non-interest income stabilizes banks and makes them more resilient to economic conditions (Gallo Apilado & Kolari, 1996). Very early studies such as that of Boyd, Hanweck and Pithyachariyakul (1980) and Kwast (1989) found little or no increase in risk from diversifying into non-interest income activities.

One of the strong arguments about why diversifying into non-interest income tend to make banks more risky and result in a collapse of the banking sector was provided by Wagner (2010). According to Wagner (2010), as banks continue to diversify, they will hold more and more similar portfolios. As a result, a collapse in one portfolios leads to a synchronized weakness in other banks holding similar portfolios. This finding was consistent with findings of Acharya (2009) and Ibragimov, Jaffee, and Walden (2011). According to Acharya (2009) banks collapse from diversification into non-interest income due to the high correlation of investments by banks in an industry. Their result imply that eventually banks will hold assets which are similar to each banks and may likely cause a simultaneous toppling of banks when the assets or investments of one bank fails. Ibragimov et al. (2011) also notes that the instability caused by diversifying into non-interest income is caused because banks take a hedged position in other bank's risky portfolio, resulting in an interdependence positions of banks, causing banks to collapse when one bank's portfolio fails. These set of studies seem to provide evidence for increase in systematic risks, by arguing that diversification may only reduce idiosyncratic risk, but also increases systemic crises.

Literature into non-interest income and bank risks have also been studied into diverse dimensions of bank income activities. For instance, Kohler (2013) examine how non-interest income impact on the riskiness and stability of banks with the retail and investment banking models. Following Hirtle and Stiroh (2007) and Kohler (2013), retail banks issue more than fifty percent of their assets as loans, while investment-oriented banks issue less than fifty percent of their assets as loans. Kohler (2013) provides an understanding into the risk exposure and stability for banks under separate banking models than for banks under the universal banking model.

A major implication identified by Kohler (2013) was to help banks with separate banking models to allow the diversification of their income and become stable. Results from Kohler (2013) suggest that increasing shares of non-interest income; fees and commissions' income, trading income and other non-interest income, help banks with a more retail-oriented business model to better diversify their income structure and to become more resilient to overall economic conditions that affect their loan portfolio, consistent with findings from (Stiroh, 2004). On the other hand, investment-oriented banks become significantly less stable and increase their risk exposure by increasing shares of non-interest income. The findings of Kohler (2013) seem to be one of the most significant papers that examined the risk taking behaviour of banks under retail and investment banking activities.

Going forward, empirical literature also examine how diversification increases risk for different bank sizes. For instance, Lepetit et al. (2008) provide evidence to show that diversifying into trading income for small banks does not increase the overall riskiness and instability of banks, while fees and commission's income increases bank risk. Hidayat et al. (2012) offer evidence to show that small banks are less likely prone to instability from diversifying into non-interest income sources. On the other hand, their results showed that large banks are more prone to higher risks

and instability from increasing activities into non-interest income sources. Results by Hidayat et al. (2012) for large banks is consistent with results by Kwan (1998), De Young and Roland (2001), Stiroh (2004), and Lepetit et al. (2008); while results for small banks was found to be inconsistent with Lepetit et al. (2008). Arguments in defense of the result imply that the fixed costs associated with non-interest banking activities offer large banks the incentive to be more aggressive in their risk taking, in contrast to small-sized banks.

2.6 Factors That Influence Bank Risk Taking

Banking operations have been undertaken with the likelihood of adverse effects on some of its main activities. A number of factors have been documented in empirical studies as factors that influence the risk taking behaviour of banks. For instance, Konishi and Yasuda (2004) used stock market data and identifies that, the implementation of capital requirements by banks reduces risk, stable shareholder relationships also reduces risk and the decline of franchise value increases bank risk for Japanese banks. Stiroh (2006) also used financial information for publicly traded US bank holding companies, and found factors such as commercial, industrial and consumer lending and non-interest income of banks. These result seem to vary with respect to the data used and the method adopted. The study examine empirical analysis and results on factors that influence bank risk taking.

2.6.1 Capital Requirement of Banks

Documented studies by VanHoose (2007) opine that researchers in the mid-50's and 70's sought to determine the optimal level of capital for banks. VanHoose (2007) maintain that most of the

formulae for determining capital levels, recommended by researchers, failed because of innovations in the financial systems within that period. An initial move was made by the US, who impose some primary capital levels as minimum capital. According to Jokipii and Milne (2011) while banks no longer hold the minimum capital requirements but would rather hold some desired levels of capital, deductions according to the literature, indicate that such levels of capital are held proportionate to their risk taking behaviours.

Empirically, researchers have noted that bank capital requirements have become a very relevant tool in providing some form of buffer for banks in times of adverse economic condition (Dewatripont & Tirole, 1994; Aggarwal & Jacques, 2001; Rime, 2001). Going forward, these studies have notes that the capital requirement is also used by banks to check the risk appetite of banks. According to empirical result, evidence exist to show that banks have increases their capital levels have also increased their risk appetite (Shrieves & Dahl, 1992). Contrary results for the capital-risk relationship was presented by Jacques and Nigro (1997). Arguments raised by Shrieves and Dahl (1992) about findings by Jacques and Nigro (1997) explains that contrary result exist if banks seek to exploit deposit insurance subsidies.

Researchers provide arguments about bank capital requirements, consistent with the buffer theory, which expects banks to maintain some level of capital above the required minimum (Milne & Whalley, 2001; Peura & Keppo, 2006; VanHoose, 2007). Consistent with this prediction, Heid, Porath and Stolz (2004) finds that banks with low capital buffers (lowly capitalized) reduce risk while raising their capital levels in a bid to accumulate stable levels of capital, while banks with larger buffers (well-capitalized) increases risk while increasing their capital levels. Explanations why banks hold large capital ratios or large buffers have been pointed out in literature. Lindquist (2004) for instance, argue that banks hold large buffers in order to interventions and costs

associated with regulatory discipline in times when they fall below the minimum capital ratio. In this way, large buffers help in safeguarding the depletion of capital and its associated shocks.

Results for capital levels and risk taking are more skewed towards studies that maintain that a positive relationship exist between capital levels and risk taking behaviour of banks. Some strand of literature note that capital adequacy ratio of banks reduce the levels of risky assets (Jacques and Nigro, 1997; Rime, 2001), while other argue otherwise (Shrieves & Dahl, 1992; Altunbas, Carbo, Gardener and Molyneux, 2007).VanHoose (2007) explains that divergence in the empirical literature occurs because of the vastness of the methods employed; and also the capital-risk relationship is augmented by factors such as deposit insurance. Altunbas et al. (2007) also indicate that agency cost and information asymmetry significantly impact the risk-capital relationships of banks; which also explains why explains why some banks react to increased capital requirements by taking more risk, while others may reduce leverage.

Arguments upholding increased risk from increased capital ratio suggest that increased competition and expensive cost of raising capital encourage excessive risk taking, required to make up for the loss in returns needed to increase capital ratios. Also, Cerasi and Daltung (2000) suggest that monitoring risk taking activities for banks financed with equity is lower than when banks are financed with debt. The implication is the external monitoring from debt issuers on bank risk taking activities. Similar results was also found by Diamond (1984). According to Altunbas et al. (2007) liability holders penalize banks that increase risk by asking for higher returns if they take on more risk. Banks on the other hand respond by holding more capital to reduce insolvency risk. However, banks that increase their risk may not necessarily hold more capital if they believe all depositors are insured.

2.6.2 Bank Assets or Size

The asset size of banks is an important factor in determining risk taking behaviour of banks. Literature notes the phenomenon of "too big to fail" usually associated with large banks, which ensures that governments do everything in their power to keep large banks in business (Moosa, 2010). This phenomenon has been seen to induce the risk appetite of banks and cause them to excessively take risks through diversifying bank earnings (Kohler, 2014; Hidayat et al., 2012).

Empirical results about how bank asset size relates with risk taking maintain that it is large banks that can easily diversify and have the tendencies of exposing themselves to more risk (Hidayat et al., 2012). Cerasi and Daltung (2000) also opine that due to the indivisibility of bank assets, diversifying increases the size of a bank. A look at literature reveals that while there is no clear consensus about how the asset size of a bank increases risk, literature mostly note the disadvantage of large banks in risk taking activities (Lepetit et al., 2008; Kohler, 2014). More specifically, Lepetit et al. (2008) note that risk increases when large banks increase earnings from fees and commissions' income; while trading income reduces risk for small banks. Hidayat et al. (2012) found large banks to adversely affect the stability of banks when they earn from non-interest income sources.

Following the dimensions of retail and investment activities, Kohler (2014) maintain that large banks that undertake investment activities become more risky from increasing earnings from non-interest earnings. Also, Kohler (2014) shows that large banks that undertake retail activities become stable when they increase earnings from interest income and reduce earnings from non-interest.

2.6.3 Liquidity

According to empirical literature, banks provide liquidity to their customers by pooling individual liquidity risk (Diamond & Rajan, 2001). In the course of providing liquidity to its customers, banks expose themselves to liquidity shocks, thus making their liquidity provision role very risky (Allen & Gale, 2000). Allen and Gale (2004) argue that banks or financial institutions are prone to risks if there are sudden withdrawals of funding. Literature also indicated that liquidity also provides the opportunity of enhancing trading against bank's interest (Myers and Rajan, 1998). Demirgüç-kunt and Huizinga (2010) also provide evidence to show that diversifying into more liquid non-interest income banking activities such as trading activities increases bank risks. Calomiris (1999) also show that non-deposit funding in a bank's funding mix can reduce bank instability risk through better monitoring, while Song and Thakor (2007) argue otherwise. They argue that non-deposit funding are prone to premature withdrawals making them an unreliable source of funding for non-interest income activities. Their result was consistent with Ratnovski and Huang (2009) who show that reliance on wholesale funding becomes unreliable when wholesale financiers funding when they perceive signals of bank solvency.

2.5.4 Other Determinants

Other variables seen to influence risk taking in banking include earning from non-interest income, competition among others. Demirgüç-kunt and Huizinga (2010) for instance note that the 2007/8 financial crisis revealed the fragility of banks that relied on their loan portfolios. Risk from the loan portfolios of banks mostly arise from the default by customers. Kohler (2014) also show that investment-oriented banks are more unstable from increasing their earnings from interest sources.

A key observation in literature is that most risk arising from the loan portfolio of banks usually arise from the moral hazards of customers after a loan transaction.

Empirically, findings on concentration and risk taking is mixed. For instance, Boyd and De Nicolo (2005) show that lowering interest rates by banks in a competitive loan market leads to a higher chance of a payoff by borrowers, which in turn could increase stability. Berger et al. (2009) use competition variables for 30 developed countries and found that banks with a higher market power increase risk from their loan portfolio. Jayaratne and Strahan (1998) also noted that loan losses significantly reduced after the US banking sector became more competitive. Keeley (1990) on the other hand provided contradictory findings to that of Jayaratne and Strahan (1998). Empirics provided by Boyd et al. [2006] also reveal that the probability of bank failure using the Z-score was positively and significant with concentration, implying that concentration reduced risk for banks.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The chapter provides the methodology used, related with data issues, analysis and presentation of results. The chapter identifies the research design, the type and source of data, empirical models used, specifies the empirical model, an estimation of variables used in the model, description of how data was analyzed and how the results were presented.

3.2 Research Design

The study used a multiple linear regression model for the study. The study constructed a multiple linear regression model using empirical variables following empirical literature (Hidayat et al., 2012; Kohler, 2013; Meslier et al., 2014). The regression model approach was used because it was effective at establishing the significance of relationships and examining the impacts of non-interest income variables on bank risk variable.

3.3 Data Issues

The study used accounting data, stemming from the financial statements of banks in Africa. The financial data for banks in Africa was used to construct a panel of three hundred and eighty-three (383) African Banks from 2008 to 2012.

The financial data of banks were classified into banks that undertake retail and investment activities. Following Kohler (2013) and Hirtle and Stiroh (2007), investment-oriented banks are

banks with a customer loans-to-total assets ratio of less than 50%. On the other hand, retail-oriented banks are banks with more than 50% of customer loans-to-total assets ratio.

The study acquired financial information of African Banks from the Bankscope database. In the Bankscope database the study constructed non-interest income, risk and other control variables which were used in the conduct of the study. The study eliminated newly incorporated banks within the sample period which had less than four years data points. The study also eliminated merged banks within these period with less than four years data points. The study sampled from twenty-nine (29) countries in Africa.

3.4 Model Specification

The study used an OLS regression model with Newey–West standard errors, robust for heteroskedascity and autocorrelation, in determining the relationship and impact of non-interest income variables and bank risk.

The first model measured the impact of non-interest income variables on the risk for banks in Africa.

The second model measured the impact of non-interest income on the risk of retail and investment-oriented banks in Africa.

The last model measured the interaction between non-interest income and bank size in impacting bank riskiness and stability for African banks.

3.4.1 Model 1

The specified OLS regression model with Newey–West standard errors, robust for heteroskedascity and autocorrelation of the African Panel is specified below;

$$\boldsymbol{LZSCORE_{it} = \beta_0 + \beta_1 NNII_{it} + \beta_2 CTRL_{it} + \varepsilon_{it}}$$

$\boldsymbol{LZSCORE_{it}}$ is a bank risk variable for African bank (*i*) in time (*t*). The risk variables include is the natural log of the Z – score.

$\boldsymbol{NNII_{it}}$ is a vector of non-interest income variables; fees and commissions income (FCI), trading income (TI) and total net non-interest income (NNI) for bank (*i*) in time (*t*).

The $\boldsymbol{CTRL_{it}}$ is a vector of controlling variables for bank risk; interest income, bank size, liquidity, funding structure and profitability. The income variable used was the Net Interest Income (NII_{it}), measured as the ratio of net interest income to total operating income of African banks (*i*) in time (*t*). The bank size variable ($SIZE_{it}$) was measured as the natural log of total assets of African banks (*i*) in time (*t*). The funding structure variable was the capital ratio measured as the ratio of total equity to total assets (CAR_{it}) of African banks (*i*) in time (*t*). The liquidity variable, was measured as the ratio of liquid assets to total assets (LIQ_{it}) of African banks (*i*) in time (*t*). Finally, the profitability variable was the risk-adjusted return on assets (RAROA_{it}) measured as the ratio of ROA to standard deviation of ROA.

The β_0 and β_{1-2} are the intercept and variable estimator terms respectively. Finally, the ε_{it} term represents the unobserved time and firm-specific error term of the model.

3.4.2 Model 2

The second model examines the impact of non-interest income on bank risks for banks that undertake retail and investment banking activities in Africa. The specified regression model is as follows.

$$\boldsymbol{LZSCORE_{it} = \beta_0 + \beta_1 NNII_{it} + \beta_2 CTRL_{it} + \beta_3 DUMMY_{it} + \varepsilon_{it}}$$

$\boldsymbol{DUMMY_{it}}$ is a dummy for African banks that undertake retail or investment activities for African banks (i) in time (t).

3.4.3 Model 3

The third model measured the interaction between non-interest income and bank size in impacting bank riskiness for African banks, and is specified below;

$$\boldsymbol{LZSCORE_{it} = \beta_0 + \beta_1 NNII_{it} + \beta_2 NNII_{it} \times SIZE_{it} + \beta_3 SIZE_{it} + \beta_4 CTRL_{it} + \varepsilon_{it}}$$

The $\boldsymbol{NNII_{it} \times SIZE_{it}}$ is a vector of interaction between non-interest income variables (NNI_{it}) bank size ($SIZE_{it}$), following Hidayat et al. (2012).

3.5 Description of Variables

The variables in the study have been decomposed under three main classifications; dependent variables, independent variables and control variables.

The dependent variables are bank risk variables. Independent variables capture non-interest income variables. Finally control variables control examine variables which control for bank risk.

3.5.1 Dependent Variable

The study used the measurement of bank risk following Lepetit et al. (2008), Hidayat et al. (2012) and Kohler (2013), who considered the Z-score, standard deviation of return on assets (SDROA), but ignore average ratio of loan loss provisions to net loans (LLP) used by Lepetit et al. (2008) because it is traditionally backward looking and highly procyclical (Laeven & Majnoni, 2003; Bikker & Metzemakers, 2005; Kohler, 2013). The Z-score was also used as a stability risk variable, following Hidayat et al. (2012) and Kohler (2013). For the purpose of this study, the Z-score was used as the risk variable because the Z-score is an overall measure of bank risk capturing not only credit, but also liquidity and market risk that primarily arises from non-lending activities.

The Z-score is a risk variable which indicates the probability of bank failure (Boyd & Graham, 1986; Hidayat et al., 2012). More specifically, it indicates the number of standard deviations below the expected value of a bank's return on assets at which equity is depleted and the bank is insolvent (Boyd et al., 1993; Kohler, 2013). Empirically, the Z – score was computed following (Laeven and Levine, 2009, Altunbas et al., 2011 and Demirgüç-kunt and Huizinga, 2010; Kohler, 2013) as;

$$\boldsymbol{Z - score} = \frac{\boldsymbol{ROA_{it} + CAR_{it}}}{\boldsymbol{SDROA_{it}}}$$

The SDROA was computed using a three-year rolling window, following Kohler (2013); Meslier et al. (2013). The Z-score and the probability of bank insolvency are inversely related; a high Z-score indicate that banks incur less risks and are more stable, and vice versa. The natural log of the Z-score was used (LZSCORE) because the Z-score is highly skewed to the right.

3.5.2 Independent Variables

Literature regard non-interest income activities as a measure of the degree of non-banking activities or income diversification (Stiroh, 2004). Net interest income has been divided into different components (Stiroh, 2004, De Young & Roland, 2001; Lepetit et al., 2008).

First is the average ratio of net fee and commission income to net operating income (FCI). The second is the average ratio of net trading income to net operating income (TI). This decomposition of non-interest income was used to analyze risk implications for different types of financial products (Hidayat et al., 2012).

Meslier et al. (2014) used the ratio of total non-interest income to operational income (NNI) and the ratio of the decomposed non-interest income; fees and commission, trading and other non-interest income to operational income. Extant literature also uses only non-interest income as the ratio of non-interest income to operating income (Altunbas et al., 2011; Demirgüç-kunt & Huizinga, 2010; Kohler, 2012), because non-interest income, differ across banks. Ranging from banks that have no non-interest income to banks generating almost all of their operating income from non-interest income activities.

Net Fee and Commission Income/Net Operating Income

Net fees and commission income (FCI) is measured in the model as the ratio of fees and commissions income divided by the average operations income for a bank (i) in the year (t);

$$\boldsymbol{FCI} = \frac{Fees\ \&\ Commission\ Income}{Operational\ Income}$$

Net Fees and Commission income is defined as bank commissions + service charges/fees + other fees/commissions, following (Meslier et al., 2013). The study expected a positive relationship with investment bank risks but negative with retail banks.

Net Trading Income/Net Operating Income

Net trading income (TI) is measured in the model as the ratio of trading income divided by the average operations income for a bank (*i*) in the year (*t*);

$$\boldsymbol{TI} = \frac{Income\ from\ trading\ Activities}{Operational\ Income}$$

Trading income is defined as Trading gains/(losses) (from government securities, private debt/equity securities, and financial futures, options) + Foreign exchange profits/(losses)+Gold trading gains/(losses) + Profit/(loss) on sale of redemption of investments, following (Meslier et al., 2013). A negative relationship is expected between trading income and bank risk because trading income increases bank risks because it is very volatile for retail-oriented banks, but reduces risk for investment-oriented banks, following arguments by Kohler (2013).

Total Non-Interest Income/ Operating Income

Non-interest income is measured as the ratio of total non-interest income to operations income for a bank (*i*) in the year (*t*);

$$NNI = \frac{Total\ Non - Interest\ Income}{Operational\ Income}$$

Total non-interest income is defined as the sum of all non-interest income of banks such as fees, commissions, trading and other incomes, following (Meslier et al., 2013).

We expect non-interest income to be positive with risk for investment banks and negative for retail banks.

As summary of the expectations of the main independent variables are as follows.

Expected Signs of Non-Interest Income Variables with Bank Risk		
	Investment	**Retail**
Fees and Commissions Income (FCI)	+	-
Trading Income (TI)	+	-
Total Net Non-Interest Income (NNI)	+	-

3.5.3 Control Variables

The study controlled for bank risks, following Kohler (2013) who identified bank size (SIZE), liquidity assets to total assets (LIQ), risk-adjusted return on assets (RAROA), ratio of equity to total assets (CAR) and the ratio of interest income on operating income (NII) to be other factors of bank risk taking. The study compute the control variables as follows.

Size = $\ln TA_{it}$ representing the log of total assets for banks (i) at a time (t).

$$\boldsymbol{CAR_{it}} = \frac{Equity_{it}}{Total\ Assets_{it}}$$

$$\boldsymbol{LIQ_{it}} = \frac{Liquid\ Assets_{it}}{Total\ Assets_{it}}$$

$$\boldsymbol{RAROA_{it}} = \frac{ROA_{it}}{SDROA_{it}}$$

$$\boldsymbol{NII} = \frac{Total\ Interest\ Income}{Operational\ Income}$$

3.6 Data Analyses

A panel analysis of African Banks were constructed and analyzed using OLS regression with Newey–West standard errors, which is robust for heteroskedascity and autocorrelation. The OLS model was used because it provides the Best Linear Unbiased Estimates (BLUE) of the estimators. The OLS model was robust for heteroskedascity and autocorrelation, using the Newey–West standard errors because of the presence of heteroskedascity and autocorrelation in the residual term.

The study ensured a stable model by testing the unobserved error term of the OLS regression model for the assumptions of no multicollinearity in the independent variables. The variance inflation factors were used to determine no multicollinearity in the study.

The results for the study were tested at 1%, 5% and 10% levels of significance and presented in tables. Stata 13 was used in analyzing the panel data of the study.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

The chapter presents an analysis of the panel data for African banks. First, the study presents summary statistics of variables used in the study. The descriptive statistics examine the main characteristics of each variable by examining the average results of the variables and the standard deviation of the variable across the sample period.

Secondly, the study examine the impact of non-interest variables on bank risk and stability for African banks. The results provide an understanding of how non-interest income variables impact bank risk and stability for banks in Africa. Then on, the study shows the impact of non-interest income variables on bank risk for retail and investment banking activities for African banks.

Thirdly, results for the interaction between non-interest income variables and bank size are presented to examine their impacts on risk for banks in Africa. The study also examine impacts for how the interacted term between non-interest income variables and bank size, and how they impact on bank risk for retail and investment banking activities in Africa.

Finally, the results presented in this chapter are discussed with literature in order to examine findings that are consistent or inconsistent with empirical results in other contexts. The results and discussions of the panel analyses are presented in the ensuing paragraphs.

4.2 Description of Summary Statistics

The study provides a description of some key variables of the study. The results of the variable description has been presented in Table 4.2 below.

Table 4.2: Summary Description on Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
CTRY	1915				29
BANK	1915				383
LZSCORE	1674	3.303	1.306	-4.405	7.919
FCI	1589	0.674	2.186	-36.000	23.000
TI	919	0.358	1.252	-17.000	12.000
NNI	1670	1.302	4.228	-85.000	40.000
SIZE	1756	6.376	1.709	1.099	11.750
LIQ	1740	0.811	0.132	0.019	0.999
NII	1652	1.781	5.526	-85.000	140.000
CAR	1758	0.158	0.135	0.005	0.999
RAROA	1700	7.426	17.511	-28.461	358.535
LOAN/ASSET	1713	0.520	0.178	0.015	0.992

Source: Author's Analysis 2015, Bankscope Data.

The results indicate that a total of twenty-nine (29) African countries were featured in the study, with a total of three hundred and eighty-three (383) banks in Africa. Results for the main variables used in the study are as follows.

Bank risks, log of the Z-score (LZSCORE), reported an average of 3.30 for African banks, for an interval range of -4.40 and 7.92 (see Table 4.2). The results provide evidence to suggest that the solvency risks of African banks exhibit rises and falls at marginal level. The results indicate that while those with marginal increments exhibit lower risks, those with falling marginal Z-score values exhibit banks with higher volatility. The average result thus indicate that most African banks on average have reduced solvency risks as they have their Z-score increasing marginally at 3.30.

Fees and commissions' income (FCI) for African banks reported an average result of 0.67, whiles a higher boundary of 23 is reported (see Table 4.2). The results show relatively lower FCI for African banks. On the other hand, trading income (TI) for African banks reported an average of 0.36, with a higher bound limit of 12. Again, relatively lower average TI is included in the income portfolios of African banks.

Comparing the results of FCI and TI tot eh average total non-interest income (NNI) indicate that African banks include an average of 1.30 NNI in their income portfolio (see Table 4.2). The average results for trading income (TI) and fees and commissions' income (FCI) show that, African banks include more non-interest income from fees and commissions income (FCI) than it does for trading income (TI). Evidence also exists to show that fees and commissions' income (FCI) and trading income (TI) are not the only sources of non-interest income for African banks. This is because the difference between the sum of FCI and TI and the NNI show other non-interest incomes which are included in NNI. However, information about such other sources were non-available for the conduct of this study.

Bank size (SIZE) in Africa reported an average of 6.37 from a higher bound of 11.75 (see Table 4.2). For the purpose of the study, banks were categorized in sizes as follows; first 35% (small-sized), above 36% to 65% (medium-sized) and above 65% (large sized). Given an average SIZE of 6.37, the result indicate relatively medium-sized banks in Africa, lie between 35% to 64% of the higher bound limit. The implication of the result show that the majority of African banks are small and medium-sized. Only few of the banks, however, are large.

The results for the ratio of earning assets to total assets of banks (LIQ), show that the asset of African banks is composed of about an average of 81% earning assets (see Table 4.2). The implication of the results show that most African banks hold more earning or income generating assets in their asset mix. The standard deviation of the LIQ was also very low at 0.14 indicating low variations in the average LIQ held by African banks.

The result for the interest income for African banks indicate that banks averaged included 1.78 NII in their income portfolio (see Table 4.2). An examination of the shares of interest and non-interest income reveal that average net total interest income (NII) was seen to be higher than average total net non-interest income (NNI) for African Banks. There was a 0.48 difference between total interest income (NII) and total non-interest income (NNI). Thus, it thus indicate that most African banks generate more earnings from their interest earning portfolios that from their non-interest earning activities, on average.

The results of the capital ratio (CAR) of African banks show that banks on average used about 16% of equity to finance its assets (see Table 4.2). A scatter of the capital ratio for African banks shows that the majority of African banks used less proportions of equity in finance bank assets.

The result of the CAR is mostly driven by the respective regulations in the country. This accounts for the low standard deviation of the CAR. The decision to finance assets with equity is much more regulated than left to the whims of banks. The results show evidence to suggest that very large proportions of debts are used in financing the assets of African banks.

Profitability (RAROA) for African banks reported an average earnings of 7.43 from its total income portfolio (see Table 4.2). The result reveal a high standard deviation of 17.51, indicating the volatile nature of bank earnings from both its interest and non-interest earning portfolios. The results thus indicate from a higher boundary of 358.54 that banks have high earnings and high volatility of those earnings.

Finally, in determining the prevalence of earnings from the loan portfolio and other portfolios of African banks, the study examine results for the proportion of loan-to-assets (LOANASS) of African banks. The result of the study indicate that African banks on average generate 52% of loans to customers from their assets (see Table 4.1). The result suggest that most African banks on average issue more loans from their assets, indicating that earnings generation from the loan portfolio of banks is an average practice. This thus indicate the mix of earnings generation activities of African banks.

4.3 Testing Assumptions of the Multiple Linear Regression Model

The study begin by testing the assumptions of the multiple linear regression model, to ensure unbiased and robust estimates. The study tests the assumptions of normality, homoskedasticity and no autocorrelation of the error term. The assumption of no multicollinearity in the explanatory

variables was also examined. The results of the diagnostics of the multiple linear regression model have been presented in the following paragraphs.

4.3.1 Testing for No Multicollinearity of the Explanatory Variables

Multicollinearity was identified by observing strong correlation, correlation coefficient of 50% and above, between the explanatory variables. The correlational matrix is used to determine strong correlation in the explanatory variables, as presented below (see Table 4.3.1).

Table 4.3.1: Correlational Matrix of Explanatory Variables

	SIZE	LIQ	CAR	NII	RAROA
SIZE	1				
LIQ	0.2009	1			
CAR	-0.2861	-0.2458	1		
NII	0.019	0.0706	-0.0277	1	
RAROA	0.1069	0.0458	-0.0575	-0.001	1

Source: Author's Analysis 2015, Bankscope Data.

The result of the correlational matrix indicate no strong correlation between the explanatory variables. The results show weak relationships, coefficients below 50%, between the explanatory variables (see Table 4.3.1). The results thus indicate the presence of no multicollinearity in the explanatory variables. The lack of multicollinearity in the explanatory variables indicate that the standard errors of the coefficients are not inflated and the estimates are not biased.

4.3.2 Testing for Homoskedasticity in Error Term

The assumption of homoskedasticity was tested for the error term of the multiple linear regression model was tested using the Breusch-Pagan / Cook-Weisberg test for heteroscedasticity. The test was conducted under the null hypothesis of "homoskedasticity". The result of the homoskedasticity for the three multiple linear regression models have been presented below (see Table 4.3.2).

Table 4.3.2 Breusch-Pagan / Cook-Weisberg Test for Heteroscedasticity

Ho: Constant variance **Variables: fitted values of LZSCORE**			
	Model 1	**Model 2**	**Model 3**
chi2(1)	439.65	183.86	382.31
Prob > chi2	0.0000***	0.0000***	0.0000***

Significant levels at 10%*, 5%** & 1%***
Source: Author's Analysis 2015, Bankscope Data.

The result of the study indicate the presence of heteroscedasticity in the multiple linear regression models. The result indicate that for all three multiple linear regression models, the null hypothesis of homoskedasticity was rejected, thus a retention of the alternate hypothesis of heteroscedasticity (see Table 4.3.2).

4.3.3 Testing for No Autocorrelation in Error Term

The assumption of no autocorrelation in the error term was tested using the Wooldridge test for autocorrelation. The assumption was tested under the null hypothesis of "no first order autocorrelation". The result of the Wooldridge test for autocorrelation is presented below (see Table 4.3.3).

Table 4.3.3: Wooldridge Test for Autocorrelation

H_0: No First Order Autocorrelation			
Models	**d.f**	**F-Statistic**	**Prob > F**
Model 1	F (1, 308)	133.857	0.0000***
Model 2	F (1, 175)	91.311	0.0000***
Model 3	F (1, 325)	147.970	0.0000***

Significant levels at 10%*, 5%** & 1%***
Source: Author's Analysis 2015, Bankscope Data.

The result of the Wooldridge test indicates that the null hypothesis of no autocorrelation was rejected, and the alternate hypothesis of autocorrelation was retained by the study (see Table 4.3.3). The results show the presence of autocorrelation in the regression model.

The presence of autocorrelation and heteroscedasticity suggests that the results from the model would be biased. Thus, to correct for biasedness as a result of autocorrelation and heteroscedasticity, the study used the OLS regression with Newey–West standard errors to provide robust estimates in the presence of autocorrelation and heteroscedasticity.

4.4 Non-Interest Income and Risk for African Banks

This section presents results for the impact of various shares for non-interest income; fees and commissions' income (FCI), trading income (TI) and total net non-interest income (NNI) on risk (LZSCORE) for African banks. The results have been presented in the paragraphs below (see Table 4.3).

Table 4.3: Impact of Non-Interest Income on Risk for African Banks

	LZSCORE	LZSCORE	LZSCORE
FCI	-0.003		
	(0.13)		
TI		-0.030	
		(0.52)	
NNI			-0.011
			(0.79)
SIZE	0.187	0.174	0.180
	(10.13)***	(7.63)***	(9.87)***
LIQ	1.452	1.283	1.412
	(5.58)***	(3.53)***	(5.53)***
CAR	2.006	3.527	1.894
	(6.91)***	(5.74)***	(6.84)***
NII	0.014	0.018	0.020
	(1.44)	(1.24)	(1.48)
RAROA	0.038	0.046	0.037
	(5.38)***	(5.32)***	(5.75)***
_CONS	0.278	0.239	0.386
	(1.06)	(0.68)	(1.51)
R^2	0.38	0.41	0.37
N	1,511	874	1,574

Coefficients & Standard Errors (in parenthesis)

Significant levels at 10%*, 5%** & 1%***

LZSCORE= ratio of return on asset and capital ratio to standard deviation of return on assets FCI= ratio of fees and commissions' income to total operating income TI= ratio of trading income to total operating income NNI= ratio of total non-interest income to total operating income SIZE = natural log of total assets LIQ= ratio of earning assets to total assets NII= ratio of total interest income to total operating income CAR= ratio of equity to total assets RAROA= ratio of return on assets to standard deviation of return on assets

Source: Author's Analysis 2015, Bankscope Data.

The results of the study indicate that fees and commissions' income (FCI), trading income (TI) and total net non-interest income (NNI) have a negative but insignificant relationship with bank instability risks in Africa (see Table 4.4). The result indicate that increasing earnings from fees and commissions', trading and other non-interest earning activities increases the risk that banks will fail (LZSCORE). The study found that banks that earn from the various shares of non-interest income earning activities increases risk for African banks, however, at insignificant levels.

The study find evidence to show that the size of a bank (SIZE) matters in increasing the stability of banks in Africa (see Table 4.4). The result suggest that increasing the size of the bank makes banks more stable and reduced risks for African banks. The results indicate that large banks have incentives to expose themselves to high risks from diversifying into non-interest income sources in Africa. The study shows that the size of a bank significantly reduces risk for banks that earn from fees and commission, trading and total non-interest income. Thus, the evidence seem to suggest that the size of a bank is important to reduce risks for banks that earn from non-interest earning activities in Africa.

The ratio of earning assets to total assets (LIQ) showed a positive relationship with bank risks for African banks (see Table 4.4). The result indicate that increasing the liquidity of banks reduce risks for banks. The implication is that banks that hold larger proportions of that assets as earning assets significantly reduces risk and increases stability of African banks. The study suggest that banks that earn from non-interest income sources must hold larger proportions of liquid assets as part of their asset base, in order to be more stable and reduce risks.

Again, the study show that capital ratio (CAR) has a positive relationship with insolvency risks (LZSCORE) (see Table 4.4). The result suggest that increasing the CAR of banks reduces risk and

makes African banks more stable. The implication of the result is that African banks have to increase the financing of their assets using equity capital in order to reduce risks and remain stable. According to Porter (2009), banks increase risks in order to increase their earnings on capital. Hovakimian and Kane (2000) also indicate that highly levered banks have the incentive transfer or shift their risk to customers than lowly levered banks. The implication of their results is that lowly capitalized banks transfer or shift their risk to customers in forms such as high transaction costs.

The results show that interest income (NII) reduce bank risk and makes banks more stable in Africa (see Table 4.4). The result found a positive but insignificant relationship between interest income and bank risks, for banks that diversify their earnings portfolio to include fees and commissions' income, trading income and other non-interest income. The result suggest that earning from the loan portfolio of banks, as well as non-interest income sources, exposes banks to less risks. The results however indicate that earning both interest and non-interest income is insignificant in explaining risk reduction for African banks.

Finally, the study found positive relationships between profitability (RAROA) and bank stability risk in Africa (see Table 4.4). The study suggest that the overall income portfolio of banks, sourced from both interest and non-interest activities, significantly reduces risk for African banks. The study suggest that diversifying the income portfolio of banks reduces risks. The implication of the result is that earning from interest and non-interest activities

4.5 Non-Interest Income and Bank Risk foe Retail and Investment Banking Activities

The study present results for banks that undertake retail and investment banking activities, following Kohler (2014). The study examine the assertion that diversifying into non-interest earning activities have different impacts on risks, for banks that undertake retail and investment banking activities. The results have been presented in the paragraphs below (see Table 4.5).

Table 4.4: Impact of Non-Interest income on Risks for Retail and Investment Activities

	RETAIL ACTIVITIES			INVESTMENT ACTIVITIES		
	LZSCORE	**LZSCORE**	**LZSCORE**	**LZSCORE**	**LZSCORE**	**LZSCORE**
FCI	-0.005			0.049		
	(0.23)			(0.83)		
TI		0.051			-0.009	
		(0.46)			(0.12)	
NNI			-0.009			0.004
			(0.68)			(0.11)
SIZE	0.193	0.146	0.190	0.204	0.223	0.177
	(8.23)***	(5.52)***	(8.31)***	(7.15)***	(5.27)***	(6.02)***
LIQ	1.964	2.539	1.957	0.921	0.168	0.856
	(5.47)***	(4.02)***	(5.60)***	(2.22)**	(0.35)	(2.07)**
CAR	1.427	2.611	1.429	3.640	4.165	2.980
	(4.52)***	(4.16)***	(4.60)***	(5.75)***	(3.94)***	(5.11)***
NII	0.012	0.005	0.016	0.011	0.018	0.025
	(1.27)	(0.21)	(1.21)	(0.37)	(0.71)	(0.76)
RAROA	0.032	0.037	0.031	0.056	0.086	0.057
	(4.52)***	(5.20)***	(5.00)***	(4.68)***	(7.16)***	(4.64)***
_CONS	-0.001	-0.387	0.037	0.148	0.391	0.462
	(0.00)	(0.70)	(0.10)	(0.38)	(0.75)	(1.20)
R^2	0.39	0.43	0.39	0.42	0.50	0.40
N	860	489	891	642	377	672

Coefficients & Standard Errors (in parenthesis)

Significant levels at 10%*, 5%** & 1%***

LZSCORE= ratio of return on asset and capital ratio to standard deviation of return on assets FCI= ratio of fees and commissions' income to total operating income TI= ratio of trading income to total operating income NNI= ratio of total non-interest income to total operating income SIZE = natural log of total assets LIQ= ratio of earning assets to total assets NII= ratio of total interest income to total operating income CAR= ratio of equity to total assets RAROA= ratio of return on assets to standard deviation of return on assets

Source: Author's Analysis 2015, Bankscope Data.

The result indicate that fees and commissions income (FCI) and total non-interest income (NNI) have a negative relationship with bank risks, for retail-oriented banks (see Table 4.5). The result suggest that diversifying into FCI and other non-interest income variables increases risk and reduces the stability of retail-oriented banks, at insignificant levels. Trading income (TI) was directly related with stability or solvency risk for retail-oriented banks suggesting that diversifying into TI makes banks stable and reduces the chance that retail-oriented banks will fail (see Table 4.5). The implication is that retail banking activities provide much more stable funding for trading activities, thus diversifying into trading activities reduces the chance that bank might fail, but at insignificant levels. Thus, the results suggest that retail banks should diversify into trading activities (TI) in order to remain stable. Following Kohler (2013; 2014), it cannot be opined that retail-oriented banks must reduce the shares of retail and other non-interest earning activities in order to remain stable; and increase trading activities to become stable because non-interest income variables are insignificant in explaining bank risk for retail banking activities.

On the other hand, diversifying into fees and commissions' income (FCI), and total non-interest income (NNI) enhance the stability of investment-oriented banks, however, at insignificant levels (see Table 4.5). The result suggest that, we cannot deduce that investment-oriented banks may increase bank stability by diversifying into FCI and other non-interest income sources because FCI and NNI were insignificant with risks. On the other hand. Relationships suggest that increasing earnings from trading income (TI) increases risks and make banks more unstable. This is because trading activities (TI) are basically based on speculations. Again, the result does not provide justification to indicate, following Kohler (2013) that investment-oriented banks must increase their shares of FCI and NNI in order to be stable, because the impacts are insignificant. Going by relationships, the study is inconsistent with DeYoung and Torna (2013), who indicate that larger

shares of fee-based income significantly reduce the probability of bank failure bank for retail-oriented banks because it represents a larger share of non-interest income was consistent for African banks.

Further results indicate that, the large bank sizes (SIZE) significantly enhances bank stability for both retail and investment-oriented banks that diversify into fees and commissions' income, trading income and other non-interest earning activities (see Table 4.5). The overall implication is that large banks that are more retail or investment-oriented have risk reduction and banks stability advantages when they diversify into non-interest income generating activities. Small retail banks, on the other hand are prone to shocks and may deteriorate in stability when they diversifying into non-interest earning activities, for banks that are either retail or investment-oriented. Thus, larger bank sizes, irrespective of specialized banking activities are more stable and resilient to shocks when they increase non-interest income, because they have larger asset bases to buffer such shocks from diversifying.

The study also found that diversified banks that increase the share of earning assets (LIQ), significantly enhances their stability and ability to withstand shocks, for both retail-oriented and investment-oriented banks that diversify into non-interest income sources (see Table 4.5). The result suggest that having more liquid assets help banks to withstand liquidity shocks and become stable. According to Kohler (2014), investment-oriented banks, for instance, are more dependent on non-deposit funding thus hold larger stocks of liquid assets as a buffer against liquidity shocks. Again, literature notes that retail-oriented banks suffer less shocks from holding liquidity from core deposits to finance their loan portfolio because they are unlikely to be withdrawn prematurely (Song & Thakor, 2007).

The study further indicate that holding larger capital ratios (CAR) or being well-capitalized is significantly essential for risk reduction, for banks that diversify into non-interest earnings, for retail and investment-oriented banks (see Table 4.5). The result suggest that well-capitalized banks help both retail and investment-oriented banks to remain resilient to shocks and bank crisis, as they are able to offset shocks of their earning.

Results from the study indicate that increasing interest earnings (NII), for both retail and investment-oriented banks that have diversified into non-interest income sources, reduces risk and enhancing bank stability (see Table 4.5). The impacts was found to be insignificant implying that although increasing the shares of interest income reduces risk for banks that diversify into non-interest income, interest income does not explain risk reduction for both retail and investment banks that diversify into non-interest activities. Thus, the study cannot say that actual risk reduction exist for banks that diversify their earnings portfolio.

Finally, the result indicate that profitability (RAROA) on the income portfolios of both retail and investment-oriented banks were significant in reducing bank risks and enhancing the stability of banks (see Table 4.5). The implication is that earnings from a diversified income portfolio reduces risk and increases the stability of banks, for banks that are both retail and investment-oriented. Thus, the income portfolio of African banks are more stable and resilient to shocks when banks diversify their earnings into interest and non-interest income, for banks that undertake retail and investment activities.

4.6 Interacting Non-Interest Income Variables with Bank Size

The study examined that assertion that non-interest income variables present different impacts on bank risk when interacted with bank size, following Hidayat et al. (2012). The study examine is presented in the paragraphs below (see Table 4.6).

Table 4.6: Impact of Interacting Non-Interest Income and Bank Size on Risks in Africa

	LZSCORE	LZSCORE	LZSCORE
FCI	0.143		
	(1.85)*		
FCI*SIZE	-0.021		
	(1.92)*		
TI		0.236	
		(2.04)**	
TI*SIZE		-0.046	
		(2.02)**	
NNI			0.043
			(0.84)
NNI*SIZE			-0.007
			(1.14)
SIZE	0.202	0.189	0.189
	(9.88)***	(7.80)***	(9.20)***
LIQ	1.411	1.226	1.397
	(5.44)***	(3.37)***	(5.48)***
CAR	2.027	3.560	1.905
	(6.99)***	(5.79)***	(6.79)***
NII	0.020	0.033	0.022
	(1.62)	(1.59)	(1.56)
RAROA	0.038	0.046	0.037
	(5.38)***	(5.30)***	(5.75)***
_CONS	0.195	0.158	0.320
	(0.74)	(0.45)	(1.20)
R^2	0.38	0.42	0.37
N	1,511	874	1,574

Coefficients & Standard Errors (in parenthesis)

Significant levels at 10%*, 5%** & 1%***

LZSCORE= ratio of return on asset and capital ratio to standard deviation of return on assets FCI= ratio of fees and commissions' income to total operating income TI= ratio of trading income to total operating income NNI= ratio of total non-interest income to total operating income SIZE = natural log of total assets LIQ= ratio of earning assets to total assets NII= ratio of total interest income to total operating income CAR= ratio of equity to total assets RAROA= ratio of return on assets to standard deviation of return on assets

Source: Author's Analysis 2015, Bankscope Data.

The result indicate that fees and commissions income (FCI) and trading income (TI) and total non-interest income (NNI); as well as bank size (SIZE) have positive relationship with risk for African banks (see Table 4.6). The results suggest that increasing earnings by larger banks that diversify into FCI, TI and other NNI reduces risk. However only FCI and TI significantly reduces risks for banks that have larger assets and diversify into non-interest income sources.

Thus, when FCI and TI are interacted with bank size, the study find that banks become more risky and more unstable. The implication is that larger banks must reduce earnings from non-interest income sources in order to reduce risk and become stable. Similar result was found for NNI, but at insignificant levels, suggesting that other non-interest earning activities are not significant in impacting risks, in the face of the size of a bank. The result seem to suggest that smaller banks may be able to increase their earnings from non-interest income sources than larger banks because larger banks may become more unstable when their assets are depleted from shocks of excessive risk taking. Thus, lager banks must reduce earnings from non-interest earning sources in order to become stable, smaller banks on the other hand may increase earnings from non-interest income sources in order to become more stable.

Results for the other control variables indicate that liquidity, capital ratio and profitability reduces the risk of African banks (see Table 4.6). The result suggest that African banks with more liquid assets, well-capitalized and increases income from both interest and non-interest sources, are more stable and resilient to shocks from taking risks.

4.7 Interacting Non-Interest Income with Bank Size for Retail and Investment Activities

The study examine the impact of non-interest income variables on risk, when interacted with bank size for retail and investment banking activities in Africa. The results of the data analysis has been presented in the paragraph below (see Table 4.7).

Table 4.7: Interacted Non-Interest Income and Size for Retail and Investment Activities

	RETAIL ACTIVITIES			INVESTMENT ACTIVITIES		
	LZSCORE	LZSCORE	LZSCORE	LZSCORE	LZSCORE	LZSCORE
FCI	0.153			0.098		
	(1.48)			(1.06)		
FCI*SIZE	-0.023			-0.009		
	(1.53)			(0.52)		
TI		0.413			0.644	
		(1.69)*			(3.50)***	
TI*SIZE		-0.051			-0.129	
		(1.42)			(3.75)***	
NNI			0.059			-0.005
			(0.96)			(0.05)
NNI*SIZE			-0.009			0.001
			(1.15)			(0.09)
SIZE	0.211	0.161	0.201	0.209	0.257	0.175
	(7.88)***	(5.47)***	(7.82)***	(7.07)***	(5.87)***	(4.78)***
LIQ	1.898	2.490	1.933	0.917	-0.001	0.857
	(5.34)***	(3.98)***	(5.59)***	(2.22)**	(0.00)	(2.07)**
CAR	1.448	2.729	1.429	3.641	4.157	2.978
	(4.60)***	(4.33)***	(4.54)***	(5.76)***	(3.96)***	(5.08)***
NII	0.018	0.013	0.019	0.017	0.059	0.026
	(1.40)	(0.46)	(1.28)	(0.47)	(2.81)***	(0.76)
RAROA	0.032	0.037	0.031	0.056	0.086	0.057
	(4.53)***	(5.19)***	(5.00)***	(4.67)***	(7.23)***	(4.64)***
_CONS	-0.086	-0.486	-0.038	0.119	0.290	0.473
	(0.23)	(0.88)	(0.10)	(0.30)	(0.56)	(1.15)
R^2	0.39	0.44	0.39	0.42	0.52	0.40
N	860	489	891	642	377	672

Coefficients & Standard Errors (in parenthesis)

Significant levels at 10%*, 5%** & 1%***

LZSCORE= ratio of return on asset and capital ratio to standard deviation of return on assets FCI= ratio of fees and commissions' income to total operating income TI= ratio of trading income to total operating income NNI= ratio of total non-interest income to total operating income SIZE = natural log of total assets LIQ= ratio of earning assets to total assets NII= ratio of total interest income to total operating income CAR= ratio of equity to total assets RAROA= ratio of return on assets to standard deviation of return on assets

Source: Author's Analysis 2015, Bankscope Data.

The result found the directional relationship between non-interest income variables (FCI, TI & NNI) and risk (LZSCORE) reduces risk and enhances the stability of African banks; in the case of both retail and investment banking activities. Bank size was also found to significantly reduce risks for significant in enhancing bank stability. The result suggest that diversifying into non-interest earning activities alone reduces risks; as well as increasing banks that increase their asset base also reduce risks.

On the other hand, when non-interest income variables interact with banks size, they were found to increase risk and make banks more stable, for both retail and investment banking activities. The result suggest that diversifying into non-interest income while increasing the size of the banks increases bank risk and make banks less stable and prone to failure. The result only found that banks that diversify into trading activities while increasing the size of the bank significantly increases their risks, mostly because speculation-based earnings from trading activities puts the assets of banks in precarious positions and may increase the chances that banks may fail. The result suggest that the chances of failure for investment activities is greater than for retail activities. On the other hand, FCI and NNI were insignificant with bank risks implying that they are not important in explaining risk reduction for banks that undertake retail of investment banking activities.

The implication is that larger banks, whether retail or investment-oriented, must significantly reduce earnings from trading activities in order to reduce risks and enhance their stability; while smaller banks may increase earnings from non-interest income sources in order to remain stable.

The result seem to provide evidence that the investment banking model influence result for the interaction term on earnings volatility for African banks.

Results for earnings generation from interest income (NII) suggests that investment banks that diversify into trading income (TI) reduce risks and remain stable. Thus, the results suggest that investment-oriented banks reduce their risk when they earn from both interest and trading activities usually because core deposits from interest earning activities provide a much more stable source of funding for investment activities, thus reduces their risk.

Results for the other control variables indicate that diversifying into non-interest income sources while increasing liquid assets, equity capital and profitability makes African banks more stable, whether undertaking retail or investment activities.

4.8 Discussion of Results

Findings for how non-interest income impact risks indicate that non-interest income does not significantly increase risks for African banks. The findings provide evidence to show that non-interest income variables does not significantly increase banks risks, as reported by empirical studies (DeYoung & Roland, 2001; Stiroh, 2006; De Jonghe, 2008). The results imply that African banks that increase earnings from the shares of non-interest income do not significantly increase risks.

On the other hand, when non-interest income variables interacted with the size of the bank, non-interest income increases the risk and instability of African banks. The findings concur with results found by Hidayat et al. (2012) for Indonesia. According to the results, as banks grow in size, they become more income of aggressive in their risk exposure, from earning from non-interest income. The results imply that large banks that increase earnings from fees and commissions and trading activities significantly increase bank risks and instability. The implication is that large banks must

reduce earnings from their non-interest in order to reduce risks and become more stable. Smaller banks on the other hand may not have a lot of assets or liquidity to increase earnings from non-interest income, thus smaller banks can reduce risk and become more stable.

When non-interest income is examined along the lines of retail and investment banking activities, results indicate that increasing fees and commissions and other non-interest income increases risk for retail banking activities, while trading income reduces risks. However, the results were not significant suggesting that fees and commissions income and other non-interest income does not influence risk for retail banks. In the case of investment banking activities, fees and commissions income and other non-interest income reduces risk while trading income increases risk, but at insignificant levels. The results was found to be inconsistent with findings by Kohler (2014) who report that the impact of fee income on the Z-score differs between retail- and investment-oriented banks. The results of the study does not support findings by Kohler (2014) for Europe, who argued that retail banks reduce risk by increasing earnings from non-interest income activities, while investment banks must reduce the shares of non-interest income in order to reduce risk. No evidence exist to support findings of Kohler (2014).

On the other hand, when non-interest income variables are interacted with the size of a bank, we find that only trading income significantly increase risks for both retail and investment banks in activities. Thus, the impacts are greater for investment-oriented than for retail-oriented banks because earnings for trading income is based on speculations, thus increasing investment activities further increases risks for banks. The results indicate that banks must reduce their shares of trading income in both retail and investment activities, in order to reduce risk. The findings seem inconsistent with Kohler (2014) who suggest that banks that undertake investment activities must increase earnings from non-interest income activities in order to reduce risk and become stable,

while retail-oriented banks must reduce earnings from non-interest income in order to become more stable.

Findings for the control variables indicate that the size of a bank matter in increasing the stability of African banks, and for banks that increase earnings from retail or investment activities. The results seem to show that banks that are bigger in size have more assets are able to withstand shocks from risk taking. Again, results for banks that earn from non-interest activities in relation to their size, found that the size of a bank serves as an incentive to excessively increase risk by increasing earnings from non-interest sources, Following Shehzad, Scholtens and De Haan (2008). On the whole, while the size of a bank's asset may be an advantage to buffer shocks from risk taking, it also serves as an incentive to increase risk from earning from non-interest sources.

Findings for bank liquidity indicates that banks that hold more earning assets as a proportion of their assets reduce risks for African banks. The study suggest that holding more liquid assets reduces risk by reducing unreliable funding for non-interest activities. Literature notes that wholesale funding are usually withdrawn prematurely and increases bank risks (Lepetit et al., 2012; Kohler, 2014). Lepetit et al. (2012) show that investment banks usually hold more liquidity than retail banks because of the unreliable nature of their funding, in order to withstand liquidity shocks. Kohler (2014) explain that investment banks are more dependent on non-deposit funding thus must hold larger stocks of liquid assets as a buffer against liquidity shocks. The assertions by Lepetit et al. (2012) and Kohler (2014) are consistent for African banks that increase earnings from retail and investment activities. The study thus find evidence of reduced risk and stability from increasing a bank's liquidity.

Findings for interest income indicate that while it reduces risks, no significant relationship exist between interest income and risk, for banks that also earn from non-interest activities. Evidence exist to show that interest income significantly reduce risk for investment-oriented banks that also earn from trading activities. Evidence exist to suggest that investment-oriented banks must increase earnings from trading activities in order to reduce risk and become stable. The implication is that investment-oriented banks must increase earnings from interest sources in order to reduce risk, following Kohler (2014) for German banks. Increasing interest income does not significantly reduce risk for retail banks in Africa. The results were found inconsistent with findings by Kohler (2014) for German banks, who maintain that retail banks must reduce earnings from interest activities in order to reduce risk.

Furthermore, the result show that capital ratio significantly reduces risk, suggesting that increasing the shares of equity in the capital structure of a bank reduces risk and increases the stability of banks, even for banks that undertake either retail or investment activities. According to Hovakimian and Kane (2000), highly levered banks have the incentive to transfer or shift their risk to customers than lowly levered banks. The result found contrary findings, which suggest that well-capitalized banks better with stand shocks from risk, including bankruptcy costs, which makes banks more stable and resilient to shocks. The result suggest that highly capitalized banks can usually absorb the shocks or risks from diversifying into non-interest sources, than transferring or shifting them to customers as opined by Hovakimian and Kane (2000). The result thus deny the moral hazard problem in banking which suggests that regulators allow well-capitalized banks to make riskier loans without paying higher interest on deposits, thus allowing well-capitalized banks to increase their risks excessively (Bhattacharya & Thakor, 1993; Berger et al, 1994).

Finally, the results for risk-adjusted profits of banks indicate that banks make sufficient earnings to compensate for the risk they incur from earning from non-interest sources, thus reducing the risk that banks make significantly. The results are inconsistent with DeYoung and Roland (2001) who maintain that increased reliance on non-interest income increases volatility of profits without an increase in average profits. Demirgüç-kunt and Huizinga (2010) also reported that income generated from non-interest is very risky and reduces the overall bank performance. The results thus provide contrary result to these studies, but concur with Saunders and Walter (1994) and Kwan and Laderman (1999) who found that profits earned from a diversified bank portfolio reduce risk.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction to Chapter

The chapter provides a summary of the results presented and discussions of the findings in the study. The chapter also provides a conclusion, stemming from the main findings and discussions of the study. Finally, the study provide key recommendations stemming from the key findings of the study. The study propose recommendations related with policy, practice and further academic research.

5.2 Summary of Findings

The study examined how non-interest income made banks more risky, for the retail and the investment banking activities in Africa. Owing to that, the study examined how various shares of non-interest income; fees and commissions, trading income and total non-interest income variables; influenced bank risk and stability of banks in Africa. The study further examined how diversifying into various shares of non-interest activities, by banks that engaged in retail and investment activities, made banks more risky. Finally, the study also examined whether the size of a bank interacts with non-interest income variables to influence bank risk and stability for African banks; and banks that are retail or investment-oriented.

The study used financial information obtained from the Bankscope database from 2008 to 2012. The study used OLS regression model with Newey–West standard errors, robust for

heteroskedascity and autocorrelation, to examine how the non-interest income variables influences overall risks and stability of African banks. The study tested how the shares of non-interest income variables; fees and commissions income (FCI), trading income (TI) and total net non-interest income (NNI) influenced bank stability risk (LZSCORE).

The findings of the study indicate that no significant relationship exist between fees and commissions' income, trading income and total non-interest income, and bank risk. The results imply that African banks that increase earnings from the shares of non-interest income do not significantly make banks more risky. The result was similar for banks that were retail and investment-oriented in Africa, for the sample period.

However, when non-interest income interact with the size of a bank, the findings show that as banks grow in size, they become more aggressive in their earnings and increase risk exposure from earning from non-interest income. The findings show that large banks must reduce earnings from non-interest activities, fees and commissions' income and trading income, in order to reduce risks and become more stable. Smaller banks on the other hand may not have a lot of assets to increase earnings from non-interest income, thus smaller banks can reduce risk and become more stable from increasing earnings from non-interest income.

Findings for the interaction between non-interest income variables and banks size, along retail and investment activities indicate that trading income significantly increase risks and makes banks unstable for both retail and investment banks in activities because earnings for trading income is based on speculations and highly volatile.

Findings for control variables for risk indicate that the size of a bank matter in increasing the stability of African banks, and for banks that increase earnings from retail or investment activities.

The findings show that while the size of a bank's asset may be an advantage to buffer shocks from risk taking, it also serves as an incentive to increase risk from earning from non-interest sources.

The findings further indicate that holding more liquid assets reduces risk by reducing unreliable funding for non-interest activities, usually because wholesale funding are usually withdrawn prematurely and increases bank risks, especially for investment-oriented banks, consistent with empirical findings.

Again, the findings of the study indicate that no significant relationship exist between interest income and risk, for banks that also earn from non-interest activities. Evidence only exist to show that interest income significantly reduce risk, for investment-oriented banks that also earn from trading activities. Thus, investment-oriented banks must increase earnings from trading activities in order to reduce risk and become stable, consistent with empirical results for Germany.

Furthermore, the findings showed that capital ratio significantly reduces risk for African banks implying that well-capitalized banks better withstand shocks from risk, including bankruptcy costs, which makes banks more stable and resilient to shocks. The finding show that highly capitalized African banks can absorb the shocks or risks from diversifying into non-interest sources, than transferring or shifting them to customers as opined by empirical results.

Finally, the findings of the study indicate that banks make sufficient earnings to compensate for the risk they incur from earning from non-interest sources, thus reducing the risk that banks make significantly. The findings were found to be inconsistent with findings that report no significant compensation in earnings, from diversifying into non-interest income sources.

5.3 Conclusion

The study used financial information of 383 African banks to draw conclusions based on robust results using the Newey–West standard errors of the OLS regression model. The robustness of the regression model makes the conclusions drawn from the result more representative of African banks.

The study conclude that the size of a bank matter in diversifying into non-interest activities. Thus, larger banks will increase their risks become more unstable from diversifying into fees and commissions' income and trading income because the size of a bank's assets provide an incentive to increase earnings from non-interest sources. On the other hand, smaller banks may become more stable from diversifying into fees and commissions' income and trading income. On the other hand, the study found that trading income makes banks more risky and makes banks more unstable, for both retail and investment banking activities in Africa. The findings from the study suggest that investment-oriented banks must reduce earnings from trading income further than retail-oriented banks, in order to become more stable and resilient to shocks.

The findings can however limited to fees and commissions' income and trading income. The product range of non-interest activities span beyond fees and commissions' income and trading income, to include insurance income, forex income, among others. However, due to unavailability of data for other non-interest activities, the results can only be generalized for fees and commissions' income and trading income, which also seem to represent most of the earnings from non-interest sources.

On the whole, the study found evidence to suggest that banks that diversify into non-interest activities, taking into consideration the size of their asset, make banks more risky and increases the instability of the bank.

5.4 Recommendations

The findings of the study direct recommendations to address policy, business practices and academic research for how non-interest income influences bank risk.

For policy recommendations, the study propose that restrictions are imposed on the limits of earnings from non-interest income sources. Given that literature points out that regulators do not impose capital requirements on non-interest income, earning from non-interest income sources seem to have no limits and restrictions, although it has been seen to make banks more risky. Again, regulators also do not require banks to hold reserves on non-interest income but on interest generated from customers' deposits. There seem to be no focus on the regulation of non-interest activities. One way that regulators could impose restrictions on the level of non-interest activities is to direct banks to increase their reserves with the central banks when their earnings from non-interest activities crosses a threshold which could make banks unstable. This recommendation is made because banks must hold sufficient reserves to buffer shocks from earnings from non-interest activities. An increment in bank reserves with their central banks seem a viable strategy and has the effects of bringing relief to distressed banks and reduce bankruptcy costs, as a result of their risk taking activities from non-interest earnings. Again, regulators can also cause banks to increase their capital requirement beyond the minimum threshold, for large banks that earn non-interest income beyond a threshold that could make banks unstable. The study found large banks be more risky and unstable from increasing earnings from non-interest sources. This recommendation also stems from the findings that well-capitalized banks may withstand shocks and become more stable. Thus, a directive of regulators to large banks especially, will help safeguard large banks that have the resources to increase their risk exposure from non-interest income.

For sustainable business practices, banks are advised to design new products for their retail activities, while enhancing opportunities for generating fees and commissions income as well, in order to diversify. However, caution must be taken not to increase the fixed assets of banks in order to increase the size of banks. The study found evidence to show that large sizes increases the risks and instability of African banks. Thus, banks should diversify into products that are related with their current assets, in order to keep their risk appetite very low. Banks should however focus on increasing earnings assets, as it helps to reduces liquidity shocks of banks. Thus, while banks aim to increase their product ranges, the set up cost or the fixed assets should be based on existing assets but focus should be placed on increasing earning assets which provides sufficient liquidity to which stand shocks. Increasing earning assets also helps banks, especially investment-oriented banks, to have access to a more stable source of funding other than the wholesale and other short-term non-deposit funding that are prone to premature terminations. Increasing earning assets means making banks' source of funding more reliable and less volatile to.

Finally, the study recommend further academic studies by increasing the shares of the non-interest income, if possible. Given that the range of non-interest activities in Africa is very wide, the study was limited by information for the wide range of non-interest income activities. This would help to individually examine how each share of non-interest income influences risk for African banks. Again, further research is recommended to examine results for different countries in the different regional blocks. The recommendation is made following that there could be unique characteristics and some heterogeneous characteristics that are common to countries in each regional blocks. This is significant as it would help in designing policy directives aimed at addressing risk exposure from non-interest activities and the design of range of products relevant in reducing instability risks for African countries.

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APPENDICES

Appendix 1: Number of Banks According to Regional Blocks

	All	Central	Eastern	Northern	Southern	Western
Countries	29	2	9	5	4	9
Banks	383	20	136	94	52	81
Obs	1915	100	680	470	260	405

Source: Author's Compilation of Bankscope Data, 2015.

The data provides a geographical distribution of banks sampled from African countries. For the purpose of the study, the blocks were geographically divided into Middle or Central African countries, Eastern Africa, Northern Africa, Southern Africa and Western Africa, consistent with UN geographical classifications.

The study observed that Eastern Africa presented the most number of banks for the study. The Eastern African block was followed by the Northern block which also presented the next highest number of banks and general observations. The result is followed by Western, Southern and finally Central African Banks respectively.

In terms of country representations from the geographic blocks, it was observed that at an average country participation of 5.8, eastern and western African countries provided the most number of data from nine (9) countries in the geographical location respectively. The rest in the northern, southern and central geographical classifications were represented 5, 4 and 2 countries respectively. The participation rates of countries does not impose significant effects on the data, as banking activities are largely homogenously retail or investment related. And the study does not seek to analyze country effects but to provide an aggregate view of the phenomenon.

Appendix 2: Number of Banks in Each Country

A distribution of all the banks used in the study, from their various countries have been presented below. From the list provided, Zimbabwe was eliminated from the sample because it only had one bank with the available data, which was highly unrepresentative of the country.

African Block/ Country	Number of Banks
Northern Africa	
Algeria	17
Egypt	30
Morocco	16
Sudan	12
Tunisia	19
Central Africa	
Angola	14
Cameroon	6
Eastern Africa	
Ethiopia	9
Kenya	31
Malawi	10
Mauritius	14
Mozambique	11
Rwanda	6
Tanzania	22
Uganda	16
Zambia	17
Southern Africa	
Botswana	9
Namibia	12
South Africa	26
Swaziland	5
Zimbabwe (eliminated from the list)	1*
Western Africa	
Benin	5
Burkina Faso	8
Cote d'Ivoire	8
Ghana	21
Mali	7
Mauritania	7
Nigeria	9
Senegal	10
Sierra Leone	6

Source: Author's Compilation of Bankscope Data, 2015.

Appendix 3: Retail and Investment Banking Activities in Africa

	Banking Activities		Retail		Investment	
Variable	**Obs**	**Max**	**Obs**	**Max**	**Obs**	**Max**
Countries	1915	29	1166	29	738	29
Banks	1915	383	1166	383	738	383

Source: Author's Compilation of Bankscope Data, 2015.

The data observations for African banks were classified under retail and investment banking activities. Following the definitions, retail banking activities are those banks that earn fifty percent and more from their loan portfolios. Thus, banks that have a ratio of loan to assets greater than 50%. On the other hand, banks that undertake investment banking activities earn less from their loan portfolios and increase earnings from other sources. As a result, banks that had a loan to asset ratio of less than 50% were considered investment activities.

It is important to note that banks were be either focused on retail or investment activities at different times, in the course of their operation, due to the universal banking license which allows the easy switch in banking activities. The distribution of retail and investment activities in Africa indicates that retail activities far outweigh investment activities. It is however to be noted that investment activities are significant activities undertaken by African banks.

Appendix 4: Correlation Matrix for All Banks, Retail and Investment Banks in Africa

	ALL BANKS				RETAIL ACTIVITIES				INVESTMENT ACTIVITIES			
	NII	**FCI**	**TI**	**NNI**	**NII**	**FCI**	**TI**	**NNI**	**NII**	**FCI**	**TI**	**NNI**
NII	1				1				1			
FCI	0.86	1			0.85	1			0.94	1		
TI	0.79	0.68	1		0.85	0.72	1		0.72	0.69	1	
NNI	0.89	0.91	0.80	1	0.92	0.93	0.86	1	0.79	0.83	0.77	1

FCI= ratio of fees and commissions' income to total operating income **TI**= ratio of trading income to total operating income **NNI**= ratio of total non-interest income to total operating income **NII**= ratio of total interest income to total operating income

Source: Author's Compilation of Bankscope Data, 2015.

An examination of the relationships between interest and non-interest income variables (fees and commissions income, trading income and total non-interest income), is important in understanding the relationships between the various income activities in Africa. This is done with the help of the Pearson Correlation coefficient (R^2).

Evidence exists to indicate that fees and commissions income (FCI), trading income (TI), and total non-interest income (NNI) have strong positive relationships with net interest income (NII); for both retail and investment activities. The implication of the study is that incomes generated from non-interest activities are related to incomes generated from the loan portfolio of banks; and non-interest income has been shown to be the second highest contributor of bank earnings following incomes from banks' loan portfolios. Following Stiroh (2004), explanations provided for the positive correlation found between interest income and non-interest income variables suggest that the cross-selling of different bank products to the same customers.

Appendix 5: Further Robust Testing Using Quantile Regression

The study examined the relationship between non-interest income variables and bank stability risk, by using a 25th, 50th and 75th percentiles of the sample considered. One main advantage of using a quantile regression models is to allow the observation of heterogeneous effects on covariates; and are more robust against outliers in the response measurements.

The results examined how non-interest income variables impact bank risk. The findings indicate that at the 50th percentile of the sample considered, fees and commissions income and total non-interest income increases risk for African banks. However on the 75th percentile of the sample, fees and commissions, trading income and total non-interest income significantly increased risk for African banks. There seem to be evidence indicating that fees and commission income activities increases the risk of African banks, when fifty (50) percent or more of the sample is considered.

The findings from the average 50th and 75th percentiles of the population show inconsistent results, compared to using the conditional mean of the entire sample, hence providing more robust findings.

	ALL AFRICAN BANKS								
	LZSCORE			LZSCORE			LZSCORE		
VARIABLES	**.25**	**.50**	**.75**	**.25**	**.50**	**.75**	**.25**	**.50**	**.75**
FCI	-0.00112	-0.0524***	-0.103***						
	(0.0278)	(0.0149)	(0.0122)						
TI				-0.0793	-0.0119	-0.0739**			
				(0.0571)	(0.0289)	(0.0353)			
NNI							-0.0144	-0.0352***	-0.0487***
							(0.0151)	(0.00773)	(0.00664)
SIZE	0.196***	0.0989***	0.0672***	0.179***	0.0948***	0.0463***	0.192***	0.0981***	0.0731***
	(0.0253)	(0.0136)	(0.0111)	(0.0283)	(0.0143)	(0.0175)	(0.0250)	(0.0128)	(0.0110)
LIQ	1.585***	1.162***	0.802***	1.545***	1.106***	1.003***	1.401***	1.038***	0.718***
	(0.316)	(0.169)	(0.139)	(0.392)	(0.198)	(0.242)	(0.312)	(0.160)	(0.137)
CAR	2.220***	1.878***	1.807***	3.575***	2.506***	2.121***	2.118***	1.812***	1.819***
	(0.352)	(0.189)	(0.154)	(0.543)	(0.274)	(0.336)	(0.344)	(0.176)	(0.151)
NII	0.00656	0.0329***	0.0545***	0.0188	0.00889	0.0253***	0.0204*	0.0440***	0.0606***
	(0.0106)	(0.00568)	(0.00465)	(0.0124)	(0.00627)	(0.00766)	(0.0115)	(0.00590)	(0.00507)
RAROA	0.0578***	0.0763***	0.0810***	0.0749***	0.0884***	0.0862***	0.0574***	0.0762***	0.0789***
	(0.00224)	(0.00120)	(0.000980)	(0.00305)	(0.00154)	(0.00189)	(0.00217)	(0.00111)	(0.000957)
Cons_	-0.433	1.010***	1.842***	-0.558	0.888***	1.739***	-0.256	1.118***	1.874***
	(0.307)	(0.164)	(0.134)	(0.384)	(0.194)	(0.237)	(0.304)	(0.156)	(0.134)
Pseudo R^2	**0.2206**	**0.2960**	**0.3761**	**0.2576**	**0.3277**	**0.3780**	**0.2105**	**0.2892**	**0.3687**
Obs	**1,509**	**1,509**	**1,509**	**874**	**874**	**874**	**1,572**	**1,572**	**1,572**

Coefficients & Standard Errors (in parenthesis) ***Significant levels at 10%*, 5%** & 1%******

Source: Author's Analysis 2015, Bankscope Data.

On the other hand, when the retail activities of the bank is considered, the results show similar results as results found for all African banks. At the 50th percentile of the sample, fees and commissions income and total non-interest income is seen to increase risk for African banks. However at the 75th percentile of the sample, fees and commissions, trading income and total non-interest income are seen to show significant increase in risk for African banks. The evidence still points to the assertion that fees and commission income is a major income source driving increases in risk for African banks, for more than fifty percent of banks in Africa.

Similarly, findings from fifty to seventy-five percent of banks in Africa, show inconsistent results to results for all African banks.

RETAIL BANKING ACTIVITIES									
	LZSCORE			LZSCORE			LZSCORE		
VARIABLES	.25	.50	.75	.25	.50	.75	.25	.50	.75
FCI	-0.0157	-0.0290*	-0.113***						
	(0.0338)	(0.0157)	(0.0128)						
TI				0.0177	0.0294	-0.165***			
				(0.106)	(0.0496)	(0.0576)			
NNI							-0.0141	-0.0223**	-0.0574***
							(0.0194)	(0.00902)	(0.00793)
SIZE	0.205***	0.109***	0.0647***	0.171***	0.0941***	0.0401*	0.201***	0.106***	0.0668***
	(0.0375)	(0.0174)	(0.0142)	(0.0423)	(0.0197)	(0.0228)	(0.0364)	(0.0170)	(0.0149)
LIQ	2.634***	1.577***	0.786***	2.587***	2.414***	1.796***	2.533***	1.634***	0.942***
	(0.557)	(0.258)	(0.211)	(0.780)	(0.363)	(0.422)	(0.534)	(0.249)	(0.218)
CAR	1.757***	1.427***	1.403***	3.257***	2.311***	1.700***	1.703***	1.490***	1.514***
	(0.476)	(0.221)	(0.180)	(0.940)	(0.438)	(0.508)	(0.464)	(0.216)	(0.190)
NII	0.0146	0.0229***	0.0593***	0.00602	0.00272	0.0452***	0.0198	0.0335***	0.0684***
	(0.0128)	(0.00594)	(0.00484)	(0.0197)	(0.00915)	(0.0106)	(0.0143)	(0.00666)	(0.00585)
RAROA	0.0497***	0.0647***	0.0688***	0.0560***	0.0716***	0.0749***	0.0453***	0.0645***	0.0661***
	(0.00299)	(0.00139)	(0.00113)	(0.00390)	(0.00181)	(0.00211)	(0.00279)	(0.00130)	(0.00114)
CONS_	-1.207**	0.793***	2.074***	-1.212*	-0.0419	1.263***	-1.056**	0.752***	1.913***
	(0.524)	(0.243)	(0.198)	(0.697)	(0.325)	(0.377)	(0.506)	(0.236)	(0.207)
Pseudo R^2	**0.2182**	**0.2935**	**0.3738**	**0.2468**	**0.3183**	**0.3826**	**0.2074**	**0.2857**	**0.3688**
Obs	**863**	**863**	**863**	**490**	**490**	**490**	**895**	**895**	**895**

Coefficients & Standard Errors (in parenthesis), ***Significant levels at 10%*, 5%** & 1%******

Source: Author's Analysis 2015, Bankscope Data.

Results further indicates that fees and commissions income alone reduces bank risk at the 50th percentile of the all African banks (by about 20% margin); trading income alone also significantly reduces risks for fifty to seventy-five percent of African banks, by margins of about 24% and 38% respectively. However when non-interest income variables interact with and bank size, the findings indicate that trading income and fees and commissions income, significantly increases bank risk for between fifty to seventy-five percent of banks in Africa.

ALL AFRICAN BANKS									
	LZSCORE			LZSCORE			LZSCORE		
VARIABLES	**0.25**	**0.50**	**0.75**	**0.25**	**0.50**	**0.75**	**0.25**	**0.50**	**0.75**
FCI	0.0728	0.199*	0.128						
	(0.123)	(0.117)	(0.124)						
FCI*SIZE	-0.0117	-0.0309**	-0.0307*						
	(0.0173)	(0.0152)	(0.0177)						
TI				0.247	0.236*	0.384**			
				(0.178)	(0.133)	(0.153)			
TI*SIZE				-0.0386	-0.0516**	-0.0912***			
				(0.0302)	(0.0238)	(0.0271)			
NNI							0.00267	0.0710	0.0555
							(0.131)	(0.0818)	(0.0614)
NNI*SIZE							-0.00259	-0.0128	-0.0146
							(0.0203)	(0.0116)	(0.00927)
SIZE	0.201***	0.120***	0.102***	0.186***	0.115***	0.0821***	0.195***	0.116***	0.0961***
	(0.0279)	(0.0188)	(0.0127)	(0.0253)	(0.0121)	(0.0224)	(0.0331)	(0.0212)	(0.0190)
LIQ	1.474***	1.119***	0.745***	1.366***	1.088***	0.760***	1.373***	1.093***	0.650***
	(0.316)	(0.220)	(0.167)	(0.427)	(0.230)	(0.275)	(0.285)	(0.182)	(0.147)
CAR	2.178***	1.885***	1.919***	3.342***	2.784***	2.291***	2.120***	1.868***	1.916***
	(0.380)	(0.272)	(0.223)	(0.758)	(0.529)	(0.640)	(0.228)	(0.335)	(0.313)
NII	0.0168	0.0321	0.0656***	0.0196	0.0470**	0.0770***	0.0213	0.0428	0.0783***
	(0.0219)	(0.0213)	(0.0185)	(0.0227)	(0.0228)	(0.0194)	(0.0280)	(0.0276)	(0.0245)
RAROA	0.0581***	0.0765***	0.0814***	0.0760***	0.0876***	0.0889***	0.0575***	0.0763***	0.0798***
	(0.00887)	(0.00694)	(0.00512)	(0.0140)	(0.00846)	(0.0100)	(0.00954)	(0.00700)	(0.00604)
Cons_	-0.396	0.866***	1.592***	-0.440	0.683***	1.601***	-0.255	0.913***	1.712***
	(0.340)	(0.294)	(0.195)	(0.415)	(0.263)	(0.224)	(0.251)	(0.210)	(0.158)
Pseudo R^2	**0.2214**	**0.2995**	**0.3798**	**0.2608**	**0.3337**	**0.3878**	**0.2108**	**0.2908**	**0.3712**
Observations	**1,509**	**1,509**	**1,509**	**874**	**874**	**874**	**1,572**	**1,572**	**1,572**

Coefficients & Standard Errors (in parenthesis) ***Significant levels at 10%*, 5%** & 1%******

Source: Author's Analysis 2015, Bankscope Data.

When the interaction between non-interest income variables and bank size for African banks are examined along the lines of retail banking activities, the evidence suggest that trading income increases risk for African banks (10% marginally) at the 75th percentile of banks that undertake retail banking activities. The evidence seem to suggest that banks that undertake retail banking activities must reduce earnings from trading activities in order to reduce their risks. Fees and commissions income and total non-interest income had no significant relationship with bank risks.

RETAIL BANKING ACTIVITIES									
	LZSCORE			LZSCORE			LZSCORE		
VARIABLES	**0.25**	**0.50**	**0.75**	**0.25**	**0.50**	**0.75**	**0.25**	**0.50**	**0.75**
FCI	0.157	0.226	0.0146						
	(0.230)	(0.149)	(0.134)						
FCI*SIZE	-0.0235	-0.0344	-0.0163						
	(0.0368)	(0.0229)	(0.0191)						
TI				0.494	0.428	0.513			
				(0.484)	(0.384)	(0.412)			
TI*SIZE				-0.0615	-0.0551	-0.100*			
				(0.0679)	(0.0546)	(0.0572)			
NNI							0.0305	0.109	0.0171
							(0.0837)	(0.0900)	(0.0818)
NNI*SIZE							-0.00502	-0.0171	-0.0120
							(0.0146)	(0.0152)	(0.0123)
SIZE	0.215***	0.142***	0.0839***	0.170***	0.111***	0.0761**	0.203***	0.129***	0.0849***
	(0.0548)	(0.0293)	(0.0201)	(0.0359)	(0.0241)	(0.0337)	(0.0479)	(0.0318)	(0.0231)
LIQ	2.539***	1.530***	0.775***	2.678***	2.056***	1.768***	2.612***	1.701***	0.902***
	(0.648)	(0.445)	(0.234)	(0.631)	(0.448)	(0.442)	(0.487)	(0.419)	(0.185)
CAR	1.735***	1.555***	1.455***	2.923***	2.301***	1.834***	1.700**	1.620***	1.638***
	(0.491)	(0.302)	(0.261)	(0.880)	(0.702)	(0.589)	(0.675)	(0.306)	(0.255)
NII	0.0230	0.0357	0.0638**	0.0114	0.0171	0.0784***	0.0171	0.0431	0.0958***
	(0.0316)	(0.0306)	(0.0265)	(0.0429)	(0.0269)	(0.0280)	(0.0405)	(0.0372)	(0.0291)
RAROA	0.0492***	0.0657***	0.0687***	0.0555***	0.0720***	0.0767***	0.0451***	0.0649***	0.0672***
	(0.0151)	(0.00930)	(0.00654)	(0.0195)	(0.0126)	(0.0114)	(0.0102)	(0.00645)	(0.00465)
CONS_	-1.193*	0.538	1.919***	-1.245**	0.125	0.918	-1.127**	0.467	1.747***
	(0.719)	(0.401)	(0.237)	(0.575)	(0.496)	(0.598)	(0.463)	(0.436)	(0.260)
Pseudo R^2	0.2207	0.2975	0.3751	0.2508	0.3229	0.3859	0.2078	0.2882	0.3700
Observations	**863**	**863**	**863**	**490**	**490**	**490**	**895**	**895**	**895**

Coefficients & Standard Errors (in parenthesis) ***Significant levels at 10%*, 5%** & 1%******

Source: Author's Analysis 2015, Bankscope Data.

Finally, the results indicate that trading income alone significantly reduces bank risks, but when interacted with bank size, for banks that undertake investment banking activities, indicates that trading income increases risk (marginally between 10% to 14%) for African banks at the 50th and 75th percentiles of the sample. The evidence seem to suggest that banks that undertake investment banking activities must reduce earnings from trading activities in order to enhances their stability in the market. Fees and commissions income and total non-interest income had no significant relationship with bank risks.

INVESTMENT BANKING ACTIVITIES									
	LZSCORE			LZSCORE			LZSCORE		
VARIABLES	**0.25**	**0.50**	**0.75**	**0.25**	**0.50**	**0.75**	**0.25**	**0.50**	**0.75**
FCI	0.0174	0.117	0.104						
	(0.196)	(0.0995)	(0.124)						
FCISIZE	-0.00944	-0.0159	-0.00664						
	(0.0431)	(0.0154)	(0.0218)						
TI				0.417	0.426**	0.683***			
				(0.446)	(0.201)	(0.228)			
TISIZE				-0.0802	-0.102***	-0.138***			
				(0.0697)	(0.0350)	(0.0423)			
NNI							0.153	-0.0273	-0.0198
							(0.218)	(0.115)	(0.0442)
NNISIZE							-0.0319	0.00570	0.00948
							(0.0338)	(0.0208)	(0.00917)
SIZE	0.232***	0.110***	0.0838***	0.216***	0.113***	0.105***	0.238***	0.0929***	0.0496**
	(0.0315)	(0.0173)	(0.0254)	(0.0545)	(0.0310)	(0.0399)	(0.0292)	(0.0218)	(0.0198)
LIQ	0.662**	0.412	0.247	0.458	0.403	-0.0702	0.307	0.320	0.229
	(0.275)	(0.332)	(0.185)	(0.381)	(0.347)	(0.377)	(0.382)	(0.272)	(0.146)
CAR	3.530***	2.837***	2.982***	3.350**	2.794**	2.793***	2.476***	2.770***	2.898***
	(0.552)	(0.503)	(0.578)	(1.408)	(1.117)	(1.049)	(0.607)	(0.543)	(0.585)
NII	0.0333	0.0249	0.0565*	0.0273	0.0658***	0.0664**	0.0509	0.0286	0.0428**
	(0.0559)	(0.0373)	(0.0324)	(0.0286)	(0.0252)	(0.0261)	(0.0463)	(0.0379)	(0.0216)
RAROA	0.0737***	0.0992***	0.113***	0.100***	0.107***	0.113***	0.0796***	0.102***	0.115***
	(0.0186)	(0.0109)	(0.0113)	(0.0159)	(0.0111)	(0.0115)	(0.0199)	(0.0166)	(0.0138)
CONS_	-0.265	1.169***	1.602***	-0.0430	1.102**	1.793***	0.111	1.332***	1.845***
	(0.329)	(0.230)	(0.152)	(0.688)	(0.524)	(0.407)	(0.324)	(0.212)	(0.274)
Pseudo R^2	**0.2533**	**0.3269**	**0.4135**	**0.3349**	**0.3769**	**0.4216**	**0.2478**	**0.3216**	**0.4114**
Observations	**637**	**637**	**637**	**376**	**376**	**376**	**666**	**666**	**666**

Coefficients & Standard Errors (in parenthesis) ***Significant levels at 10%*, 5%** & 1%******

Source: Author's Analysis 2015, Bankscope Data.