

**DETERMINANTS OF NON-INTEREST INCOME IN KENYA'S COMMERCIAL
BANKS**

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Management**

DECLARATION

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

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DEDICATION

I wish to dedicate this research paper to my parents Mr. Christopher Jimmy Atellu and Mrs. Marriettah Nyambura Miles for their endless sacrifice in facilitating my education

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I am greatly indebted to my supervisors Dr. Owen Nyang'oro and Dr. Peter Muriu. May I take this opportunity to thank them for devoting their time to guide me through this entire research paper, their advice, constructive criticisms and valuable suggestions helped me a lot in the writing of this research paper.

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ABSTRACT

The main objective of this study is to investigate the determinants of non-interest income in Kenya's commercial banks. An empirical analysis is carried out to determine the impact of bank specific characteristics, technological development and macroeconomic factors on commercial banks non-interest income. A panel data of 2003-2012 is used in this research paper.

The main findings are that non-interest income of commercial banks in Kenya is affected by management efficiency, bank's size, technological development and macroeconomic factors. Bank size and management efficiency is positively and significantly related to non-interest income while ATM development, inflation and growth of gross domestic product are negatively and significantly related to non-interest income.

An important policy implication of this research paper is that a policy on diversification should be put in place by the government to avoid relying on traditional bank activities. Commercial banks should make every effort to increase their size by diversifying their products through investing in financial market and selling mutual funds in the market. To increase their equity to asset ratio banks should issue more shares through rights issue or post incorporation issue so as to diversify their investments towards non- interest income. Government can control inflation through the use of direct intervention price policy to control the prices of lending in the market this will in turn encourage banks to think of other sources of income other than depending on the traditional interest income.

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ABBREVIATIONS

ATM	Automated Teller Machine
CBK	Central Bank of Kenya
CBR	Central Bank Rate
GDP	Gross Domestic Product
KNBS	Kenya National Bureau of Statistics
NBFIs	Non-Bank Financial Institutions
OLS	Ordinary Least Square
ROA	Return on Assets
ROE	Return on Equity
SUR	Seemingly Unrelated Regression
USA	United States of America
VIF	Variance Inflation Factor

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Commercial banks sources of income include interest income, non-interest income and other incomes. Interest income is also known as traditional source of income. Most commercial banks in Kenya rely significantly on traditional source of income. However this source of income has lost important regulatory protection as new competition has emerged from non-bank financial institutions (NBFIs) which have significantly reduced interest income earned by commercial banks. Individual bank characteristics, technological development, deregulation and globalization has exposed most commercial banks to intense competition from NBFIs necessitating commercial banks to look for other sources of income other than depending on interest incomes only (DeYoung and Rice 2000). Therefore most commercial banks have decided to diversify their sources of income mainly to non-interest income so as to maintain their profitability and to ensure their financial stability in the competitive market.

Theoretically, diversification of bank revenue sources is preferred because service fees and other non-interest income are not related with traditional interest income. Therefore income diversification leads to a more stable net operating income and better risk adjusted financial performance. However existing empirical studies on the effect of diversification in banking do not clearly support the theoretically expected benefits of diversification. This study examines the factors that affect non-interest income in Kenya and the changes in the percentage of non-interest income to net total income.

1.1.1 Kenya banking sector and income diversification

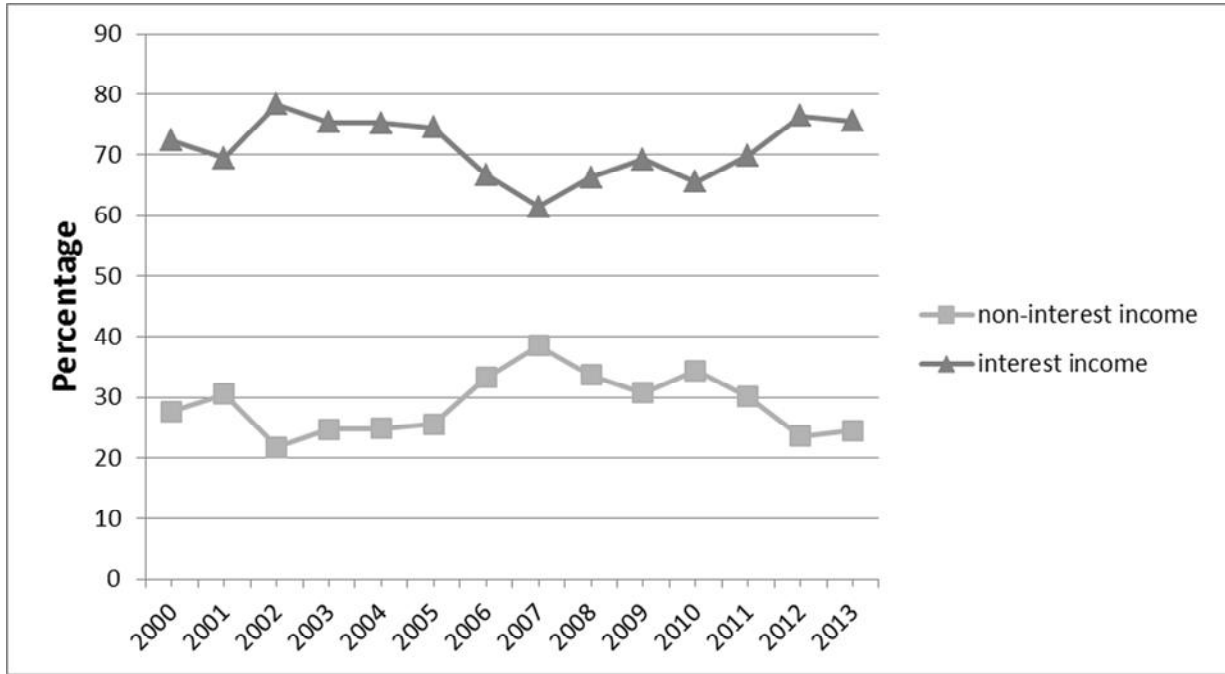
Non-interest income is defined as the income that commercial banks earn from other sources outside their traditional lending operations or revenue that banks earn from other operations apart from their core intermediation services. Non-interest income includes: loan arrangement fees, custody fees, trust fees, financial advice fees, funds management fees and commission earned from insurance companies. There are three main sources of non-interest income which originate from three information function of intermediation that includes; origination, service and portfolio management (Thygerson, 1995).

Banks have reacted to loan origination fees and loan syndicate by diversifying their products toward non-interest income by investing in financial markets and selling mutual funds. In the year 2012 most commercial banks in Kenya showed a decrease in interest income by about forty percent as compared to the previous period. This decrease in interest income compelled commercial banks to look for other sources of income that would ensure stability in revenue and also mitigate themselves from risk exposure (Kiweu, 2012). When a firm diversifies its revenue sources it will be able to reduce the risks it faces, but this will depend on the correlation between different lines of investments and prices of different investment. Therefore it is out of this argument that most banks have diversified their revenue sources through value adding activities such as service charges, fees, commissions and foreign exchange dealings (DeYoung and Roland, 2001).

Figure 1 shows the trend of interest and non-interest income of commercial banks in Kenya for the period 2000-2013. The trend analysis of the two streams of revenue shows clearly the emphasis on interest income from traditional lending in Kenya over the whole period under study. However, the figure shows fluctuations in non-interest income which is an indication that non-interest income can grow if the government adopts policies that would encourage diversification in other sources of income in the banking sector.

The contribution of non-interest income to total income of the banking sector was below thirty one percent in the period 2000-2005. This was attributed to banks concentrating on certain fee based activities that include fees and placement services and ignoring other sources of non-interest income like dividend income and investment income among others. High lending rates also motivated banks to concentrate on traditional interest income because of the high profit levels associated with this source of income.

Figure 1: Trend of net interest income and non-interest income as percentage of net operating income in Kenya, 2000-2013



Source: *Central Bank of Kenya*

However, after 2005 diversification to trade fees, foreign exchange commission, dividend income, investment income and other non-interest income intensified. This led to a slow but steady increase in non-interest income above thirty one percent up to 2011 where it again went below the thirty percent mark. The increase in percentage of non-interest income was occasioned by reduction of the CBK rate in the period 2005-2011 from ten percent in 2006 to almost five percent in 2011. The reduction in CBK rate was aimed at encouraging investments in the country.

Tight monetary policy in 2012 due to deteriorating current account balance led to the central bank rate (CBR) increasing to eighteen percent. This led banks to shift their source of income to traditional interest income by increasing their lending rates hence reaping more profits at the expense of non-interest income which declined to almost twenty three percent of the total income in the banking sector. In 2013 the economy slightly stabilized and the CBK relaxed its CBR from eighteen percent to eleven percent which led commercial banks to diversify their sources of

income so as to ensure stability in their earnings. This was reflected by a slight increase of non-interest income by one percent in 2013.

Table 1 shows a comparison of non-interest income and interest income of commercial banks in East African countries; Kenya, Tanzania and Uganda. From the table it is evident that traditional interest income still contributes the highest percentage of commercial banks' total income. The trend growth of average non-interest income observed in financial years 2004 through to 2012 in the three countries shows that the contribution of non-interest income to total commercial banks' income is high in Uganda at almost thirty four percent on average, followed by Tanzania at thirty one percent and finally Kenya at thirty percent. This shows that commercial banks in Uganda have resorted to diversification of their incomes due to the instability of traditional interest income and frequent changes in the economic conditions of the country. However the observed percentage changes are indicative of the fact that non-interest income can grow in future in the three countries.

Table 1: Comparison of interest income and non-interest income in Uganda, Kenya and Tanzania: 2004-2012

Years	UGANDA		KENYA		TANZANIA	
	Interest income %	Non-interest income %	Interest income %	Non-interest income %	Interest income %	Non-interest income %
2004	64.45	35.55	75.20	24.80	60.94	39.06
2005	67.06	32.94	74.40	25.60	66.36	33.64
2006	69.22	30.78	66.70	33.30	71.00	29.00
2007	67.02	32.98	61.50	38.50	72.90	27.10
2008	68.20	31.80	66.30	33.70	71.64	28.36
2009	66.50	33.50	69.30	30.70	70.34	29.66
2010	66.10	33.90	65.60	34.40	66.00	34.00
2011	62.50	37.50	69.90	30.10	67.70	32.30
2012	65.40	34.60	76.40	23.60	72.23	27.77

Source: *Bank of Uganda, Bank of Tanzania and Central Bank of Kenya Bank Supervision Annual Reports: 2004-2012*

Table 2 shows the income component and the performance of banks in terms of return on asset (ROA) and return on equity (ROE). As the percentage of non-interest income increases, the

percentage of profitability indicators also increases positively over the years. This shows that as much as banks still depend on interest rate as their major source of income, non-interest income also plays an important role in determining the level of profitability in banks hence ensuring stability in incomes. The table shows that periods with high ratio of non-interest incomes are consistent with high ROA and ROE.

Table 2: Income Components and Profitability Indicators (2000-2013)

Year	Non-interest income %	Interest income %	ROA %	ROE %
2000	27.7	72.3	0.92	9.01
2001	30.5	69.5	1.7	16.5
2002	21.7	78.3	1.0	11.1
2003	24.7	75.3	2.3	23.7
2004	24.8	75.2	2.1	22.5
2005	25.6	74.4	2.4	23.9
2006	33.3	66.7	3.7	41.3
2007	38.5	61.5	2.4	28.3
2008	33.7	66.3	2.6	26.5
2009	30.7	69.3	2.6	26.5
2010	34.4	65.6	2.6	25.0
2011	30.1	69.9	3.8	28.2
2012	23.6	76.4	4.4	30.9
2013	24.5	75.5	4.7	30.0

Source: *Central Bank of Kenya*

1.2 Statement of the problem

Financial sector liberalization, deregulation and technological development have eroded commercial banks competitive advantage and it has made it easier for NBFIs institutions to equally compete for the few customers in the market. This has compelled commercial banks to diversify to other sources of income instead of depending on the traditional interest income. Commercial banks have diversified their income earning activities towards non-interest income such as selling mutual funds and investing in the money market mainly because this source of income can be used to offset default risks that are associated with interest incomes which are susceptible to economic recession. DeYoung and Rice (2004) argue that fee based activities reap

abnormal returns in the short run which can help insure commercial banks from their earnings instability.

Studies conducted in Kenya by Kiweu (2012) and Teimet et al. (2011) have focused on the impact of diversification on financial performance of commercial banks. These studies note that banks tend to diversify by trading in stocks, bonds, real estate and private equity to raise their fee revenue, trading revenue and other types of non-interest income. However they do not reveal what exactly determines non-interest income and its growth in the total percentage share of commercial banks gross income. This study seeks to fill this knowledge gap by analyzing the impact of bank characteristics, market conditions, technological changes and macro-economic conditions in determining non-interest income. The study links non-interest income to the total assets of commercial banks. Linking profit and loss item (non-interest income) to the balance sheet item (total assets) will assist us in exploring the inter-relationship between non-interest income and size of a bank since it is assumed that big banks have an edge in generating more non-interest income over small banks. This study will assist commercial banks in identifying which variables to target and strategies they should put in place if they are to increase their non-interest income.

1.3 Objectives of the study

The main objective is to establish the determinants of non-interest income in Kenya's commercial banks. With specific objectives being:

1. To analyze the effect of bank characteristic and market conditions on non-interest income of commercial banks.
2. To analyze the effect of technological changes and macro-economic conditions on non-interest income of commercial banks.
3. To provide policy recommendation based on the findings of (i) and (ii) above.

1.4 Research questions

The main question that this research tries to answer is what exactly determines non-interest income and its growth in Kenya in the last decade. With specific questions being:

1. What is the effect of bank characteristic and market conditions on non-interest income of commercial banks?
2. What is the effect of technological changes and macro-economic conditions on non-interest income of commercial banks?

1.4 Significance of the study

There is a lot of pressure in Kenya's commercial banks to diversify their business from traditional interest income to a fee based earning activities like investment banking and insurance services so as to stabilize their lending rates and profitability in the long run. Diversification can greatly reduce default risk because as non-interest income increases, banks will shift from lending activities. Previous studies by Kiweu (2012) and Teimet et al. (2011) explain the impact of non-interest income on profitability of commercial banks in Kenya but does not explain what exactly determines non-interest income. This study contributes to the existing literature in Kenya because it assists in examining the factors that determine non-interest income so as to rebalance income in the banking sector. Such a study has not been fully exploited in Kenya and therefore this study will assist in shading some light into these factors.

Since commercial banks in Kenya have been recording fluctuations in their profits over the years it is important to exploit other sources of income and what determines these sources so as to ensure stability in their incomes. This study will also assist policy makers to draw policies that will create a conducive environment for bankers to diversify their incomes and reduce pressure on lending rates.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews interrelated literature on the subject under study presented by various scholars, researchers, authors and analysts. The chapter is organized according to specific objectives in order to ensure relevance of the problem. To avoid duplication of the existing studies the review has been done to provide a clear understanding of the existing knowledge. The specific areas covered include the theoretical underpinnings of the study and empirical review which are on deregulation, technological change, bank size and macro-economic variables

2.2 Theoretical literature

Markowitz (1952) introduced the Harry Markowitz (H.M) model to help in providing a normative approach to investors' decision to invest in assets or securities under risk. This model is based on the assumption that investors are rational, risk averse, they have a single period investment, they prefer to increase consumption and that investors will choose the best portfolio out of the efficient set. Therefore from portfolios that have the same returns investors will prefer the portfolio with low risk and portfolios that have the same risk levels so as to earn high returns. The return on these securities is assumed to be normally distributed, meaning that the mean and variance analysis is the foundation of portfolio decision. Therefore investors will hold a well-diversified portfolio instead of investing their entire wealth on single asset or security.

This theory, however, assumes certainty which is unrealistic in the real world and it would be nice if well behaved solutions (positive weights) were obtained in an unconstrained manner when the set of investment assets is close to the available investment opportunity which is not often the case.

Wolfe (2010), on the other hand, in his financial leverage model argues that as banks invest in different investments their portfolio will begin to overlap and look progressively alike. A decline in the value of these investments can lead to joint catastrophes. They used a model with two banks to show that diversification can increase the likelihood of systematic crises and therefore it is undesirable. While non-interest income may help reduce individual banks risks it can increase the chances of systematic crises where most banks fail.

The main assumption of his model is that in case of a single default, the bank in debt can sell its assets to the liquid bank and avoid a more expensive liquidation. Such handovers of resources are not possible when both banks are in debt, which makes physical liquidation of the assets unavoidable. This implies the existence of a negative externality among the banks, which means that as banks increase their diversification level they escalate the possibility of expensive winding up of by the other bank. In his study Wolfe (2010) explores the diversification-diversity tradeoff in the presence of financial externalities. In these models, the cost at which assets are discharged are endogenously determined and are lower when a larger number of portfolios are liquidated at the same time. Hence, the magnitude of diversification of a bank determines the liquidation costs of other intermediaries. Since these prices are not affected by the banks, the equilibrium and effective levels of expansion do not necessarily match. The ineffectiveness arises due to the deviation of banks' profit incentives and the depositors' welfare.

2.3 Empirical Review

There are four main factors that determine non-interest income in the banking industry, they include market conditions (deregulation), technological development, bank characteristics (bank size and bank efficiency) and macro-economic (inflation and economic growth) conditions.

2.3.1 Deregulation and non-interest income

Deregulation can be defined as the removal or simplification of government rules and regulations that constraint the operation of market forces. This will in turn stimulate competition in the financial sector leading to efficiency in service delivery. Deregulation in Kenya started in the early nineties and since then, we have seen banks unbundling deposit price as they compensate depositors for below the market interest rates by giving different types of other services in favor of separate charges for individual retail products (Kiweu, 2012).

Using a panel data analysis, De Young and Rice (2004) studied the effect of deregulation on non-interest income of commercial banks in USA. He used financial performance of a bank relative to its peers over the past three years to proxy for deregulation and found the variable to be statistically significant. He postulates that deregulation enhances competition in the banking sector which will in turn prompt banks to diversify their products so as to stabilize income. This confirms other previous studies by Mnasri and Abaoub (2003), Staikouras and Wood (2003), Isik

and Hassan (2003) and Acharya et al. (2002). These studies use capital to assets ratio and core deposit as a share of total assets to proxy for deregulation. They find these variables to be statistically significant with a positive coefficient. We therefore conclude that as deregulation in the banking sector improves we also expect non-interest income to increase.

The findings are however in sharp contrast with Craigwell and Maxwell (2006) who studied the impact of deregulation using bank relative financial performance which is calculated as bank return on assets minus the average return on assets of the other bank on non-interest income in Barbados commercial banks using unbalanced panel data. The coefficient of deregulation was found to be insignificant showing that this variable does not affect changes in non-interest income. He argued that banks have not met the ever increasing consumer needs and there has been a very small change in banks activities towards increasing non-interest income. For example, there still appears to be weighty dependence on past book accounts rather than superannuation which is particular to reserve management.

Previous studies that arrived at the same findings include Busch and Kick (2009) and Belgrave et al. (2004).

2.3.2 Technological changes and non-interest income

Variations in the level of information and communications technology that include automated teller machines (ATM), internet banking and new intermediation technologies in form of loan safety, credit recording together with the introduction and development of financial instruments and markets which include high-yield bonds, commercial paper, financial derivatives all subsidizes non-interest income to banks. Sherene and Bailey (2010) using a panel data of Jamaican commercial banks apply a seemingly unrelated regression (SUR) to analyze the determinants of non-interest income. They used ATM development to proxy technological development and found the coefficient of technology to be positively significant. Meaning that banks that have improved their technologies generate stronger levels of non-interest income. This finding is supported by previous studies by Craigwell and Maxwell (2006) who used ATM development as a proxy for technological development, Belgrave (2004) and DeYoung and Rice (2004) who used both cashless transaction and the dollar amount of mutual fund assets per capita. They found out that technology advance and adoption increases non-interest income at

banks by generating new fee income that more than outweighs the losses of fee income related to the reductions in cash balance depositors need to hold in checking and other liquid bank accounts.

On the contrary Shahzad (2012), in a study of Pakistan commercial banks find that the relationship between technology and non-interest income only remains significant in the long run. He used ATM per capita as a variable to represent growth in technology in the banking sector. He postulated that in the short run technological advancement tends to yield no significant effect on the net non-interest income. This could be because short run periods involve a heavy cost of investment, while in the long run the banking sector only incurs the cost of maintenance.

In Kenya the introduction of mobile and internet banking has seen many banks diversifying their sources of income to non-interest income. Therefore technology also plays a major role in determining non-interest income.

2.3.3 Bank size and non-interest income

Pennathur and Subrah (2012) using unbalanced panel data of one hundred and seventy two banks in India study the impact of bank ownership structure and size on non-interest income. The study used natural log of bank assets to proxy bank size, and a dummy variable to proxy big, sporadic growths in bank size. The study reveals that diversification benefits from non-interest income tend to increase with bank's size and small banks with very small portions of non-interest income record some little significant gains. Comparatively large banks make use of economies of scale in order to dominate the production of consumer loans. In spite of their low unit cost, however, the market for this product is extremely competitive and large banks must complement their revenue stream with non-interest income. As non-interest income increases banks tend to shift from lending activities to more diversified banking activities (see Kiweu, 2012; Elsas et al., 2010; Hahm, 2008; Mercieca et al., 2007 and Baele et al., 2007).

In contrast, Chiarozza et al (2008), using panel data in studying the impact of bank size on non-interest income in USA commercial banks. They used natural log of bank's assets to proxy for bank size and they found the coefficient to be insignificant. Non-interest income tends to diminish as banks increase in size with small banks recording the most significant gains in non-

interest income. This is supported by the findings of Craigwell and Maxwell (2006) in their study of commercial banks in Barbados. They used log of assets and a dummy variable reflecting the difference between local and foreign banks to represent the size of banks and this variable was found to be negatively significant. This deviates from the findings of Pennathur and Subrah (2012). Therefore they postulated that banks in Barbados generate less non-interest income per dollar of assets both in small and big banks.

2.2.4 Macro-economic condition and non-interest income

Kiweu (2012) in his study of commercial banks in Kenya found that macro-economic variables also play an equally important role in determining non-interest income in Kenya. Macro-economic variables that have been used in the previous studies includes; rate of inflation, changes in gross domestic product, exchange rate volatility and variability in Treasury bill rates. This confirms previous studies by Hahn (2008), Craigwell and Maxwell (2006) who used both inflation rate and changes in gross domestic product, DeYoung and Rice (2004), Sanya and Wolfe (2010) who used inflation rate, exchange rate volatility and changes in the gross domestic product. Sherene and Bailey (2010) also used panel data to study the impact of foreign exchange volatility and interest rate in determining non-interest income in Jamaican banks for the period 1999-2010. They found the coefficients of these variables to be statistically significant in determining non-interest income. This confirms similar findings by Gorener and Choi (2013) and Yang et al. (2006). The findings are however in sharp contrast to Lin et al. (2012) who examined the impact of stock market and inflation in determining non-interest income using panel data of European banks. Previous studies that arrived at the same conclusion include Liu and Wilson (2010) and Lepetit et al. (2008).

2.3 Overview of the literature

A review of previous literature in the preceding section shows that most of the studies carried out on the determinants of banks' non-interest income include bank characteristics, market conditions, technological development and macro-economic conditions (see for example DeYoung and Rice, 2004; Craigwell and Maxwell, 2006; Pennathur and Subrah, 2007; and Sherene and Bailey 2010). However it is worth noting that most studies that explain the

determinants of non-interest income are mainly from developed countries perhaps because of the importance of deregulation, technological development and stable market conditions relative to the less developed countries. Most of the studies in Kenya have examined the income diversification strategies adopted by banks and the effect of non-interest income on commercial banks performance (Kiweu, 2012; Teimet et al. 2010); however Kiweu (2012) and Teimet et al.(2010) do not exactly explain what determines non-interest income in Kenya's commercial banks. This study therefore seeks to fill this gap by examining factors that influence non-interest income in these banks.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology employed to examine the determinants of non-interest income in Kenya's commercial banks. A theoretical framework for the study is first outlined followed by the specification of the empirical model. The variables used in the study are explained, including sources of data and diagnostic test to be employed on the data.

3.2 Theoretical framework

We discuss income diversification determinants using the Markowitz (1952) optimization method of constructing a portfolio. The method to design the risk-reward relation is led by assigning estimated values, standard deviations and correlation to security's single period returns. One can then compute the unpredictability and the anticipated returns of the selected investments which are used as measures of risk and return individually bearing in mind what determines investment in a given portfolio. A financier is then able to find a few selected investments out of an almost unlimited number of possible weights of securities that will offer the best risk-reward mixture of securities making up the selected investment.

By looking at what determines non-interest income in commercial banks, one is able to reduce the total risk of selected investment in relation to its returns. Based on this theory concerning portfolio management, diversification can be carried out with a variety of strategies and this is based on the notion that the variables that primarily influence diversification in portfolios that earn non-interest income in commercial banks include, deregulation, bank specific characteristics (bank efficiency, bank size and bank strategy), technological development and macro-economic variables. It is theoretically expected that when there is deregulation in the economy that encourages competition, improvement in bank efficiency, increase in sizes of banks, changes into strategies that encourage diversification, improvement in technology and changes in macro-economic conditions, percentage of non-interest income to total commercial banks income will increase. The objective of this study is to examine factors that influence non-interest income so as to ensure stability in commercial banks earning.

3.3 Model specification

Panel data is used in our study to investigate the determinants of non-interest income. Panel data involves a multi-dimensional data that frequently involves measurement over time. It has the following form:

$$\pi_{it} = \alpha + \beta' X_{it} + \varepsilon_{it} \dots \dots \dots (1)$$

Where X represents variables under study, i is the individual dimension and t is the time dimension. Panel data analysis has three more or less independent approaches that include; independently pooled panels, fixed effect models (FEM) and random effect models (REM). Selection between these methods depends upon the objective of our analysis and the problem concerning the exogeneity of the explanatory variable. The assumption of the error term also determines whether we speak of FEM or REM.

Pooled data have no unique attributes of individuals within the measurement set, and no universal effects across time. It can be presented as follows:

$$\Pi_{it} = \alpha + \sum_{k=1}^K \beta_k X_{it}^k + \sum_{l=1}^L \beta_l X_{it}^l + \sum_{n=1}^N \beta_n X_{it}^n + \sum_{m=1}^M \beta_m X_{it}^m + \varepsilon_{it} \dots \dots \dots (2)$$

Where: $\varepsilon_{it} \sim id(0, \delta^2) \forall_{it}$

Meaning that individual observations are serially uncorrelated and the error term assumes a classical linear model hence pooled data can be estimated using Ordinary Least Square (OLS) method.

Baltagi (1995) argues that FEM is suitable if the data exhausts the population; the study is focusing on a specific set of N firms and the inference is restricted to the inference of these firms. Under FEM the intercept differs across individuals but each individual's intercept does not vary over time; that is it is time invariant. The slope regressors do not also vary across individuals or over time. It can be represented as follows.

$$\Pi_{it} = \alpha_i + \sum_{k=1}^K \beta_k X_{it}^k + \sum_{l=1}^L \beta_l X_{it}^l + \sum_{n=1}^N \beta_n X_{it}^n + \sum_{m=1}^M \beta_m X_{it}^m + \varepsilon_{it} \dots \dots \dots (3)$$

The subscript i has been introduced on the intercept term to suggest that the intercept of the banks may be different. These differences are due to special features of each bank, such as management skills or management strategies. To test the suitability of FEM the F-statistic is used. The null hypothesis of the F-statistics is that the study units are homogeneous and as such pooled models is better and that the alternative is that the study units are heterogeneous and therefore they cannot be pooled. The null hypothesis is accepted when the test statistics is less than the critical value and rejection of the null hypothesis leads to acceptance of the FEM.

We can expand equation (2) to derive REM by separating the unit specific residuals in the error term whereby the number of individuals is large and the number of time periods is small. The error term component can be specified as follows:

$$\varepsilon_{it} = \vartheta_i + \omega_{it} \dots \dots \dots (4)$$

The individual specific effects ϑ_i are random and distributed normally. They are constant across time and may or may not be correlated with X_{it}^k . Further ω_{it} varies independently across time and individuals.

Assumptions that are made on individual effect determine whether FEM or REM is used. For Random Effect Model ϑ_i is uncorrelated with X_{it}^k , but for the Fixed Effect Model ω_{it} is assumed to be correlated to X_{it}^k . Therefore equation (2) can be written as.

$$\Pi_{it} = \alpha + \sum_{k=1}^K \beta_k X_{it}^k + \sum_{l=1}^L \beta_l X_{it}^l + \sum_{n=1}^N \beta_n X_{it}^n + \sum_{m=1}^M \beta_m X_{it}^m + \vartheta_i + \omega_{it} \dots \dots \dots (5)$$

It can also be written as:

$$\bar{\Pi}_i = \alpha + \beta \bar{X}_k + \beta \bar{X}_l + \bar{X}_n + \beta \bar{X}_m + \vartheta_i + \bar{\omega}_{it} \dots \dots \dots (6)$$

Where $\bar{\Pi}_i$, \bar{X}_k , \bar{X}_l , \bar{X}_n , \bar{X}_m and $\bar{\omega}_{it}$ are averages of the variables to be estimated with respect to time. When we subtract equation (6) from equation (5) we get:

$$(\Pi_{it} - \bar{\Pi}_i) = (X_{it} - X_i) \beta + (\omega_{it} - \bar{\omega}_{it}) \dots \dots \dots (7)$$

Under REM generalized least square method is used for estimation because it is assumed that the ϑ_i 's are random. Cross section means through time estimators are estimated to get a matrix-weighted average of the within and the between (Greene, 2008). Hausman test is used to determine whether to use FEM or REM.

3.4 Empirical model

The study adopts DeYoung and Rice (2004) model to estimate the determinants of non-interest income in Kenya. The model captures the impact of bank characteristic, technological development, market conditions and macro-economic conditions on non-interest income. The equation links profit and loss item (non-interest income) to the balance sheet item (total assets). This assists us in exploring the inter-relationship between non-interest income and size of a bank since it is assumed that big banks have an edge in generating more non-interest income over small banks. A regression equation is framed to represent our model using a basic linear equation as follows.

$$\Pi_{it} = \alpha + \sum_{k=1}^K \beta_k X_{it}^k + \sum_{l=1}^L \beta_l X_{it}^l + \sum_{n=1}^N \beta_n X_{it}^n + \sum_{m=1}^M \beta_m X_t^m + \varepsilon_{it} \dots \dots \dots (8)$$

Where: Π_{it} is the non-interest income of bank i at time t , with $i = 1, \dots, N$, $t = 1, \dots, T$; α is a constant in the regression equation, X_{it}^k is a vector of bank i 's specific variables (k) that include capital assets ratio (*CAPRAT*), size (*SIZE*) and loan assets ratio (*LOARAT*) during period t ; X_{it}^l is a vector of technological development variables (l) of bank i presented as (*ATMDEV*) during period t . X_{it}^n is a vector of market conditions variables (n) of bank i shown as loans to assets ratio (*LOARAT*) during period t . X_t^m is a vector of macro-economic variables (m) presented as inflation rate (*INFL*) and changes in economic growth (*GDP*) at period t and $\varepsilon_{it} = \vartheta_i + \omega_{it}$ is the error term with ϑ_i being the unobservable bank specific effects across commercial banks which may vary due to differences in management and ω_{it} the individual error. This is a one-way error

component regression model, where $\vartheta_t \sim IIN(0, \sigma_\vartheta^2)$ and independent of $\omega_{it} \sim IIN(0, \sigma_\omega^2)$. Therefore from equation (1), we formulate the equation to be regressed as follows:

$$NIIT_{it} = \alpha_1 + \alpha_2 CAPRAT_{it} + \alpha_3 SIZE_{it} + \alpha_4 LOARAT_{it} + \alpha_5 EQRAT_{it} + \alpha_6 ATMDEV_t + \alpha_7 GDP_t + \alpha_8 INFL_t + \varepsilon_t$$

..... (8)

Where: *NIIT* is non-interest income to assets ratio, *CAPRAT* is the capital assets ratio, *SIZE* represents size of the bank, *LOARAT* is the loans ratio, *EQRAT* captures the equity assets ratio, *ATMDEV* represents development of technology which is the ratio of the total number of ATMs in the country to per capita income. The total number of ATM is used because of the difficulty in determining the specific number of ATM development in the banks that have been used in this study. *GDP* represents changes in the level of economic growth and *INFL* denotes rate of inflation over a period of time in the study.

3.4 Definition and measurement of variables

3.4.1 Dependent variable

Non-interest income (NIIT): this is measured as the ratio of total non-interest income to share of total assets.

$$Non\ interest\ income = \frac{Non - interest\ income}{Total\ Assets}$$

3.4.3 Bank specific characteristic

Capital-assets ratio (*CAPRAT*): It is used to capture the impact of *deregulation* on the growth of non-interest income in commercial banks. Previous studies that centered on deregulation and its impact on non-interest income include: DeYoung and Rice (2004), Isik and Hassan (2003) and Acharya et al. (2002). Financial performance of banks relative to its peers over the last three years, core deposit as a share of total assets and bank return on assets minus the average return on assets are also used to proxy for deregulation in previous studies. These studies forecast an increase in non-interest income due to deregulation in terms of the removal or simplification of government rules and regulations that constraint the operation of market forces. Empirical

evidence, however, is mixed. Therefore we predict indeterminate association between the level of deregulation and non-interest income of commercial bank. A higher capital ratio implies high levels of deregulation and lower capital ratio implies low levels of deregulation.

Size (*SIZE*): it is measured as the natural logarithm of total bank's asset and it captures the size effect of commercial banks. Log of assets and dummy variable that account for large discontinuous increase in bank size have also been used to proxy for changes in size of commercial banks in previous studies. Most studies consider large banks to have greater ability to diversify risks. The interpretation is that large banks enjoy economies of scale and could take risky projects which medium and small banks could not enjoy. Therefore bigger banks may have better risk management and expansion prospects; on the other hand, small banks are more elastic in their day to day operations (see Kiweu, 2012; Chiorazzo et al., 2008; Busch and Kick, 2009; and Craigwell and Maxwell, 2006). Therefore we expect a positive relationship between bank size and non-interest income.

Loans-assets ratio (*LOARAT*): Is used to proxy the *strategic response* of banks. Increase in total loans and advances to total asset signify that the bank's income strategy is based on traditional interest income. On the contrary non-interest income will increase when the banks strategy is to diversify its incomes, suggesting a negative relationship between the loans ratio and the level of non-interest income raised by commercial banks (see DeYoung and Rice, 2004). Empirical studies that support this relationship include Sherene and Bailey (2010) Craigwell and Maxwell (2006) and Stiroh (2004). We thus expect an inverse relationship between loan to asset ratio and non-interest income.

Equity to assets ratio (*EQRAT*): This is the ratio of equity to total assets. This variable indicates the financial leverage degree of a bank which reflects how banks are efficient. A greater ratio of equity/total assets means a high risk aversion and safeguard to bank default risk. Therefore banks will diversify their sources of income to non-interest income. Most of the recent studies in income diversification literature have also used this variable (see for example, Pennathur and Subrah, 2012; Busch and Kick, 2009; and Chiorazzo et al., 2008,). We therefore postulate that higher equity ratio is positively related to non-interest income. Conjecture

3.4.4 Technological development

ATM development (*ATMDEV*): Technological development is measured by the ratio of number of ATMs to per capita income. This variable has been used to capture changes and application of technology in the banking sector. Other variables used to capture changes in technology include cashless transactions, dollar amount of mutual fund assets per capita and ATM per capita. When technology changes it is expected that banks are likely to generate stronger levels of non-interest income (see Sherene and Bailey 2010; and Craigwell and Maxwell, 2006). We thus expect a positive relationship between technological development and commercial banks non-interest income

3.4.5 Macro-economic condition

Gross domestic product (*GDP*) growth: This variable has mixed results in different studies (see Chiorrazo et al., 2008 and Craigwell and Maxwell, 2006). Banks with robust loaning policy may not find it viable to change to non-interest revenue activities since they can expand their earnings through interest revenue (Sanya and Wolfe, 2010).

Hahm (2008) observes that fast emerging economies with high GDP rate are likely to show a lesser non-interest income as compared to slow moving economies. This demonstrates that banks are likely to expand towards non-interest income as economic growth slows. Sluggish economic growth may decrease proceeds from investment activities leading to dependency on lending activities. This will in turn increase competition among banks hence lowering profitability of lending activities. Subsequently the general lending risk among borrowers is augmented which in turn lowers the anticipated returns on lending. Hence banks will have more motivation to diversify into alternative non-interest income activities such as fee business. We thus expect an inverse relationship between GDP growth and non-interest income.

Inflation (*INFL*): A high inflation environs often discourages the growth of long term capital market such as bond, hypothecation and retirement income funds (Hahm, 2008). More liquid and vigorous stock market simplify equity funding for firms and investments in capital market instruments for commercial banks raising a burden to spread their revenue structure and expand into more capital related activities. On the other hand low-inflation environs and a high level of

capital market growth enables non-interest income expansion of commercial banks (DeYoung and Rice, 2004). The coefficient of inflation rate is therefore expected to be negative.

Table 3: Summary of variables and measurement

Variable	Measure	Expected sign effect	Source
Non-interest income (<i>NIIT</i>)	Ratio of non-interest income to total assets		CBK
<u>Bank specific characteristics</u>			
Capital ratio (<i>CAPRAT</i>)	Ratio of total capital to total assets	Indeterminate	CBK
Size (<i>SIZE</i>)	Natural logarithm of total bank assets	Positive	CBK
Loans ratio (<i>LOARAT</i>)	Ratio of total loans and advances to total assets	Negative	CBK
Equity ratio (<i>EQRAT</i>)	Ratio of total equity to total assets	Positive	CBK
<u>Technological development</u>			
ATM development (<i>ATMDEV</i>)	Ratio of total number of ATMs to per capita income	Positive	CBK
<u>Macro-economic environment</u>			
Gross domestic product (<i>GDP</i>)	Annual GDP growth	Indeterminate	KNBS
Inflation (<i>INFL</i>)	Growth in consumer price index	Negative	KNBS

3.5 Data and Sources

Annual data on market conditions, bank specific characteristics, technological development and macro-economic conditions from 2003-2014 is used. The study covers a sample of 35 banks that have been in existence since 2003-2014. Data sources include; the Central Bank of Kenya (CBK)

Surveys, Bank Supervision Reports, annual financial statements of various banks and Kenya Bankers Association Surveys. Macro-economic variables are collected from the Economic Survey Reports sourced from Kenya National Bureau of Statistics.

3.6 Estimation and testing procedures

Our data set is prone to many setbacks and these setbacks help in the determination of our estimation procedure. First the error term may be heteroscedastic where the residual variance differs across time periods. Breusch-Pagan test is used to determine any evidence of heteroscedasticity in the residual variance. The Lagrange multiplier is computed and compared with the relevant data set of this model so as to ascertain the critical chi square value. The null hypothesis of the error term variance is rejected basing on calculations of the sample at confidence interval of 5% using the chi square test. To control cross section heteroscedasticity of variables we use white's transformation estimator because it can produce standard errors robust to inconsistent variance along the forecasted line of best fit (Greene, 2008).

The study uses Hausman test (Hausman, 1978) to arrive at the most suitable model to use. Hausman test is often employed to test the assumption that the random effects are uncorrelated with the explanatory variables against the alternative that the fixed effects are random.

To obtain a robust empirical result for the specified regression equation a sensitivity test is performed. The variables of interest will strongly affect the dependent variable if the coefficients are not sensitive to the inclusion of different variables. The overall explanatory power of the model is improved so as to assess the effect of additional variables in the regressed equation.

CHAPTER FOUR

EMPIRICAL RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the study. This includes summary statistics, regression analysis and post-estimation or diagnostic test.

4.2 Descriptive analysis

4.2.1 Summary statistics

Before carrying out regression descriptive statistics such as skewness, kurtosis, Jarque-Bera statistics and probability values are calculated for all the variables. Results of the same are presented in Table 4. The means of the variables are positive. The variables are not very highly dispersed from the mean as seen from the standard deviation with the highest dispersion being that of the size of banks (SIZE) at 1.4211 compared to those other variables.

Table 3: Summary statistics

Variable	Obs	Mean	Standard deviation	Skewness	Kurtosis	Min	Max
Non-interest income (NIIT)	350	0.0386	0.0564	0.87	6.57	0.4600	0.5915
Capital assets ratio (CAPRAT)	350	0.1701	0.1942	0.78	7.12	0.0003	3.2067
Size (SIZE)	350	9.2182	1.4211	1.87	8.67	0.0020	12.6251
Loans assets ratio (LOARAT)	350	0.5811	0.2468	0.56	4.56	0.0070	2.3514
Equity assets ratio (EQRAT)	350	0.1824	0.1229	1.11	2.78	0.0100	0.7680
ATM development (ATMDEV)	350	0.0280	0.0153	0.14	7.90	0.0055	0.0475
Inflation (INFL)	350	0.1188	0.0551	1.67	3.42	0.0400	0.2620
Gross domestic product (GDP)	350	0.0462	0.0168	0.97	6.7	0.0150	0.0700

Source: Author's computation

All variables have a relatively peaked distribution as shown by the kurtosis. Although the highest peaked distributions is that of the size of commercial banks (SIZE) of 8.67.

4.2.2 Correlation

Our explanatory variable will not have a good p-value if there is presence of multicollinearity. We therefore perform a correlation test to investigate whether there is existence of a perfect or exact linear relationship among some or all explanatory variables of the regression model. Baltagi (2008) asserts that multicollinearity is only a problem if correlation coefficient of a model is above 0.70 which is not the case in our model. Multicollinearity problem is further reduced in a panel data because it has more degrees of freedom. Table 5 shows that non-interest income (NIIT) is positively correlated to capital assets ratio (CAPRAT), equity assets ratio (EQRAT), ATM development (ATMDEV) and gross domestic product (GDP). Increased deregulation in the banking sector represented by capital assets ratio is likely to increase competition between banks and NBFIs hence necessitating commercial banks to diversify their sources of income if they are to maintain their profitability.

Risk averse banks will tend to diversify their income to non-interest income so as to avoid uncertainty in earnings associated with traditional interest income caused by default risk. This however depends entirely on how efficient the management is. ATM development is positively correlated with non-interest income implying that as commercial banks continue investing in technology most likely non-interest income will increase. Increase in gross domestic product also has a positive correlation with non-interest income. This implies that as the economy grows we expect banks to diversify their sources of income to increase their earnings.

However, size (SIZE), loans assets ratio (LOARAT), and inflation are negatively correlated to non-interest income. As the size of the bank increases their non-interest income tend to diminish implying that large banks may have a higher market power. This allows big banks to control their source of income towards traditional interest income which earns higher incomes. An increase in the amount of loans and advances also implies that commercial banks depend heavily on traditional interest income.

Table 4: Pearson's pairwise correlation

	NIIT	CAPRAT	SIZE	EQRAT	ATMDEV	LOARAT	INFL	GDP
NIIT	1.000							
CAPRAT	0.130	1.000						
SIZE	-0.096	-0.259	1.000					
EQRAT	0.404	0.462	-0.453	1.000				
ATMDEV	0.162	-0.023	0.396	-0.118	1.000			
LOARAT	-0.525	0.085	-0.034	0.198	-0.190	1.000		
INFL	-0.014	-0.018	-0.023	0.013	-0.112	0.087	1.000	
GDP	0.033	-0.056	-0.012	-0.012	-0.085	0.033	-0.534	1.000

Source: Author's computation

Increased in the rate of inflation is expected to create uncertainty in the market hence deterring development of long-term capital market, mortgage market and pension funds where commercial banks would otherwise diversify their sources of income. This implies that banks will depend majorly on traditional interest income as evidenced in Kenya in 2011. No higher correlation exists between any of the independent variables other than non-interest income (NIIT) which is the dependent variable and equity assets ratio (EQRAT) implying that efficient management plays a major role in determining non-interest income. Therefore in general there is no problem of multicollinearity in the data.

The possible degree of multicollinearity among variables is also examined using variance inflation factor (VIF) in Table 6. The variance inflation factor shows the extent to which the standard error of coefficient of interest has a variance that has been inflated upwards. The rule of thumb is that we do not want the standard errors of the coefficients to be inflated more than two times of their basic size. We are therefore concern with VIF that are more than twice the standard errors of our coefficients in the regressed equation. However our coefficients of interest exhibit lower VIFs suggesting that there is no multicollinearity in our variables of interest.

Table 5: Variance inflation factor for regressed variables

Variable	VIF	1/VIF	Decision
CAPRAT	1.29	0.774786	No multicollinearity
SIZE	1.52	0.657310	No multicollinearity
LOARAT	1.10	0.905062	No multicollinearity
EQRAT	1.57	0.638471	No multicollinearity
ATMDEV	1.30	0.772131	No multicollinearity
INFL	1.45	0.691873	No multicollinearity
GDP	1.44	0.696616	No multicollinearity

The VIFs are less than double the standard errors of coefficients

4.3 Heteroscedasticity test

Breusch pagan test is used to test for heteroscedasticity in our data. This test produces chi square test statistics with seven degrees of freedom when the null hypothesis of no heteroscedasticity is satisfied. The test statistics in our case is a chi-square of 1131.77 with a probability value of zero; we therefore reject the null hypothesis of homoscedasticity, meaning that at least in one of these independent variables the variance of the residual increases. Since heteroscedasticity causes standard errors to be biased we solve the problem by estimating robust standard errors. OLS assumes that standard errors are both independent and identically distributed. Robust standard error relaxes either or both of these assumptions. Therefore with presence of heteroscedasticity robust standard errors tend to be more effective. Coefficient estimates of the original regression will not change, but because the standard errors are changed the t-statistics gives a more reasonably accurate P values. To control heteroscedasticity we use the regression with robust standard errors. None of the estimated coefficient changes but the t-values are a little different. This justifies the reason why we are using robust t-statistics in our estimation so as to control for heteroscedasticity. Table 7 below presents estimated coefficients without control for heteroscedasticity and estimated coefficients with controlling for heteroscedasticity.

Table 6: Test for heteroscedasticity

variables	Coefficients without control for heteroscedasticity	Coefficients with control for heteroscedasticity
CAPRAT	0.2563 (1.18)	0.2563 (1.17)
SIZE	0.0024 (2.75)	0.0024 (2.99)
EQRAT	0.0091 (4.01)	0.0091 (2.27)
LOARAT	-0.0056 (-1.45)	-0.0056 (-1.55)
ATMDEV	-0.2622 (-2.70)	-0.2622 (-2.92)
INFL	-0.0210 (-2.33)	-0.0210 (-2.44)
GDP	-0.0636 (-2.65)	-0.0636 (-2.60)

(t and robust t values are in parenthesis)

Source: Author's computation

4.4 Panel unit root test

Table 8 presents the results for stationary test. This study uses Im, Pesaran and Shin test to test whether the panel data is stationary. From these tests all the variables are stationary at level.

Table 7: Result for stationarity test

Im-Pesaran-Shin test		
variables	(1)	(2)
NIIT	-2.4568	-2.8124
CAPRAT	-1.9474	-2.6366
SIZE	-1.9209	-2.7584
EQRAT	-1.9411	-2.6277
LOARAT	-2.3405	-2.6983
ATMDEV	-2.7524	-3.1647
INFL	-3.4538	-3.2201
GDP	-2.6248	-2.9843

Notes: (1) without trend; (2) with trend. Im-Pesaran-Shin critical values without trend: -1.8500 (1% level); -1.7501 (5% level); -1.7000 (10% level), Im-Pesaran-Shin critical values with trend: -2.5300 (1% level); -2.4200 (5% level); -2.3600 (10% level).

4.5 Specification test

The study carries out a Hausman specific test to confirm the right model for the data set as presented in table 9. Hausman test has a null hypothesis that favors a fixed effect model (in which case errors are correlated with the regressors) whereas the alternative hypothesis favors the random effect model (where errors are uncorrelated to regressors). The outcome of the test shows that the probability of chi-square statistics test is at zero. This means we have a significant result at five percent. It is also revealed from $\text{corr}(u_i, xb) = 0.1162$ that 55% of variance in non-interest income is attributed to differences across banks hence we have to control for these differences (see table 10, $\rho = 0.5528$ or intra class correlation). This shows that the most appropriate model is a fixed effect model. The use of fixed effect model is further reinforced by Breusch and Pagan lagrangian multiplier (LM) test for random effect versus the ordinary least square. The outcome of the test also shows that the probability of chi-square statistics test value is at zero meaning significant results. This means we should not use a pooled model but instead we should use one of the individual specific effects.

Table 8: Hausman fixed random specification test

NIIT	Coefficients		
	Fixed effect (b)	Random effect (B)	Difference (b-B)
Capital asset ratio (CAPRAT)	0.0256	0.0243	0.0013
Size (SIZE)	0.0024	0.0022	0.0002
Equity assets ratio (EQRAT)	0.0091	0.0170	0.079
Loans assets ratio (LOARAT)	-0.0056	-0.0042	-0.0015
ATM development (ATMDEV)	-0.2622	-0.2551	0.0071
Inflation (INFL)	-0.0200	-0.0237	0.0037
Gross domestic product (GDP)	-0.0636	-0.0801	0.0166

Test: Ho: difference in coefficients not systematic, $\chi^2(7) = (b-B)'[(V_b - V_B)^{-1}](b-B)$, $S = (S_{fe} - S_{re}) = 35.56$, $Prob > \chi^2 = 0.0000$, $(V_b - V_B)$ is not positive definite)

4.6 Discussion of empirical results

This section extends the analysis of our model in section 3.3 by regressing non-interest income model with proxies for bank specific characteristics, technological development and macroeconomic variables. The results for the estimated model are presented in table 10 where estimation is based on fixed effect model with robust standard errors. Interestingly our results are almost consistent with expected outcome of the variables to be estimated except for ATM development (ATMDEV). The overall Wald statistic shows rejection of the hypothesis that all coefficients are equal to zero.

We find that deregulation has an insignificant positive relationship with non-interest income. This is depicted by a positive coefficient of capital to assets ratio. Intuitively this is an indication that deregulation does not play a role in determining non-interest income in commercial banks (see Craigwell and Maxwell, 2006). According to Kiweu (2012), Kenya's banking industry has undergone unprecedented changes caused by deregulation of financial services; however, these changes have not been reflected in the growth of the percentage of non-interest income in

Kenya's commercial bank. Volatility in the rate of non-interest income is still being experienced. As Craigwell and Maxwell (2006) explain, despite deregulation across the globe most developing countries have not met the ever increasing consumer needs and there has been a very small change in banks activities towards increasing non-interest income. For instance, there still seems to be heavy reliance on past book accounts rather than superannuation which is particular to funds management.

Table 9: Empirical result

NIIT	Coef.	Robust Std. Err.	t	t P>t
CAPRAT	.0256	.0208	1.17	0.242
SIZE	.0024	.0061	2.99	0.003
EQRAT	.0091	.0168	2.27	0.024
LOARAT	-.0056	.0463	-1.55	0.122
ATMDEV	-.2622	.1972	-2.92	0.004
INFL	-.0200	.0109	-2.44	0.015
GDP	-.0636	.0350	-2.60	0.010
Constant	.0466	.0110	8.06	0.000
Sigma_u	.0469			
Sigma_e	.0422			
rho	.5528 (fraction of variance due to u_i)			

Significant result for commercial bank size in our regression confirms the economies of scale hypothesis in commercial bank's intermediation process. Large banks can take risky and more expensive projects that small banks could not take because of better risk management strategies and diversification opportunities (Chiorazzo et al., 2008). Therefore in our findings we suggest that banks will have to exercise a dual objective of managerial firm size expansion and efficient risk management strategies to increase their non-interest income. It could also imply that banks

that raise high non-interest income in Kenya are large in size as compared to medium and small size banks. This was in agreement with the findings of DeYoung and Rice (2004).

As predicted by Hahm (2008), bank's strategy measured by the ratio of loans and advances to total banks assets is insignificantly and negatively related to non-interest income. This study therefore does not find evidence to support the existing empirical studies which assert that increased loans and advances will lead to a reduction in the non-interest income (see Craigwell and Maxwell, 2006; DeYoung and Rice, 2004 and Sherene and Bailey, 2010). This finding is also supported by Elsas et al. (2010) who argue that non-interest income co-exists with, rather than replacing, interest income from the intermediation activities that remain banks' core financial services function.

We find risk aversion expressed as ratio of equity to total assets to significantly increase non-interest income. Risk averse managers tend to diversify their income towards non-interest income because it involves less risk as compared to traditional interest income which is prone to default risks and fluctuations in the interest rates. This finding is constant with Pennathur and Subrah (2012) and Busch and Kicks (2009). This perhaps explains why non-interest income as a percentage of total interest income has been increasing in the last decade. Chiorazzo et al. (2008) also concludes that efficient managers tend to be more risk averse and this is reflected by their systematic product diversification in the banking sector as compared to less efficient managers.

We find technological development to be negatively and significantly related to non-interest income. The theoretical back ground that technological development leads to increase in non-interest income is not supported in our estimation result. The study therefore finds evidence to confirm Shahzad (2012) findings that technological advancement tends to have a negative association with non-interest income. This association may be attributed to heavy costs of investment, systematic costs and maintenance costs that are involved both in the short run and in the long run. The result may also be due to a change in technology in the sector towards mobile and internet banking thus reducing the impact of ATMs in commercial banks.

We find that gross domestic product (GDP) rate has a significant and negative association with non-interest income. This is reflected by a relatively higher negative coefficient of GDP variable in our estimated equation. This confirms Hahm (2008) finding that commercial banks in fast

growing economies with high GDP rate tend not to diversify to non-interest income. This implies that most customers are in a position to borrow money at high lending rates due to their confidence in the economy.

Inflation in Kenya is also found to be significantly and negatively related to non-interest income in our regression result. The significant inflation rate suggests that inflation also plays a role in determining non-interest income in Kenya's commercial banks. However this relationship is inverse as predicted by the theory. Indeed, Kiweu (2012) shows how inflation influences non-interest income in Kenya in the period 2010-2011. He postulates that high inflation rate hampers the development of long term capital market, because inflation makes financial savings less attractive than savings in real estate. This leads to a reduction in non-interest income by shifting corporate financing and savings behavior of firms and households away from capital markets.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This study investigates the determinants of non-interest income in Kenya's commercial banks. We have specified an empirical framework to examine the determinants of non-interest income in commercial banks using bank specific characteristics, technological development and macro-economic variables. A balanced panel data of 35 commercial banks in Kenya during 2003-2004 was analyzed. The effect of bank specific characteristics and macro-economic variables are in line with the expected theory, however, deregulation and bank strategy are insignificant contrary to our expectation. Our robust regression is also consistent with our fixed effect regression.

Interestingly our estimation result has shown that bank size, equity ratio, technological development, inflation and growth in gross domestic product are significant variables in determining non-interest income in Kenya's commercial banks. Capital assets ratio and loans assets ratio are the only two variables that were found to be insignificant contrary to our expected outcome in Table 3.

5.2 Conclusion

Based on the result of the study we have established that bank size and equity to asset ratio are significantly and positively related to non-interest income. ATM development, inflation and growth of gross domestic product on the other hand are significantly and negatively associated with non-interest income in Kenya's commercial banks. Policy makers should therefore come up with policies that would target these variables in order to reduce volatility of non-interest income as a percentage of total commercial banks income in Kenya. It is important to start contemplating on the likely benefits of such income in order to stabilize commercial bank's total earnings.

5.3 Policy recommendations

Based on our conclusion the following recommendations are made:

The study has established a positive and significant influence of bank size to non-interest income. The most important question is which size optimizes commercial bank's non-interest income. To increase their sizes commercial banks should come up with a policy that would assist them in diversifying their products. Diversification leads to expansion of bank activities into

different investment ventures and this can be done through investing in financial markets and selling of mutual funds in the market. A policy on diversification should also be put in place by the government to avoid relying on traditional bank activities. A policy that encourages commercial banks to engage in Non-interest income activities since non-interest income has a positive impact on bank performance. However, the regulatory authority should come in and homogenize prices of such activities in order to protect bank clients from being exploited.

A significant and positive relationship between equity to assets ratio and non-interest income is established. For commercial banks to increase their equity ratio they can issue new equity through rights issue to existing shareholders or post incorporation issue to the public. Increased equity will lead to further product diversification as banks will have enough capital to invest in other ventures other than depending on traditional interest income. Banks should also back risk taking managers who tend to diversify banking products towards non-interest income. A major problem, however, is that most commercial banks in Kenya depend on traditional interest income and most of them seem to be insensitive to the cries of the public over high lending rates.

A significant and negative relationship between technological development and non-interest income is established in our estimation. Government should focus on policy that encourage introduction of low cost advanced technologies in the banking sector. For example policy that encouraged mobile banking and internet banking will prompt commercial banks to shift towards mobile and internet banking services which increases diversification and productivity that would assist banks to shift their dependence on interest income and invest in other non-interest income ventures in the long run.

Inflation is significantly and negatively associated to non-interest income. Government can control inflation through the use of direct intervention price policy to control the price of lending in the market. This will prompt banks to strategize on raising more income through other sources other than the traditional non-interest income by diversifying their operations. Diversification in turn leads to increased non-interest income in commercial banks.

The study also established a significant and negative relationship between growth of gross domestic product and non-interest income. Policy makers should therefore use monetary and fiscal policy to ensure that the economy grows at a stable rate. This is to avoid both unbalanced growth rates and high rates of inflation which increases volatility in non-interest income.

5.4 Limitations and areas of further study

One of the limitations experienced was that the series of data used was too short (2003-2012) to establish clearly the long run and short run dynamics. Future studies need to establish determinants using a longer series and investigate if and why there may be changes in estimated parameters.

Some of the reviewed studies show other factors beyond the scope of variables that were not included in this study. These are: returns on assets, market concentration, stock market risk, exchange rate and level of investment. Further studies need to find out how these additional factors impact on non-interest income of commercial banks.

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APPENDIX TABLES

Table 10: Estimation results for pooled estimation, FEM and REM

variables	Pooled estimation	Fixed effect estimation	Random effect estimation
CAPRAT	0.0138 (3.28)	0.0256 (1.18)	0.0243 (2.44)
SIZE	0.0386 (4.45)	0.0024 (2.75)	0.0022 (1.03)
EQRAT	0.0470 (5.21)	0.0091 (4.01)	0.0170 (1.57)
LOARAT	-0.0164 (-3.35)	-0.0056 (-1.45)	-0.0041 (-0.25)
ATMDEV	-0.2590 (-4.40)	-0.2622 (-2.70)	-0.2551 (-2.72)
INFL	-0.4171 (-4.31)	-0.0200 (-2.33)	-0.0237 (-1.64)
GDP	-0.1489 (-4.55)	-0.0636 (-2.65)	-0.0801 (-1.75)

Note: t-statistics are in parenthesis and significant at 5%

Source: Author's computation

APPENDIX FIGURES

Figure 2: means of the variables

