"PORTFOLIO DIVERSIFICATION: AN EMPIRICAL INVESTIGATION OF COMMERCIAL BANKS IN KENYA"

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A MANAGEMENT PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE DEGREE OF MASTER OF BUSINESS AND ADMINISTRATION OF THE UNIVERSITY OF NAIROBI.

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

1.2. Background

1.3. Objectives of the Study

1.4. Significance of the Study

This Research Project has been submitted for examination with my approval as University Supervisor.

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TABLE OF CONTENTS

LIST OF TABLES ................................................................. (i)

ACKNOWLEDGEMENTS .......................................................... (ii)

ABSTRACT ............................................................................ (iv)

CHAPTER 1: INTRODUCTION

1.2. Background ................................................................. 3

1.2. Statement of The Problem ............................................. 5

1.3. Objectives of The Study ................................................ 6

1.4. Significance of The Study .............................................. 7

CHAPTER 2: LITERATURE REVIEW

2.1. Definitions and conceptual framework ............................... 9

2.1.1. Portfolio Diversification ........................................... 9

2.1.2. An Overview of Banking in Kenya ............................. 10

2.1.3. Factors Affecting Bank Portfolio Diversification ......... 13

2.2 The Portfolio Theory ..................................................... 16

2.2.1. The Historical Perspective ....................................... 16

2.2.2. Efficient Frontier .................................................... 20

2.2.3. Feasible Portfolios .................................................. 20

2.2.4. Mathematical background of the Portfolio Theory ....... 21

2.3. Past Research Studies .................................................. 27
CHAPTER 3: RESEARCH DESIGN

3.1. Data Population ............................................. 35
3.2. Data Sample ................................................... 35
3.3. Data Collection .............................................. 35
3.3.1. Nature of Data ............................................. 35
3.3.2. The Source of Data ....................................... 37
3.4.1. Preliminary Analysis ..................................... 38
3.4.2. The Model .................................................. 39
3.4.3. Assumptions of the Model ............................... 40
3.4.4. Prediction using the Model ............................. 42
3.4.5. Application of the Model ............................... 43

CHAPTER 4: DATA ANALYSIS AND FINDINGS

4.1. Analysis for 1993 Data ...................................... 46
4.2. Analysis for 1994 Data ...................................... 49

CHAPTER 5: SUMMARY AND CONCLUSIONS

5.1. Summary of Findings and Implications .................... 53
5.2. Conclusions .................................................. 53
5.3. Limitations of the Study ................................... 55
5.4. Recommendations for Further Studies .................... 57

APPENDICES ....................................................... 58

BIBLIOGRAPHY ..................................................... 65
LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DESCRIPTIVE STATISTICS ANALYSIS</td>
</tr>
<tr>
<td>2</td>
<td>RAW DATA 1993</td>
</tr>
<tr>
<td>3</td>
<td>RAW DATA 1994</td>
</tr>
<tr>
<td>4</td>
<td>COMMERCIAL BANKS OPERATING IN KENYA</td>
</tr>
<tr>
<td>5</td>
<td>BANK PEER GROUPS</td>
</tr>
</tbody>
</table>

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In loving memory of the late Brothers and Friends

JACKTON and NATHAN OMODI
DEDICATED to the late NATHAN OMODI who taught me the value of hard work and being self reliant. He was instrumental, an inspiration and moulded me to what I am. And to my Mum for her long endurance, struggle and patience.
ABSTRACT

This study had set out to address the problem of determining portfolio composition that ensures efficient diversification against risk by commercial banks in Kenya. Currently, most banks apply intuitive or subjective methods in deriving the number of distinct government securities to hold in a portfolio. Such methods not only lack objectivity but may not achieve the near portfolio diversification efficiency.

It is with this view, that the study examined some factors that were deemed to be affecting portfolio diversification of Commercial banks in Kenya, and by using such factors to develop an empirical method of ascertaining the required portfolio composition.

Data was obtained from 31 out of 37 commercial banks registered in Kenya by the end of 1994. Multiple Regression Analysis statistical technique, with the aid of Macromanager and Macrostat computer software packages, was used to conduct the data analysis.

Based on the results of the Regression Analysis, there were indications of a relationship between the selected independent variables: Networth, Deposits not allocated to the customers (Deposits less loans) and the amount of loans, and the independent variable, number of distinct government securities. The relationship indicated a marked improvement over the years from 31% in 1993 to 67% in 1994.
In the absence of any laid down objective rule of determining the number of distinct government securities to hold, the 1994 model obtained, provides an estimate and/or a beginning ground for obtaining bank portfolio composition.

It is also hoped that the results of this study will be read and/or interpreted in light of the limitations to the study.

Commercial Banks form a very important segment of the investment market (Dougall, 1973)². Commercial banks are institutional investors that act in a position of trust, investing not only their own, but the funds of others entrusted to their care. Such a position requires a greater degree of prudence and caution than the individuals might employ in the selection of their own commitments.

Traditionally, these banks have been viewed as issuers of indenituous who develop a wage between lending rates. These institutions have been portrayed as intermediaries between borrowers and lenders of funds.

This view ignores the fact that banks also intermediate for and shareholders.

In reality, these institutions conduct investment activities


CHAPTER 1: INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The banking system in Kenya is regulated by the Central Bank of Kenya (CBK) Act and the Banking Act. These Acts are intended primarily to facilitate the development and maintenance of a sound monetary policy (Ngesa, 1990). The Banking Act is also designed to safeguard customer's deposits.

Commercial Banks form a very important segment of the investment market (Dougall, 1973). Commercial banks are institutional investors that act in a position of trust, investing not only their money, but the funds of others entrusted to their care. Such a position requires a greater degree of prudence and caution than the individuals might employ in the selection of their own commitments.

Traditionally, these banks have been viewed as issuers of indirect debt who develop a wage between lending rates. These institutions have been portrayed as intermediaries between borrowers and lenders of funds.

This view ignores the fact that banks also intermediate for their shareholders.

In reality, these institutions conduct investment activities


on behalf of their shareholders by holding a portfolio of securities. Investment in securities pre-supposes risk, and a common way of reducing risk is to follow the principle of diversification (Sprecher, 1978).

The benefit of diversifying, is that the assurance of obtaining the anticipated return on the portfolio of securities is increased. In a diversified portfolio, some securities may not perform as expected but others may exceed expectations, with the effect that the actual results of the portfolio will be close to those anticipated.

Portfolio composition is the ultimate decision since the investor must decide what securities to include in his portfolio. An investor is generally expected to select the portfolio whose risk and expected return will maximize his expected utility. This presupposes risk and uncertainty, since portfolio composition would not be necessary under conditions of certainty. In a world of risk and uncertainty, portfolio composition is used as a means of diversifying and therefore reducing the risk that is incurred.

The current practice by most commercial banks in an attempt to

decide on their portfolio composition is through the use of subjective judgmental methods.

Just as Sprecher points out:

"......risk is a quantitative variable and the actual portfolios are derived intuitively."

Although, there are more recent portfolio composition models involving the quantification of the risk and the return variables, (and in the case of mean -variance models, mathematical programming techniques used), these models are yet to be applied to the Kenyan Scenario.

Thus, the concern in this study, is to conduct an investigation of the factors that affect portfolio composition of the commercial banks in Kenya, and consequently derive an empirical method of determining such a composition.

**STATEMENT OF THE PROBLEM**

The problem of determining a portfolio composition that ensures efficient diversification against risk faces almost all commercial banks in Kenya.

Most banks use intuitive or subjective methods in deriving the number of securities to hold in a portfolio. Such methods not only lack objectivity but may not achieve near portfolio diversification efficiency.
Thus, this study set outs to examine the factors that affect a bank’s portfolio composition, and by using such factors to develop an empirical method of ascertaining the required portfolio composition.

**OBJECTIVE OF THE STUDY**

The study has two major objectives:

1. To investigate the factors that affect security portfolio holdings of Kenya’s commercial banks.

2. To develop an empirical method of determining a bank’s portfolio composition.

**HYPOTHESIS TO BE TESTED**

The study intends to test the following hypotheses:

H1: A bank’s size is not related to the nature of its diversification (where a bank’s size is measured by the deposit amount).

H2: Bank diversification is independent of its net worth.

H3: There is an independent relationship between the amount of deposits not allocated to the customers (Deposits less Loans), and diversification.

H4: Bank Loans (Advances) is independent of its diversification.
SIGNIFICANCE OF THE STUDY

It is hoped that the findings of this study will:

1. Offer an objective methodology of portfolio diversification to bank financial managers.
2. Aid bank stockholders and/or potential investors to assess the extent to which a bank has diversified in a portfolio of securities.
3. Provide a comprehensive background material for investigating the nature of bank investments in Kenya, which can be used by academic researchers and Government economists.

MOTIVATION TO THE STUDY

Many banks in Kenya over the recent past have either been put under statutory management by the Central Bank or gone into liquidation. Notable examples of such banks include; Pan African Bank, Trade Bank, Meridian Biao Bank, and so forth.

Although, there are many reasons that could have led to such a scenario, crucial among them is the technical insolvency which chiefly arises from the nature of investment policy pursued by a bank.

Investment policy of surplus funds is not only important in determining the profitability and liquidity but also the risk position of a bank. Banks usually have at their disposal large amounts of cash balances that requires a careful investment policy which ensures profitability but at the same time minimizes risk from such investments.
It is against such a perspective that the researcher was motivated to investigate the factors that would influence portfolio diversification by commercial banks in Kenya.

As Coddington and Moore (1986) put it: “Diversification is a strategy that attempts to spread financial risk by investing in various assets or markets.”

A diversification is the investment in a number of securities as opposed to concentrating in one or two securities (Sprecher, 1978). Smith (1970) defines a “portfolio” as a list of securities that belongs to an investor or a group of investors having certain characteristics. He adds that a portfolio is itself a distinct entity with identifiable characteristics and is not just the sum of its elements.

According to Websters dictionary, “risk” is the “chance of injury, damage or loss.” Risk is an important concept to the investor and in simple terms refers to the variability of returns on investment.


CHAPTER 2: LITERATURE REVIEW

2.1 Definitions and conceptual framework

2.1.1 Portfolio Diversification

There are many ways in which the terms; "portfolio" and "Diversification" have been defined but the basic underlying meanings and/or idea has been consistently maintained in the literature.

As Coddington and Moore (1986) put it:

"Diversification is a strategy that attempts to spread financial risk by investing in various assets or markets."

Thus, diversification is the investment in a number of securities as opposed to concentrating in one or two securities (Sprecher, 1978)\(^7\)

Smith (1970) defines a "portfolio" as a list of securities that belongs to an investor or a group of investors having certain goals. He adds that, a portfolio is itself a distinct entity with measurable characteristics and is not just the sum of its components.

According to Websters dictionary, "risk" is the "chance of injury, damage or loss."\(^8\) Risk is an important concept to the investor and in simple terms refers to the variability of returns of an investment.

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\(^6\) Coddington, D.C., and Moore, K.D. "Market Driven strategies in Health care", Jossey Base Ltd., 1987

\(^7\) Sprecher, 1978. op.cit

Risk is therefore a part of any financial investment decision and must be analyzed along with the other facets of a potential investment decision.

Thus, portfolio diversification refers to spreading financial risk by investing in different securities which are contained in a portfolio.

In this study, the securities are restricted to government treasury bills and bonds. These are the most common security instruments that commercial banks invest in.

2.1.2 An Overview of Banking in Kenya

The banking system in Kenya performs several operations which contribute to the functioning of the financial system (Salami, 1989). The banking sector therefore plays a very significant role in boosting national output, employment and income (Bett, 1992). It is therefore one of the fundamental sectors to the country's economic development.

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According to the U.S.A. internal Revenue Code 1954, a bank is defined as:

"Any bank or trust company...... a substantial portion of the business of which consists of receiving deposits and making loans and discounts ......such terms also mean domestic building and loan associations." 

The Kenya Banking Act (Cap 488) defines a bank as:

"Any company carrying out a banking business......and banking business is any business which includes the acceptance of deposits of money from the public repayable on demand or after a fixed period of notice."

For an institution to qualify as a bank in Kenya, the following five conditions must be fulfilled:

i) Acceptance of deposits

ii) Maintaining of current Accounts

iii) Payments can be made in cheques

iv) Collection of cheques and,

v) extension of credit (loans or advances)

The Kenyan financial system consists of two broad types of Institutions: Commercial Banks and the Non-Bank Financial institutions.

The main difference between a commercial bank and a Non-bank financial institution is that the former is able to provide current account services while the latter is not. The two types of institutions therefore compete for Non-current account deposits.

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Thus, the scope of this study is limited to commercial banks and do not consider Non-bank financial institutions.

The assets of commercial banks consists of three major types:

1. Primary reserves of cash and balances with other banks, including the legal reserves.
2. Earning assets, consisting of loans and investments
3. Fixed Assets.

The earning assets category, which is our main concern in this study, consists of four categories:

i) Secondary reserves consisting of highly liquid loans, such as bankers acceptances, and short-terms Treasury bills.
ii) The bond investment account
iii) Securities held for trading
iv) Other earning assets, consisting of commercial, consumer and real estate loans.

The secondary reserves should be of such high quality and liquidity that it can be converted into cash at any time without material loss.

In determining the relative proportion of assets in each group, the bank faces the difficult problem of maintaining liquidity at the same time deriving a reasonable income.

The primary reserves are completely liquid but produce no income. The secondary reserves are extremely liquid but at times pay a low rate of return.
Ordinarily, they yield a rate of return but in times of credit stress, their rates of interest exceed those of long-term securities.

2.1.3 Factors Affecting Bank Portfolio Diversification

There are many studies based in U.S.A. and U.K. which have addressed the factors that affect bank portfolio diversification. Notable among these studies is that of Dougall (1973) who advanced four factors.

1. The nature of deposit liabilities - He asserted that banks which normally carry large demand deposits, especially those which act as depositories for other banks must maintain a higher degree of liquidity than those whose time deposits predominate or whose demand deposits are usually stable. Liquidity is reflected in the proportion of short-term government securities among the earnings assets.

2. The relationship between deposits and capital funds: Banks normally have a very small net worth in relation to assets. The capital (stock), surplus, undivided profits, and contingency reserves that comprise the net worth represent the protection afforded by the owners to the depositors. The lower the ratio of net worth to deposits, the greater the risk and hence the greater the need for liquidity through high quality and short maturity.

12Dougall H.E., Op cit.
3. The pattern of assets - closely related to the previous factor is the amount and character of the bank's assets other than its highly liquid investments. If assets at risk - that is, loans and discounts exclusive of open-market paper, and longer-term investments - the risk element in the investment program must be kept at a minimum through emphasis on higher quality and shorter maturities in the bond discount.

Assets, Deposits and Net Worth are related by the supervisory authorities and by bank management. The less liquid the assets, the greater the proportion, net worth must bear to deposits. The bank with a maximum of loans and a minimum of liquid investments must have a higher cushion of owners' equity.

4. The Bank's Earnings Requirements: This factor is placed last because a bank's investment policy must always be based more on considerations of safety than of income. A bank has the objective of earning an attractive rate on the investment of its stockholders; but its first responsibility is to its depositors.

Dougall continues to add that high risk and high earnings go hand in hand (at least until disaster strikes); low risk-taking, produces low returns. To strike the proper medium between these extremes is the central investment problem of banking.

The relation of capital funds to deposits, the character of the deposits, and the types of services rendered by the bank all affect the degree of risk it assumes; the same factors also
determine its earnings power. When, in order to produce satisfactory earnings, the cash position of a bank is reduced, or loans and investments of longer maturity or of lower quality are acquired, or deposits are greatly increased, the interest of the stockholders and those of the depositors must be balanced with the unusual ingenuity.

Kane and Buser (1979) also identified similar factors with almost similar relationships between a bank's portfolio and nature of investment. They considered four factors that are crucial in the determination of a bank's portfolio composition. These are:

Net worth of a bank; frequency of dealing in Government securities; Amounts of Deposits and loans (Advances); and amount of deposits not given out as loans.

They reached a conclusion almost similar to Dougall's, that the frequency a bank deals in Government securities, networth and amount of deposits not given out as loans, influence positively a bank's portfolio composition. But loans were found to have a negative relationship with a bank's portfolio composition.

In addition, Kane and Buser also indicated that portfolio diversification increases modestly with bank size up to approximately the USD 500 million deposit level.

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Ferguson (1986) demonstrated that by shifting a portfolio’s mix between a risky asset in accordance with the behaviour of the risky asset, one can create a Dynamic Asset Allocation (DAA) program that will provide good upside participation while limiting downside exposure. He further added that a DAA strategy that used a levered position in the risky asset and one-year treasury bills as the safe asset, and that limited loss in any given year to 15 percent, would have achieved a compound annual return of 10.4 percent over the 1928 to 1983 period, versus 9.1 percent for the unlevered asset.

Thus, Ferguson considered treasury bills as a safe asset this study also intends to use treasury bills as one type of securities to be held in a bank portfolio composition.

2.2. THE PORTFOLIO THEORY

2.2.1. HISTORICAL PERSPECTIVE

The formulation of portfolio theory rests on the work of Dr. Harry Markowitz. He made his basic contributions in an article in 1952, and it was this work that has altered everyone’s perspective regarding portfolio management.

---

Markowitz used mathematical programming and statistical analysis in order to arrange for the optimum allocation of assets within portfolios. To reach this objective, Markowitz generated portfolios within a reward-risk context. That is, he considered the variance in the expected returns from investments and their relationship to each other in constructing portfolios.

Professor William F. Sharpe has also made several contributions to portfolio theory. He elaborated on and improved the tenets of portfolio theory and decisively proved the merits of using portfolio theory. He proved the virtues of Markowitz's system of asset diversification, basing diversification on the interrelationships between the elements of a set. He also suggested portfolio models that involve fewer and simpler calculations than Markowitz's original model (called the full variance model), and he developed several computer programs for their practical application to real portfolio situations.

A portfolio combines a number of asset units into aggregate packages. Mathematically, a portfolio is defined in terms of the percentages of the total assets allocated to each portfolio element (securities). Thus, a security portfolio is defined in terms of the percentages of a set that are invested in the various elements (a portfolio is considered a set).

Portfolio theory uses the model approach to illustrate portfolio designs, and models rest on assumptions. Among the assumptions that these models have used include:

1. Investors can visualize each prospective investment as a probability distribution of expected returns over a definite holding period.

2. Investors visualize risk as the variation that they might experience in their expected returns. The rate earned from an investment will fluctuate, and a measure of this fluctuation constitutes the risk associated with investment outlets.

3. Investors contrast risks and rewards in their decision making process. They base their investments on anticipated returns and the expected variations in these returns.

4. Investors operate at different risk levels. Therefore, they would prefer high returns to lower returns at any given risk level. The objective of portfolio theory is to maximize returns for investors at any given level of risk.

Markowitz analytic procedure provides a method for identifying portfolios that are efficient in the sense that they satisfy certain efficiency criteria and various preconditions that may be imposed by a portfolio manager. A portfolio is referred to be efficient if it (1) offers a higher expected rate of return than any other portfolio having the same level of risk and (2) offers a lower risk level of risk than any other portfolio having the same expected rate of return. These efficiency criteria are appropriate for use by investors who are:

1. Risk averse in the sense that they are made happy by anticipation of gain but are vexed by uncertainty about future rates of return.

2. Willing to base investment decisions about risky assets on estimated means, variances and covariances of rate of return.

It is also worth noting that application of quantitative portfolio selection techniques would not necessarily preempt any of the portfolio manager's accustomed discretionary options or the manager's responsibility for selecting portfolios that balance expected rate of return and risk in a way that satisfies the client's investments objectives.

Neither is it the purpose of normative portfolio theory to dictate to an investor what are proper investment objectives.

---

2.2.2. **Efficient Frontier**

A portfolio is really the blending of securities together into a composite whole for investment purposes. In Markowitz terminology, securities can be mixed together in a portfolio so that their owner can earn a maximum return at any given risk level. Markowitz named an efficient set of portfolios the "efficient frontier." The efficient frontier concept has been developed and used by many authors as a basic element in portfolio selection. The purpose of portfolio theory is to define the composition of efficient portfolios in order to achieve expected returns and contrast their estimates against portfolio risks.

2.2.3. **Feasible Portfolios**

With such a high degree of reasonableness prevailing in the market place, there is a limit to the number of expected returns possible from mixing securities on a list of securities. Thus, there is a very large number of security packages (almost infinite in number) possible from a list of securities that fall on or below the efficient frontier. Although any set of feasible portfolios in this area is invariably quite large, the set elements are still limited.

They are confined to the reward-risk combinations that can be generated from the inputs of portfolio theory data that can be market determined and reasonable.
In compact notation, a portfolio is actually a set of percentages \(x'\) whose value totals one.

A negative value of any element of a portfolio set suggests that the asset has been sold short.\(^{17}\) Consequently, the asset is not owned. In addition, an aggregate portfolio value exceeding 100 percent suggests that the assets constituting the portfolio require more capital than is currently available for investment or, alternatively, a need for borrowing. One final comment has to be made; all feasible portfolios must have the proportion of their total funds devoted to each element equal to or greater than zero.

2. **Rate of Return**

As is possible with any capital asset, portfolio theory utilizes the holding period return (market return) to define the expected roles of return earned by either single portfolio elements or by aggregate portfolio. The holding period return considers the anticipated income earned from an asset plus the expected gain or loss earned through its disposal.

In terms of common stock prices the holding period return can be expressed as follows:

\[
\text{HPR} = \frac{\text{P}_1 + \text{P}_2}{\text{P}}
\]

\(^{17}\) Negative \(x_i\)'s can indicate assets sold short, the model assumes \((x_i >= 0)\) which does not allow short sales.
Where;

\[ HPR = \text{The holding period return} \]
\[ P_1 = \text{The initial price} \]
\[ P_2 = \text{The terminal price} \]
\[ P = P_2 - P_1 \]

In terms of bond prices, the holding period return can be expressed as follows:

\[ HPR = \frac{I_t}{P} \]

Where;

\[ I_t = \text{Interest to be earned during the holding period} \]

3. **Portfolio Returns**

The expected returns earned by a portfolio is given as follows:

\[ R_p = \sum_{i=1}^{n} X_i R_i \]

Where;

\[ R_p = \text{The expected rate of returns earned by a portfolio} \]
\[ n = \text{Number of assets in a portfolio} \]
\[ R_i = \text{Expected rates of return earned by individual set elements} \]
\[ X_i = \text{Proportion of the total fund invested in each asset; that is, the portfolio element.} \]
4. **Measuring Risk**

In designing portfolios, investor-analysis use two measures of risk. The first is concerned with a portfolio's elements, while the second is concerned with aggregate portfolio risk. A brief look at each of these two classifications is as follows:

(i) **Standard Deviation** has been used as a measure of risk in portfolio theory. Risk is considered to be the likelihood of variation around the expected returns earned by either securities or portfolios.

The standard deviation about the expected return in a portfolio is given as:

\[ S_i = \left( \sum_{i=1}^{n} P_i (R_i - E(R_i))^2 \right)^{1/2} \]

Where
- \( S_i \) = standard deviation of the returns (\( R_i \))
- \( P_i \) = Probability of occurrence
- \( R_{iy} \) = Returns ... holding period of returns
- \( E(R_i) \) = Expected returns
- \( n \) = Number of returns

(ii) **Aggregate Portfolio Risk**

After income-producing assets have been intermingled in portfolios, the proper measure of their aggregate risk (portfolio risk) is more than merely combining their constituent standard deviations (\( S_i \)) together mathematically.
Portfolio elements have their own risk characteristics and their own earnings pattern. When they are combined in a portfolio, their return will fluctuate differently. The contribution each element makes to a portfolio varies from element to element because the variance of their expected returns are different. Therefore, it can be stated unequivocally that the expected returns from assets not only vary and change in absolute amounts but they also move in different directions. Portfolio elements can vary inversely (negatively correlated), and they can vary directly (positively correlated).

Aggregate portfolio risk ($S_p$) depends upon the variance of expected returns and the relationship between portfolio elements as measured by their coefficient of correlation.

(ii) The two element portfolio

In a two-security portfolio, the total variance depends upon the amounts invested in the two securities ($X_i$ and $X_j$), the two standard deviations ($S_i$ and $S_s$) of the expected returns, and the coefficient of correlation ($P_{ij}$).

For a two-unit portfolio, these concepts can be expressed as:

$$S_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} X_i X_j P_{ij} S_i S_j$$
or in the extended form:

\[ \text{covariance (C)} = P_{ij} S_i S_j \]

so that equations (1) and (2) respectively become:

1. \[ S_P^2 = \sum_{i=1}^{n} x_i^2 S_i^2 + \sum_{j=1}^{n} x_j^2 S_j^2 + 2 \sum_{i=1}^{n} \sum_{j=i+1}^{n} x_i x_j P_{ij} S_i S_j \]

The covariance \((C_{ij})\) is equal to \(P_{ij} S_i S_j\) so that equations (1) and (2) respectively become:

\[ 3. S_P^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} x_i x_j P_{ij} \]

or

\[ 4. S_P^2 = x_i^2 S_i^2 + x_j^2 S_j^2 + 2x_i x_j P_{ij} \]

Where

- \(S_p\) = The standard deviation of a portfolio's expected returns
- \(x_i\) = The proportion of the total funds invested in security \(i\)
- \(x_j\) = The population of the total funds invested in security \(j\)
- \(P_{ij}\) = The coefficient of correlation between the two expected returns.

\(S_i\) and \(S_j\) = The standard deviation of the expected returns for security \(x_i\) and \(x_j\) respectively
A move beyond the two-unit portfolio to three, four or more units would increase the terms of equation (1) and (2) rapidly. The terms would increase because analysts must specify more terms to cover the interrelationships between portfolio elements; more and more covariance terms as well as variance terms would be needed.

Hence, a large diversified portfolio as an example would divert our efforts to equation solving.

2.3. Past Research Studies

Although Markowitz asserted that to ensure efficient diversification, securities should be packaged into portfolios, the problem of portfolio diversification would not be fully solved as evidenced by other studies. As Grubel (1979)\textsuperscript{18} points out, when a portfolio manager has investment success with a portfolio it often presents him with opportunities to manage different and larger portfolios. Ultimately, he will confront a portfolio so large that his talents are taxed to the limit; having reached his level of "incompetence", he will no longer be able to achieve above-average returns.

Grubel adds that in a world in which recognition for success comes rapidly, portfolio managers rapidly reach the levels of incompetence and tend to remain there for some time.

Thus, at any given moment, only a small proportion of all portfolio managers will be earning consistently above average returns. And they will move through the successful portfolios of their careers so quickly that their existence will not really be visible to the tests of academics.

Kano and Yamazaki (1991)\(^{19}\) demonstrated that a portfolio optimization model using mean-absolute deviation risk (L_1) function can remove most of the difficulties associated with the classical Markowitz's model while maintaining its advantages over equilibrium models. In particular, the L_1 risk model leads to a linear program instead of a quadratic program so that a large scale optimization problem consisting of more than 1,000 stocks may be solved on a real time basis.

Numerical data using the historical data of 225 stocks showed that the L_1 risk model generates a portfolio quite similar to that of Markowitz's model within a fraction of time required to solve the latter.

---

Wayne and Campbell (1991)\textsuperscript{20} advanced that critical to tactical asset allocation are the predicted returns for various asset classes. In terms of asset pricing theory, most of the predictability of portfolio returns can be explained by shifts in risk exposure and in the economy-wide compensation for bearing risks associated with the stock market, unexpected inflation, consumer expenditures and interest rates.

They added that risk exposures (betas) change predictability through time. There are also predictable changes in the compensation (risk premium) for a given beta, which vary with the business cycle. At the portfolio level, changes in the risk premiums are far more important than changes in the betas.

Gary et al (1991)\textsuperscript{21} presented a framework for determining the contributions of different aspects of the investment management process, assets allocation policy, active assets allocation and security selection to the total return of investment portfolios. Data from 82 large pension plans indicated that asset allocation policy, however determined, is the overwhelmingly dominant contributor to total return.


They carried out a survey of institutional investors, corporate issuers, investment underwriters and market regulators in Germany, Japan, Switzerland, the United Kingdom and the U.S., to ascertain if international accounting differences actually affect market decisions.

Approximately one-half of the survey participants feel that international accounting diversity influences their capital decisions. International accounting diversity may thus be a barrier that affects the pricing of securities and the compositions of international portfolios. Roughly one-half of the market participants surveyed, however, according to the article, feel that they have effective ways of coping with diversity.

Samuelson (1969) dealt with the portfolio selection problem in a dynamic framework. He examined and expanded the theory of portfolio selection when the elasticity of marginal utility is invariant with changes in wealth. He concludes that:

"... for isoelastic marginal utilities, in your prime of life you have the same relative risk - tolerance as towards the end of life"

According to Samuelson, under this class of utility functions and assuming frictionless markets, investment behaviour should not be a function of age.

Chen et al (1971) addressed the problem of portfolio revision over time. They formulated a single-period portfolio revision model by incorporating into the Markowitz model two constraints, which specify the effect of transfer costs as portfolio revision. The model can be used to determine the optimal portfolio to which an investor should change his current portfolio immediately.

Analytical results for the model are derived for a two asset case and compared with Smith’s target portfolio.

The single-period portfolio revision model is then extended to the multi-period case using a dynamic programming framework (model), which can be used to select an optimum series of portfolios over time.

Sharpe (1963) presented a model that relates the return of a security to a market index. The model assumes that the movement of securities depends solely on their response to the common market index.

The model vastly reduces the data requirements of the Markowitz model. It also reduces computation time due to the simplified form of the variance-covariance matrix.

---

Cohen and Pogue (1967)\textsuperscript{28} presented two new model structures that share with the Sharpe model a vast reduction in both data requirements and computational time. However, their models allow more sources of interaction between securities than does Sharpe’s. The authors explore the structure of their models along with Sharpe’s and examine how well these model perform in the selection of portfolios.

The ability of these models to select portfolios that perform better than random portfolios and at least as well as (or better) than mutual funds is noted.

Pratt (1964)\textsuperscript{29}, asserted that given an efficient frontier, there is the problem of picking which of the efficient portfolios we desire to hold. Pratt discusses the properties of various utility functions that might be used to select such a portfolio

Sharpe (1964)\textsuperscript{30}, uses modern portfolio theory to derive the equilibrium yield for a risky asset. As might be expected, this return depends on the asset’s covariance with the market index.

\begin{itemize}
\end{itemize}
Treynor and Mazuy (1966)\textsuperscript{31} advanced that, if a portfolio consisted of a constant proportion of common stocks, then there would be a linear relationship between the return on the portfolio and the market return. However, if a portfolio manager were able to anticipate changes in the stock market, he would not maintain a constant proportion of stocks but rather would decrease his common stock holdings when a market was declining and increase it when the market was improving.

Based on these past studies, it is clear that the issue of portfolio composition requires crucial consideration. No past studies have been undertaken known to this researcher in Kenya.

CHAPTER 3

3.0. RESEARCH DESIGN

3.1 DATA POPULATION

The population comprises all the commercial banks operating in Kenya under the Banking Act of 1968.

3.2 DATA SAMPLE

The sample taken up for the study was 31 banks randomly selected out of the population of 37 commercial banks operating in Kenya up to the end of 1994.

3.3 DATA COLLECTION

This was in the form of secondary data obtainable from the following sources:
- Records from the Central Bank of Kenya
- Treasury
- Individuals Banks
- Registrar of companies
- Daily Newspapers for the Published Balance Sheets.
- Nairobi Stock Exchange

3.3.1 THE NATURE OF DATA

Based on the Literature Review already conducted, there are five main factors that affect Bank Portfolio Diversification.
[Note: Portfolio Diversification in this study refers to the Number of distinct Government Securities i.e treasury bills and bonds held by the Commercial Banks]

The five factors are:

1. Deposits (D)
2. Loans (L)
3. Networth (NW)
4. Deposits less loans (D-L)
5. How Regular a Bank trades in government securities.

Thus, these five factors have been used to determine the nature of diversification (i.e. number of distinct government securities held).

Past studies used Multiple Regression Analysis to ascertain the relationship between these factors and the number of distinct government securities held (Diversification).

Such a relationship has been stated as follows:

\[ n = b_0 + b_1 d_N + b_2 D + b_3 NW + b_4 (D - L) + b_5 L + \epsilon \]

Where:

- \( n \) = Number of distinct government securities
- \( d_N \) = Dummy variable that take on the value of unit for banks that trade regularly in government securities but zero otherwise.
NW = Net worth
L = Loans
D = Deposits
(D-L) = Deposits less loans (not allocated to the customers)
b's = The regression Coefficients
E = The error term recording the effect, if any, of all omitted variables that influence a bank's choice of the number of distinct government securities.

3.3.2. THE SOURCE DATA

The factors are derived from the elements of financial statements (specifically the Balance Sheet and the notes thereon) as follows:

1. Amounts of Deposits, Loans, Networth are directly obtained from Balance sheets (and notes to the accounts thereon). This financial statements were obtained from:
   - The Nairobi Stock Exchange (NSE) for publicly quoted Commercial Banks.
   - Central Bank of Kenya and Registrar of Companies - with whom Commercial Banks file their annual returns/accounts.

2. Information on how regular commercial banks trade in Government Securities was not readily available. This necessitated the researcher to exclude this factor from the list of variables to be investigated as affecting bank portfolio diversification. Accordingly, the predicting
The regression model was modified to take into consideration the exclusion of the above factor, and was as follows:

\[ n = b_0 + b_1 NW + b_2 (D-L) + b_3 L + E \]

NOTE:

1. For the financial statements and/or other required information that were not readily obtainable from the above specified sources, the researcher contacted the individual banks through the Questionnaire method (please refer to the questionnaire attached).

2. The required financial data could only be obtained for the periods ending 1993 and 1994. This brought limitations to the study since there are government securities which are traded for less than a year say semi-annually (6 months), 3 months, monthly or even weekly.

3. Once the data is complete, it is then fitted in the statistical technique chosen, which in this case is the Multiple Regression Analysis. The four Independent variables are used to predict the Nature of diversification (i.e. the Number of distinct Government Securities).

3.4. DATA ANALYSIS

3.4.1. Preliminary Analysis

This was in a tabular form depicting the mean and standard deviation of the number of distinct securities held by banks.
This enabled a preliminary investigation to be done on the pattern of such securities overtime.

3.4.2. **THE MODEL**

Multiple regression analysis and the related statistical tool is the technique that was applied in this study.

The generated predictive equation derived from the analysis is of the form:

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + E \]

Where;

- **Y** = response variable
- **\( \beta_0 \)** = a constant
- **\( \beta_i \)** = the partial regression coefficient for variable **i**
- **\( X_i \)** = score on predictor variable **i**
- **E** = Error term

The reason why multiple regression and correlation analysis were selected in preference to other statistical tools is that from the literature review conducted, it was evidenced that the regression models were widely used.

So there would be reason to believe that the statistical tool is applicable to this study. In any case, a simple plot of the data will provide guidance as to the nature of the relationships.
3.4.3. **Assumptions of the Model**

A number of assumptions are usually made to validate the results of a regression model (Onuonga 1988). The assumptions are important mainly to aid in interpreting the various measures of the goodness of fit of the resulting predictive equation.

In addition, there are usually tests conducted to ascertain whether these assumptions have been violated or not.

These assumptions are:

1. The error term $e_i$ for all possible sets of given values $X_1, X_2, ..., X_n$ are assumed to be normally distributed (heteroscedasticity).

2. The random variable, $e_i$ (error term) is assumed to be statistically independent of each of the predictor variables. This implies that at each observation $i$, the covariance between a predictor variable and corresponding error term is zero; (n-1) coefficients, the number of degree of freedom is.

3. The expected value (the mean) of the error is zero for all possible sets of given values $X_1, X_2, X_3, ..., X_n$, that is $E(e_i) = 0$. This implies that for given $X_i$, the differences between $Y_i$ and $\bar{Y}_i$ are on the average zero through some of the differences may be positive other negative.

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The variance of the errors is finite and is constant for all possible sets of given values $x_1$, $x_2$, $x_3$, ..., $x_n$ (homoscedasticity). This means that the dispersion or variability of points in the population from the regression line must be constant;

5. Any two error terms are statistically independent of any other, that is, their covariance is zero. The error term at one point in the population cannot be systematically related to the error term of any other point in the population.

6. None of the predictor variables is an exact linear combination of another predictor variable(s). This assumption requires that no perfectly linear relationship exists (Multicollinearity).

7. The number of observation(M) must exceed the number of coefficients $(n+1)$ being estimated, where $n$ is the number of predictor variables.

With $(n+1)$ coefficients, the number of degree of freedom is $m-(n+1)$. Therefore the condition specifies that there must be at least one degree of freedom.

The robustness of the regression model less in the fact that various tests are available to test both the significance of the estimators and violation of some of the assumptions.
It is important to remember that the validity of the regression application depends upon whether basic conditions in the period ahead will be similar to those in existence during the period upon which the regression is based.

**Application of the Model**

In this study, A Cross - Section Regression Analysis will then be applied to explain the number of distinct issues held in a time series of cross sections of banks.

The proposed model will be of the following form:

\[ n = b_0 + b_1 NW + b_2 (D-L) + b_3 L + E \]

Where:

- \( n \) = Number of distinct government securities (that is, government treasury bills and bonds) distinct in some feature: coupon, maturity and call provision.
- \( NW \) = Net worth of a bank
- \( (D-L) \) = The amount of deposits not allocated to customer loans (that is, Deposits less loans)
- \( L \) = Total loans
- \( E \) = The error term recording the effect if any, of all omitted variables that influence a bank's choice of the number of distinct government securities.
- \( b's \) = The regression coefficients

Kane and Buser\textsuperscript{35} used a similar model to predict security portfolio Diversification at U.S commercial Banks. They used the same type and number of indicator variables to predict the number of distinct securities that a bank holds at a given period.

No such study, known to this author, has been conducted in Kenya.

\textsuperscript{35} Kane., E.J. and Buser S.A., Op.Cit.
CHAPTER 4: DATA ANALYSIS AND FINDINGS

The main concern in this study was to carry out an empirical investigation on the factors that affect portfolio diversification of commercial Banks in Kenya. Four factors, so far, had been identified that require an enquiry on the nature of their effects, if any, on bank portfolio diversification. These were:

1. Networth
2. Loans
3. Deposits less loans
4. How frequently a bank trades in Government securities

Due to the constraints involved in data collection, data could only be obtained on the first 3 factors, that is, networth, loans and deposits less loans (D-L).

As has been indicated in the previous sections of this report, the main statistical technique to be used in data analysis is Multiple Regression Analysis.

Thus, data on the dependent variable (number of distinct government securities) and the 3 dependent variables, mentioned above, were run on a Multiple Regression Statistical Analysis. The Macro manager and Macrostat Computer Software Packages were used for this purpose. The two packages were considered to be powerful enough to produce the required output needed for the necessary analysis.

\[ y = -0.003N + 0.019L + 0.0044D + 0.0035 \]
The Modified Multiple Regression Equation is of the following form:

\[ Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \xi \]

Where:
- \( Y \) = Number of distinct government securities, that is government treasury bills and bonds, distinct in some feature: coupon, maturity and call provision (\( n \)).
- \( X_1 \) = Networth of a Commercial Bank (NW).
- \( X_2 \) = Amount of Deposits not allocated to customer loans, that is, deposits less loans (D-L).
- \( X_3 \) = Loans (L)

A Regression Analysis was conducted for the two years, 1993 and 1994 separately. The results are analyzed as follows:

### 4.1. DATA ANALYSIS FOR THE YEAR 1993

1. The Regression Equation

The resulting Regression Equation for 1993 is:

\[ Y = 8.35 - 0.0656x_1 + 0.01869x_2 + 0.008446x_3 \]

The equation translated back to our original predicting equation form becomes:

\[ n = 8.35 - 0.065NW + 0.01869(D-L) + 0.008446L \]
This implies that for every change by Ksh. 10 million in Networth (NW), Deposits less loans (D-L) and loans (L), the number of distinct government securities held by the Commercial banks is bound to change by (0.065), 0.01869 and 0.008446 respectively.

The constant 8.35 represents the minimal number of government securities in the optimally diversified portfolio of banks in the sample selected in 1994.

2. **Coefficient of Determination:**

The Regression shows a coefficient of determination of approximately 31%. This indicates that only 31% of the variations in the number of government securities held by commercial banks is explained by the 3 predictor variables. This is a weak relationship which shows that there are other factors, not taken up in this analysis which are explaining the remaining 69% of the variations in the number of distinct government securities held.

3. **Significance of the Regression Coefficients:**

Testing the regression coefficients at the 95% confidence interval level reveal the following:

$H_0 : B_i = 0, (i = 1 \text{ to } 3)$

$H_A : \text{Non of the regression coefficient equals to zero.}$

This at Alpha equal to 0.05, non of the probability values is less than 0.05 showing that the coefficients are not statically significant at the 95% level of confidence.
4. Significance of the Overall Regression Equation

From the analysis of variance in computer print-out, the F-ratio is significant at levels below 99% (or alpha equal to 0.0163). That is the overall regression coefficient is only significant at levels < = 99%.

This provides indications that there are some relationships between the predictor variables and the independent variable.

5. The Durbin - Watson Statistic

The computer print-out also gives the Durbin - Watson statistic for testing autocorrelation. This is conducted as follows:

Ho : There is no positive autocorrelation

HA : There is positive autocorrelation

The Durbin - Watson statistic, $d = 1.3697$

From the table of Durbin-Watson Test for alpha = 0.05 when number of observations, $n = 31$ and number of independent variables, $K = 3$;

$d_L = 1.23$

$d_U = 1.65$

Since the observed $d$ value is greater than $d_L = 1.37$, we accept the Ho of no positive autocorrelation and conclude that residuals do not exhibit positive serial correlation.
6. Correlation Matrix

From the computer print-out of the correlation matrix, the followings correlations are established.

The predictor variables; NW, (D-L) and L have moderate correlations with independent variable, n of 48%, 53% and 53% respectively. This shows that the variables: Networth, loans and Deposits not allocated to the customers (D-L) are not highly related to the number of distinct government securities held by the commercial banks in Kenya.

Networth is on average correlated to the factors: loans and Deposit not allocated to the customers (D-L) of 96% and 96% respectively. While the factor: Deposit not allocated to the customers has a relationship of 98% to the amount of loans.

Since there are averagely high relationships between these predictors variables: Networth, Deposits not allocated to the customers and loans, there are indications of multicollinearity existing among the independent variables.

4.2. DATA ANALYSIS FOR THE YEAR 1994

1. The Regression Equation:

In the initial form, this is stated as follows:

\[ Y = 7.48 + 0.0882X_1 + 0.0006988X_2 - 0.00929X_3 \]
Interpretation: For every Ksh. 10 million change in the factors: Networth, Deposits not allocated to the customers (D-L) and loans, the number of distinct government securities held by the commercial banks will change by 0.0882, 0.0006988 and -0.00929 respectively.

2. Coefficient of Determination

From the computer print out, \( R^2 = 67\% \) (approx)

This implies that the selected predictor variables: Networth, Deposits not allowed to customers and loans can only explain 67\% of the variations in the number of distinct government securities held by the commercial banks.

3. Significance of the regression coefficients

This is tested the hypothesis

\[ H_0 : B_i = 0 \quad (i = 1 \text{ to } 3) \]

\[ H_A : \text{Not all of the regression coefficients equals to zero.} \]

All the coefficients except networth at the 0.05 level. But at alpha equal to 0.9 loans are significant variables. From the output it can be seen that the F - ratio is very significant at even at the conventional critical values of 0.05 and 0.01 indicating that the whole regression equation is significant.
5. The Durbin-Watson statistic

Alpha = 0.05 while d = 1.7758
n = 31
k = 3
d_L = 1.23
d_U = 1.65

Since the observed d value is greater than d_U = 1.65, we reject Ho of no positive autocorrelation and conclude again that the residuals exhibit positive serial correlation.

6. The Correlation Matrix

The following correlations was established among the variables:

This is generally a very high relationship between the predictor variables NW, (D-L) and L and the Dependent variable of 78%, 59%, and 68% respectively.

There is also high relationship between NW and (D-L) of 74% and NW and loans of 95%. D-L and L have correlation of 72%.

Once more, the high relationships among the predictor variables are indications of multicollinearity.

Table 1 indicates high values of standard deviations for the selected variables.
The number of distinct government securities has a mean value of 9.1 in 1993 and 11.46 in 1994.

Thus, from the sample of commercial Banks selected for analysis, there are high fluctuations of the number of government securities held.
SUMMARY AND CONCLUSION

5.1. Summary of Findings and Implications

This study had addressed itself to the problem of determining portfolio composition that ensures efficient diversification against risk by Commercial Banks in Kenya.

As had been established, most commercial banks use intuitive or subjective methods in deriving the number of distinct government securities held in a portfolio. Such methods not only lack objectivity but may not achieve the near portfolio diversification efficiency.

It is against such a background that this study had set out to examine the factors that affect a commercial bank's portfolio composition, and by using such factors to develop an empirical method of ascertaining the required portfolio composition.

Data was collected from 31 out of the 37 Commercial Banks registered in Kenya by the end of 1994. Multiple Regression Analysis is the statistical technique which was applied with the aid of the Macromanager and Macrostat computer software packages to analyze data collected.

The Multiple Regression Equation used was of the following form:

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \]

The coefficient of determination is 67%. The correlation matrix indicates a high

53
The following variables were used:-

Independent variable \( Y = \) The number of distinct government securities held in a period, (in this study one year)

Dependent variables

\( X_1 = \) Networth (NW)

\( X_2 = \) Deposits not allocated to the customer (D-L)

\( X_3 = \) Loans (L)

From the computer output from the selected software packages, the following resulting regression equation

\[
1994 : Y = 7.48 + 0.0882x_1 + 0.0006988x_2 - 0.00929x_3
\]

\[
1993 : Y = 8.35 - 0.0656x_1 + 0.01869x_2 + 0.008446x_3
\]

Based on the analysis of the resulting computer output, the 1993 results shows weaker relationships having a low coefficient of determination of 31% while the regression coefficients are not significant at 0.05 level of significance. The whole regression equation is also not significant at the same level.

Proceeding to 1994, there is a marked improved on the resulting relationship. The coefficient of determination is 67% but the regression coefficients are still not significant at the 0.05 level of coefficient. The correlation matrix indicates a high correlation between the number of securities held \( (y) \) and the predictor variables: NW, \( (D-L) \) and \( L \) of 78\%, 59\% and 68\%.
The number of distinct government securities is approximately 10 in both the two years which according to earlier interpretations indicate the minimal number of securities in the optimally diversified portfolio of banks in the sample selected. Thus, as the Regression equation can be used to approximate the number of distinct government securities held.

From the data analysis, it was established that although the resulting regression model had relatively weak strength, it showed some relationship (67%) among the predictor variables; networth (NW) of a bank, Deposits not allocated to Commercial Banks (D-L) and loans, and the number of distinct government securities held. Otherwise, there are other factors not taken up in the above analysis that is responsible for the variations of the number of securities held by the commercial banks.

5.3. LIMITATIONS OF THE STUDY

This study was constrained by the following limitations:

1. Data on the number of government securities held and the selected predictor variables could not be obtained on a semi-annual or monthly or weekly basis. Yet, there are government securities traded on for less than a year. Other variables also could not be investigated, though the researcher had initially planned to undertake the same.
That is, information on how regularly a commercial bank trades in government securities could not be ascertained, yet it is a factor which had been identified to be influencing the number of securities held. Could be repeated using semi-annual, monthly or weekly data from the commercial banks.

2. The closing amounts of Networth, Deposits and Loans reported in the financial statements (that is, Balance Sheets and notes thereon) were taken as the average and/or approximate figures for the whole year's deposits, loans and Networth.

3. The setbacks of the statistical technique used, which in this case was Multiple Regression Analysis. The Regression results for both two years indicate problems of multicollinearity and Autocorrelation as established under data analysis section.
5.4. RECOMMENDATIONS FOR FURTHER STUDIES

This study could be repeated using a semi-annual, monthly or weekly data from the Commercial banks.

Additional predictor variables could be also included in the analysis to improve on the strength of the relationship. Finally the model could be repeated for the period preceding end of 1994, to investigate the nature of relationship overtime.
### TABLE 1: DESCRIPTIVE STATISTICS ANALYSIS

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NOTES

1. This directory includes banks operating in Kenya as at the date of the directory and excludes the following banks which were in interim liquidation or receivership:
   (a) Continental Bank Ltd
   (b) Post Bank Credit Ltd
   (c) Exchange Bank Ltd
   (d) Trade Bank Ltd
   (e) Pan African Bank Ltd

2. **TABLE 5: BANK PEER GROUPS**

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3. The Delphis Bank Ltd took over the operations of the former Bank of Credit and Commerce International on 30th August, 1991.

4. The Bank of Oman changed its name to Mashreq Bank (Psc) on 1.10.93.
REGRESSION ANALYSIS

HEADER DATA FOR: A:FOOD LABEL: f
NUMBER OF CASES: 31 NUMBER OF VARIABLES: 4

BANK PORTFOLIO DIVERSIFICATION FOR THE YEAR 1994

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STD. ERROR OF EST. = 3.99

ADJUSTED R SQUARED = .63
R SQUARED = .67
MULTIPLE R = .82

ANALYSIS OF VARIANCE TABLE

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**DURBIN-WATSON TEST** = 1.7758

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*Critical Value (1-Tail, 11 DF): 1.695*
### CORRELATION MATRIX

**HEADER DATA FOR: A:FOOD  LABEL: f**
**NUMBER OF CASES: 31  NUMBER OF VARIABLES: 4**

**BANK PORTFOLIO DIVERSIFICATION FOR THE YEAR 1994**

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**CRITICAL VALUE (1-TAIL, .05) = + Or \(-0.30127\)**

**CRITICAL VALUE (2-TAIL, .05) = \(\pm0.35441\)**

**\\( N = 31 \)**
REGRESSION ANALYSIS

HEADER DATA FOR: A:BALL  LABEL: B
NUMBER OF CASES: 31  NUMBER OF VARIABLES: 4

BANK PORTFOLIO DIVERSIFICATION FOR THE YEAR 1993

INDEX  NAME  MEAN  STD. DEV.
1  X1  33.52  56.21
2  X2  100.87  202.90
3  X3  125.45  346.88

DEPENDENT VARIABLE: Y

VAR. REGRESSION COEFFICIENT  STD. ERROR  T(DF= 27)  PROB.  PARTIAL r²
X1  -6.56E-02  6.48E-02  -1.012  .32057  .0365
X2  1.86E-02  2.51E-02  .743  .46366  .0201
X3  8.45E-02  1.37E-02  .615  .54382  .0138

CONSTANT  8.35

STD. ERROR OF EST. = 5.10

ADJUSTED R SQUARED = .24
R SQUARED = .31
MULTIPLE R = .56

ANALYSIS OF VARIANCE TABLE

SOURCE  SUM OF SQUARES  D.F.  MEAN SQUARE  F RATIO  PROB.
REGRESSION  319.19  3  106.40  4.083  .0163
RESIDUAL  703.52  27  26.06
TOTAL  1022.71  30

OBSERVED  CALCULATED  RESIDUAL  STANDARDIZED RESIDUALS

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DURBIN-WATSON TEST = 1.3697

PORTFOLIO DIVERSIFICATION FOR THE YEAR 1991
### Correlation Matrix

**Header Data for:** A: Ball  
**Label:** B  
**Number of Cases:** 31  
**Number of Variables:** 4

#### Bank Portfolio Diversification for the Year 1993

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**Critical Value (1-tail, .05) =** +0.30127  
**Critical Value (2-tail, .05) =** ±0.35441

**N = 31**

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*ACCOUNTING IMPLICATIONS OF DIVERSIFICATION.*  

*DIVERSIFICATION AND THE RISK-RETURN TRADE OFF.*  

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