



# The Effect of Portfolio Diversification on Risk Reduction in Nigeria Investing Companies.

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## ABSTRACT

The study focuses on the effect of portfolio diversification on risk reduction in Nigeria investing companies. Panel data regression analysis was used as the methodology for the study. It is used to proffer solution to the problem of bias caused by unobserved heterogeneity and to exploit panel data sets to reveal the dynamic that are difficult to detect with cross sectional data. This is analyzed using the e-view econometric software version. For effective appraisal of this study, this research makes use of three variable; return on equity (ROE), return on asset (ROA) and risk. While return on equity and return on asset are used as measure of firm performance of the investing companies, risk is used to measure the exposure of the firm, according to Stephaney and Miguel (2002). A total of 15 firms were sampled across the economy, the annual financial reports of these companies were used.

From the study, it was established that the effective way a firm can reduce its risk is to engage in a portfolio of investment, this has been demonstrated from the study and showed that portfolio diversification and risk reduction are key variables to any organizational success. In testing the measurement of goodness of the variables, it shows that the whole model is statistically significant and that effective portfolio diversification and risk reduction in any organization cannot be over emphasized because it leads to a reduction in wastage, cost reduction and increase in profitability's of the companies. The study also affirmed the objective that portfolio diversification on risk reduction are pre-requisite for Nigeria investing companies performance. It is therefore, recommended that emphasis should be focused on the significance of risk factors which will not only assist the investors in portfolio formation but will enhance diversification on investment.

## I. INTRODUCTION

### 1.1. Background to the Study

In finance diversification means reducing risk by investing in variety of assets. If the asset value do not move up and down in perfect

synchrony, a diversified portfolio will have less risk than the weighted average risk of its constituents. Therefore, any risk-averse investor will diversify to at least some extent, with more risk-averse investors. Diversification is one of the two general techniques for reducing investment risk, the other is hedging. Diversification relies on the lack of a tight positive relationship among the assets' returns, and works even when correlations are near zero or somewhat positive. Hedging relies on negative correlation among assets, or shorting assets with positive correlation. Diversification is a portfolio strategy designed to reduce exposure of risk by combining a variety of investments into one basket of portfolio. The rationale behind this technique contends that a portfolio of different kind of investments will yield higher returns and pose a lower risk than any individual investment found within the portfolio.

Wright (2008) argued that there is no such thing as a risk free investment and mentioned some important risks that need to be taken into account, namely: shortfall risk, liquidity risk, re-investment risk, inflation risk, market risk, interest rate risk, currency risk, economic risk, credit risk and finally political risk. He insisted on his theory of risk management towards portfolio management that some investment and portfolio should reflect his own goals, personal circumstances and risk tolerance. For him, there is no one-size-fits-all solution. Diversification simply means not putting all your eggs in one basket. Asset class diversification is the primary way to manage volatility {Wright and Buffet, 2006}. The simplest example of diversification is provided by the proverb "don't put all your eggs in one basket". Dropping the basket will break all the eggs. Placing each egg in a different basket is more diversified. In finance, an example of an undiversified portfolio is to hold only one stock. This is risky; it is not unusual for a single stock to go down 50% in one year. It is much less common for a portfolio of 20 stocks to go down that much, even if they are selected at random. If the stocks are selected from a variety of industries, company sizes and types (such



as some growth stocks and some value stocks) it is still less likely.

Further diversification can be obtained by obtained by investing in stocks from different countries and in different asset classes such as bonds, real estate, private equity, infrastructure and commodities such as heating oil or gold. Since the mid-1970s, it has also been argued that diversification would generate superior risk-adjusted returns for large institutional investors by reducing overall portfolio risk while capturing some of the higher rates of return offered by the emerging markets of Asia and Latin America. If the prior expectations of the returns on all assets in the portfolio are identical, the expected return on a diversified portfolio will be identical to that on an undiversified portfolio. Ex post, some assets will do better than others, but since one does not know in advance which assets will perform better, this fact cannot be exploited in advance. The ex-post return on a diversified portfolio can never exceed that of the top-performing investment, and indeed will always be lower than the highest return (unless all returns are ex post identical).

Conversely, the diversified portfolio's return will always be higher than that of the worst-performing investment. So by diversifying, one loses the chance of having invested solely in the single asset that comes out best, but one also avoids having invested solely in the asset that comes out worst. That is the role of diversification; it narrows the range of possible outcomes. Diversification needs not either help or hurt expected returns, unless the alternative non-diversified portfolio has a higher expected return. But risk averse investors may find it beneficial to diversify into assets with lower expected returns, thereby lowering the expected return on the portfolio, when the risk-reduction benefit of doing so exceeds the cost in terms of diminished expected return. Given the advantages of diversification, many experts recommend maximum diversification, also known as 'buying the market portfolio'. Unfortunately, identifying that portfolio is not straight forward. The earliest definition comes from the capital asset pricing model which argues that maximum diversification comes from buying a pro rata share of all available assets. This is the idea underlying index funds. One objection to that is that it means avoiding investments like futures that exist in zero net supply. Another is that the portfolio is determined by what securities come to market, rather than underlying economic value.

Finally, buying pro rata shares means that the portfolios overweight any assets that are

overvalued and underweight any assets that are undervalued. This line of argument leads to portfolios that are weighted according to some definition of 'economic footprint', such as total underlying assets or annual cash flow. "Risk Parity" is an alternative idea. This weighs assets inverse proportion to risk, so the portfolio has equal risk in all asset classes. This is justified both on theoretical grounds and with the pragmatic argument that future risk is much easier to forecast than either future market value or future economic footprint.

## 1.2 Statement of the Problem

With no iota of doubt, the relationship between portfolio diversification and risk reduction in investing companies has been one of the most debated topics in the field of finance, (Rosemary, Hi & Veliyath, 2002, Santalo & Becewa 2008). Investors have ways by which they reduce risks, consider for example a portfolio that consists on investment in stocks of a firm will sustain a full brunt of loss and decline if the firm's stocks suffer a serious downturn in the market. Therefore, shifting the investment between the stocks of two or more different firms, this will reduce the potential loss and risks the investor stands to experience in his portfolio. Although several ways have been suggested to diversify portfolio and likewise, but so many questions are still not justified on the issue of portfolio diversification and risk reduction. (Campa and Kedia, 2002). (Grinder, Tallman & Olsen 2000), (Rumelt, 1984) see that series of diversification studies have been carried out mostly in various developed countries but limited evidence is available in emerging markets. The empirical evidence emerging from various studied about the effect of portfolio diversification and risk reduction have so far yielded mixed results that are inconclusive and contradicting.

Also, several studies on portfolio diversification and risk reduction have been restricted to the stock broking firms in Nigeria, which should not be as suggested by (Hoskisson, 2005) that diversified firms have business operation in more than one industries, therefore studies should be carried out in other industries aside stock broking firm. From the foregoing, it has been seen that so many questions and problems have informed or prompted this study, also whether portfolio diversification improves or worsens corporate risk reduction is worthy of further research such as the one being undertaken in this study.

## 1.3 Objectives of the Study



The broad objective of this study is to examine the effects of portfolio diversification on risk reduction in Nigeria investing companies.

The specific objectives are to:-

- i. investigate the effect of portfolio diversification on firm performance
- ii. examine the relationship between portfolio diversification and the firm risk reduction
- iii. examine the effects of correlation on stock selection
- iv. examine the rationale for stock selection by investors.

#### **1.4 Research Questions**

According to the objectives stated above, the research questions that would be examined in the course of the study are as follows:

- i. What are the effects of portfolio diversification on firm performance?
- ii. What is the relationship between portfolio diversification and the firm risk reduction?
- iii. What are the effects of correlation on stock selection?
- iv. What are the rationales for stock selection by investors?

#### **1.5 Research Hypotheses**

The hypotheses to be tested in the course of this research work are the followings:

##### **Hypotheses One**

Ho: Portfolio diversification has no significant effect on risk reduction in Nigeria Investing Companies

Hi: Portfolio diversification has significant effect on risk reduction in Nigeria Investing Companies

##### **Hypotheses Two**

Ho: portfolio diversification has no significant effect on Firms Performance

Hi: portfolio diversification has significant effect on Firm Performance

##### **Hypotheses Three**

Ho: Correlation coefficient has no significant effect on stock selection

Hi: Correlation coefficient has significant effect on stock selection

##### **Hypotheses Four**

Ho: Stock selection has no significant effects to the investors

Hi: Stock selection has significant effects to the investors

#### **1.6 Significance of the Study**

The study focuses on the effects of portfolio diversification on risk reduction in

Nigerian investing companies. From various empirical studies; it is expected to critically assess the risk factors which affect the processes of investors' portfolio selection and diversification. Thus, this research is justified because it will motivate and develop institutional investors towards achieving optimum portfolio diversification, as means to reduce risks which are usually associated with investments in Nigeria economy.

The study is also justified on the basis that it will provide explanation for the significant of risk factors which will go a long way to provide new evidence on the effect of portfolio diversifications on risk reduction. This will widen the knowledge of individual investors and portfolio managers in taking efficient decisions on the allocation of funds, which will in turn, encourage the overall development of the Nigeria capital market. The study also serves as a tool for aiding students and other researchers who want to know the practical and theoretical aspects of stock selection and portfolio formation in the Nigeria Stock Exchange (NSE) Capital market assist them especially in the right steps when carrying out such other research on this topic. On the other hand, the empirical results of the various empirical works carried out by many researchers in the past may not be applicable to the recent challenges (e.g. financial crisis) confronting investors in most parts of the world economy.

Lastly, it will assist the financial institution and corporate organizations on how to diversify their portfolio instead of holding on to a single portfolio; and also assist the corporate organization on proper and good risk management of their assets and liabilities; to assist the investors on how to reduce portfolio risk by holding combinations of instruments which are not perfectly positively correlated (Correlation coefficient).

#### **1.7 Scope and Delimitation of the Study**

The study covers all the related issues on the effects of portfolio diversification on risk reduction in Nigeria investing companies as well as nature and the relationship between the stocks selection at the Nigeria Stock Exchange. It occupies a crucial place in the CAMP model. The study makes use of the annual reports of 15 selected stock broking firms operating in the Nigeria Stock Exchange. In selecting these companies, special consideration was placed on the major contribution to the Nigeria capital market and the selection cuts across major stock broking firms in the Nigeria Stock Exchange. This study is limited to 15 stock broking firms in Nigeria. Data were extracted from the annual reports and accounts of various registered



stock broking firms in the Nigeria Stock Exchange (NSE).

### **1.8 Operational Definition of Terms**

#### **i. Diversification**

Diversification is a means by which a firm expands from its core business into other product markets. It is also a technique that reduces risks by allocation investments among various financial instruments, industries or sectors and other categories.

#### **ii. Hedging**

This is a risk management technique to reduce or eliminate price, interest rate or foreign exchange risk exposures. The elimination or reduction of such exposures is accomplished by entering into transactions that create offsetting risk positions. The concept is that when an institution has an open position which entails a risk that it wishes to avoid or minimize, the institution can undertake a further transaction which compensates for the risk and acts as a hedge. If the hedge is effective, any gain or loss on the hedged risk position will be offset by a loss or gain on the hedge itself.

#### **iii. Mergers and Acquisitions**

This is another common way for firms to diversify. And it occurs through purchasing of another firm that is approximately of the same size. This is known as merger. For instance, Smithkline combined with Glaxo, two pharmaceutical giants to form Glaxosmithkline. It can also occur in another dimension, when one of the firms is considerably larger than the other, it is called acquisition. For instance, Coca Cola Plc acquire Schweppes, Bitter lemon and recently Limca under the name of Coca Cola Company.

#### **iv. Portfolio Risk**

Portfolio risk can be defined as the probability that the actual will not be the same as expected return on the portfolio.

#### **v. Risk Reduction**

Risk reduction is a systematic process for the identification and evaluation of pure loss exposure faced by an organization or an individual and for the selection and implementation of the most appropriate techniques for treating sure exposure.

#### **vi. Risk:**

Risk can be described as the objective uncertainty as to the occurrence of an undesired event.

#### **vii. Asymmetric Information**

Asymmetric information is the process whereby different people have different information about the share price. (Stijn and Laura, 2005) explained that whoever can gain the first hand information can achieve effect portfolio diversification.

#### **viii. Market Efficiency**

The Capital Market efficiency implies that share prices reflect all available information. Also individual investors are not able to affect the price of stocks (securities). This means that there are large numbers of investors holding small amount of wealth.

#### **ix. Organization of the Study**

The study is segmented into five chapters. Chapter one focuses on the background of the study, statement of the problem, objectives, research questions, and hypotheses to be tested, significance of the study, scope and limitation, and the outline of the study. Conceptual issues, theoretical framework and review of related empirical studies form the basis for chapter two, while chapter three basically examines the methodology, where the model is specified and the estimation procedures are presented. In chapter four, collected data were presented and interpreted; chapter five which is the last segment presents the summary, conclusion and recommendations based on the findings of the study.

## **II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

### **2.1 Literature Review**

#### **2.1.1 Concept of Risk Reduction**

Risk reduction can be described as the performance of activities designed to minimize the negative impact (cost) of uncertainty (risk) regarding possible losses (Schmitt & Roth, 1990). Risk reduction is a systematic process for the identification and evaluation of pure loss exposure faced by an organization or an individual and for the selection and implementation of the most appropriate techniques for treating sure exposure. (Radja, 1997). According to (Popov & Stulzmann, 2003), two main concepts can be extracted from this definition; uncertainty or in other words, we cannot predict the future work accuracy. Uncertainty arises when an individual perceives risk; it pushes him to control or at least to be prepared for the possible outcomes. (Killian, 2004) described risk as the objective uncertainty as to the occurrence of an undesired event; anyway, it is rightly said there is no generally accepted definition on risk because the



word is used in different disciplines to suit the professional registers. The basic consideration in the traditional risk management policy has been the reduction of the variability of the firm future cash flow under this policy, derivatives are used as the major tool of reducing the cash variability. According to (Pandey, 2005), it is assumed that cash flow variability initiation is a good from the shareholders point of view and this will cause the shareholders value to increase. (Osekita, 2002) also described risk as the amount of uncertainty about the expected rate of return from an investment. He stated that the more uncertainty the expected rate of return to investors, the greater the risk involved in the instrument. According to (Oloyede, 2001) described risk in relation to portfolio selection; that the relevant risk for an individual project is not its total risk, but its covariance with all other investments in the portfolio. However, (Nusbaum, 2008) argue that a diversified portfolio should take risks but not a lot. (Reeves, 2005) suggested that the objective of the investors is to make money as possible with a little risk of losing that money in the process as far as possible. Undoubtedly, risk management is the cornerstone of prudent practices. Risks in its nature are of utmost importance concerning any financial and non-financial institutions around the world. Many philosophers and gurus, for instance, (Dembo, 2006) and (Miller, 1972) have made sample study on risk and about several mode of diversifying its consequences through a portfolio management theory. Modern Portfolio Theory for which Harry Markowitz was jointly awarded the Nobel Prize in 1990, provides the academic bedrock for diversifying portfolios. (Litain, 1985), using IRS data over 1974 -89 period found gains from forming portfolios of bank and non-bank activities when using International Financial Statistic (IFS) rather than individual bank data. As a result, certain portfolios of bank and non-bank activities showed substantially higher returns for lower risk. Diversifying banks activities internationally forms part in the risk management practices. Several studies have been undertaken to analyse the benefits of international portfolio diversification in developed as well as in emerging markets. (Ali-Yrkko, 2002), classifies the bank's motive to diversify as an economic, management and value maximization motive. (Allen & Santomero, 1998) argued that diversification improves bank's fundamental role in risk management. Beale Jonghe and (Vennet, 2006), (Sriroh, 2006), has identified the need to assess the endogeneity of diversification decision. (Reisen, 2000) concluded that international diversification

reduces risk earlier than domestic diversification in the sense that securities reveal stranger correlations as a result of their joint exposure to country specific stocks. In fact, globalization is likely to raise the expected return for a given risk level. The diversification benefits are therefore for the reduction of risk resulting in markets that are practically uncorrelated and negatively correlated. The empirical work of (Butler & Jaouin, 2001) found that the fundamental rationale for international portfolio diversification expands the opportunities for gains from portfolio diversification afar from those that are available through domestic securities. (Arouri, 2004) showed that international diversification is often considered as the best mechanism to improve portfolio performance. In fact, correlation between asset returns from different markets is minor than correlation within the same market. (Utomi, 2002) in one of his books titled "portfolio diversification as a business survival" stated that the widespread of business failure in Nigeria could be attributed among other factors to over dependence on foreign exchange income as their main source of income or revenue. (Utomo, 2002) also quoted the works of (Pandey, 1999) saying that a portfolio is composed of individual assets where the returns on the entire portfolio is equal to the weighted average of the varying returns on its components assets. Thus, some assets in the portfolio may generate higher rate of returns than other assets in the entire portfolio, then reduced variability (risks) of the portfolio to meet all necessary financial obligations and therefore guarantees its survival. A portfolio is also said to be a grouping of financial assets such as stocks, bonds and cash equivalent as well as their mutual exchange, traded and closed funds counterparts. Portfolio is seen in the variability of returns caused by two closely related factors of risks e.g. variability of return caused by interest rate fluctuation and inflation. It will be unsound for a firm to take financial obligation and decision to add to the existing portfolio and investment that is prone to significant risk of inflation and another investment that is prone to interest rate risk. Diversification is a technique that reduces risks by allocation of investments among various financial instruments, industries or sectors and other categories. The aim of diversification is to maximize returns by investing in different industries or sectors that would react differently to the same economic condition. Most financial analysts and consultants believe that although it does not guarantee against loss, hence diversification is the most important tool of attaining long-range of financial goals while minimizing risk.



Diversification was frequently deployed as an important grand strategy for firm's growth, (Reed & Luffman, 1986). While non-diversified firm take advantage of economic of scale, firms adopting a diversified or diversification strategy enjoy the economics of scale and the strategy is created by sharing strategic resources among business units (Hoskisson, & Hitt, 1990), (Montgomery, 1994), and (Rumanujam & Varadarajam, 1989). Diversification among firms, industries and assets classes afford the investors the greatest protection against business risk, financial risk and volatility.

The grand strategy involving diversification, represent distinctive departure from the firm's existing base of operations, basically from acquisition and internal generation (Spinn-off) of a separate business with possibilities counter balancing the strengths and weakness of the two business. However, diversification occasionally is undertaken as unrelated investments, because of the high profit potentials and their minimal resources demands (John Harrison, 1999). Also, diversification is a risk management technique that mixes a wide variety of investments within a portfolio. The rationale behind this technique contends that a portfolio of different kinds of investment will on average yield returns and pose a lower risk than any individual investment found within the portfolio. (Alan Dorsey, 2007). portfolio diversification strives to smooth out unsystematic risks events in a portfolio so that the positive performance (returns) of some investments will neutralize the negative (loss) performance of other investments within a portfolio.

Therefore, the benefits of diversification will hold only if the securities in the portfolio are not perfectly related. Further diversification benefits can be gained by maintaining and investing funds in foreign securities because they tend to be less closely related with domestic investments. For example, an economic down turn in the US economy may not affect Japan's economy in the same way as a result of differences in economic, operational, political and technological environments, therefore holding Japanese Investment would allow an investor to have a cushion of protection against losses that arise from America investment as a result of US economic downturn. Taking a closer look at the concept of portfolio diversification, the idea is to create a portfolio that includes multiple investments in order to reduce risks, consider for example, a portfolio that consists of stock suffered a serious downturn; the portfolio will sustain the full brunt of the decline of loss. By splitting the investments

(diversification) between stocks of two or more different companies, the potential risks to the portfolio will be reduced (James & Mcwchinney, 2009).

### **2.1.2 The Risk**

As we live in the world of uncertainty, we cannot predict the future with accuracy. Uncertainty arises when an individual perceives risk. For this reason, a process is set in place, which includes three steps. Identification, measurement and management of the risk.

#### **i. Identification**

The first step consists of the identification of sources of risk. In order to identify these sources, the risk needs to be defined. Definition and identification will be different for each institution. This is due to the fact that risk always has two sides, the real risk and the perception of a risk. Another important factor is the aversion of a company of importation on how risk is willing to bear. Moreover, the objectives assigned to risk management will affect the identification of risk. Various actions are undertaken to achieve the identification; physical inspection, risk analysis, questionnaire, flow chart analysis, financial statement analysis and use of check list.

#### **ii. Measurement**

Once identified, a risk should be measured in order to assess its importance, when measuring a risk, two concepts are crucial, loss frequent and loss severity. The latter indicates the total amount of loss that a company could face whereas loss of frequency shows how often a loss is express to occur. Multiplying one by the model are used to predict losses as well as different rates. (exchange, inflation and interest rate) and to estimate their influence on the bank's earning and balance sheet.

#### **iii. Management**

The third step is to select and implement the appropriate technique to manage risk. One first possibility is simply to avoid risk. The second option is to control losses, which consists of trying to reduce the frequency and the severity of losses. The third technique consist of choosing a retention level.

### **2.1.3 Types of Risk Business or Financial Risk**



This type of risks refers to a situation whereby the price of security of a business declines in the market place either because of declining profitability of the issuer or financial insolvency. Of the two, the former occurs more frequently. Several reasons may explain why a business can decline in its profitability. These may be internal or external. Internal factors may include bad management, lack of new products or inefficiency in cost control. An external factor includes general business downturn, increasing competition from other industries, and overcapacity in the industries. The consequence of any of these factors is deterioration in ability of the issuing company to make profit.

**ii. Liquidity Risk**

This type of risk occurs when a firm finds it quite unable to meet up with its commitments as they fall due and inability to undertake new transactions when desirable. In a banking firm, this may be due to financing mismatches in tenor of assets and liabilities resulting in losses from liquefying assets of switching liabilities in adverse market conditions to meet liquidity claims. It may also be due to heavy dependence on purchased liquidity from highly volatile interest sensitive sources. This may force a bank to the point of seeking the assistance of the lender of the last resort to remain in business (Bhide, 1993).

**iii. Credit Risk**

This is the type of risk that occurs when interest on loans and the principal will not be paid and that market conditions will equally make it difficult for the bank to fully sell collaterals of the customers (debtors) to cover their debts to the bank. This type of risk will erode the bank's capital in the long run which will therefore affect its operation and performance, (Joel, 2009).

**iv. Earning Risk**

This type of risk arises from changes in interest rate, assets prices, operating expenses and from changes in inflation rate (Markides, 1992). It is concerned with the factors that can widen or narrow the net income of a firm after all expenses including taxes have been deducted.

**v. Operation Risk**

This is the probability that operating expenses may exceed operating revenue such that they are unable to pay their bills as at when due they are threatened with collapse. A bank that is under pressure may force or push staff into speculation in foreign market, pay excessive brokerage to win

business, pay higher interest to win deposit and enhance speculative projects with higher income. When these speculative projects collapse, losses are incurred (Geringer, 1989).

**vi. Investment Risk**

This type of risk is concerned with drop in value of marketable securities for reasons other than default or delayed payment but stock market crash or variability in interest and exchange rates. (Wan & Hoskisson, 2003).

**vii. Foreign Exchange Risk**

This type of risk occurs when a firm engages in trading in securities outside the boundaries of the country in which it is situated. This is due to losses incurred as a result of conversion of currencies and differences in political, regulatory and economic set-up of different countries of the world. It is also due to speculations and mismatches in foreign exchange exposures. Examples abound of bank collapse attributed to this type of risk. Franklin National Bank failure of 1974 after \$65million loss on speculation; Bankhaus Herrstah in Germany 1974, Voskhod Handles Bank, Soviet Union, 1985 as a result of speculation loss (Graham, Lemon & Wolf, 2002).

**viii. Regulatory Risk**

This type of risk arises from enacting new laws and regulations or stricter enforcement of existing ones that limit the earning power of a firm or the ability of such firm to reduce its risk exposure. A feature of this risk is its suddenness, since regulations may be passed giving firms little or no time to adjust to the new situation which will affect their performance.

**ix. Funding Risk**

This risk arises from the probability that a bank will be unable to purchase funds to meet its liquidity and obligation needs as they arise. This may occur when a bank is faced with sudden but unusually large withdrawals of funds and the bank is compelled to rely on less stable purchased funds at abnormal terms. This conveys signs of weakness which may affect the goodwill of the bank in the inter-bank market (Ojo, 2003).

**x. Fraud Risk**

This is another type of risk, which stems from fraud or embezzlement by employees of various organizations in Nigeria and it has the ability to weaken such firms. Crime risk is very rampant in various sectors in the Nigeria economy



and has led to the collapse or failure of many firms as a result of high rate of insider abuse and weakness of the various internal control systems in such firms (Luy, 2010). Apart from the employees, other factors such as frequent and persistent of armed robbery attacks on banks and other blue chips companies have been on the increase in recent years, which increase the risk (crime) of a firm and also reduce its performance (profitability). The on-going reforms in the country, innovations and technology will help financial assets transactions will be encouraged than cash based transactions.

**xi. Price-Level Risk**

This occurs when there is loss of purchasing power from returns of fixed income securities as a result of inflationary pressure. For instance, an investors purchased a ten year bond in 1987 at par ₦1,000 and found in caching the bond in 1997 that about 60 of the purchasing power of the original investment has been lost, because of significant increase in the cost of living.

**xii. Interest-Rate Risk**

The holders of fixed-income securities are also affected by changes in interest rate. As interest rate move up, the price of existing fixed security moves down, and vice versa. This fundamental of investment analysis relationship is due to the fact that no buyer will want to buy a bond at par when its fixed interest rate is lower than the prevailing interest rate on bond of comparative grade.

**xiii. Market Risk**

Prices of securities may as a result of many factors like a change in investors psychology toward equities in general, or toward certain types of group of securities at the time. Adverse political, social, or economic news or rumours can affect investors' psychology. This may consequently cause substantial declines in prices in the securities market.

**xiv. Psychological Risk**

This risk refers to the individual investors' emotional instability. When the market is bullish, investor are overly enthuses; when the market is declined, fear of loss grips them. In aperiod of anxiety, investors may sell most or all their securities irrespective of their normal value in terms of actual and potential earnings. They will be prepared to pay excessive price for securities without questioning their normal worth during the later stage of a bull market.

**xv. Systematic Risk**

Systematic risks are the market conditions that affect large number of assets (or companies), each to a greater or lesser extent and are sometimes called market risks. Uncertainties about general economic conditions such as GNP, interest rates, exchange rates, inflation or unemployment levels are some of the examples of systematic risks, let us assume that there is an unanticipated increase in inflation which would affect cost of supplies, wages, the value of the raw materials and affect the prices of the finished products leading to a fall in the real purchasing power of the individuals. Forces such as these, which all companies are susceptible, are the essence of systematic risks. You might wonder whether it is possible to avoid systematic risk. The answer is no because these types of risks affect the whole economy and which would adversely affect the values of the financial assets irrespective of the different types of assets in the portfolio. Systematic risk affects different types of asset in different ways. One situation is the reinvestment risk where investing fixed-term, fixed capital deposits such as fixed deposits when the interest rates have decreased. Fluctuations in the interest rates affect the market value of the bonds and depending on the direction of the movement, the bonds may become more or less attractive to the investors. Fluctuations in corporate earnings have major influence on the share prices. If a country's economy is going through a rough period, then we can expect a greater risk in the share prices as a whole.

**xvi. Unsystematic Risks**

This is when borrower or an issuer of securities such as bonds will default on the obligations to repay the principal and/or interest payments. This type of risk affects a single asset or a small group of assets and they are unique to individual companies or assets. The various types of unsystematic risks can be subdivided into several categories depending on the root causes. Business risk is where the revenues of the company are insufficient to cover the fixed cost of the operations. Financial risk occurs when the revenue companies (companies that are more reliance on borrowed funds than equity) are more exposed to this type of risk.

**xvii. Management Risk**

This is where the managers of the company are unable to manage the business at profit level, may be due to inexperience or incompetence or where there is evidence of organized fraud by the claims (Security) that a lender may have on a



borrower. In the case of a company going into liquidation, an ordinary shareholder faces a much higher collateral risk than a secured creditor. We can see from the above point that unsystematic risk does not depend on economic activities and therefore it can be reduced and essentially eliminated by applying a diversification strategy. This means, if you have a number of assets in your portfolio, and as long as the unsystematic risk associated with these assets are not correlated (not moving in the same direction), the positive and negative events should largely cancel out each other. For an amateur, this may sound a bit confusing. Let's see how a well-diversified portfolio can eliminate the unsystematic risk portion. First, what do you mean by a portfolio? It can be described as a group of assets such as shares, debentures, Treasury Bills held by an investor. It must be noted that holding just two or three different types of assets does not constitute a diversified portfolio. Generally, it is said that there should be at least twenty or more different types of assets in a well-diversified portfolio. Then, we will look at the two types of risks in relation to diversification. We discussed earlier that unsystematic risk is the one that is particular to a single group of assets. For example, if a company discovers a new production technique that will increase production and reduce costs, then shares of the company will tend to increase. This is a positive event that results in value addition to the company and events such as mergers with large companies, an increase in market share, introduction of innovation products are some of the other examples of positive events. On the other hand, unanticipated law suits, trade union actions such as strikes, industrial accidents, large scale frauds by employees or management and similar negative events will tend to decrease the value of the future cash flows and thereby the share prices. Since such a negative event is particular only to a single company, the values of the financial assets in the market as a whole will not be affected. Suppose you hold shares of only one company, and then the value of that share would fluctuate because of positive and negative company specific events. But if you held a large portfolio, some of the shares in the portfolio will go up because of positive company-specific events and some will go down in value because of negative events. The net effect on the overall portfolio will be relatively small as these effects tend to cancel out each other.

The principal of diversification says that spreading an investment across various assets will eliminate some of the risks (unsystematic) and there is a minimum level of risk affects almost all assets

in the economy to some degree, even in a well-diversified portfolio, that portion on the risk will still exist. Investing all your money in one or two financial products is similar to putting all the eggs in one basket and the consequences in the event of something going wrong would be much greater than having a well-diversified portfolio which would have lesser impact. Risk can be addressed in four ways. It can be avoided. In this case, total risk does not seek risk premium payment since it could be avoided. Risk can be reduced. This can be achieved through efficient portfolio management. Risk can be shifted, for instance by taking insurance cover, risk can be assumed. Most investors directly or indirectly assumed some measure of risk, which ought to be compensated with required rate of return.

#### **2.1.4 Types of Diversification**

There are various types of portfolio diversification, below have briefly discuss about the diversification in stock, bond and mutual fund.

##### **1. Diversification in Stock**

Diversification in stock can be done by investing in companies with different market capital size. According to (Swedroe, 2006) small capital stocks tend to have higher return.

Besides that, investors can also diversify their investment in growth stocks and value stocks. In addition, stocks investment can further be diversified into stocks with high positive momentum (high 12 – months past return) and stocks with low momentum. The easiest of stock diversification is diversifying across industries. A recent research by (Shamser, Taufiq, Hassan & Zulkarnain, 2006) indicated that there is an unstable correlation of return between industries. However, by holding industrial diversified portfolio for a long period. It will still yield some risk reduction benefits. On the other hand, the benefits of international portfolio diversification have always been questioned. Different researches have been done using different methods and different data. According to the study of Giorgio and Bruno (1977), international diversified portfolio still provides larger benefits than domestic diversified portfolio under integrated world markets. While looking at the efforts of (Sazalizainal Abidin, Mohamed Ariffm, Annuar, Nassir & Shamsher, 2004), a study from this perspective proved that domestic diversified portfolio can outperform international diversified portfolio in the long run and in the crisis period.

##### **ii. Diversification in Bond**



Bond diversification is about investing in bond with different maturity and different risk. With different terms of maturity, bond diversification can effectively achieve diversification across time horizons. In addition, diversification in bond can be done by investing in bond which different default risk. Bond with higher yield always comes with higher default risk, and it always depends on the market situation to decide which kind of bond should have bigger weight in the portfolio.

## ii. Diversification in Mutual Fund

Diversification in mutual fund is the easiest way in varying the risk within securities. If investor are buying mutual fund shares, then investor are effectively diversifying across securities. By buying into a basket of securities via index funds, ETFs, managed funds and such, then you are automatically spreading your risk across the board.

### 2.1.5 Strategies of Diversification

There are many specified diversification strategies that are developed in stock market. Those specified strategies will be discussed in theories of diversification. Instead, this research will categorize the strategy of diversification into two main areas, which are the passive strategy and active strategy.

#### i. Passive Strategy

Passive strategy is a style of management where a portfolio mirrors a market index. It is also known as indexing the portfolio. Followers of passive strategy believe in the efficient market hypothesis (EMH). It states that all time markets incorporate and reflect all information rendering individual stock picking futile. It is nearly impossible to outperform the market. As a result, the best investing strategy is to invest in index funds, or equally invest in every large capital stock. Historical data has proved that passive diversification strategy had outperformed the majority of actively managed fund. (Swedroe, 2006) has proved that from the year 1927 till 2004, actively managed fund was outperformed by passively managed fund. Another research which is done by (Luxenberg, 2009) proved that is still possible to beat the passively managed portfolio using active strategy; however, the chance is nearly impossible.

#### ii. Active Strategy

Active strategy is the total opposite of passive strategy. In contrast, the concept of active strategy is to actively diversify a fund's portfolio by

trading and changing the stocks in portfolio. It relies on analytical research, forecasts, and their own judgment and experience in making investment decisions on what securities to buy, hold and sell. Hence, it incurs a lot of efforts and cost in stock selection, market timing, information acquisition, and so on. The followers of active strategy do not believe in the efficient market hypothesis, and it is possible to profit from the stock market through any number of strategies that aim to identify mispriced securities. Despite of all the efforts incurred, historical data proves that the return of actively managed fund is outperformed by actively managed fund. However, (Stephens, 2007) stated that, this may have been true during 1980s and 1990s. By evaluation only the return starting from 2000 passively managed fund does not provide such significant return. This is because when the market is corrected, there is a high level of correlation among most market based financial products.

### 2.1.6 Factors Affecting Portfolio Diversification

#### Number of Assets in the Portfolio

In general, the increase in the number of assets in the portfolio will reduce the volatility of the portfolio. How can the lowest volatility be achieved as the number of assets increasing? (Barber, Brad, Chip, Health & Terrance 2003) and (Goetzmann & Kumar, 2002) indicated that diversification is a concept that relates to the portfolio variance. The variance can be reduced by increasing the number of assets in the portfolio. (William, Massimo & Andrei, 2004) explained that portfolio vitality is reduced when the number of assets in the portfolio increases.

#### ii. Correlation of the Assets

To achieve effective diversification, portfolio holdings should not be highly correlated. This is an inverse relationship between correlation and portfolio diversification. When correlation increases, diversification decreases. It shows that the higher the variance, the lower the correlation of risk indicators. Therefore, portfolio diversification with lower correlation tends to have lower portfolio risk.

#### iii. Asymmetric Information

To manage a portfolio of asset, investors should gain the first hand information. Asymmetric information means that different people have different information. (Stijn & Laura, 2005) explained that whoever can gain the first hand information can achieve effective portfolio



diversification. In general equilibrium, investors can specialize by holding different portfolio with different information.

#### iv. Standard Deviation (Unique Risk + Market Risk)

In finance, standard deviation represents the total risk in a portfolio. It consists of unique risk and market risk. Unique risk is the firm or industry specific risk that can be diversified away by increasing the number of stocks in a portfolio. On the contrary, market risk is the non-diversifiable risk causing the value of an investment adversely affected by the market movement. As illustrated below, the number of securities is negatively related to unique risk, and so is the total risk of the portfolio (standard deviation). Since unique risk can be diversified away, the market risk should be only risk concern for the investors. Market risk is not affected by the number of securities. It is affected by the portfolio beta  $\{\beta\}$ .

#### 1.7 Effect of Diversification of Variance

One simple measure of financial risk is variance. Diversification can lower the variance of a portfolio's return below what it would be if the entire portfolio were invested in the asset with the lowest variance of return, even if the assets' returns are uncorrelated. For example, let asset X have stochastic return  $x$  and asset Y have stochastic return  $y$ , with respective return variance  $0^2x$  and  $0^2y$ . If the fraction  $q$  of a one-unit (e.g. one-million-dollar) portfolio is asset and the fraction  $1 - q$  is placed in Y, the stochastic portfolio return is  $qx + (1 - q)y$ . If  $x$  and  $y$  are correlated, the variance of portfolio return is  $\text{var}(qx + (1 - q)y) = q^2 0^2x + (1 - q)^2 0^2y$ . The variance minimizing value of  $q$  is  $q = 0^2y / (0^2x + 0^2y)$ , which is less than what it would be at either of the undiversified values  $q = 1$  and  $q = 0$  (which respectively give portfolio variance of  $0^2x$  and  $0^2y$ ). Note that the favourable effect of diversification on portfolio variance would be enhanced if  $x$  and  $y$  were negatively correlated but diminished (though not necessarily eliminated) if they were positively correlated.

In general, the presence of more assets in a portfolio leads to greater diversification benefits, as can be seen by considering portfolio variance as a function of  $n$ , the number of assets. For example, if all assets' returns are mutually uncorrelated and have identical variance  $0^2x$ , portfolio variance is minimized by holding all assets in the equal proportions  $1/n$ . Then the portfolio return's variance  $\text{var}(1/n x_1 + 1/n x_2 + \dots + 1/n x_n) =$

$n(1/n)0^2x = 0^2x/n$ , which is monotonically decreasing in  $n$ .

The latter analysis can be adapted to show adding uncorrelated risky assets to a portion, thereby increasing the portfolio's size, is not diversification, which involves subdividing the portfolio among many smaller investments. In the case of adding investments, the portfolio's return is  $x_1 + x_2 + \dots$  instead of  $(1/n)x_1 + (1/n)x_2 + \dots + (1/n)x_n$  and the variance of the portfolio return if the assets are uncorrelated is  $\text{var}(x_1 + x_2 + \dots + x_n) = 0^2x + 0^2x + \dots + 0^2x = n0^2x$ , which is increasing in  $n$  rather than decreasing. This, for example, when an insurance company adds more and more uncorrelated policies to its portfolio, this expansion does not itself represent diversification-the diversification occurs in the spreading of the insurance company's risk over a large number of part-owners of the company.

#### 2.1.8 Effect of Taxation and Inflation on Stock

(Van Horne, 2002) in his work title multivariable and factor valuation on extended capital asset pricing model, stressed that the effect of taxation on stock is composed of two parts.

- i. Dividend, if any received during the holding period and
- ii. The capital gain or loss that occurs when stock is sold.

The study tends to clarify that if all investors paid either no taxes or the same taxes on dividend and capital gains, that CAMP generalization by whether the company paid high or low dividend. (Van Horne, 2002) emphasized the unsettled nature of the argument, the expected before tax return on security would be a function of both the stocks beta and its dividend yield.  $R_j = R_j + B_j + t(d_j - R_f)$

Where  $R_f$  is the risk free rate,  $b$ , is the coefficient indicating the relative importance of beta,  $\beta_j$ , the security's beta  $t$ , is the coefficient indicating the relative importance of the tax effect and  $d_1$  the greater the expected before tax return that investors require. And if it was 0.1 and the dividend yield was to rise by 1.0 percent, the expected return would have to increase by 0.1 percent to make the stock attractive to investors.

(Ibboston & Sinquefeld, 1976) assumed that marker equilibrium occurred in normal terms and that investors are concerned with inflation. They factored this into account when making an investment decision. The realized real return for a security can be expressed as:  $R_j = R_j - P$

Where  $R_j$  is the return for security J in real terms,  $R_j$  is return for security J in nominal terms



and P is the inflating during the period. They showed that if inflation is highly predictive, investors simply will add on inflation premium source of uncertainty. Therefore, the risk of a security can be described by its systematic and in systematic risks, regardless of whether these risks are measured in real or nominal terms (Brennan, 1998)

In addition, when inflation is uncertain, things are difficult. By uncertainty, we mean that the market does not anticipate changes that occur in the rate of inflation. Whether uncertain inflation is good or bad for a stock increases with unanticipated increase inflation, this desirable property reduced the systematic risk of the stock in real terms and provides a hedge. Contrarily, if the stock's return goes when unanticipated inflation occurs, then it is undesirable because it increases the systematic risk of the stock in real terms (Adetifa, Glen, 1998) argued that the greater the covariance of the return on a stock with unanticipated changes in inflation, the lower the expected nominal returns the market will require. Evidence shows that one could express the unexpected nominal return of a stock as a positive function of its beta and a negative inflation as stated here under:-

$$R_j = R_f + \beta_j (I - I^e) + \frac{\text{inflation covariance}}{b_j^2} \dots$$

Where I is a coefficient indicating the relative importance of a security's covariance with inflation,  $b_j^2$  is the variance of inflation, and other variables are the same as defined for equation (3.1). In effect, the last variable, is a beta for the sensitivity of security returns to changes in inflation. By dividing by inflation's variance, things are expected on a relative as opposed to an obsolete basis. In other words, covariance with inflation may be desirable property and lower the return that investors require. Many stocks have negative covariance; their returns tend to decline with unanticipated increases in inflation and vice versa. Though stock (or even stocks overall) to unanticipated changes in inflation.

### 2.1.9 Sources of Risk in Portfolio

Portfolio risk can be defined as the probability that the actual will not be the same as expected return on the portfolio. An astute investor wants to avoid too much risk will prefer that the actual return is more or less the same as expected. (Vannono, 2000). In the course of meeting the expectations of the various stakeholders, management of a firm engages in various unavoidable risks, some of which include: interest rate, operation, investment, funding, earning,

regulatory, foreign exchange and fraud risks which affect the performance of firms.

#### i. Interest Rate Risk

This is the type of risk that occurs as a result of the frequently rising and falling of interest rate which affects the level of profitability of a bank (McDougall & Round, 1984). This is derived from the fact that, prices and yields of bonds vary inversely with interest rate charges. If interest rate increases suddenly and unexpectedly, the market value of fixed income bonds and fixed rate loans will fall. A bank that is faced with the need to sell its assets in such a rising rate will incur losses.

#### ii. Earning Risk

This type of risk arises from changes in interest rate, assets prices, operating expenses and from changes in inflation rate (Markides, 1992). It is concerned with the factors that can widen or narrow the net income of a firm after all expenses including taxes have been deducted.

#### iii. Operating Risk

This is the probability that operating expenses may exceed operating revenues such that they are unable to pay their bills as at when due and they are threatened with collapse. A bank that is under pressure may force or push staff into speculation in foreign exchange market, pay excessive brokerage to win business, pay higher interest to win deposit and enhance speculative projects with higher income. When these speculative projects collapse losses are incurred (Geringer, 1989).

#### iv. Investment Risk

This type of risk is concerned with drop in value of marketable securities for reasons other than default or delayed payment but stock market crash or variability in interest and exchange rates. (Wan & Hoskisson, 2003).

#### v. Foreign Exchange Risk

This type of risk occurs when a firm engages in trading in securities outside the boundaries of the country in which it is situated. This is due to losses incurred as a result of conversion of currencies and differences in political, regulatory and economic set-up of different countries of the world. It is also due to speculations and mismatches in foreign exchange exposures. Examples abound of bank collapse attributed to this type of risk. Franklin National Bank failure of 1974 after \$65million loss on speculation; Bankhans in Germany 1974, Voskhod Handles Bank, Soviet Union, 1985 as a result of speculation loss (Graham, Lemon & Wolf, 2002).

#### vi. Regulatory Risk



This type of risk arises from enacting new laws and regulations or stricter enforcement of existing ones that limit the earning power of a firm or the ability of such firm to reduce its risk exposure. A feature of this risk is its suddenness, since regulations may be passed giving firms little or no time to adjust to the new situation which will affect their performance.

**vii. Funding Risk**

This risk arises from the probability that a bank will be unable to purchase funds to meet its liquidity and obligation needs as they arise. This may occur when a bank is faced with sudden but unusually large withdrawals of funds and the bank is compelled to rely on less stable purchased funds at abnormal terms. This conveys signs of weakness which may affect the goodwill of the bank in the inter-bank market. (Ojo, 2003).

**viii. Fraud Risk**

This is another type of risk, which stems from fraud or embezzlement by employees of various organizations in Nigeria and it has the ability to weaken such firms. Crime risk is very rampant in various sectors in Nigeria economy and has led to the collapse or failure of many firms as a result of high rate of insider abuse and weakness of the various internal control systems in such firms. (Luy, 2010). Apart from the employees, other factors such as frequent and persistent of armed robbery attacks on banks and other blue chips companies have been on the increase in recent years, which increase the risk (crime) of a firm and also reduce its performance (profitability). The on-going reforms in the country, innovations and technology will help financial assets transactions will be encouraged than cash based transactions.

**2.1.10 Classification of the Diversification Factors**

From the manager's point of view, the decision to diversify is made to respond to the business environment. In the broadest sense, business environment is defined as the whole sets of relevant strategic conditions surrounding the decision maker. It is composed of resources, information and institutional structure, etc. Business environment facilitates and enforces the decision-making on one side and provides constraints on the process on the other. Without interpreting or analyzing these conditions, managers cannot come up with any sound strategic decision. Business environment is conveniently divided into internal or external one in accordance with the boundary of the firm. Some organizational characteristics, such as the organizational structure,

culture, managerial skills, capital, technology and work force, belong to the internal environment category, while others, such as public policy, factor markets and competition in the product market, are the external social environment elements beyond the scope of the firm. Accordingly, the factor attributed to the decision to diversify could be classified as an internal factor or external one in the same way. Those within the boundary of an organization and belong to the organization environment are the internal factors and those outside the boundary of the organization and belong to the social environment are the external factors. Business environment also can be classified as resource of relationship element according to its characteristic. For the manager, a firm is the production function in production process and come up with output to supply the market. Thus the decision to diversify is within the consideration of a process to deploy resources to gain the best outcome. Secondly, a firm is also a coalition of relationship occurring along with the production process. These relationships are the interactions among the individuals or group of individuals involved in the same production process, which normally with different and often contradicting objectives. To obtain the resources from the factor markets arises the relationship between the firm and its suppliers, to organize the production induces the relationship among the owners of resources, and to supply the market, the firms encounter the relationship with its competitors and kinds of regulatory organization. Thus, the decision of diversification is also within the consideration of a process for the manager to deal with all the relationships and to cope with individual objectives at the same time.

As a consequence, the environment element that influences the decision of diversification can be classified into resource and relationship category. The factors considered in the production process to the resource domain, while the factors related to the relationships belong to the relationship one. To sum up, the business environment in which the decision is made can be understood in two dimensions. One dimension is the boundary of the firm, according to which, the environment is classified as internal or external condition. The other dimension is the characteristic of the content of the environment, which classifies the environment into resource or relationship domain.

**2.1.11 Description of the Diversification Factors**

**A. Internal Resource Factor**



The first category is the internal resource factor, which relates to the production process within the firm boundary. Neoclassical economics takes the firm as a production process, taking in resources from one side and getting the output at the other. Considering this process of physical resources flow, diversification is a strategic decision to achieve production efficiency. Specifically, the efficiency achieving consideration consists of three components: cost minimization, productivity maximization and organizational capability matching.

#### **(1) Cost Minimization**

When the multi product cost function summarizes both the production and organizational costs of operating a firm, economies of scope is the precise condition required for the emergency of multi product firms in a competitive environment. (Panzar & Willig, 1981). A firm diversified into several business segments can exploit certain synergy effects which saliently reduce its production costs, because diversification allows these business units to share the purchasing, marketing, Research and Development, and operational and financial resources. Resource sharing or knowledge and skill transferring enables the diversified firm either to reduce overall operating costs in one or more of these divisions, and/or to better differentiate the products of one or more of its divisions which leads to advantage over an un-diversified rival.

#### **(2) Productivity Maximization**

Productivity maximization motivation emerges when, with one reason or another, the resources are not fully employed in the organization. To do so, the firm could either sell out the spare resources through the market or make use of it by diversifying into different business. (Teece, 1980, 1982) and (Silverman, 1999) argue that diversification is a better choice for a firm to exploit its rent generating resources. According to the transaction cost theory and resource based view, external costs occur when dealing with spare resources through market process. Thus, the theory justifies why a firm diversifies instead of renting out their spare or excess capabilities to achieve efficiency.

#### **(3) Organizational Capabilities Matching**

A firm's organizational capabilities are the collective physical facilities and skills of employees, especially the abilities of the top and middle management. More specifically, organizational capabilities can be thought of as marketing skills, distribution skills, product development skills and organization skills and so on, and they serve as the engines of corporation's evolution (Chandler, 1990).

(Matsusaka, 2001) builds a new neoclassical firm model, arguing that organizational capabilities' matching is also an efficiency achieving element that drives a firm to diversify. He defines organizational capabilities as firm specific resources, but to some extent, they are general capabilities that potentially are applicable to different industries, thus, these capabilities are transferable. He models organizational capabilities into a firm's production function as an additional input, and presents mathematical proof that diversification, as a process to match the business and the abilities, is the best way to pursue value maximization.

### **B Internal Relationship Factor**

The second category is the internal relationship factor, which relates to the relationship flows within the firm and should be taken account into decision process. Among these relationships, the most important and relevant one is that between the shareholder and the manager (principle-agent relationship). Which largely concerns the consistence and decision making process.

In this vein, the factors that contribute to diversification include wealth maximization, human capital risk reducing and independence considerations.

#### **(1) Wealth Maximization**

On the basis of utility maximization promises, many researchers argue that diversification facilitates managers' wealth maximization goal instead of shareholders' value maximization. Manager's wealth function is composed of both monetary rewards, such as salary, bonus, options, and non pecuniary benefits associated with managing a larger corporation, for example, prestige, power, and perquisites such as company cars, offices and so on. Especially, the non monetary rewards are the benefits that diversification provides to managers and the shareholders don't enjoy. Diversification obviously provides managers an avenue for increased compensation and may serve as a motive for increased diversification. (Hoskisson & Hitt, 1990). Whether the firm grows internally or externally, there is a highly positive relationship between managers' wealth level and the firm's size supported by large number of studies, such as (Rose & Shepard, 1997), (Ueng & Wells, 2001), (Hoskisson & Hitt, 1990), (Jensen & Murphy, 1990). Especially, a recent study by (Ueng & Wells, 2001) probes into the manager incentive structure, and comes up with the conclusion that managers with



lower ratio of incentives, which means market value of shares owned by a manager is not substantial relative to his total compensation, consistently undertake more diversified acquisition than managers with the higher incentive ratio. Another empirical study also provides evidence about the relationship between managers' wealth maximization and firm diversification. By investigating the relationship between CEO compensation and firm diversification over the period from 1985 to 1990, (Rose & Shepard, 1997) finds that CEO of a firm with two lines of businesses gets average 13% more in salary and bonus than that of a similar sized but un-diversified firm, which implies that wealth maximization is a factor that accounts for diversification. (Berry, 2000) also find that CEOs in diversified organizations are paid more than those in focused organizations.

### **(2) Risk Reducing**

Portfolio theory argues that diversification is an efficient practice to reduce risks in portfolio since returns are highly but not perfectly correlated (Markowitz, 1992). However, diversification of the firm is not always beneficial from owners' point of view (Amihud & Lev, 1981) Because either in perfect capital markets or in the imperfect markets, diversification reduces the variance of firm's income distribution and this may be more costly than when investors achieve the preferred degree of risk in their portfolio on their own. And diversification has been indicated to even adversely affect equity holders by including a wealth transfer from stakeholders to bond holders. (Amihud & Lev, 1981). As a consequence, diversification, aimed at reducing firm risk. This line of view argues that when manager's personal wealth, such as income or employment, is tied to the firm's fortunes, thus, the risk associated with manager's wealth is also associated with firm's risk. When the firm fails to achieve predetermined targets, or faces bankruptcy, the manager will be hurt more than the stakeholders will. This may be because, for example, managers being in a position to lose their current employment, future career opportunities and potential earnings. Since manager's personal portfolios cannot effectively diversify such employment risk, he may diversify the firm to stabilize the firm's income stream or bankruptcy effect. (Amihud & Lev, 1981); (Hyland & Diltz, 2002). The empirical evidence that the firms with higher managers' ownership tend to engage in more conglomerate acquisitions than those with lower managers' ownership. Although not so much risk reduction

outcome is found in (Lewellen, 1989) sample, when acquiring firms' senior executives have large company shareholdings, the risk reduction outcomes do occur more often.

### **(3) Independence**

In the modern corporation organization, the manager is controlling over the decision making process, however, to what extent he can control, or to what extent he can make a decision on his free will is constrained by efficiency of the governance mechanism. As a result, the third factor in this category that drives firms to diversify is managers' independence motivation, which is defined as the freedom to make decisions without encountering shareholders constraints. While a manager is subject to pressures imposed to ensure he acts in the interest of shareholders, diversification is a strategy used to reduce or avoid such constraints. There are certain possibilities for a manager to gain independence through diversification. When a firm is diversified into several businesses, the manager will take more and more resources under his control, and it also makes management more complex than the stand alone business, therefore, it is more difficult and costly for the shareholders to monitor manager's behavior. Moreover, the information disclosed by diversified firms will be less informative than those focused firm due to the aggregate nature of the accounting reports, so the situation of information asymmetry between shareholders and managers will be enhanced. As a result, the manager is becoming more and more an "insider" within his managerial empire. At the end, shareholders have to provide manager with more leeway in handling the business. Obviously, diversification fits the needs. (Hoskisson & Turk, 1990) document that imperfect governance cannot reduce the managerial deviation from shareholders' value even creates the motives to diversify. (Denis & Denis, 1997) also find a strong negative relationship between the level of diversification and managerial equity ownership. (Anderson, 2000) argues that there is no enough evidence about the inefficient governance in diversified firms; nevertheless, their empirical investigation does provide evidence that diversified firms have lower insider ownership and outsider director than that of single segment firms. More specifically, when a firm diversifies into those asset is matching manager-specific investments, the manager will be more valuable to shareholders and costly to be replaced. Therefore, manager will be more valuable to shareholders and costly to be replaced. Therefore, manager gains more bargain power and freedom to action in the decision-making process.



Researchers disclose this situation in which managers fail to experience discipline from the full range of corporate governance and control mechanism as managerial entrenchment, and argue that managerial entrenchment is the sound explanation for the excessive expansion through diversification. (Shleifer & Vishney, 1989) find that a manager might direct a firm's diversification in a way that increases the firm's demands for his or her particular skills. Especially when the firm encounters poor financial performance in comparison with its industry peers or a change in industry conditions that make the incumbent value less, as diversification will benefit the manager with more job security, bargain power in negotiation with the board of directors, and eventually the manager will get more latitude in determining corporate strategy. (Berger, Ofek & Yermackm 1997) observe that when CEO does not face pressure from either ownership and compensation incentives or active monitoring, the level of firm's leverage is lower, which means an entrenched manager seeks diversification so as to be able to avoid internal and external constrains.

### **C. External Resource Factor**

The third category is the external resource factor, which is largely focused on the environment outside of the firm. In this line, diversification is to access to certain resources that cannot or too costly be obtained in the factor markets, such as certain materials, work force, critical technologies, distribution channels, Research and Development Capability, managerial skills, target customers and even certain geographic market. Among these external resource flows, diversify to build an internal capital market has been intensively discussed in the existing strategic and financial literatures and treated as a main factor attributes to diversification. The rational of internal capital market building through diversification is to raised funds for a given project, which basically response to the external capital market inefficiency or credit constraints due to under development, information, incentives, asset specificity and transaction cost problems. (Stein, 1997); (Lamont, 1997). External capital market is consisted of kinds of intermediary financial institutions, such as banks, insurance firms, funds, and others. These institutions borrow capital from investors and lend it to finance projects through a series of regulated markets, and face constraints related to the reliability of capital supply in the external capital market. (Rajan, 1994) examines the New England Banks' credit policies and finds that they are altered following a downturn

in the local real estate market, (Gertler & Gilehrist, 1994) also find that in response to monetary policy shocks, banks will cut back on credit. Such credit constraints, because of underdevelopment, unreliability of capital supply or other reasons, will at large cause business short of capital over time or occasionally. Diversified firm through cross-segment subsidization provides the money-starving business with financing resources. For given segment or investment project, a diversified firm can become capital sufficient in the aggregate by configuring its business portfolios as a whole. While allowing capital flow from surplus segment to the constrained one, internal capital market will occur inefficient choking off and prevent business from being irrationally starved of capital due to cyclicity's and investment. (fads Liebeskind, 2000). Many researchers have found that there is investment interdependence among lines of businesses, which implies that the diversified firm is an internal capital market. (Lamont, 1997) examines the capital expenditure of diversified oil companies after the 1986 oil price decrease, finding that the companies significantly reduced their non-oil investment compared to the media industry investment. (Shin & Stulz, 1998) provide evidence that a segment of a diversified firm depends on the cash flow of the firm's other segments, but significantly less than on its own cash flow, and the investment by segments of highly diversified firms is larger and less sensitive to their cash flow than the investment of comparable single segments firms. More interesting, internal capital market has become a major channel of financing projects in modern economies. (Triantis, 2000) finds that 4/5 of corporate projects are financed by internal capital market, and (Lamont, 1997) also finds that from 1981 to 1991, internal funds accounted for more than 3 quarters of capital outlays for U.S. non financial corporations.

### **D. External Relationship Factor**

The fourth category is the external relationship factor, which is related to the relationship flow outside of the firm. In this category, the relationship between a firm and its competitor is the most important one that should be taken into account. Thus, the competition advantage pursuing is the first factor influencing the decision to diversify.

#### **(1) Competition Advantage Pursuing**

It is needless to repeat the significance of competition advantage for a firm and the importance of competition analysis in decision making.



However, to achieve this advantage, there are two different considerations that explain why firms decide to diversify. One is the competence building, the other is the competition reducing. There has been a large volume of researches motivated by (Schumpeter, 1942) about how to build corporate competing capability by efficiently and innovatively exploiting firms' resources. Nevertheless, the competition advantage achieved by these innovations is argued to be not sustainable in the long run, because these kinds of innovations are easy to be imitated or substituted so that eventually these advantages will disperse over time. Not until the early 1990s, has enough attention been attracted in the strategy sense of diversification to achieve sustainable competing capability (Welnerfelt, 1994); (Barney, 2001). Some strategy literatures investigate further into that the same characteristics that make resources difficult to transfer across company boundaries may also make them difficult for competitors to imitate, thus potentially resources from a source of sustainable competitive advantage in the market in which they are applied. (Lippman & Rumelt, 1982). These resources are called strategic assets, or core competence, including a firm's management skills, organizational process and routines, information and knowledge. Core competences are valuable, rare, imperfectly tradable and not substitutable, and most important, they do not deteriorate as applied or shared, they grow (Prahalad & Hamel, 1990). By expanding into different lines of business, different lines of products or markets, a firm can accumulate its competence resources through learning by doing. And in the long run, only the accumulated competences that enable firm to build new strategic assets more quickly and efficiently can allow it to sustain supernormal profits over its peer firms (Markides & Williamson, 1994). (James, 1985) provides evidence in his empirical study of U.S. manufacturing firms between 1963 and 1977, finding revealed that firms didn't diversify at random, but were related to their primary activities. Therefore, diversification is not only a strategy for the firm to more profitably employ the underused resources that have multiple markets or products uses, but also a strategy to gain the sustainable competence advantage at the same time. Competition reducing consideration focuses on the strategic practices that would reduce the level of competition and gain firm a favourite market position so that diversified firm will implement influences over product market and finally enjoy the profitable market return. Diversification facilitates competition reduction for two reasons. By

increasing the entry barrier, diversification will reduce the quantity of competitors and enhance the dominant firm's market position. And by increasing the possibility to cooperate and stability of an existing collusion, diversification will dramatically dilute competition in the market place.

The first way to reduce competition through diversification is related to the market structure view. Through cross subsidization within divisions, a diversified firm may increase the possibility of potential predatory pricing so as to prevent a new entry (Rhoades, 1974); (Caves, 1981). The cross subsidization will support the diversified firm to win a survival game against a non diversified rival, which means when the predatory pricing behavior happens; the diversified firm can sustain losses for a longer time because of its lower cost advantage. In addition, the consolidated financial reporting will obscure the excess profits in a specific line of business, and this kind of information loss will decrease the attractiveness of the profitable business, while available, normally it will induce entry (Rhoades, 1974). Furthermore, reciprocal buying among the large diversified firms will foreclose markets to smaller competitors, and keep the number of market participants as small as possible. Thus, through diversification, firm can enhance or keep a favourable market share or market structure so as to gain a dominant market position.

The second way is related to the conduct analysis and largely based on the conception of "mutual forbearance", raised first by (Edwards, 1955), and later on developed into the definition "multi-market contact" or similar conceptual delineations (Adams, 1974); (Areeda and Turner, 1979); (Scott, 1982); (Feinberg, 1984, 1985). Mutual forbearance, or multi-market contact, refers to the circumstance that firms compete with each other in more than one market. (Edwards, 1955) assets that when one large conglomerate enterprise competes with another, the two are likely to encounter each other in a considerable number of markets. The multiplicity of their contact may blunt the edge of competition. Companies that meet their rivals in multiple markets will recognize their independence situation, and diversification will strengthen firms' recognition so as to be able to facilitate tacit collusion to compete less and get more market control. Diversification also can facilitate the tacit collusions by increasing firm's signal scope to show that they want to deviate from competition (Busse, 2000). Most of the later researches develop repeated Bertrand oligopoly models, which are based on the game theory, to



explain how mutual forbearance will induce firms to practice parallel behavior, hence reduce the extent of competition in a certain industry (Feinberg, 1985); (Bernheim & Whinston, 1990); (Oughton & Hughes, 1993); (Busse, 2000).

Furthermore, they also argue that this collusion equilibrium will be sustainable while diversification does influence the extent of multi-market contact substantively. While firms behave in a repeated game mode, a deviation from the collusion in one market will induce retaliation, such as tit-for-tat, trigger pricing, and other punishment in all of the markets. As long as a firm emphasizes long term payoff, sustainable collusion will be the Nash equilibrium outcome. In short, once diversification established or increased, the effect of multi-market contact will increase the possibility of collusion, and in the mean time, the same effect will keep the existing collusion sustainable.

## (2) Regulation Avoiding

Another relationship factor a firm should consider out of firm's boundary is the institutional environment. More specifically, it refers to the constraints imposed on the market place by the regulatory regime. These constraints basically work as the substitute for market forces. In the neoclassical economics, there is no room for government to intervene in the market process, however, thanks to the transaction costs, imperfect information, boundary rationalities, monopoly, externalities and others market failures factors, perfect competition equilibrium is too perfect to achieve. To correct market failure, government develops sets of institutional arrangements so as to pursue the whole society welfare maximization. Among these institutional settings, most relevant and important to the decision of diversification is the antitrust law, which aims at protecting economic freedom and provoking competition. Diversification is one of the most common methods that firm chooses to grow and firm chooses diversification to grow is to avoid regulation enforced by antitrust law. Growth is essential for a firm not only because growth enhances the strength to fight the adverse business environment, but also because growth brings firm with profitability. Firms grow into the dimensions of either horizontal expansion, or vertical integration, or diversification. However, in modern economy, to what extent a firm may grow and into what kind of dimension it can grow are tremendously influenced by the public policy, that antitrust law. Antitrust law deeply concerns the business practices that would gain or exercise marketpower, which means control over the

price and competition in the market, and eventually hurts consumers. Most of the antitrust enforcement has largely focused on the merger and acquisition activities and dominance cases, and in these cases, the antitrust analysis emphasizes the role of market structure in the rule of reason tradition since there are practical difficulties to evaluate market power directly. In the structural analysis, firm size in relation to the market is a critical consideration, as a result, grow by vertical integration or horizontal expansion is much easier to be challenged. Although the 1950 Amendment to the Clayton Act and later the Merger Guidelines have considered to cover all of the horizontal, vertical, and conglomerate mergers within the antitrust regime, since conglomerate merger or acquisitions don't involve the removal of a substantial actual competitor from the market, nor a customer and supplier integrated, the illegality of the practice is not as easily ascertained as in the case of horizontal or vertical acquisitions. Thus, antitrust legislation forced corporations away from direct "concentration affecting" mergers to diversified acquisitions. (Sheleifer & Vishny, 1991) review the U.S take over waves in the 1960s and 1980s and conclude that antitrust policy is the single most important aspect of the environment that shaped the two takeover waves.

### 2.1.12 The Relationship between Diversification and Corporate Performance

There are four categories of strategic conditions that contribute to the diversification decision, emphasizing either internal or external, either resources or relationships influences of the business environment. Apparently, not all the elements but only those important and have been studied are included here. Diversification could have different influences on the firm's value when driven by different considerations. Based on the theoretical and empirical discussions, the effect that each diversification factor has on the diversification performance can be summarized as follows:-

- i. Due to the size effect, a negative relationship between diversification and corporate performance would be predicted under efficiency-achieving factor.
- ii. Manager's wealth maximization factor would have negative influence on corporate performance.
- iii. The influence of diversification under risk reduction factor might be negative on the firm's performance



iv. There would be a negative relationship between managers' independence factor and corporate performance.

v. Because of the inefficiency internal capital market, a negative relationship between diversification and corporate performance would be expected under internal capital market building motivation.

vi. Competition advantage pursuing would have a positive effect on the corporate performance.

vii. Regulation avoiding is an important element that drives firm to diversify; however, it will influence the patterns of diversification substantially and directly instead of the corporate performance.

Most of the existing researches report a negative relationship between diversification and corporate performance. According to the previous discussion, such diversification discount is not because of measurement errors, time period or method of analysis, apparently the factors, which drive firms to diversify, should be responsible.

### 2.1.13 Motives for Diversification

There are many motives behind diversification strategies that are adopted by various firms as motives related to competitiveness and performance of such firms. (Jung, 2003). The motives are illustrated as follows:-

#### i. Synergistic Motive

The first and obvious motive of diversification is shown in cases where synergy exists within individual units, which are operated as a single organization or firm. Synergy occurs when the sum of all the entire business together equals more than the sum of different units. (Hitt, 2001). (Amit & Livnat, 1988) argued that diversification into related business may increase the market power of the diversified company which in turn, may help the company to enhance its long-term strategic position.

#### ii. Financial Motive

The motive is based on the fundamental premise of portfolio theory that "one should not put all eggs in one basket". It may also be said that a firm should diversify and not depend on a single operation. It was also shown in finance theory that, whenever the cash flows on the individual units are not perfectly correlated, the total risk as measured by variability of consolidated cash flows is reduced by diversification. (Amit & Livnat, 1998).

#### iii. Market Power Motive

Conventional wisdom suggests that, the bigger the company, the more the resources it controls, hence it should perform above average in an industry. Diversified firms have conglomerate power, which helps them thrive on their diversify (Hill, 1985). In his own view, (Gribbin, 1976) says a firm will have conglomerate power if it does not hold significant position in a number of markets.

#### iv. Agency Motives

A number of diversification motives from agency perspective will not be beneficial to the principal. The reason for this is the separation that exists between the owner and manager, where the manager does not own any equity capital in the firm. This is in agreement with (Sambharya's 2000) motive for the diversification; it states that it may reflect top management aspirations and goals. Four main reasons why managers diversify are as follows:-

i. To build empire: which is a situation in which managers diversify in order to create their own empire. (Montgomery, 1994).

ii. Managerial entrenchment: managers will diversify into new markets or products in such a way that increases the demand for their skills and abilities. (Schleifer Vishny, 1989).

iii. Risk reduction managers try to reduce their employment risk by diversifying into different markets and products and thereby make the organization or firm less dependent on a single market or product, satisfying the basis of portfolio theory which states that a firm should not put all her resources into a single business or market or product.

#### v. Resource Motive

Conventional wisdom suggests, that the bigger the company the more resources it controls, hence it should perform above average in an industry. This wisdom is the basis for the resource-based motive, which states that, bundled resources and capabilities that are aggregated over time also underpin a company's competitive advantage (Barney, 1991). When a firm has under-used resources that can be profitably employed. It also has an incentive to expand (diversify). Furthermore, diversification is driven by the need to use these excess resources (Caves, 1981). In order to grow, the firm needs to specialize and the resources from successful growth will be used to diversify the company.

### 2.2.14 Process of Becoming a Diversified Firm

Most organizations do not start completely diversified. Rather, they begin their operations in a



single business, pursuing a particular business level strategy. Success in this strategy then creates resources and strength that the organization can use in related business. The following are the ways a firm can become diversified:

**i. Internal Development of New Products**

Some firms diversify by developing their own new products and services within the boundaries of their traditional line of business operations. For example, Nigeria Breweries Plc followed this path to diversification. Relying on its traditional strengths in beer market, it then began to apply this strength in a new business by producing Maltina, Farouz. Etc. which is a related diversification with the same resources into a new product market.

**ii. Replacement of Suppliers and Customers**

Firms can also become diversified by replacing their former suppliers and customers. A company that stops buying supplied raw materials from other companies and began to provide its own supplies has diversified through Backward vertical Integration Strategy. For example, Unilever Plc at a time decided not to rely on the supplies of palm oil from Okitipupa Oil Palm plantation to manufacture its detergent soaps and began to provide its palm oil by establishing her own oil plantation. Also, it can also come in another dimension, i.e. when an organization or business firm stops selling his products to distributor but instead decided to create a subsidiary unit of firm that will sell directly to the customers of its distributors or sell directly to the consumers has diversified through Forward Vertical Integration strategy.

**iii. Mergers and Acquisitions**

This is another common way for firms to diversify. It occurs through purchasing of another firm that is approximately of the same size. This is known as merger. For instance, Smithkline combined with Glazo, two pharmaceutical giants to form Glazosmithkline. It can also occur in another dimension, when one of the firms is considerably larger than the other, it is called acquisition. For instance, Coca Cola Plc acquired Schweppes, Bitter lemon and recently Limca under the name of Coca Cola Company.

**2.1.15 Benefits and Cost of Corporate Diversification**

There are both benefits and cost associated with corporate diversification. The efficient internal market argument typically suggests that, diversified firms have more access to internally generated resources and can exploit superior information to

allocate resources among divisions. (Williamson, 1967). Diversified firms can also employ a number of mechanisms to create and exploits market power advantage, the tools that are largely unavailable to their more focused counterparts. These include predatory pricing, cross subsidization and reciprocal buying. Predatory pricing is defined as the sustainable price cutting with the aim of preventing existing rivals from future entry. On the other hand, cross subsidization is a process in which the firms tap excess revenue from one product line to support another. Entry deterrence is a method of constructing a reputation for predatory behaviour to prevent a new entry.

Finally, reciprocal buying and selling in which the focal company gives preference in purchasing decisions or contracting requirements to suppliers. From a resource based perspective, further benefits of diversification include the ability to exploit excess firm specific assets and share resources such as brand names, managerial skills, consumer loyalty and technological innovations. Benefits also stem from tax and other financial advantages associated with diversification. (Berger & Ofek, 1995) and increase debt capacity due to reduce bankruptcy probabilities. (Hewellen, 1971). (Majd & Meyers, 1987) for instance note that undiversified firms are at a significant tax disadvantage because tax is paid to the government when income is positive but the government does not pay the firm when income is negative. This disadvantage is reduced, but not eliminated by the tax code's "carry back"

And "carry forward" provisions. Their analysis predicts that as long as one or more segments of conglomerate experience losses in some years, a conglomerate pays less than what separate units or firms could pay. Diversifying the activities of a firm could be associated with severe disadvantages. The predominant view is that diversified firms are engulfed with severe agency problems that lead to inefficient resource allocation. (Jensen, 1986) asserts that managers of firm with unused borrowing power and large free cash flows are more likely to undertake unnecessary expansion activities for their private benefits. (Jirapornetal, 2006). (Williamson, 1967) stressed that, the information processing problems that arise between corporate headquarters and divisional managers limit the expected result of diversification. Information and incentive problem also lead to misallocation of resources among divisions of a diversified firm. (Meyer, 1992); (Rajan,2000). Furthermore, Santalo and Becerra relationship depends on the relative efficiency of diversifying



firms and industry characteristics because of these myriad benefits and costs, it is difficult to predict the net impact of benefits and costs associated with corporate diversification on firm performance.

## **2.2 Theoretical Framework**

Many financial theories can be linked with risk assessments to draw home the effect of portfolio diversification on risk reduction in Nigeria investing companies.

### **2.2.1 Portfolio Theory Model**

Portfolio theory approach was introduced in 1952 by Harry Markowitz in his article titled "Portfolio Selection". He proposed that investors focus on selecting portfolio based on their overall risk-reward characteristic instead of merely compiling portfolios from securities that each individually has attractive risk-reward characteristics. In a nutshell, investors should select portfolio not individual securities. (Tobin, 1958) expanded on Markowitz's work by adding a risk-free asset to the analysis. This made it possible to leverage or deleverage portfolio on the efficient frontier. Emphasizing that out of the entire universe of possible portfolios certain ones will optimally balance risk and return. This leads to the notions of super-efficient portfolio and the capital market line. He concluded that through leverage, portfolio on the capital market line is able to outperform portfolio on the efficient frontier.

Thus, in contrast to the traditional approach to the problems of choice under risk which appraises single investment projects on the basis of its total risk and return, the portfolio theory evaluates individual investment on the basis of its association with existing investment. Moreover, (Joseph, 1979) suggested that portfolio theory provides a broad context for understanding the interactions of systematic risk and return and that it is a theory on how risk averse investors can construct portfolio or to optimize or maximize market risk, emphasizing that risk is associated with higher return. The relationship between risk and return is taken step further by considering the Capital Asset Pricing Model (CAPM) developed by (Sharpe, 1964).

### **Modern Portfolio Theory**

The modern portfolio theory (MPT) is a theory of investment which attempts to maximize portfolio expected return for a given amount of portfolio risk, equivalently risk for a given level of expected return, by carefully choosing the proportions of various assets. Although MPT is widely used in practice in the financial industry and

several of its creators won a Nobel memorial prize for the theory, in recent years the basic assumptions of MPT have been widely challenged by fields such as behavioural economics.

MPT is a mathematical formulation of the concept of diversification in investing, with the aim of selecting a collection of investment assets that has collectively lower risk than any individual asset. It can be seen intuitively because different types of assets often change in value in opposite ways. For example, as prices in the stock market tend to move individually. But diversification lowers risk even if assets' returns are not negatively correlated-indeed, even if they are positively correlated. More technically, MPT models an asset return as a normally distributed function (or more generally as an elliptically distributed random variable), define risk as the standard deviation of return, and models a portfolio as a weighted combination of assets so that the return of a portfolio is the weighted combination of the assets' returns. By combining different assets whose returns are not perfectly positively correlated, MPT seeks to reduce the total variance of the portfolio return. MPT also assumes that investors are rational and markets efficient. Modern Portfolio Theory was developed in the 1950s through the early 1970s and was considered an important advance in the mathematics modeling of finance. Since then, many theoretical and practical criticisms have been levelled against it. These include the fact that financial returns do not follow a Gaussian distribution or indeed an symmetric distribution, and that correlations between asset classes are not fixed but can vary depending on external events (especially in crises). Further, there is growing evidence that investors are not rational and markets are not efficient.

### **Assumption of Modern Portfolio Theory**

The framework of modern portfolio theory (MPT) makes many assumptions about investors and markets, some are explicit in the equation, such as the use of normal distributions to model returns. Others are implicit, such as the neglect of taxes and transaction fees. None of these assumptions are entirely true, and each of them compromises MPT to some degree. Asset returns are (jointly) normally distributed random variables. In fact, it is frequently observed that returns in equity and other markets are not normally distributed. Large swing 3 to 6 standard deviation from the mean occur in the market far more frequently than the normal distribution assumption would predict. While the model can also be justified by assuming any returns distributions that are symmetrical whereas asset



returns empirically are not correlations between assets are fixed and constant forever, correlations depend on systemic relationships between the underlying assets, and change when these relationships changes. Examples include one country declaring war on another, or a general market crash, during time of financial crisis, all assets tend to become positively correlated, because they all move {down} together. In other words, MPT breaks down precisely when investors are most in need of protection from risk. All investors aim to maximize economic utility in other word, to make as much money as possible, regardless of any other consideration. This is a key assumption of the efficient market hypothesis, upon which MPT relies. All investors are rational and risk-averse. This is another assumption of the efficient market hypothesis, but we now know from behavioral economics that market participants are not rational. It does not allow for 'herd behaviour' or investors who will accept lower returns for higher risk. i.e. casino gamblers clearly pay for risk, and it is possible that some stock traders will pay it as well. All investors have access to the same information at the time. This also comes from the efficient market hypothesis. In fact, real market contain information asymmetric, insider trading, and those who are simply better informed than others. Investors have an accurate conception of possible returns, i.e. The probability beliefs of investors match the true distribution of returns. A different possibility is that investors' expectation are based, causing market prices to be informational inefficient. This possibility is studied in the field of behavioural finance, which uses psychological assumption to provide alternatives to the CAPM such as the overconfidence based asset pricing model of (Kent Daniel, David Hirshleifer, & Avanidhar, 2001).

There are no taxes or transactional cost. Real financial products are subject both to taxes and transactional cost (such as broker fees), and taking these into account will alter the composition of the optimum portfolio. These assumptions can be relaxed with more complicated versions of the model. All investors are price takers, i.e. their actions do not influence prices. In reality, sufficiently large sales or purchases of individual assets can shift market prices for that asset and others (via cross-elasticity of demand). An investors may not even be able to assemble the theoretical optimal portfolio if the market moves too much while they are buying the required securities. Any investor can lend and borrow an unlimited amount at the risk free rate of interest. In reality, every investor has a credit limit. All securities can

be divided into parcels of any size. In reality, fractional shares usually cannot be brought or sold, and some assets have minimum orders sizes.

### **2.2.3 Capital Asset Pricing Model (CAPM)**

The Capital Asset Pricing Model was developed by (Sharpe, 1964), (Lintner, 1965) and (Mossin, 1966) as a general equilibrium model. In addition to the Markowitz analysis, it provided the framework for analyzing the risk of individual securities within general capital market equilibrium. The Capital Asset Pricing Model states that since investors hold portfolio of securities rather than a single security, it is reasonable to consider the riskiness of each security in terms of contribution to the risk of the portfolio and not its own risk if held in isolation. (Oloyede, 2001). Its importance lies in the ability to measure the effect of a security risk as the total risk of a portfolio in a different way not in terms of the security's standard deviation and its correlation with the other securities in the portfolio. In recent years the trend has been to move away from stock picking and toward portfolio management. Most of the academic literatures from the last two decades generally support the efficient markets paradigm. (Haugen, 1995) stressed that efficiency means that on a well-developed security exchange, assets prices accurately reflect the trade-off between the relative risk and potential returns associated with the security.

(Sharpe, 1964) & (Lintner, 1965) added two key assumptions to the Markowitz model to identify a portfolio that must be mean-variance-efficient. The first assumption is complete agreement: given market clearing asset prices of  $t=1$ , investors agree on the joint distribution of asset returns from  $t=1$  to  $t$ . And this distribution is the true one, that is, the distribution from which the returns they used to test the model are drawn. The second assumption is that there is borrowing and lending at a risk-free rate, which is the same for all investors and does not depend on the amount borrow or lent.

(Fama & French, 2004) supported the ideas of Markowitz and Sharpe by describing portfolio opportunities and tell the CAPM story. The study revealed that the Horizontal axis shows portfolio risk, measured by the standard deviation of portfolio return; the vertical axis shows expected return. While the curve abc, which called the minimum variance frontier. Traces combinations of expected return and risk for portfolio of risky assets that minimize return for minimum variance portfolio is apparent. For example, an investor who wants a high expected return, perhaps at point a, must accept



high volatility. (Tobin, 1959) suggested that adding risk-free borrowing and lending turns the efficient set into a straight line. Investors seek diversification for a multitude of reasons; stock specific risk can be diversified by increasing the number of holdings in order to mitigate the effects of a blow up in any particular stock. However, the greater challenge lies with eradicating systematic or market risk. Market risk can never be totally eliminated within a stock portfolio; however, it is possible to decrease the level of correction within a portfolio. For example, investors could favour small caps over large caps. This is feasible because it is possible to find stocks whose earnings are less exposed to the economy at large. Indeed, it is easy to find counter-cyclical stocks within the small cap universe. Another option is to reduce the number of holdings and have a few 'focused' positions. However, this approach increases stock specific risk, so it is hard to argue that it is reducing risk. Evidence shows that CAPM is based on a number of simplifying assumptions (Sharpe, 1963), (Lintner, 1969), (Treyner & Mossin, 1966).

The most Important Assumptions Are:-

**i. Risk Aversion and Mean-Variance Characterization**

Investors are risk-averse. They evaluate a security's and risk in terms of the expected return and variance or standard deviation respectively. They prefer the highest expected return for a given level of risk. This implies that investors are mean-variance optimizers and they form efficient portfolio.

**ii. Market Efficiency**

The Capital Market efficiency implies that share prices reflect all available information. Also, individual investors are not able to affect the price of stocks (securities). This means that there are large numbers of investors holding small amount of wealth.

**iii. Risk Free Rate**

All investors can lend and borrow at a risk free rate of interest. They form portfolio from publicly traded securities like shares or stocks and bonds.

**iv. Homogenous Expectation**

All investors have the same expectations about the expected returns and risk of securities (stock).

**v. Single Time Period**

All investors' decisions are based on the single time period. (Klemkosky & Scott, 1973) in their paper titled 'Risk Analysis' found that a

rational investor should not take on any diversifiable risk, as only non-diversifiable risks are rewarded within the scope of the CAPM model. However, the required return on an asset, that is, the return that compensates for risks taken, must be linked to its riskiness in a portfolio context. However, in the CAPM context, portfolio risk is represented by higher variance, that is, less predictability. In other words, the beta of the portfolio is the defining factor in rewarding the systematic exposure taken by an investor.

i. To reduce unsystematic risk of portfolio investment

ii. To spread the systematic risks inherent in security investment so that an investor does not put all his eggs in one basket.

iii. Since systematic risk cannot be eliminated or reduced, diversification enables an investor to assume these risks and still earn a moderate rate of return.

iv. It has been proved that the higher the risk of a portfolio, the higher the rate of returns or vice versa. Therefore, diversification enables an investor to include these high yield investments in his portfolio so as to maintain a desired rate of return.

**2.2.4 Agency Theory**

Agency theory, originated by (Berle & Means, 1932), is a dominant paradigm to explain the organization's efficiency problem. Generally, agency problem or principal-agent relationship arises when parties' behaviours are constrained through contract, in which one or more persons (the principal) (s) engage another person (the agent) to perform some services on their behalf. Agency theory proposes that both of the parties are opportunist and selfish actors who will bear any effort to achieve their own utility maximization. Normally, principals can limit the divergence between principal and agent by appropriate monitor and incentive arrangement, such as managerial shareholding, institutions shareholding and board of directors. While any monitor and incentive will induce costs themselves, and at the same time, because of information is imperfect, costly, and especially asymmetrically distributed among the parties, the efficiency of the governance system is in question. Therefore, there is a good reason to believe that the agent will not always act in the best interests of the principal, even in some circumstances; managers might make a decision at the expense of owners. In a nutshell, agency theory is the theory about the moral hazards problem, or the ex post costs of contract. (Mueller, 1972) develops a firm's life cycle model, arguing that in



the mature stage, managers will have a lower marginal cost of capital curve than that of stockholders, which means while holding different time preference for growth, absence of sense of obligation, and inefficiency of governance mechanism, managers might over invest to maximize the growth in physical size of their corporation rather than its profits or stockholder welfare. This equilibrium model, is widely accepted as growth maximization theory, discloses that diversification is a way to achieve the pleasures of empire building, even at the expense of shareholders interest. Following Mueller's tradition, later literatures further argue that diversified growth maximization hypothesis serves managers discretion by increasing the resources under their control, for example, "free cash flow" (Scharfstein, 1998), or by increasing the managers' compensation, because changes in compensation are positively related to the growth in sales, (Ueng & Wells, 2001); (Rose & Shepard, 1997), or by entrenching managers specific skills, (Berger, Ofek & Yermack, 1997); (Shleifer & Vishny, 1989) as they are costly to be replaced, or by reducing managers' human capital risk. (Dennis & Dennis, 1997). Thus, this vein of research more emphasizes the potential conflict between the principle (shareholders) and the agent (managers), implying diversification will generate lower total gains. However, there are still some arguments about the positive influence that diversification will reduce the agent costs, for example, (Aron, 1988) proposes that diversification is an optimal response to the moral hazards facing firm's owners, (Amihud, 1986). (Lubatkin & Chatterjee, 1994) offer other reasons that diversification will improve shareholder welfare through risk-reducing that cannot be diversified away through investment portfolios, therefore risk-reducing through diversification may not be at odds with shareholder wealth maximization. Although diversification in some circumstances will have benefits, the majority of researches are expecting a negative relationship between diversification and corporate performance. Most of the empirical tests, such as (Dennis & Dennis 1997), (Hyland & Diltz, 2002) and others, find that free cash flow, managerial motives or managerialism can explain the reason of diversification, and conclude that agency problems are responsible for firms maintaining value reducing diversification strategies. (Berger & Ofek, 1999) find that the reduction of agency conflicts explaining the trend toward increased focus, rather than changes in the benefits from internal capital markets or changes in the regulatory or competitive environments.

### 2.3 Review of Empirical Studies

Many writers have observed that, in principle, the capital asset pricing model is testable, since it is based on investors' expectation about future returns and expectations are inherently awkward to measure, (Lamont & Owen, 1997). Hence, test of the capital asset pricing model have to examine past returns and take these as proxies for future expected returns based on a key premise. If a long enough period is examined mistaken expectations are likely to be corrected and people will come to rely on past average achieved returns when formulating expectations.

The tests of the capital asset pricing model are based on three implications of the relation between expected return and market beta implied by the model. First, expected returns on all assets are linearly related to their betas, and no other variable have marginal explanatory power. Second, the beta premium is positive, meaning that the expected return on the market portfolio exceeds the expected return on assets whose return are uncorrelated with the market return. Third, in the Sharpe and Lintner version of the model, assets uncorrelated with the market have expected return equal to the risk free interest rate, and the beta premium is the expected market returns minus the risk-free rate. Most tests of these predictions used either cross-section or time-series regressions. Both approaches date to early test of the model, (Fama & Macbeth, 1973), (Douglas, 1968) & (Tobin, 1958).

(Bettis & Mahajan, 1985) selected a sample of 80 firms to examine the relationship of risk/return performance in two categories of related and unrelated diversified firms on the basis of accounting data. They found that, on average, the related diversified firms perform better than the unrelated diversified firms. However, no significant difference in terms of risk measurement was explored. Most of the studies in 1990s also remained inconclusive on the role of diversification on firm performance.

(Hill & Hensen, 1991) examined diversification and its impact on performance in pharmaceutical industry of USA for the period 1977-86. They concluded that the motive behind diversification of the US pharmaceutical industry was to reduce the risk based on technological dynamism. They reported that such diversification contributed to a decline in the economic performance of the firm.

(Baker, 1992) analyzed the time series of Beatrice company since its inception in 1891 to its growth as a food conglomerate and reported that the related diversification of the firm produce value



whereas unrelated diversification could not contribute in terms of value addition of the firm.

(Lubatkin & Chatterjee, 1994) created a random sample of 246 Fortune 500 firms to study the relationship of diversification with risk and return. They found a U shaped graph for the relationship between corporate diversification and stock return as well as risk. They suggested that the diversification in similar business can reduce the risk without hampering the economic performance as compared to diversification in terms of diversified business.

(Pandy & Rao, 1998) selected a sample of 2,637 US firms for the period 1981-90 to study the difference in performance between diversified and undiversified firms and reported that the undiversified firms, however, in the context of risk, the undiversified firms have a higher risk as compared to diversified firms.

(Lins & Servaes, 2002) used a sample of over 1,000 firms from five emerging economies to study whether a diversified firm's shares were traded at a premium or a discount and found that the diversified firms' shares were traded on a discount of 7% as compared to undiversified firms' shares.

(Maksimovic & Gordon, 2002) also collected the 3,74,339 segment observations of the US firms for the period 1975-92 to study the original size of conglomerates and their growth across different industry.

The early cross-section regression tests focus on the Sharpe and Lintner model's predictions about the intercept and slope in the relation between expected return and market betas. The model predicts that the intercept in these regressions is the risk-free rate (RM)-Rf.

Two problems in these tests quickly became apparent. First, estimate of beta for individual assets are imprecise, creating a measurement error problem when they explain average returns. Secondly, the regression residuals have common sources of variations, such as industry effects in average returns. Positive correlation in the residuals produces downward bias in the usual ordinary least squares estimates of the standard errors of the cross-section regression slopes.

To improve the precision of estimated betas, researchers such as (Blume, 1970), (Friend & Blume, 1970) and (Black, 1972) work with portfolios, rather than individual securities. They discovered that estimates of beta for diversified portfolios are more precise the estimates for individual securities. Thus, using portfolios in cross-section regressions of average returns on betas and reduces the critical errors in variables problem.

Grouping however, shrinks the range of betas and reduces statistical power. To investigate this problem, researchers sort securities on beta when forming portfolios. This sorting procedure is now standard in empirical tests.

(Douglas, 1969) study was the first empirical test at the CAMP. He regressed the returns on a large cross sectional sample of common stocks on their own variance and on their covariance with an index constructed from the sample. The finding showed that for various time sub-periods of the data, average realized return is significantly positively reacted to the variance measure but not to the covariance measure. In addition, he summarized some unpublished results of (Lintner, 1965) using a regression similar to the ones he used previously and found the coefficients of both the systematic and unsystematic risk variance to be positive and equally significant.

(Fama & French, 2004) had made the most thorough test to date of CAPM finding no evidence for the correct relationship between security return and beta over the period 1970-1980. Using the cross-sectional approach supported neither a linear nor a positive relationship. It appeared that average stock returns were explained better by company size as measure by market capitalization, large firms generally offering lower returns and by the ratio of book value of equity to market value, returns being positively associated with these variables. They concluded that rather than being explained by a single variable, beta security risk was multi-dimensional.

(Black, 1972) (Lease & Schlarbaum, 1974) did seem to support the positive association between beta and average stock returns envisaged by the CAMP for long periods up to the late 1960s. However, evidence began to emerge that the ex post security Market Line (SMI) was much flatter than implied by the theory and that the intercept was considerably higher than achieved returns on 'risk-free' assets. (Blume & Husiok, 1973), (Banz, 1981), (Basu, 1977), (Friece & Blume, 1970).

(Miller & Scholes, 1972) presented the Lintner result on the different body of data and found that the estimated values of coefficients of Beta, B differ quite markedly from their theoretical values. They tried to explain what is responsible for departures of the empirical results from the theoretical predictions in terms of misspecifications of the model. They are not contended that the possible factors exploited are enough to account for the observed discrepancies.

The study argued further that; test based on securities is not the best on two grounds. One is due



to the fact that errors in variables may bias result in estimating. Also confirmed in the study that such measurement errors may then alternate the true relationship between return and risk. Second, reason concerned the unsystematic risk of individual

stocks, by granting securities into portfolios much of this effect will be eliminated, thereby allowing a clear view of the relationship between return and systematic risk.

#### 2.4 Summary of the Empirical Studies

S/N	NAME	PERIOD	THEORY/ MODEL	OBJECTIVE
1.	Shape, Tobin, Treynor, Lintner & Mossin	1964, 1965 and 1966	Capital Asset Pricing Model	The expected return on security or portfolio is expressed as a function of the unsystematic risk of the asset
2.	Kucukkoclaglu	2004	CAMP	Beta coefficient is evaluated by the market and can be eliminated through unsystematic risk diversification.
3.	Roll	1977	The efficacy of CAMP	The market scope considered in calculating the beta factor is inadequate.
4.	Basu	1983	CAMP	The beta cannot explain why the firms with low price-earning rate have returns.
5.	Banz and Brown	1981, 1983	CAMP	They found that a similar abnormality is observed in the firm size.
6.	Downen and Bauman	1986	CAMP	Showed that the anomalies observed in the firm size varied from year to year.
7.	Fama and French	1992	CAMP	They demonstrated that there is no linear relationship between the beta coefficient and the average return.
8.	Bruner	1996	CAMP	The study revealed that capital asset pricing model is used to calculate the cost and that many investors prefer beta coefficient to assess than investment.
9	Oloyede	2001	CAMP	The importance of CAPM lies in the ability to measure the effect of a security risk on the total risk of a portfolio in a different way (not in term of the security standard deviation and its correlation with the other securities in the portfolio).
10	Osekita	2003	CAMP	CAPM assumes a linear relationship between returns obtained from an individual security and the average rate of returns from all securities in the market.

**Source: Author's Computation**

In conclusion, all investors can eliminate the unsystematic risk by forming well-diversified portfolios. As the number of assets in a portfolio increases, the unsystematic risk declines, which

results in a parallel decrease in the total risk; nevertheless, this decrease can only be reduced down to the level of systematic risk of the assets in question. The principal of diversification says that



spreading an investment across various assets will eliminate some of the risks (unsystematic) and there is a minimum level of risk that cannot be eliminated by diversification, i.e. a systematic risk. Since systematic risk affects almost all assets in the economy to some degree, even in a well-diversified portfolio, that portion of the risk will still exist. Therefore investing all your money in one or two financial products is similar to putting all the eggs in one basket and the consequences in the event of something going wrong would be much greater than having a well-diversified portfolio which has a lesser impact.

### III. METHODOLOGY

#### 3.1 Research Design

This study adopts the panel data regression analysis of the ordinary least square to test the relationships existing between the dependent variable and independent variables under the fixed effect, the dependent variable will be risk reduction while the independent variables will be portfolio diversification. Panel data regression analysis is employed in order to proffer solution to the problem of bias caused by unobserved heterogeneity and to exploit panel data sets to reveal the dynamics that are difficult to detect with cross-sectional data. This is analyzed using the E-view econometric soft-wire version 3.1. in order to avoid any form of model misspecification, adequate panel approaches would be followed in analyzing the data set. According to (Yaffee, 2005) the fixed effects and random effects models are the most commonly used in analyzing panel data, but for the sake of this study constant effect model is added due to the fact that the coefficient is constant in each of the companies.

#### 3.2 Re-Statement of Hypothesis

As pointed out earlier in chapter one, the hypotheses are formulated for testing in this research work. The “Null” hypotheses are the assumptions which are made to render a statistical hypothesis insignificant; and it is denoted by Ho.

The model for this research work is however presented below:-

$$SLTK = f(ROE, DI, LEV, TAX, \dots) \dots \dots \dots \text{Model (3.1)}$$

$$SLTK = f(ROA, DI, LEV, TAX, \dots) \dots \dots \dots \text{Model (3.2)}$$

The model is therefore represented in a linear form:

$$SLTK = \beta_0 + \beta_1 D1 + \beta_2 LEV + \beta_3 TAX + \beta_4 ROE$$

$$SLTK = \beta_0 + \beta_1 D1 + \beta_2 LEV + \beta_3 TAX + \beta_4 ROA$$

Specifying the model in Explicit from loglinearizing;

$$\text{Log (SLTK)} = \beta_0 + \beta_1 \text{Log (D1)} + \beta_2 \text{Log(LEV)} + \beta_3 \text{Log(TAX)} + \beta_4 \text{Log(ROE)} + \mu \dots \dots \dots (4)$$

$$\text{Log (SLTK)} = \beta_0 + \beta_1 \text{Log (D1)} + \beta_2 \text{Log(LEV)} + \beta_3 \text{Log(TAX)} + \beta_4 \text{Log(ROA)} + \mu \dots \dots \dots (5)$$

B1,  $\beta_2$ ,  $\beta_3$ ,  $\beta_4$ , = Co-efficient

Therefore, for the purpose of emphasis, the hypotheses to test the above model are as follows:-

#### Hypothesis One

Ho: Portfolio Diversification has no significant effect on Risk Reduction in Nigeria Investing Companies.

KI: Portfolio Diversification has significant effect on Risk Reduction in Nigeria Investing Companies.

#### Hypothesis Two

Ho: Portfolio Diversification has no significant effect on Firm’s Performance

HI: Portfolio Diversification has significant effect on Firm’s Performance

#### Hypothesis Three

Ho: Correlation coefficient has no significant effect on stock selection

HI: Correlation coefficient has significant effect on stock selection

#### Hypothesis Four

Ho: Stock selection has no significant effects to the investors

HI: Stock selection has significant effects to the investors

#### 3.3 Model Specification

For effective appraisal of this study, this research makes use of (Markowitz, 1955) Model to measure the risk, while return on equity and return on asset were used as a measure of firm performance of investing companies. This was in line with (Stephany & Miguel, 2002). Return on equity is calculated as net income to total equity while return on asset is calculated as net income to total asset. Leverage is included as proxy for any variation in firm values from differences in capital structure. It is also used as a measure of riskiness of investing companies; this is also supported by (Aliu, 2010) this is done to suit the purpose of the research. To measure diversification, firm total capital/sales were used (Acharya, 2002). Also government fiscal policy (tax) was used as one of the factors that affect investing companies; other explanatory variables which are: diversification index, leverage, and tax.



Log = Natural Logarithm  
 $\mu$  = Stochastic Error Term

Where:

ROE = Return on Equity  
 ROA = Return on Asset  
 D1 = Diversification  
 LEV = Leverage  
 TAX = Tax  
 SLTK = Risk  
 f = functional relationship

Also in measuring the risk of the portfolio, (Markwitz, 1952) model as stated above was used to calculate the portfolio risk of the securities. Therefore, in measuring the portfolio of two assets, the risk of a portfolio could be measured in terms of its variance or standard deviation. The portfolio return is the weighted average of returns on individual asset's variance or standard deviation. (Pandey, 2005).

SLTK = Risk of the Companies

$$\sigma_p^2 = \sigma_x^2 w_x^2 + \sigma_y^2 w_y^2 + 2w_x w_y \sigma_x \sigma_y \text{cov}_{xy}$$

$$= a_x^2 w_x^2 + a_y^2 w_y^2 + 2w_x w_y \sigma_x \sigma_y \text{cov}_{xy}$$

The standard deviation of two asset portfolio is the square root of variance

$$\sigma^{RP} = \sqrt{\sigma_x^2 w_x^2 + \sigma_y^2 w_y^2 + 2w_x w_y \sigma_x \sigma_y \text{cov}_{xy}}$$

Where

$\sigma^{RP}$  = Returns on Portfolio  
 $\sigma_x^2$  = Square of Standard Deviation of x  
 $w_x^2$  = Square of Standard x  
 $\sigma_y^2$  = Square of Standard Deviation of y  
 $w_y^2$  = Square of Weight of Securities y  
 $w_x$  = Weight of Securities x  
 $w_y$  = Weight of Securities y  
 $\sigma_x$  = Standard Deviation of Security x  
 $\sigma_y$  = Standard Deviation of Security y  
 $\text{cov}_{xy}$  = Covariance of Security x and y

### 3.4 Model Estimation

The study shall adopt the panel data regression analysis to analysis the relationship between; return on equity, return on asset and risk of selected stock broking firms in Nigeria and some related variables which includes diversification, leverage, and tax.

#### 3.4.1 Reason for the Panel Data

What are the advantages of panel data over cross-sectional or time series data? (Baltagi, 1977) lists the following advantages of panel data;

- i. Some panel data relate to States, firms, individuals, countries etc overtime, there is bound to be heterogeneity in these units. The techniques of panel data estimates can take such heterogeneity explicitly into account by allowing for subject specific variables.
- ii. By combining time series of cross-section observations, panel data gives "more informative data, more degree of freedom and more efficiency".

iii. By studying the repeated cross section of observations, panel data are better suited to study the dynamics of change.

iv. Panel data can better detect and measure effects that simply cannot be observed in pure cross-sectional or pure time-series data.

v. Panel data enables us to study more complicated behavioural models. For example, phenomena such as economies of scale and technological change can be better handled by panel data than pure cross-section or time series data.

However, a panel is described as balanced if there is an observation of every unit of observation for every time period and as unbalanced if some observations are missing.

However, if one is using an unbalanced panel one needs to take note of the possibility that the Causes of mission observations are endogenous to the model. Equally, if a balanced panel has been created artificially be eliminating all units of observations with missing observations, the



resulting data set may not be representative of its population. There are four possibilities and options when it comes to panel data regression which are reviewed below.

### 3.4.2 The constant Effect Model

The term ‘constant effect’ deals with estimation under some conditions that the Coefficient is constant in each of the companies we are considering. The companies’ period is also constant for the period under consideration.

### 3.4.3 The fixed Effect Model

The term “fixed effect” is due to the fact that although the intercept may differ among firms each firm does not vary over time, that is time-variant. This is the major assumption under this Model i.e. while the intercept are cross-sectional variant, they are time variant. The fixed effects model is an appropriate specification if we are focusing on a specific set of  $N$  firms.

### 3.4.4 Random Effect

Another alternative approach known as the random effects regression model subject to two conditions provide a solution to a problem in which a fixed effects regression is not an effective tool when the variables of interest are constant for each firm and such variables cannot be included.

The first condition is that it is possible to treat each of the first unobserved variables as being drawn randomly from a given distribution. This may well be the case if the individual observations constitute a random sample from a given population.

For the purpose of this research work, the fixed effect model and the random effect Model would be used because of the following reasons:

- i. Fixed effect is preferable if  $T$  (The number of time series data) is large and  $N$  (the number of cross-sectional units) is small, there is likely to be difference in values of parameters of FEM and REM.
- ii. There is a strong belief that the individual or cross-sectional units in the sample are not random drawings from a larger sample.
- iii. If the individual error component and one or more regressions are correlated, then the random estimators are biased, whereas those obtained from Fixed Effect Model are unbiased.

### 3.5 A prior Expectation

The a priori expectations are predetermined and expected sign of the parameter in the model.

$$\frac{\delta ROE}{\delta SLTK} > 0 \quad \frac{\delta ROA}{\delta DI} > 0 \quad \frac{\delta ROA}{\delta LEV} > 0$$

This indicates that there must be a positive relationship between return on equity, return on asset and risk of the firms under consideration. This shows that an increase in the diversification will lead to an increase in the endogenous variables of the firms.

$$\frac{\delta ROE}{\delta LEV} > 0 \quad \frac{\delta ROA}{\delta LEV} > 0 \quad \frac{\delta SLTK}{\delta LEV} > 0$$

This indicates that there must be a positive relationship between return on equity, return on asset and risk of the firms under consideration. This shows that an increase in the leverage will lead to an increase in the endogenous variable under consideration of the firms.

$$\frac{\delta ROE}{\delta TAX} < 0 \quad \frac{\delta ROA}{\delta TAX} < 0 \quad \frac{\delta SLTK}{\delta TAX} < 0$$

This indicates that there must be a negative relationship between return on equity, return on asset and risk of the firms under consideration. This shows that an increase in the tax of a firm will lead to a decrease in the endogenous variables under consideration of the firms.

### 3.6 Sources and Collection of Data

This study makes use of annual report data spanning from 2009 through 2013. The data was sourced from the statement of account of the stock broking firms. A total of 15 stock broking firms were sampled. These stock broking firm were carefully selected and considered based on their level of performances in Nigeria investing companies and they are being registered at the Nigeria Stock Exchange (NSE). Annual reports data of the stock broking firms’ return on equity and return on asset were used as a measure of the performance of the firms while risk is also used to measure the exposure of the firms.

### 3.7 Limitation of the Methodology

The study covers a period of 5 years. The apparent limitation of getting the appropriate and needed data as a result of difficulties encountered in getting the data from the Nigeria Stock Exchange and getting the Annual Report of the selected stock broking firms. Also there is a limitation on the years of data that are available to the stock broking firms. As a result of this, one could not get the total number of years or duration needed to make the



research work robust and provide a more accurate result therefore, the study will be limited within this year frame.

#### IV. DATA PRESENTATION, ANALYSES AND INTERPRETATION

##### 4.1 Introduction

The study investigates the effects of portfolio diversification on risk reduction in Nigeria investing companies to quantitatively determine their behaviour if portfolio diversification has a direct bearing effect. The data to be used in this analysis is presented in table 1 of the appendix. The data are analyzed using the panel regression analysis of the ordinary least square to test the relationship existing between the dependent variable and independent variables under the fixed effect.

The dependent variable is proxied as shareholder's fund (SLTK) while the independent variables are proxied as return on equity (ROE), diversification (DIV), leverage (LEV), and tax (TAX) in model 1, while model 2, had a slight modification to the explanatory variables return on asset (ROA), diversification (DIV), leverage (LEV), and tax (TAX). This chapter basically deals with the presentation of data which are secondary in nature, analysis and the interpretation of results.

##### 4.2 Presentation of Results (Model 1)

The table below shows the panel regression of the ordinary least square results conducted on the specified mode with E-view 7.0. the OLS result reveal the relationship that exists between the dependent variable and each of the independent variable.

**Table 1: Summary of Results**

Variable	Coefficients	Standard Error	Probability
SLTK	2.680274	0.303476	0.0000
ROE	0.437435	0.967219	0.6528
DIV	-0.215170	0.085821	0.0151
LEV	0.246281	0.589218	0.6776
TAX	-1.15E-07	2.38E-07	0.6316

$R^2 = 0.517694$  Adj  $R^2 = 0.362666$  F-Stat = 3.339375 Prob Stat = (0.000281) DW\*-Stat = 2.447221

**Source: Author's Computation**

From the Table 1, the relationship between the dependent variable (SLTK) and the independent variables (ROE, DIV, LEV, and TAX) can be deduced and expresses mathematically as follows:

$$SLTK = 2.680274 + 0.437435_{ROE} - 0.215170_{DIV} + 0.246281_{LEV} - 1.15E-07_{TAX} + \mu$$

##### 4.2.1 Interpretation of Results

From the above result, the coefficient of shareholders fund (SLTK) is positive, holding all explanatory constant. This implies that an increase in the level of shareholders fund (SLTK) as the explained variable will result to an increase of 2.680274 units in the explanatory variables (ROE, DIV, LEV and TAX)

Return on equity (ROE) also showed a positive relationship with shareholders fund (SLTK) with a coefficient of 0.437435. this means that an increase in the Return on equity level on investment companies in Nigeria as proxy by (ROE) will lead to an increase in the shareholders fund with a figure of 0.437335 units. Meanwhile, Diversification (DIV) turned a negative relationship with shareholders fund (SLTK) with a coefficient of -0.215170, meaning that an increase in the (DIV) will lead to

0.215170 unit reduction in the shareholders fund (SLTK)

Again, leverage (LEV) revealed a positive outcome which shows that there exists a relationship with shareholders fund (SLTK) with a coefficient of 0.246281. this means that an increase in the leverage of investment companies in the country as proxy by (LEV) will lead to an increase in the shareholders fund (SLTK) with a figure of 0.246281 unit. Tax (TAX) on the other hand shows a negative relationship with shareholders fund (SLTK) with a coefficient of -1.15E-07, meaning that an increase in the (TAX) will bring about a reduction of 1.15E-07 unit in shareholders fund (SLTK).

Nevertheless, the individual effect of each cross-section shows that the behaviour of its constant parameter shows the same attitude. All cross-sections show a positive and negative figure in their respective constant parameter. The constant parameter of UBA Capital Plc shows a negative constant parameter which indicates that if all exogenous variable are held constant, the portfolio diversification variable (SLTK) of UBA Capital Plc will reduce by 0.376651 units. Also, the constant



parameter of GTB Asset Management revealed a negative constant parameter which explains that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) on GTB Asset Management will decrease by -0.962668 units. Meanwhile, the constant parameter of International Standard Security Ltd also revealed an inverse constant parameter which indicates that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of International Standard Security Ltd will reduce by 0.105245 units. Transcorp Security Ltd constant parameter revealed a negative constant parameter which will indicate that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of Transcorp Security Ltd will decrease by 1.236447 units. Also, FCMB Holdings constant parameter revealed a negative constant parameter which indicate that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of FCMB Holding all showing a negative value respectively in their constant coefficient, -0.264236, -0.292363, and -0.112139 respectively, the implication is that all these listed investment companies will also experience a fall in their respective portfolio diversification variable (SLTK) unit with the above mentioned figures if all explanatory variables are held constant.

Furthermore, the constant parameter of Capital Bancorp Ltd shows a positive constant parameter which indicates that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of Capital Bancorp Ltd will increase by 0.2671731 units. Also, the constant parameter of Capital Trust Broker revealed a positive constant parameter which explains that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of Capital Trust Broker will increase by 0.379043 units. Meanwhile, the constant parameter of Capital Asset Limited also revealed a positive constant parameter which indicates that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of Capital Asset Ltd increase by 0.379043 units. Union Capital Market Ltd constant parameter

outcome also showed a positive constant parameter indicating that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of Union Capital Market Ltd will increase by 1.1874372 units. In the same vein, Intercontinental Security Ltd, Fidelity Finance Company Ltd and First Equity Security Ltd, all showing a positive value respectively in their constant coefficient, 0.284652, and 0.455875 and 0.433114 respectively, the implication is that all listed investment companies will also experience a rise in its SLTK unit with the above mentioned figures if all explanatory variables are held constant.

The coefficient of multiple determinations ( $R^2$ ) as given in the result of the panel regression of the ordinary least square of e-view 7.0 is given as 0.517694 which implies that only 51.7% can explain the explanatory variables (ROE, DIV, LEV, and TAX) behaviour of the explained variable (SLTK), while the remaining 48.3% is accounted for by the stochastic variable. Adjusted  $R^2$  of 0.632666 of 63.1% which further re affirms the reliability of the data as goodness fit.

#### 4.2.3 Tests for the Significance of Parameters (T-Test)

The t-test is done to test the significance of each if the explanatory variables using the student t-distribution test. It is carried out on a two tail test and by comparing the T-call and the T-tab.

**Decision Rule:** if  $T_{cal} > T_{tab}$ , accept  $H_1$  and reject  $H_0$  and if  $T_{cal} < T_{tab}$ , accept  $H_0$  and reject  $H_1$ .

T-test would be employed at 95% confidence level i.e. 5% significance level.

Degree of freedom (DOF) =  $n - k$

Where  $n$  = number of years of observation

$K$  = number of variables  $DOF = 75 - 5 =$

70

$T - Tab = 1.658 (F_{95= 5,70}) dof$

$T - tab = 1.658$  (as obtained from statistical table)

$T - cal = 2.680274$  (obtained from OLS result output, see appendix)

Variables	T-calculated	T-calculated	H <sub>0</sub>	H <sub>1</sub>	Remark
SLTK	2.6802274	1.658	Reject	Accept	Significant
ROE	0.437435	1.658	Accept	Reject	Insignificant
DIV	-0.215170	1.658	Accept	Reject	Insignificant
LEV	0.246281	1.658	Accept	Reject	Insignificant
TAX	-1.15E-07	1.658	Accept	Reject	Insignificant



From the above table, it can be deduced that the parameters are found to be statistically insignificant with the exception of SLTK that is significant and their individual t-calculated showing a value below the tabulated figure of “t” distribution.

#### 4.2.4 Tests for the Overall Significance of the Model (F-Test)

The F-test shows the statistical significance of the whole model. The basis for conducting the test is to find out whether all the independent variables put together have any significant effect on the dependent variables. It is carried out on a tail test and by comparing the F-cal and the F-tab. The hypothesis for the test is formulated as:

H<sub>0</sub>: There is no overall significance in the model

H<sub>1</sub>: There is overall significance in the model

**Decision Rule:** If  $F_{cal} > F_{tab}$ , accept H<sub>1</sub> and reject H<sub>0</sub> and if  $F_{cal} < F_{tab}$ , accept H<sub>0</sub> and reject H<sub>1</sub>

F-test would be employed at 95% confidence level i.e. 5% significance level.

Hence, (F<sub>95</sub> V<sub>1</sub>, V<sub>2</sub>) dof

Where  $V_1 = K - 1 = 5 - 1 = 4$

$V_2 = N - K = 75 - 5 = 70$ , (F<sub>95</sub> = 5,70)

F-tab = 2.29 (as obtained from statistical table)

F-cal = 3.339375 (obtained from OLS result output; see appendix)

Since the F-cal (3.339375) is greater than F-tab (2.29), it can be concluded that the whole model is significant in explaining the variation in SLTK.

The table below shows the summary of the F-test.

Table 3: Summary of the F-test

Summary		Decision		
F-Calculated	F-Tabulated	H <sub>0</sub>	H <sub>1</sub>	Remark
3.339375	2.29	Reject	Accept	Significant

The table above show  $F_{cal} > F_{tab}$ , hence, we accept H<sub>1</sub> and reject H<sub>0</sub>. The rejection of H<sub>0</sub> means the model is statistically significant.

#### 4.2.5 Tests for the Presence of Autocorrelation in the Model

The Durbin-Watson test is employed to check for the presence or absence of serial correlation i.e. autocorrelation in the model. This test is carried out using the DW\* Statistics. The DW\* Statistics obtained in OLS is given as

DW\* Statistics Value = 2.447221

Degree of Freedom (dof) =  $K^1 = K - 1 = 5 - 1 = 4$ , N = 75

$D_L = 1.49$  and  $D_U = 1.77$  at 5% significance level.

$4 - d_L = 4 - 1.49 = 2.51$  and  $4 - D_U = 4 - 1.77 = 2.23$

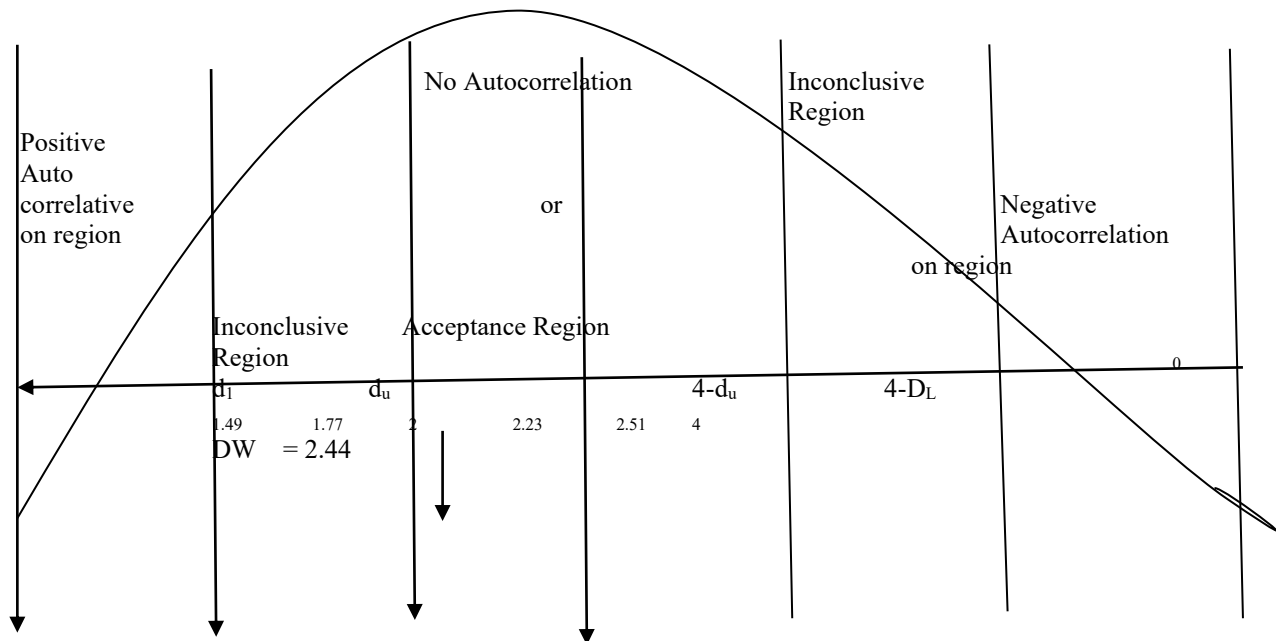


Fig 1: Durbin Watson Graph



From the graph above, it can be deduced that the DW\* statistics fall in the “Area of No Autocorrelation region”. This means that the statistical presence of autocorrelation in the model is not established, hence there is no mis-specification of variable in the model adopted for this study.

#### **4.2.6 Summary of Findings (Model 1)**

This research which is a study into the effect of portfolio diversification on risk reduction in the Nigeria investing companies found that two of the explanatory variables were against the a priori expectation of the study as leverage (DIV), and tax (TAX) showed a negative relationship with the explained variable (SLTK). Return on Equity (ROE) shows a positive coefficient of 0.437435, meaning that an increase in the Return on Equity (ROE) will result in 0.064221 units increase in the value of Shareholders Fund (SLTK). Also, the coefficient of Leverage (LEV) gave a value of 0.246281. This implies that an increase in Leverage (LEV) will result into an increase in the value of SLTK by 0.246281 units. Meanwhile, the constant parameter proxied by shareholders fund (SLTK) is in conformity with a priori expectation showing a positive result holding all other variables constant (ROE, DIV, LEV, and TAX). This means that a significant rise will occur in shareholders fund (SLTK) of investing companies in the economy will result into 2.680274 units.

Meanwhile, the fixed effect of cross sections was in the same direction in the absence of no explanatory variables while the situation of all fifteen investment companies (UBA Capital Plc, GTB Asset Management, Transcorp Security Ltd, FCMB Holding, FBN Holding, Fidelity Holding, and Monumental Security Ltd all showing an inverse behaviour while International Standard Securities, Capital Asset Ltd, and FBN Holding turns a negative value) respectively, meaning that the holding of all the explanatory variable constant will result into decrease in their respective shareholders fund (SLTK) level of the eight investment companies while the remaining seven, namely Capital Asset Ltd, Capital Trust Broker, Union Capital Market Ltd, Capital Bancorp Ltd, International Security Ltd, Fidelity Finance Company Ltd, First Equity Security Ltd investment companies showing positive behaviour. Their implication is that the holding of all explanatory variable constant will result into an increase in their respective Shareholders fund (SLTK). All of the variables show statistical insignificance with the exception of shareholders fund (SLTK) that is statistically significant with their respective t-

calculated showing a greater value less than the t-tabulated and vice versa.

The coefficient of multiple determinants ( $R^2$ ) shows the goodness fit of the model with an estimated 0.517694 which indicates that 51.2% of the behaviour of SLTK of the sampled investment companies can be explained by their individual identified portfolio diversification measures, while the error term account for the remaining 48.8% behaviour of SLTK. The DW\* test shows that there is no mis-specification of variables in the model adopted for study.

#### **4.2.7 Implications of Findings (Model 1)**

From the study carried out, this is to determine the effect of portfolio diversification on risk reduction in the Nigerian investing companies. It was established herein that a positive relationship subsist between the dependent variable (SLTK) and the constant parameter for all fifteen of the sampled investment companies. It could be inferred from the sampled investment companies that regardless of the time of establishment and size, portfolio diversification have been able to reduce risk in this company to a barest minimum. Both those that are New generation investment companies and the so called pioneer investment companies show the same behaviour, this emphasizes the need for portfolio diversification for all investment companies in reducing risk.

The behaviour of return on equity (ROE) shows that positive relationship exist between it and the portfolio diversification variable (SLTK), implying that continuous increase in the level of return on equity recorded by investment companies will result into an increase in its shareholders fund (SLTK). This is in conformity to the a priori expectation earlier set in this study.

Also, the coefficient of dividends (DIV) shows that a negative relationship exists between it and the explained variable. Thus, an increase in the value of DIV will bring about a reduction in the value of shareholders fund (SLTK) of the investment companies. This is against the a priori expectation of this study and can be linked with the deceitful statement of activities that is released on annual basis by these companies. Most of the figures released are just paper figures that do not truly exist in exactness.

Meanwhile, the variables that show cognizance with the a priori expectation (LEV) shows positive relationship with shareholders fund (SLTK) due to the fact that there is no investment managers that has any deceitful influence over it. Most investment company's assets are tangible in



nature and can be seen by everyone, also, the increase leverage will allow for investment companies to render service to more customers that have the potential of increasing their stake of investment companies on continuous basis.

Conclusively, the tax negatively relates to the explained variable (SLTK) this is in line with the a priori expectation (TAX) respectively. It suggests that an increase will reduce the level of shareholders fund (SLTK) in these investment companies. The negativity might be as a result of the fact this variable is reducing factor to shareholders fund (SLTK). This is also in line with the a priori expectation. Since, these variables are reducing factors there is need for monetary authorities to

readjust the policy of TAX, the issue of double taxation and over blotted tax figure for business enterprises. This will in return crave way for investment companies to properly diversify their portfolio so as to prevent risk occurrence in their investments.

#### 4.3 Presentation of Result (Model 2)

The table below shows the panel regression of the ordinary least square results conducted on the specified model with E-view 7.0. the OLS results reveals the relationship that exists between the dependent variable and each of the independent variables.

**Table 2: Summary of Results**

Variable	Coefficients	Standard Error	Probability
SLTK	2.768658	0.263358	0.0000
ROA	-0.060907	0.390120	0.8765
DIV	-0.219747	0.085433	0.0128
LEV	0.273464	0.587362	0.6433
TAX	-1.01E-07	2.36E-07	0.6696

$R^2 = 0.517694$  Adj  $R^2 = 0.6666620517$  F – Stat = 3.318698 Prob – Stat = (0.000301) DW\*- Stat = 2.474287

Source: Author’s Computation

From the Table 2, the relationship between the dependent variable (SLTK) and the independent variables (ROA, DIV, LEV, and TAX) can be deduced and expressed mathematically as follows:

$$SLTK = 2.768658 + -0.060907ROA - 0.219747_{DIV} + 0.273464_{LEV} - 101E-07_{TAX} + \mu$$

#### 4.3.1 Interpretation of Results

From the above, the coefficient of shareholders fund (SLTK) is positive holding all explanatory constant. This implies that an increase in the level of shareholders fund (SLTK) as the explained variable will result to an increase of 2.768658 units in the explanatory variables (ROA, DIV, LEV, and TAX).

Return on asset (ROA) showed a negative relationship with share holders fund (SLTK) with a coefficient of -0.060907. this means that an increase in the Return on asset level of investment companies in Nigeria as proxy by (SLTK will lead to a reduction on the shareholders fund with a figure of 0.060907 unit. Meanwhile, diversification (DIV) also showed an increase in the (DIV) will lead to 0.21974 unit reduction in the shareholders fund (SLTK).

Again, leverage (LEV) revealed a positive outcome which shows that there exists a relationship with shareholders fund (SLTK) with a coefficient of

0.273464. This means that an increase in the Leverage of investment companies in the country as proxy by (LEV) will lead to increase in the shareholders fund (SLTK) with a figure of 0.2734641 unit. Tax (TAX) on the other hand shows a negative relationship with shareholders fund (SLTK) with a coefficient of -1.15E-07, meaning that an increase in the (TAX) will bring about a reduction of -1.01E-07 unit in shareholders fund (SLTK).

Nevertheless, the individual effect of each cross-section shows that the behaviour of it constant parameter shows the same attitude. All cross-sections show a positive and negative figure in their respective constant parameter. The constant parameter of UBA |Capital Plc shows a negative constant parameter which indicate that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of UBA Capital Plc will reduce by -0.410196units. Also, the constant parameter of GTB Asset Management revealed a negative constant parameter which explains that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of GTB Asset Management will decrease by -1.007712units. Meanwhile, the constant parameter of Transcorp Security Ltd also revealed an inverse constant parameter which indicates that if all exogenous



variable are held constant, the portfolio diversification variable (SLTK) of Transcorp Security Ltd will reduce by -0.8872263units. Also, FCMB Holdings constant parameter revealed a negative constant parameter which indicate that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of FCMB Holding will decrease by -0.247578unit. Monumental Security Finance Ltd and FBN Holding all showing a negative value respectively in their constant coefficient, -0.264236, - 0.334205 and -0.147296 respectively, the implication is that this listed investment companies will also experience a fall in their respective portfolio diversification variable (SLTK) unit with the above mentioned figures if all explanatory variables are held constant.

Furthermore, the constant parameter of International Security Ltd shows a positive constant parameter which indicate that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of International Security Ltd will increase by 0.005135units. Capital Bancorp Ltd shows a positive constant parameter which indicates that if all exogenous variables are held constant; the portfolio diversification variable (SLTK) of Capital Bancorp Ltd will increase by 0.358905 units. Also, the constant parameter of Capital Trust Broker revealed a positive constant parameter which explains that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of Capital Trust Broker will increase by 0.49866units. Meanwhile, the constant parameter of Capital Asset Ltd, also revealed a positive constant parameter which indicates that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of Capital Asset Ltd will increase by 0.170530units. Union Capital Market Ltd constant parameter outcome also shows a positive constant parameter indicating that if all exogenous variables are held constant, the portfolio diversification variable (SLTK) of Union Capital Market Ltd will

increase by 1.246348unit. In the same vein, International Security Ltd, Fidelity Finance Company Ltd and First Equity Security Ltd, all showing a positive value respectively in their constant coefficient, 0.266062, 0.421380, and 0.391330 respectively, the implication is that all these listed investment companies will also experience a rise in its SLTK unit with the abovementioned figures if all explanatory variables are held constant.

**4.3.2 Coefficient of Multiple Determinations (R<sup>2</sup>)**

The coefficient of multiple determinations (R<sup>2</sup>) as given in the result of the panel regression of the ordinary least square of e-view 7.0 is given as 0.416143 which implies that only 51.6% can explain the explanatory variables (ROS, DIV, LEV, and TAX) behaviour of the explained variable (SLTK), while the remaining 48.4% is accounted for by the stochastic variable. Adjusted (R<sup>2</sup>) of 0.620517 Or 62.1% which further reaffirms the reliability of the data as goodness fit.

**4.4.3 Tests for the Significance of Parameters (T-Test)**

The T-Test is done to test the significance of each if the explanatory variables using the student t-distribution test. It is carried out on a two tail test and by comparing the T-Cal and the T-tab.

**Decision Rule:** if T-Cal > T-tab, accept H<sub>1</sub> and reject H<sub>0</sub> and if T-cal < T-tab, accept H<sub>0</sub> and reject H<sub>1</sub>

T-test would be employed at 95% confidence level i.e 5% significance level.

Degree of freedom (DOF) = n-k

K = number of variables DOF =

75 – 5 = 70

T-Tab = 1.658 (F<sub>05</sub> = 5,70) dof

T-tab = 1.658 (as obtained from statistical table)

T-cal = 2.680274 (obtained from OLS result output; see appendix)

Variables	T-calculated	T-calculated	H <sub>0</sub>	H <sub>1</sub>	Remark
SLTK	2.6802274	1.658	Reject	Accept	Significant
ROA	0.437435	1.658	Accept	Reject	Insignificant
DIV	-0.215170	1.658	Accept	Reject	Insignificant
LEV	0.246281	1.658	Accept	Reject	Insignificant
TAX	-1.15E-07	1.658	Accept	Reject	Insignificant

From the above table, it can be deduced that the parameters are found to be statistically insignificant with the exception of SLTK that is significant and their individual t-calculated showing a value below the tabulated figure of “t” distribution.



#### 4.3.4 Tests for the Overall Significance of the Model (F-Test)

The F-test shows the statistical significance of the whole model. The basis for conducting the test is to find out whether all the independent variables put together have any significant effect on the dependent variables. It is carried out on a tail test and by comparing the F-cal and F-tab. The hypothesis for the test is formulated as:-

$H_0$ : There is no overall significance in the model

$H_1$ : There is overall significance in the model

**Decision Rule:** if  $F\text{-cal} > F\text{-tab}$ , accept  $H_1$  and reject  $H_0$  and if  $F\text{-cal} < F\text{-tab}$ , accept  $H_0$  and reject  $H_1$ .

F-test would be employed at 95% confidence level i.e 5% significance level.

Hence,  $(F_{95} V_1, V_2)\text{dof}$

Where  $V_1 = K - 1 = 5 - 1 = 4$

$V_2 = N - K = 75 - 5 = 70$

$(F_{95} = 5, 70)\text{dof}$

$F\text{-tab} = 2.29$  (as obtained from statistical table)

$F\text{-cal} = 3.318698$  (obtained from OLS result output; see appendix)

Since the  $F\text{-cal}$  (3.318698) is greater than  $F\text{-tab}$  (2.29), it can be concluded that the whole model is significant in explaining the variations in SLTK.

The table below shows the summary of the f-test

**Table 3: Summary of F-Test**

Summary		Decision		
F-Calculated	F-Tabulated	$H_0$	$H_1$	Remark
3.318698	2.29	Reject	Accept	Significant

The table above show  $f\text{-cal} > t\text{-tab}$ , hence we accept  $H_1$  and reject  $H_0$ . The rejection of  $H_0$  means the model is statistically significant.

#### 4.3.5 Tests for the Presence of Autocorrelation in the Model

The Durbin-Watson test is employed to check for the presence or absence of serial correlation i.e. autocorrelation in the model. This test is carried out using the  $DW^*$  Statistics.  $DW^*$  Statistics value = 2.474287

Degree Freedom (dof) =  $k^1 = K - 1 = 5 - 1 = 4$ ,  $N = 75$

$D_L = 1.49$  and  $D_U = 1.77$  at 5% significance level

$4 - d_L = 4 - 1.49 = 2.51$  and  $4 - D_U = 4 - 1.77 = 2.23$

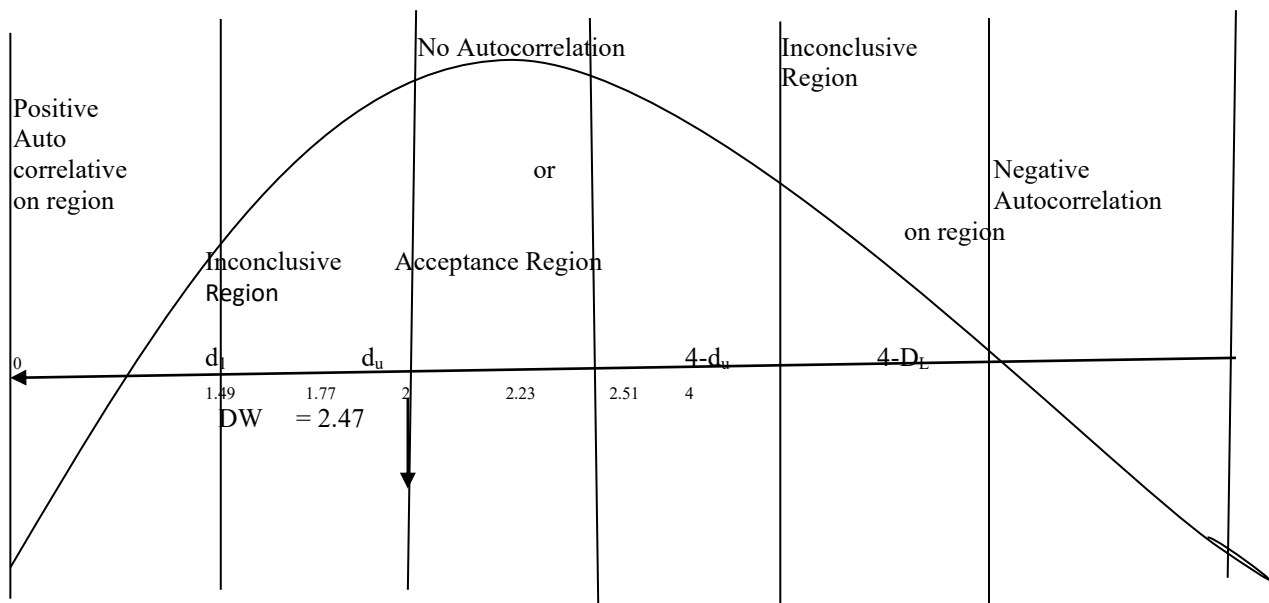


Fig 4.2: Durbin Watson Graph



From the graph above, it can be deduced that the DW\* statistics fall in the “Area of No Autocorrelation region”. This means that the statistical presence of autocorrelation in the model is not established, hence there is no mis-specification of variable in the model adopted for this study.

#### **4.3.6 Summary of Findings (Model 2)**

This research which is a study into the behaviour of portfolio diversification on risk reduction in the Nigeria investment companies found that three of the explanatory variables were against the a priori expectation of the study as return on asset (ROA), diversification (DIV) and tax (TAX) showed a negative relationship with the explained variable (SLTK). Leverage (LEV) shows a positive coefficient of 0.0273464, meaning that an increase in the leverage (LEV) will result in 0.273464 units increase in the value of shareholders Fund (SLTK). Meanwhile, the constant parameter proxied by shareholders fund (SLTK) is in conformity with a priori expectation showing a positive result holding all other variables constant (ROA, DIV, LEV, and TAX). This means that a significant rise will occur in shareholders fund (SLTK) of investment companies in the economy will result into 2.768658units.

Meanwhile, the fixed effect of cross sections was in the same direction in the absence of no explanatory variables while the situation of all fifteen investment companies (UBA Capital Plc, GTB Asset Management, Transcorp Security Ltd, FCMB Holding, FBN Holding, Fidelity Holding, Monumental Security Ltd and FBN Holdings all showing an inverse behaviour) respectively, meaning that the holding of all the explanatory variable constant will result into decrease in their respective Shareholders fund (SLTK) of the investment companies while the remaining seven, namely Capital Asset Ltd, Capital Trust Broker, Union Capital Market Ltd, Capital Bancorp Ltd, International Security Ltd, Fidelity Finance Company Ltd, First Equity Security Ltd investment companies showing a positive behaviour. The implication is that the holding of all explanatory variable constant will result into an increase in their respective Shareholders fund (SLTK). All of the variables show statistical insignificance with the exception of Shareholders fund (SLTK) that is statistically significant with their respective t-calculated showing a greater value less than the t-tabulated and vice versa.

The coefficient of multiple determinants ( $R^2$ ) shows the goodness fir of the model with an estimated 0.516143 which indicates that 51.2% of

the behaviour of SLTK of the sampled investment companies can be explained by their individual identified portfolio diversification measures. While the error term account for the remaining 48.8% behaviour of SLTK. The DW\* test shows that there is no mis-specification of variables in the model adopted for study.

#### **4.3.7 Implications of Findings (Model 2)**

From the study carried out, this is to determine the effects of portfolio diversification on risk reduction in the Nigeria investing companies. It was established herein that a positive relationship subsist between the dependent variable (SLTK) and the constant parameter for all fifteen of the sampled investment companies. It could be deduced from the sampled investment companies that regardless of the time of establishment and size, portfolio diversification have been able reduced risk in this companies to a bearest minimum. Both the new generation investment companies and the so called giant’s investment companies show the same behaviour, this emphasized the need for portfolio diversification for all investment companies in reducing risk.

The behaviour of return on asset (ROA) shows that negative relationship exists between it and the portfolio diversification variable (SLTK), implying that continuous increase in the level of return on asset recorded by investment companies will result into a decrease in it shareholders fund (SLTK). This is not in tandem with the a priori expectation earlier set in this study.

Also, the coefficient of diversification (DIV) shows that a negative relationship exists between it and the explained variable. Thus, an increase in the value of DIV will bring about a reduction in the value of shareholders fund (SLTK) of the investment companies. This is against the a priori expectation of this study and can be linked with the deceitful statement on activities that is released on annual basis by these companies. Most of the figures released are just paper figures that do not truly exit in exactness.

Meanwhile, the variables that show cognizance with the a priori expectation (LEV) show a positive relationship with shareholders fund (SLTK) due to the fact that there is no investment manager that has any deceitful influence over it. Most investment company’s assets are tangible in nature and can be seen by everyone, also, the increase leverage will allow for investment companies to render service to more customers that have the potential of increasing their stake investment companies on continuous basis.



Conclusively, the tax negatively relates to the explained variables (SLTK) this is in line with the a priori expectation (TAX) respectively. It suggests that an increase will reduce the level of shareholders fund (SLTK) in these investment companies. The negativity might be as a result of the fact that this variable is reducing factor to shareholders fund (SLTK). This is also in line with the a priori expectation. Since, these variables are reducing factor there is need for monetary authorities to readjust the policy of TAX, the issue of double taxation and over blotted tax figure for business enterprises. This will in return crave way for investment companies to properly diversify their portfolio so as to prevent risk occurrence in their investments.

## **V. SUMMARY, CONCLUSION AND RECOMMENDATIONS**

This study has empirically examined the effectiveness of portfolio diversification on risk reduction in Nigeria investing companies. A pooled analysis (panel data analysis) of fifteen (15) stock broking firms was taken. The panel data model results revealed that, the effective way a firm can reduced their risk is to engage in a portfolio of investment this has been demonstrated from the study and show that portfolio diversification and risk reduction are key variable to any organizational success letting the intercept to vary for each firm, the fixed effect model further reveals that, the intercept coefficient of each of the firms are statistically significant with the fixed effect for the entire model above, leverage proved to have a positive impact on all the explanatory's variables of the firms because their result is above average. Moreover, in the random effect model, the effect of the universal usage of all the endogenous variables by the firms is being felt on each of the firms given the robust R<sup>2</sup> risk of the firm and on the return on equity of the firm while return on asset have a low R<sup>2</sup>. The reason for this is as a result of different peculiarity associated with each of the firms. Given in the fixed effect model leverage has a positive result on all the endogenous variables. The result further revealed that, the use of debt in the capital structure of a company have a tendency of increasing return and possibly cover associated risk of a firm. Therefore, leverage has significantly impacted on the activities of firms in Nigeria. Given the effect of the random effect model which is in concurrence to the fixed effect model given the parameters estimates in the models. However, the result reveals a negative relationship with return on asset of a firm but positive relationship with return

on equity and riskiness of a firm under consideration.

### **5.2 Conclusion**

This paper has examined how diversification reduces risk; panel data regression analysis was used. It was shown that diversification reduces the prediction error of assessing risk. However, the usefulness of diversification depends upon the particular procedures used to form portfolios and how historical values of returns dispersion are extrapolated into the future.

Following the analysis, it has been observed that risks are being reduced when diversification of portfolio takes place and as such based on some statistical and econometrics models, it is confirmed that risks are being managed whether diversifying the portfolio locally or internationally. This study has succeeded in proving the convention that efficient portfoliodiversification is an investment strategy often employed directly to reduce risk to a considerable minimum level. It is a truism that the total risk of a portfolio can be reduced to equal the systematic risk when the unsystematic risk has been completely eliminated by diversification.

This ascertains that the limit of diversification lies in the fact that an investor cannot hold a more diversified portfolio than the market portfolio and since the risk associated with the market portfolio is unavailable; investors should seek for a well-diversified portfolio of assets that lies on the efficient frontier. On the other hand, because covariance risk cannot be diversified away, investors will pay a premium to escape it. Therefore, covariance is the relevant measure of risk for an asset because it measures the contribution of an investor to the variance of a well-diversified portfolio.

### **5.3 Recommendations**

Based on the analysis and findings, the following recommendations are made to enhance the processes of portfolio formation in order to achieve a sustainable optimum portfolio diversification which will effectively and efficiently help in risk reduction associated with Nigeria Investing Companies.

i. Emphasis should be focused on the significance of risk factors which will not only assist the investors in portfolio formation, but will enhance diversification of investment.

ii. The overall financial commitment by the investors should be improved upon this will assist the financial manager to effectively manage the fund in a productive manner.



iii. The yearly financial summary of each company and other market indices should be made available and accessible to the researchers by the relevant authorities i.e. The Nigeria Stock Exchange and Security and Exchange Commission, this will enhance more reliable unbiased empirical studies.

iv. Investors should not keep all their eggs in one basket; that is, they need to distribute their investable income or wealth across arrays of assets, which will enable them to hedge their investments against uncertainty or unforeseeable losses that result from changes in securities prices.

v. Portfolio investors should optimally strive to select securities with negative correlation coefficient together. This will presumably lead to an efficient portfolio which ascertains maximum return at any given level of risk.

#### 5.5 Suggestions for Further Studies

The Model of two asset portfolio was adapted for this study. This is because the researcher cannot lay his hand on the software's that can handle analysis involving portfolios more than these assets within the time limit. Future researches/studies should therefore use specialized designed software's to make analysis that accommodate more than two assets.

#### 5.5 Contributions to Knowledge.

The study focused on the effect of portfolio diversification on risk reduction in Nigeria investing companies. This bold attempt is one of the few empirical studies in this area. The choice of investing companies is unique and with sense, the study had in no small measure contributed to the body of knowledge needed globally.

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**APPENDIX 1**

COMPANY NAME	YEAR	SLTK	ROA	ROE	D1	LEV	TAX
UBA CAPITAL PLC	1	2.23	0.08	0.09	1.85	0.09	22,432
	2	1.24	0.07	0.08	1.30	0.08	77,030
	3	1.32	0.1	0.11	2.29	0.11	77,23
	4	2.56	0.09	0.11	1.18	0.11	3,061
	5	2.11	0.08	0.10	0.40	0.1	99,782
GTB ASSET MANAGEMENT	1	1.54	0.08	0.12	0.56	0.12	345,908
	2	1.33	0.09	0.15	0.85	0.15	654,908
	3	1.56	0.09	0.14	1.03	0.11	654,231
	4	1.45	0.07	0.07	1.00	0.1	245,987
	5	1.98	0.03	0.03	1.00	0.12	342,876
INTERNATIONAL STANDARD SECURITY LTD	1	3.31	0.15	0.26	0.08	0.2	716,615
	2	2.34	0.29	0.39	0.92	0.1	548,316



	3	2.23	1.31	0.50	1.39	0.16	567,230
	4	2.32	0.36	0.50	0.65	0.02	971,235
	5	2.67	0.34	0.57	1.75	0.27	492,236
TRANSCORP SECURITY LTD	1	2.21	0.12	0.96	3.04	0.15	675,987
	2	1.23	0.31	0.96	0.52	0.22	564,453
	3	2.25	1.51	0.99	0.45	0.29	453,276
	4	1.34	1.11	0.94	0.10	0.27	765,908
	5	1.67	0.67	0.64	1.16	0.24	605,007
CAPITAL ASSET LTD	1	1.66	0.11	0.11	2.96	0.19	020,513
	2	2.34	0.11	0.12	4.92	0.12	981,048
	3	2.33	0.12	0.14	3.02	0.04	492,788
	4	2.65	0.12	0.14	0.81	0.04	229,669
	5	2.34	0.11	0.13	0.18	0.05	224,044
FCMB HOLDING	1	2.97	0.05	0.05	10.8	0.25	1,450
	2	2.34	0.06	0.07	1.61	0.27	2,005
	3	3.45	0.07	0.07	1.30	0.31	1,899
	4	1.23	0.06	0.05	2.08	0.23	1,643
	5	1.34	0.13	0.10	0.32	0.18	2,782
FIDELITY HOLDING	1	2.65	0.12	0.11	0.68	0.61	267,500
	2	3.45	0.12	0.10	2.68	0.08	245,196
	3	2.35	0.06	0.05	1.19	0.03	654,870
	4	2.21	0.07	0.07	3.68	0.06	419,920
	5	1.23	0.04	0.03	0.06	0.07	228,292

CAPITAL BANCORP LTD	1						9,974.00
	2	3.65	0.33	0.35	1.00	0.04	
	3	2.43	0.04	0.05	4.52	0.3	198,356
	4	2.43	2.08	0.08	0.50	0.14	134,012
	5	2.54	2.09	0.09	0.71	0.14	100,325
	5	3.34	2.09	0.12	1.02	0.37	80,028
CAPITAL TRUST BROKER	1	2.43	0.05	0.11	2.10	0.06	42,143
	2	4.56	0.03	0.07	1.84	0.06	51,968
	3	3.34	0.04	0.15	4.51	0.33	172,978
	4	2.43	0.05	0.15	1.55	0.06	45,889
	5	3.45	0.02	0.08	1.00	0.03	89,001
UNION CAPITAL MARKET LIMITED	1	4.34	0.43	0.37	0.50	0.11	245,502
	2	2.43	0.03	0.10	3.79	0.05	627,397
	3	2.36	0.45	0.33	2.69	0.05	119,427
	4	2.43	0.33	0.35	2.02	0.04	438,992
	5	3.23	0.25	0.18	2.89	0.04	36,054
INTERCONTINENTAL SECUTIRY LTD	1	3.23	0.09	0.19	3.96	0.71	1,309.00
	2	2.87	0.09	0.22	1.06	0.81	871,888
	3	3.09	0.08	0.19	3.43	0.92	693,762
	4	3.43	0.09	0.20	1.08	0.66	6,706.00
	5	2.9	0.1	0.27	1.93	0.89	247,538
FIDELITY FINANCE COMPANY LTD	1	3.4	0.15	0.11	2.34	0.12	3,252



	2	2.43	0.06	0.13	0.22	0.13	18,467
	3	3.87	0.02	0.08	4.58	0.1	8,803
	4	3.76	0.14	0.07	2.84	0.081	24,540
	5	2.37	0.06	0.19	1.43	0.071	53,212
FIRST EQUITY SECURITY LTD	1	3.23	0.04	0.04	1.82	0.12	91,522
	2	2.98	0.02	0.09	2.84	0.1	174,440
	3	2.3	0.08	0.12	1.10	0.13	11,305
	4	3.09	0.01	0.13	3.56	0.24	36,516
	5	2.76	0.02	0.11	4.55	0.15	46,821
MONUMENTAL SECURITY AND FINANCE	1	2.98	0.21	0.12	2.61	0.18	73,392
	2	2.98	0.21	0.10	1.37	0.35	56,946
	3	1.32	0.01	0.07	0.65	0.49	23,600
	4	2.11	0.1	0.05	2.94	0.22	17,527
	5	2.32	0.08	0.20	4.29	0.83	154,599

FBN HOLDING	1	2.33	0.01	0.02	2.58	0.73	202,662
	2	2.66	0.19	0.30	0.24	0.46	182,781
	3	2.34	0.05	0.09	2.22	0.14	
	4	2.98	0.19	0.31	3.90	0.95	238,593
	5	3.34	0.22	0.03	3.87	0.72	887,884

#### APPENDIX TWO

S/N	NAME OF COMPANY	YEAR	$\hat{O}^2X$	$W^2X$	$\hat{O}^2Y$	$W^2Y$	$W_xW_y$	$\hat{O}_x \hat{O}_y$	$COV_{xy}$	SLTK
1	UBA CAPITAL PLC	1	58.02	0.36	54.19	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-24.01	2.23
		2	24.75	0.16	22.57	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-33.1	1.24
		3	44.77	0.25	43.16	0.26	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-24.15	1.32
		4	50.3	0.36	29.42	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-22	2.56
		5	53.67	0.25	63.16	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-16.15	2.11
2	GTB ASSET MANAGEMENT	1	30.56	0.36	52.25	0.16	(0.6)(0.4)=0.24	(0.71)(0.63)=0.48	-21.16	1.54
		2	53.67	0.16	31.63	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-14.01	1.33
		3	24.88	0.25	50.71	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-18.12	1.56
		4	42.26	0.36	51.68	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-21.11	1.45
		5	54.43	0.25	20.19	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-31.19	1.98
3	INTERNATIONAL STANDARD SECURITY LTD	1	42.09	0.36	37.52	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-14.06	3.31
		2	40.47	0.16	52.71	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-19.11	2.34
		3	21.84	0.25	24.7	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-24.2	2.23
		4	28.8	0.36	44.85	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-26.19	2.32
		5	31.81	0.25	36.83	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-31.18	2.67
4	TRANSCORP SECURITY LTD	1	30.59	0.36	55.94	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-18.16	2.21
		2	48.81	0.16	50.71	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-24.19	1.23
		3	21.19	0.25	27.75	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-22.7	2.25
		4	24.75	0.36	23.57	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-19.1	1.34
		5	25.85	0.25	67.97	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-34.11	1.67
5	CAPITAL ASSET LTD	1	40.15	0.16	20.54	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-24.12	1.66
		2	28.17	0.36	22.09	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-18.16	2.34
		3	56.96	0.25	43.51	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-17.12	2.33
		4	26.44	0.36	22.4	0.16	(0.6)(0.4)=0.24	(0.63)(0.77)=0.48	-22.01	2.65
		5	54.71	0.25	64.14	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-31.19	2.34
S/N	NAME OF COMPANY	YEAR	$\hat{O}^2X$	$W^2X$	$\hat{O}^2Y$	$W^2Y$	$W_xW_y$	$\hat{O}_x \hat{O}_y$	$COV_{xy}$	SLTK
6	FCMB HOLDING	1	20.27	0.36	30.89	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-29.1	2.97



		2	38.7	0.16	48.78	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-26S.11	2.34
		3	35.56	0.25	57.42	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-23.1	3.45
		4	56.58	0.36	60.11	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-16.2	1.23
		5	50.95	0.25	33.86	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-20.11	1.34
7	FIDELITY HOLDING	1	25.01	0.36	42.98	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-31.1	2.65
		2	24.72	0.16	53693	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-24.11	3.45
		3	36.08	0.25	32.9	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-29.17	2.35
		4	33.52	0.36	43.1	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-18.12	2.21
		5	56.98	0.25	52.62	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-32.19	1.23
8	CAPITAL BANCORP LTD	1	38.7	0.36	40.8	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-14.08	3.65
		2	31.2	0.16	48.7	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-22.16	2.43
		3	33.64	0.25	37.26	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-29.19	2.43
		4	52.3	0.36	4.5	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-32.16	3.54
		5	36.98	0.25	28.68	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-16.1	3.34
9	CAPITAL TRUST BROKER	1	27.54	0.36	62.98	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-20.19	2.43
		2	24.07	0.16	53.95	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-23.18	4.56
		3	29.19	0.25	34.97	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-29.1	3.34
		4	51.15	0.36	56.16	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-31.19	2.43
		5	37.77	0.25	59.66	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-22.1	3.45
10	UNION CAPITALMARKET LTD	1	42.16	0.36	34.87	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-19.1	4.34
		2	24.8	0.16	41.75	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-36.17	2.43
		3	26.67	0.25	37.72	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-14.1	2.36
		4	29.56	0.36	42.23	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-19.76	2.43
		5	24.72	0.25	53.95	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-22.12	3.23

S/N	NAME OF COMPANY	Year	$\hat{O}^2X$	$W^2X$	$\hat{O}^2y$	$W^2y$	$W_x W_y$	$\hat{O}_x \hat{O}_y$	$COV_{xy}$	SLTK
11	INTERCONTINENTA; SECURITY LTD	1	33.79	0.36	31.54	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-29.1	2.97
		2	21.6	0.16	32.85	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-26S.11	2.34
		3	34.49	0.25	43.85	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-23.1	3.45
		4	35.18	0.36	33.28	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-16.2	1.23
		5	30.63	0.25	27.1	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-20.11	1.34
12	FIDELITY FINANCE COMPANY LTD	1	26.77	0.36	28.59	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-31.1	2.65
		2	26.68	0.16	29.49	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-24.11	3.45
		3	41.19	0.25	34.79	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-29.17	2.35
		4	38.82	0.36	58.83	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-18.12	2.21
		5	41.81	0.25	48.12	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-32.19	1.23
13	FIRST EQUITY SECURITY LTD	1	52.33	0.36	67.2	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-14.08	3.65
		2	38.21	0.16	44.9	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-22.16	2.43
		3	21.69	0.25	25.08	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-29.19	2.43
		4	57.77	0.36	61.72	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-32.16	3.54
		5	51.98	0.25	37.45	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-16.1	3.34
14	MONUMENTAL SECURITY AND FINANCE LTD	1	36.02	0.36	41.95	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-20.19	2.43
		2	41.81	0.16	48.39	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-23.18	4.56
		3	33.93	0.25	47.42	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-29.1	3.34
		4	26.77	0.36	22.28	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-31.19	2.43
		5	38.96	0.25	52.51	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-22.1	3.45
15	FBN HOLDING	1	24.68	0.36	22.99	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-19.1	4.34
		2	35.88	0.16	52.35	0.36	(0.4)(0.6)=0.24	(0.63)(0.77)=0.48	-36.17	2.43
		3	46.91	0.25	33.96	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-14.1	2.36
		4	58.02	0.36	54.99	0.16	(0.6)(0.4)=0.24	(0.77)(0.63)=0.48	-19.76	2.43
		5	24.5	0.25	22.25	0.25	(0.5)(0.5)=0.25	(0.71)(0.71)=0.50	-22.12	3.23