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Determinants of non-interest income in Kenya's commercial banks

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Abstract

This study examines the determinants of non-interest income in Kenya's commercial banks. Using panel data for the period 2003-2012 the study concludes that non-interest income of commercial banks in Kenya is affected by management efficiency, bank size, technological innovation and macroeconomic factors. An important policy implication of this article is that government should make every effort to create conducive environment for competition in the banking sector so as to ensure efficiency and expansion of the banking sector in terms of deposit mobilization by commercial banks. Moderating the lending rates of commercial banks may reduce overreliance on traditional interest income.

Keywords: *Non-interest income; Efficiency; Commercial banks; Kenya*

1. Introduction

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. Individual bank characteristics, technological development, deregulation and globalization have 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 uncorrelated or imperfectly correlated with net 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. 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.

2. Non interest rate and profitability: a review

2.1 Theoretical literature

The extant literature helps us link non-interest income with commercial banks profitability. 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 of 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 diversify their portfolio will begin to overlap and look increasingly similar. A fall in the value of these portfolios can lead to joint failures. 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 underlying assumption of his model is that in case of a single default, the insolvent bank can sell its assets to the solvent bank and avoid a physical (and more costly) liquidation. Such transfers of assets are not possible when both banks are insolvent, which makes physical liquidation of the assets unavoidable. This implies the existence of a negative externality among the banks, whereby increasing a bank's diversification level increases the possibility of costly liquidation of assets by the other. In two related studies, Wolfe (2010) explores the diversification-diversity tradeoff in the presence of pecuniary externalities. In these models, the prices at which assets are liquidated are endogenously determined and are lower when a larger number of portfolios are liquidated at the same time. Hence, the extent of diversification of a bank determines the liquidation costs of other intermediaries. Since these costs are not internalized by the banks, the equilibrium and efficient levels of diversification do not necessarily coincide. The inefficiency arises due to the divergence of banks' profit incentives and the depositors' welfare.

2.2 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.

a) Deregulation and non-interest income

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 service 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 and find the variable statistically significant. This confirms other previous studies by Mnasri and Abaoub (2003), Staikouras and Wood (2003), Isik and Hassan (2003) and Acharya *et al.* (2002). The findings are however in sharp contrast with Craigwell and Maxwell (2006) who studied the impact of deregulation 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. Previous studies that arrived at the same findings include Busch and Kick (2009) and Belgrave *et al.* (2004).

b) Technological changes and non-interest income

Changes in the level of information and communications technology that include Internet banking, automated teller machines (ATM) and new intermediation technologies in form of loan securitizations, credit scoring coupled with the introduction and expansion of financial instruments and markets which include high-yield bonds, commercial paper, financial derivatives all contribute to 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 find 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 similar previous studies by Craigwell and Maxwell (2006), Belgrave (2004) and DeYoung and Rice (2004).

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. In the short run, however, 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 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.

c) 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 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. Relatively large banks make use of economies of scale in order to dominate the production of consumer loans. Despite their low unit cost, however, the market for this product is highly competitive and large banks must supplement their revenue stream with non-interest income. Therefore as non-interest income increases bank 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 found the coefficient of bank size 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 and DeYoung and Rice (2004) in their study of USA commercial banks.

d) Macro-economic condition and non-interest income

Kiweu (2012) in his study of commercial banks in Kenya found out that macro-economic variables also play an equally important role in determining non-interest income in Kenya. This confirms previous studies by Hahm (2008), Craigwell and Maxwell (2006), DeYoung and Rice (2004), Sanya and Wolfe (2010). 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 with 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).

3. Empirical methodology

3.1 Data and Empirical Models

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.

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

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 characteristics (k) during period t ; X_{it}^l is a vector of technological development variables (l) of bank i during period t . X_{it}^{nis} a vector of market conditions variables (n) of bank i during period t . X_t^{mis} a vector of macro-economic variables (m) 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 $\theta_i \sim \text{IIN}(0, \sigma_\theta^2)$ and independent of $\omega_{it} \sim \text{IIN}(0, \sigma_\omega^2)$. Therefore from equation (1), we formulate the equation to be regressed as follows:

$$\text{NIIT}_{it} = \alpha_1 + \alpha_2 \text{CAPRAT}_{it} + \alpha_3 \text{SIZE}_{it} + \alpha_4 \text{LOARAT}_{it} + \alpha_5 \text{EQRAT}_{it} + \alpha_6 \text{ATMDEV}_t + \alpha_7 \text{GDP}_t + \alpha_8 \text{INFL}_t + \varepsilon_{it} \quad (2)$$

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 the level of economic growth and INFL denotes inflation over a period of time in the study.

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

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). 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. 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 larger banks may have better risk management and diversification opportunities, on the other hand, small banks are more flexible in their 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 bank's 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 higher ratio of equity/total assets refers to risk aversion and protection to bank default risk. Therefore banks will diversify their sources of income to non-interest income. This variable is also used in most of the recent studies in income diversification literature (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.

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. 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

Gross domestic product (GDP) growth: This variable has mixed results in different studies (see Chiorazzo *et al.*, 2008 and Craigwell and Maxwell, 2006). Banks with strong lending policy may not find it feasible to shift to non-interest income activities since they can improve their earnings through interest income (Sanya and Wolfe, 2010).

Hahm (2008) observes that fast growing economies with high GDP rate tend to exhibit a lower non-interest income. This shows that banks tend to diversify towards non-interest income as economic growth slows. Slow economic growth may reduce returns from investment activities leading to dependence on lending activities. This will in turn increase competition among banks hence lowering profitability of lending activities. Consequently the overall credit risk among borrowers is increased which in turn lowers the expected returns on lending. Therefore banks will have more incentive to expand 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 environment often deters the development of long term capital market such as bond, mortgage and pension funds (Hahm, 2008). More liquid and active stock market facilitate equity financing for firms and savings in capital market instruments for commercial banks raising pressure to diversify their

revenue structure and expand into more capital related activities. On the other hand a low-inflation environment and a high level of stock market development facilitate the non-interest income expansion of commercial banks (DeYoung and Rice, 2004). The coefficient of inflation rate is therefore expected to be insignificant.

Table 1. Summary of variables and measurement

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

Source: Author's computation

Annual data on market conditions, bank specific characteristics, technological development and macro-economic conditions from 2003-2014 is used. The study covers sample of 35 banks that have been in existence since 2004-2014. Data sources include; the Central Bank of Kenya (CBK) Surveys, Bank Supervision Reports various issues, annual financial statements of various banks and Kenya Bankers Association Surveys. Macro-economic variables will be collected from the Economic Survey Reports sourced from KNBS.

3.2 Estimation and testing procedures

Our data set is prone to many setbacks and these setbacks will help in the determination of our estimation procedure. First the error term may be heteroscedastic where the residual variance will differ across time periods. Breusch-Pagan test will be used to determine any evidence of heteroscedasticity in the residual variance. The Lagrange multiplier will be 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 will be rejected basing on calculations of the sample at confidence interval

of 5% using the chi square test. To control cross section heteroscedsticity of variables we will 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 in this study. 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 correlated with the error term.

To obtain a robust empirical result for the specified regression equation a sensitivity test is performed. The variables of interest strongly affected the dependent variable because 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.

4. Empirical results

4.1 Descriptive Statistics

Descriptive statistics for all the variables used in the estimations are presented in table 2. 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. 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.

Table 2. Descriptive and 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	12.625
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

Correlation matrix is presented in table 3. It is observed 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.

Table 3. 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

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 with 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.

Increased changes in 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 or data.

This study uses Im, Pesaran and Shin test to detect whether the panel data is stationary. Im, Pesaran and Shin (IPS) detected the presence of unit roots in panel data, which puts together information from the cross section dimension with that from the time series dimension, such that for the test to have power, we will need fewer time sample observations. Therefore to analyze long-run relationships in this panel data, we will use the same procedure in our analysis. IPS test is based on Augmented Dickey-Fuller (ADF) statistics normalized across groups. From these tests we find that all the variables are stationary at level. As presented in table 4.

Table 4. Result for stationary 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).

Hausman specific test is used to confirm the right model for the data set as presented in table 5. Hausman test has a null hypothesis that favors a random effect model (in which case errors are correlated with the regressors) whereas the alternative hypothesis favors the fixed effect model (where errors are uncorrelated to regressors). The outcome of the test shows that F statistic is significant at one percent. It is revealed that 55% of variance in non-interest income is attributed to differences across banks hence we have to control for these differences. This shows that the most appropriate model is 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.

Table 5. 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: H_0 : difference in coefficients not systematic, $\chi^2(7) = (b-B)'[V(b-B)](b-B)$, $S = (S_{fe} - S_{re}) = 35.56$, $Prob > \chi^2 = 0.0000$, $(V(b-B))$ is not positive definite

5. Discussion of empirical results

This section extends the analysis of our model in section 4 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 6 where estimation is based on fixed effect model with robust standard errors. Interestingly our results are almost consistent with forecasted 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.

Table 6. Empirical result

NIIT	Coef.	Robust Std. Err.	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
_cons	.0466	.0110	8.06	0.000
sigma_u	.0469			
sigma_e	.0422			
Rho	.5528 (fraction of variance due to u_i)			

Source: Kenya Banker's Association

We find that deregulation has a robust and 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 that 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.

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 is because banks in Kenya have the powers to strategize in increasing both interest income and non-interest income at the same time due to their domination in the market. 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.

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 of borrowing 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 house hold holds away from capital markets.

6. Discussion and implications

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. Policy makers should therefore draft policies that would create conducive environment so as to encourage easy deposit mobilization by commercial banks. They should also identify new and effective ways to handle cross bank activities so that customer retention is maintained in the industry.

A significant and positive relationship between equity to assets ratio and non-interest income is established. Commercial banks should therefore back risk averse 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. Policy makers should focus on drafting policies that will encourage introduction of low cost advanced technologies in the banking sector so as to encourage efficiency and productivity that would assist banks to shift their dependence on interest income and invest in other ventures in the long run.

Inflation is significantly and negatively associated to non-interest income. Monetary authorities should reduce or cut the lending rates of commercial banks by reducing the CBR. This will reduce reliance on traditional interest incomes and compel commercial banks to diversify their sources towards non-interest income. Diversification in turn leads to increased economic growth through increased investment opportunities.

The study also established a significant and negative relationship between growth of gross domestic product and non-interest income. Policy makers should therefore use contractionary 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.

7. Conclusion

This study is our first attempt to study 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. 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. 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.

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