Bank Portfolios and Bank Earnings in Kenya: An Econometric Analysis

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ABSTRACT

This paper examines how bank earnings are affected by the bank's choice of investment portfolios. It reveals that bank earnings increase with loans and advances, placements in other banking institutions, and government securities. The results suggest that higher pricing of loans relative to deposits can be used to reduce the opportunity cost associated with holding idle reserves. Better control of expenses, for example through reduction of overheads and sound management practices, are key to strong earning performance of commercial banks.

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1 Introduction

The banking industry is a key sector in any economy, and as prime movers of economic life, banks occupy a significant place in every nation (Soyibo and Adekaye, 1991). The banking sector represents a significant value added to the economy and it is an important source of wage employment and tax revenue. The earning performance of a bank has implications on the welfare of bank customers and in the long run on economic growth.

In Kenya, the structure of commercial banks portrays a cartel-like feature. Out of 48 commercial banks in the country, 10 own 75% of the total assets in the industry (Market Intelligence, 2000), indicating that the industry is not competitive. As profit seekers, commercial banks are inclined to formulate policies that aim at diversifying their portfolio and thus guaranteeing some minimum rate of return. To achieve the objective of profit maximization, banks make decisions to invest excess cash in varying securities, involving not only the amount to invest but also the types of security in which to invest. These decisions are normally based on evaluation of expected net cash flows and the uncertainty associated with the cash flows.

The main motive for diversification is to minimize risk of loss. In general, banks consider costs and benefits of the different alternatives available when making investment decisions. Much analysis has been performed that indicates that portfolio asset allocation is by far the most important decision banks make, because these assets may account for up to 90% of bank earnings.

If commercial banks choose to invest in loans and advances, they risk default associated with these investments. Such investments potentially have negative consequences for bank earnings because some of the loans and advances to customers may end up as bad or doubtful debts. This risk may or may not be covered by collateral securities or high interest

rates. If the risk is covered by high lending rates, these compensate for the high risks and the costs incurred in valuing collateral securities, negotiation and debt servicing.

A bank may also face the risk of illiquidity if it issues large volumes of loans and advances without attention to the ease of 'shiftability' of other asset holdings in its portfolio. This is because repayment terms and periods for bank loans and advances to customers are defined by fixed contracts that differ from customer to customer, meaning that banks cannot recall the cash in debt at will, at their convenience or when there is need for liquidity. This situation can lead to a run on the bank if customers suspect that it does not have sufficient resources to meet their cash needs. A bank with cash holdings lower than the amounts required for its demand deposits may close down if all of a sudden it is invaded by customers making large withdrawals. Such a run on a bank arises out of customers' loss of confidence in the bank, a situation that adversely affects its deposits and profitability.

Commercial banks may choose to invest in treasury bills as their portfolio using their excess liquidity, to capitalize largely on prevailing high interest rates on the bills, which are also free from risk of default. The risk associated with treasury bills is tied to their fixed-interest nature, meaning that once a bank has invested in them it cannot transfer them to benefit from rising interest rates until they mature. For this reason, commercial banks respond according to their expectations on interest rates. If they anticipate a rise in interest rates on a particular earning asset in the near future, they hold on to their cash and invest it at the time when interest rates have reached their expected maximum. If they anticipate a fall in treasury bill interest rates they tend to invest immediately to avoid incurring losses when interest rates fall. This policy has been shown to contribute positively to attainment of commercial banks' objective of profit maximization.

If commercial banks choose to keep all their holdings as cash, it means that they have chosen not to engage in any investment transaction. This cash does not earn interest or bear the risk of default although it risks losing value if the 'evils' of inflation set in. Moreover, cash holdings reflect some stability of the bank. Customers will be confident that if they deposit their money it will be available when they need it.

In practice, commercial banks do not put all their cash in one earning asset. They rank their alternatives in order of desirability and put their money in all the worthwhile investments. In doing this, commercial banks tend to achieve their objective of making profit from their investments. The portfolio theory of investment seems appropriate to counter the problem of investment risk that banks face.

The remainder of this paper is organized as follows. Section 2 presents a theoretical model of portfolio investment, and section 3 discusses its empirical implementation. Section 4 discusses the data types and sources, while estimation and empirical results are presented in section 5. Section 6 provides conclusions of this study.

2. Portfolio Theory of Investment

The portfolio theory is an investment approach in which the investor balances risk against expected return to maximize earnings from an entire portfolio. Portfolios are an effective way of increasing returns while decreasing risk in investment. For this reason, portfolio selection strategies have received quite some attention in financial literature.

The modern portfolio theory introduces approximate 'mean-variance' analysis to simplify the portfolio selection problem. Markowitz (1959) attempted to quantify risk and quantitatively demonstrate why and how portfolio diversification works to reduce risk for investors. The 'risk' of a portfolio is quantified as a standard deviation of return from period to period, and the portfolio selection problem is reduced to computing an 'efficient' portfolio, that is, one that minimizes the risk for a fixed level of return in a single period.

According to the portfolio theory, the larger the expected return the better the investment, and the smaller the standard deviation of the return the more attractive the investment. Furthermore, the theory shows that we can reduce the standard deviation of the return or risk by combining anti-covariant securities. However, each asset class generally has different levels of return and risk and also behaves uniquely so that one asset may be increasing in value as another is decreasing or at least not increasing as much, and vice versa. This theory, however, has a shortcoming; it cannot allow both more and less risk-averse investors to find their optimal portfolio, a problem surmounted by the capital asset pricing model (CAPM) (Sharpe, 1964).

The CAPM, associated with Sharpe (1964), Lintner (1965) and Black (1972) explains the risk of a particular asset or portfolio using the excess return on the market portfolio (Black, 1971). The model suggests that investors should hold diversified portfolios, and predicts that investors

will hold some fraction of the market portfolio. Furthermore, an important implication of the CAPM, also referred to as efficient markets hypothesis, is that investors lacking special investment knowledge would be well advised to buy and hold diversified portfolios (Black 1971, for example).

The CAPM shows that investors require high levels of expected returns to compensate them for high expected risk. However, it is now widely recognized that in the presence of informational asymmetries and contract enforcement problems, it is not necessarily true that the banking system will allocate resources to projects or firms with the highest returns. Empirical evidence based on mean-variance portfolio selection, simulation analysis, and out of sample portfolio performance suggests that correcting for estimation error, particularly in the means, can substantially improve investment performance (for example Jobson *et al*, 1979; Jobson and Korkie (1980, 1981); Jorion, 1985, 1991).

Despite attempts to verify or refute the CAPM, there is no consensus on its legitimacy. The modelling approach employed in this paper is therefore that of the portfolio theory.

3. Empirical Model

The standard portfolio model may be stated in general terms as:

$$E = f(A, L, U) \quad (1)$$

where E are earnings made by banks over a given time period, A and L refer to the assets and liabilities held by commercial banks, respectively, and U is the residual element. Splitting up the A and L terms, the estimatable form of the model may be written as:

$$E = f(LA, COD, GSEC, DBFB, CDEP, PLABB, OTHER, INSCO, U) \quad (2)$$

where

E = bank earnings
LA = loans and advances
COD = certificate of deposit
GSEC = government securities
DBFB = deposit balances from other banks
CDEP = customer deposits
PLABB = placements, loans and advances to building societies and other banking institutions
OTHER = other assets
INSCO = investment in subsidiary companies

Adopting a specific form, a one-way error component version of the above model suitable for estimation with panel data may be written as:

$$Y_{it} = \alpha + X^{1}_{it}\beta + \mu_{it} \quad (3)$$

$$\mu_{it} = \mu i + v_{it} \quad (4)$$

For i = 1……N and t = 1……..T, with i denoting bank and t denoting time.

Where μ_i denotes the unobservable individual-specific effect, and v_{it} the remainder disturbance.

The random effects model treats the individual effect as just another error term, and it is possibly biased owing to the correlation between it and the regressors.

The fixed effect estimators are designed to handle the systematic tendency of $\mu_{it,}$ which is considered to be higher for some individual banks than for others (individual effect) and possibly higher for some time periods than for others (time effects). This model separates the constant term for each bank and can be expressed as in equations 4a and 4b, therefore:

$$Y_{it} = u + \beta_2 X_{2it} + \ldots\ldots\ldots\ldots + \beta_2 X_{2it} + \mu_{it} \quad (4a)$$

$$= u + \beta X_{it} + \mu_{it} \quad (4b)$$

Where β is the column vector of the slope parameters and u is the intercept term.

When the different intercepts are allowed for N individual banks, the model becomes

$$Y_{it} = u_i + X_{it} \beta + \mu_{it} \quad (5)$$

With u_i as an individual-specific disturbance term, the random effects model version can be written as:

$$Y_{it} = \alpha + \beta' X_{it} + \mu_{it} \quad (6)$$

$$\mu_{it} = v_{it} + u_i \quad (7)$$

Where

$$E(u_i) = E(v_{it}) = 0$$

$$Var(u_i) = \sigma_u^2$$

$$Var(v_{it}) = \sigma_v^2$$

$$Cov(v_{it}, u_i) = 0 \text{ for all i and t}$$

Where u_i denotes the unobservable individual-specific effect and is constant over time, and v_{it} denotes the purely random effect.

The random effects model is a generalized regression model, and all its disturbances have variance:

$$Var(v_{it} + u_{it}) = \sigma^2 = \sigma^2_v + \sigma^2_u$$

However, for a given i, the disturbances in different periods are correlated because of their common component, u_i:

$$Corr(v_{it} + u_i, v_{it} + u_i) = \rho + \sigma^2_u / \sigma^2$$

Using Hausman's specification test, the alternative hypothesis could not be rejected on the basis of the sample data analysed. This implies that the random effects are correlated with the variables in the model, and therefore this paper adopts the fixed effects model. Further, evidence shows that the fixed effects model is preferred over the random effects model because it is a more appropriate specification when focusing on a specific set of firms (Baltagi 1995).

4 Data Type and Sources

The study uses secondary data from income statements and balance sheets of commercial banks in Kenya covering the period 1996–2000. The reason for choosing this period is that most banks were unwilling to avail their annual reports prior to 1996. The values of individual bank portfolio holdings were obtained from income statements and balance sheets of the banks through direct contact with them. Net income was calculated by subtracting total expenditure from total income.

Owing to the relatively small number of banks (the seven banks chosen had assets valued between Ksh 1 billion and Ksh 10 billion, that is, they lay between the top and bottom categories) in the study and of the number of independent variables (seven), the data were pooled to increase the number of observations. Therefore, a sufficiently large number of observations (35) were created from the initial small sample.

Descriptive statistics of all variables indicate huge differences within and between the banks' financial resource allocations. The deviation of earnings between banks is, however, marginal. The banks hold the bulk of their money in loans and advances and customer deposits. The mean holdings in loans and advances, and customer deposits are Ksh 2.3 billion and 2.7 billion, respectively. However, the mean as a measure of central tendency is not representative of individual portfolio holdings across the banks, as indicated by the huge standard deviation. Nevertheless, there is minimal dispersion in terms of coefficient of variation.

One bank, the National Industrial Credit Bank (NIC), reported the largest portfolio holdings in four out of eight categories (Tables 1 and 2). While most banks did not invest in certificates of deposit but in subsidiary companies, Middle East Bank and Bank of India did not

invest in either. Further, each of these two banks recorded the lowest values in four of the nine portfolio holdings, the highest number of portfolio holdings with the lower figures. The other five banks had three or fewer portfolios with the lower values.

Table 1: Descriptive statistics of the banks, 1996–2000 (Ksh '000)

Variable	Mean	Standard deviation
Placements, loans and advances with building societies and other banking institutions (PLABB)	461,107.1	368,136.6
Government securities (GSEC)	619,685.4	443,947
Investment in subsidiary companies (INSCO)	45,848.12	83,133.29
Loans and advances (LA)	2,276,592	1,617,475
Other assets (OTHER)	83,677.85	91,649.34
Customer deposits (CDEP)	2,662,590	147,331
Certificates of deposit (COD)	289,760.2	454,595.7
Deposit balances from other banking institutions (DBFB)	201,603.9	208,376.9
Total income (TOTY)	801,983.6	522,350.2
Total expenditure (TOTE)	628,376.2	369,446.5
Net income (NY)	203,298.6	163,049

Nevertheless, portfolio composition of banks in Kenya is random and is most likely guided by the personal discretion of bank management. However, loan portfolio, customer deposits and profit seem to have a consistent pattern with very minimal dispersions between banks. During the period under study, NIC recorded the maximum number of observations in 6 out of 11 cases. The mean portfolio holding for that bank included Ksh 4.9 billion in loans and advances, Ksh 5.2 billion in customer deposits, Ksh 503 million in profits and Ksh 907 million in government securities.

Table 2: Descriptive statistics of NIC, 1996–2000 (Ksh '000)

Variable	Mean	Standard deviation
Placements, loans and advances with building societies and other banking institutions (PLABB)	324,527.8	176,607.9
Government securities (GSEC)	906,777.6	557,131.6
Investment in subsidiary companies (INSCO)	50,600.4	418.2108
Loans and advances (LA)	4,867,323	799,083.4
Other assets (OTHER)	121,158.2	42,950.51
Customer deposits (CDEP)	5,153,848	495,348.8
Certificates of deposit (COD)	91,560	104,891.9
Deposit balances from other banking institutions (DBFB)	0	0
Net income (NY)	503,325.8	74,791.92

5. Estimation Results and Discussion

The basic portfolio model estimated is the same as the one used in Zoeller and Hester (1966). Rates of return are imputed to earning assets and deposit liabilities by regression methods. The two authors wished to provide empirical estimates of the net rates of return that banks realize on various elements in their portfolio. Therefore, the regressions explaining costs, revenue and earnings included all earning assets and deposit liabilities. Both the explanatory and explained variables were introduced as ratios to total assets. The equation was estimated from data averaged over the four years from 1956–1959. This paper adopts the same model with various modifications. The model uses the one-way error component regression. Within this methodology, use of panel estimators has contributed significantly to this study. It has enabled the study to incorporate single effects that are unobserved and specific to each bank, and all the characteristics of a given bank that are not part of the other control variables. The coefficients are interpreted as elasticities, since a log linear equation was estimated. Both the explained and the explanatory variables are in levels and not in ratios as in the original model of Zoeller and Hester (1966).

The results of the empirical analysis are set out in Table 3, which gives estimates of the coefficients associated with the explanatory variables.

Table 3: Fixed-effects (within) regression: dependent variable is natural logarithm of net income (LnNY) (*t*-statistics in parentheses)

Models **Independent variables**	**(1)** **Coefficients**	**(2)** **Coefficients**	**(3)** **Coefficients**
LnOther assets (LnOTHER)	.0005		
	(.073)		
LnCertificates of deposit (LnCOD)	.0014	.0015	.0015
	(.483)	(.495)	(.504)
LnCustomer deposits (LnCDEP)	-.955**	-.957**	-.918**
	(-3.149)	(-3.240)	(-3.360)
LnLoans and advances (LnLA)	1.056*	1.062**	1.064**
	(2.620)	(2.729)	(2.791)
LnInvestment in subsidiary companies (LnINSCO)	-.003	-.003	
	(-.383)	(-.390)	
LnGovernment securities (LnGSEC)	.134	.133	.120*
	(1.928)	(1.983)	(2.125)
LnPlacements, loans and advances to building societies and other banking institutions (lnPLABB)	.017**	.017**	.017**
	(3.741)	(4.0587)	(4.163)
Constant	8.795*	8.754*	8.352*
	(2.261)	(2.415)	(2.449)
R-squared	.14	.15	.19
F-statistic	21.28	24.15	25.40
Sample size	35	35	35

Note: *significant at 5%; **significant at 1%

The results indicate that except for customer deposits and investments in subsidiary companies, all other factors affect bank earnings positively. Generally, customer deposits, which include demand deposits, savings deposits and time deposits, are a proxy for reservable deposits. These deposits also constitute the cheapest source of funds available to commercial banks. Therefore, the performance of a commercial bank is related to its ability to attract individual deposits. Therefore, one way

to improve a bank's profitability or earnings is to formulate aggressive policies for attracting personal deposits. However, the Central Bank of Kenya requires that banks retain a certain proportion of their deposits (liquid cash) with themselves.

In Table 3, the customer deposits variable enters the equation negatively with very significant coefficients in all the regressions. This can be considered as an estimate of the opportunity cost of holding the deposits on the assumption that market deposit and lending rates are invariant to the reserve requirements. The coefficient for investments in subsidiary companies is negative and insignificant. Observation of the expenditure structure of banks indicates that the trend of declining bank earnings due to changes in investment in subsidiary companies is a result of rising bank salaries, increasing competition and initial overhead expenditures. These costs have caused non-portfolio subsidiary expenditures to rise faster than non-portfolio revenues. This should not be interpreted to imply that subsidiaries have become unprofitable. Subsidiaries generate deposits and loans, hence well-established banks with a very large asset base are encouraged to venture into investments. Another possible explanation for this result is that the banks in the study have assets ranging in value from Ksh 1 billion to Ksh 10 billion and hence their ability to operate subsidiaries is limited.

The coefficient of loan portfolio and placements, and loans and advances to building societies and other banking institutions enter the equation positively and are highly significant in the three regressions. This indicates that the larger the bank's loan portfolio, the higher the performance of its profitability scale. The assumption here is that the bank performs careful analysis of the credit risks presented by each loan application, since most of its success depends on how 'collectable' its loan portfolio is.

These results are in line with findings in the literature. Abdulla (1994) reported similar results. A possible explanation for these results is that the loan portfolio drives bank earnings. During the years under study, one hardly notices price differentials between similar products offered by different banks. However, one can observe severe competition between banks and other financial institutions, such as insurance companies, in attracting customers by adding new features to their products.

Empirical evidence indicates that reported earnings of the banks indeed rise with all other assets except customer deposits, whose holding imposes an opportunity cost on the banks, and investment in subsidiary companies, whose non-portfolio costs tend to rise faster than non-portfolio revenues, therefore lowering profits. Loans and advances, placements with other banking institutions, customer deposits and government securities are the most important determinants of profitability in the Kenyan banking industry.

6. Conclusions

Commercial banks in Kenya contribute significantly to economic development of the country. They represent one of the most important tools for implementing government monetary policies. This role is increasingly becoming important as these banks are expected to actively participate in financing public and private investments.

Despite this important role of banks, very few studies have been conducted on bank portfolios and how they affect bank earnings and profitability. The primary purpose of this research was to conduct an empirical investigation on the impact of the magnitude and type of investment portfolios on bank earnings. To that end, three regressions with different sets of independent variables were estimated. The earning capacity of the banks was shown to rise much faster with loans and advances than with other investments. This sort of relationship could be attributed to stringent credit risk analysis by bank portfolio managers. However, investment in subsidiary companies impacts negatively on bank profits. The most reasonable explanation for this is that non-portfolio costs rise faster than non-portfolio revenues.

The results presented in this paper provide evidence that holding of bank deposits could translate into very high opportunity costs in terms of lost interest revenues, a situation that lowers profits. This finding is in line with that of Altunbas *et al* (2000). However, we also find that banking services per se do not have a significant independent influence on bank earnings. Bank portfolio managers are expected to exercise prudence in choosing portfolio investments.

This paper has not dealt with other external issues that affect bank earnings such as taxes, market share, stock market operations, foreign portfolio holdings, inflation, banks' foreign direct investment and

managerial constraints. It may be interesting, in future research, to investigate the effect of penetration of foreign banks on profitability of domestic banks.

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