DETERMINANTS OF STOCK PRICE VOLATILITY;

AN EMPIRICAL INVESTIGATION OF NAIROBI STOCK EXCHANGE.

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DECLARATION.

This management research project is my original work and has not been presented for a degree award in any university.

Signed ---------- Date 10th/2/2005

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This research project has been submitted with my approval as the University supervisor.

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DEDICATION.

To my parents Josphat kalui, Agnes Mumbua and to my loving wife Florence, son victor and our daughter Maureen. Finally, to my brothers and sisters.

May the lord bless you all in abundantly.

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LIST OF ABBREVIATIONS

NSE	Nairobi stock exchange.
EMH	Efficient Market Hypothesis.
PV	Price volatility.
POR	Payout ratio.
SZ	Size.
ASG	Growth in assets.
MBA	Masters in business administration.

ABSTRACT

The study had the objective of establishing the level of volatility of stock prices in Kenya and identifying the determinants of stock price volatility. A sample of 16 companies in Nairobi Stock Exchange is examined for a period from 1998 to 2002.

The empirical estimation is based on a cross-sectional multiple regression analysis of the relationship between stock price volatility as the dependent variable and earning volatility, payout ratio, long-term debt, size and growth in assets as the independent variable. The methodology adopted dictated the use of secondary data. Daily stock prices and annual financial reports were used in the study and analyzed using descriptive statistics and SPSS computer package.

The results showed that all the five factors have influence on stock price volatility. Specifically, Stock price volatility was inversely related to payout ratio, earning volatility and growth in assets whereas it was positively related to long-term debt and size.

Regression results confirmed that stock price volatility does exist at NSE and that it is not only a function of factors considered but also many more factors. This is because the explanatory power of the factors considered was low and that, the explanatory power of the model improved as the number of factors

increase. We therefore conclude that the level of stock price volatility at NSE is high and that earning volatility, payout ratio, long-term debt size and growth in assets are not the only determinant of stock price volatility.

Although the results are not robust enough as in the case of developed markets but are consistent with the behavior of emerging markets.

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

Mathematically, volatility is the annualized standard deviation of daily returns. A simple definition, however, is the fluctuation of stock prices without regard to direction. Big average daily stock price changes (up or down, in percentage terms) means, high volatility and small average daily price changes means low volatility.

Most financial decisions involve alternative course of action. The alternatives have different returns and risk. Hence, financial decisions of the firm are interrelated and jointly affect the market value of its share by influencing return and risk of the firm. The higher the risks on any decision the higher the required return to compensate for this risk. The relationship for required rate of return can be expressed as Risk free rate plus Risk premium, where risk free rate is compensation for time and risk premium for risk. A proper investment decision should maintain a balance between risk and return to maximize the market value of firm's shares. Such a balance is called risk-return trade off.

The possible attitude toward risk can be identified as risk avatar, risk seeker and risk indifferent. Risk avatar is an individual who prefers less risky investment. Risk seeker on the other hand is a individual who prefer risk. The person who is indifferent to risk would not care which investment he receives.

Stephen Leroy (1981) defined volatility as the very variability of price movements to be too large to be justified in terms of efficient market model. This is evidence of a failure of efficient market model due to relatively low variability of excess volatility.

A number of studies have provided the evidence in support of stock price volatility. Leroy and Porter (1981) has shown evidence that the variability of stock price indices cannot be accounted for by information regarding future dividends since dividends just do not seem to vary enough to justify the price movement. Leroy and Civita (1981) also noted independently that consumption variability might induce stock price variability whose magnitude depends on the degree of risk aversion.

Shiller (1989) on his study on stock market volatility found that rational investors' valuation of stocks would be based on expected dividends from owning the stock. Prices, however, are much too volatile to be due to changes in expected dividends, even when adjusted for inflation.

Turner and Welgel (1990) performed an extensive study of volatility, using S & P index returns from 1928 through 1990. They found that "daily return distributions for the Dow Jones and S & P 500 are negatively skewed and contain a large frequency or very small returns as compared to a normal distribution.

Empirical studies show a number of causes of stock prices volatility, firstly, by private information revealed through trading French and Roll (1988) and Barclay (1993),

although the majority of traders are small, most of the cumulative stock- price changes is due to medium- size trader. This evidence is consistent with the hypothesis that informed traders are concentrated in the medium- size category and that price movements are due mainly to the informed trader's private information.

Secondly, Black (1976) suggested the leverage effect that price movements are negatively correlated with volatility. However, he argued that the measured effect of stock price changes on volatility was too large to be explained solely by leverage effects.

Thirdly, paying large dividends reduces risk and thus influence stock price (Gordon 1963) and is a proxy for the future earnings (Baskin, 1989). A number of theoretical mechanisms have been suggested that cause dividend yield and payout ratio to vary inversely with common stock volatility. These are duration effect, rate of return effect, arbitrage pricing effect and information effect. Duration effect is that high dividend yield provides more near term cash flow. If dividend policy is stable, high dividend stocks will have a shorter duration (Gordon 1963). The Gordon growth model can be used to predict that high divided will be less sensitive to fluctuations in discount rate and thus ought to display lower price volatility.

Fourthly, according to Nishat (1999) companies with volatile earnings are expected to pay Lower dividends and are regarded more risky. Consequently, their stock prices are volatile.

Finally, Nyamute (1998) analyzed the effect of various macro-economic variables on the performance of the NSE. She considered four major variable inflation, money supply, interest rates and exchange rates. She found out that macro-economic variable do impact on the performance of stock prices at NSE.

1.1.1 Implications of Volatility

The firstly implication is that, despite the opportunity presented by increased volatility, the bubble, and bears market, there has been no evidence of active management out performance. Ernest (2002), in an S&P 500 study on active fund performance for the five year found that while the S & P 500 index lost 1.6% per annum over the period, it out performed 63% of all active funds. Ironically the active fund registered a negative 2.9% per annum. He concluded that the increased dispersion of returns increases the risk of investing in actively managed funds since they are not fully diversified across their assets class. Therefore active managers try to compensate for increased volatility and dispersion of returns by diversifying more across their asset class.

Another implication to managers is that it is hard to "beat the market" in an efficient market. The great reward exists for those who have the best information hence there is much competition for information. Managers have a duty to maximize shareholders wealth, hence there is need to know what determines stock price volatility in order to minimize risk.

There is a tendency for individual investors to believe (without any supporting evidence) that past performance of active managers is a result of skills. The greater dispersion of returns to active managers could lead investors to conclude that the few big winners resulted from superior skills instead of from random outcomes fully expected, Earnest (2002).

1.2 STATEMENT OF THE PROBLEM

Most of the studies carried out on the volatility of stock prices were done in the developed markets. The characteristics of developed markets differ greatly from those of developing markets. In developing markets, concentration of activities is within one locality, markets are small, have low activities and lack of electronic trading among others.

Nairobi Stock exchange is an important developing market of the region among the developing countries. Emerging markets are termed as a high risk, high return where investors seek high-risk premium (Nighat 1999).

Dickson and Muragu (1994) studied the weekly price movements at the NSE, emphasizing on the level of market efficiency. He found out that stock prices follow a random walk. Thus, they concluded that the nse was efficient in the weak form.

Mwangi(1997) analyzed the price movement of selected securities at the NSE with a view to develop stock price predictive model. His attempts failed and attributed the failure of predictive model to price movement (volatility).

Risk is very important in making investment decision. The higher the risk, the higher the required return. Risk arises in investment decision and evaluation because we cannot anticipate the occurrence of the possible future events with certainty and consequently cannot make any correct prediction about the cash flow sequence or stock price movements.

Prior to 1981, much of the finance literature viewed the present value of dividend to be the principal determinant of the level of stock prices. However, Leroy and Porter 1981 and Shiller (1981) argued that stock prices exhibit too much volatility to be justified by fundamental variables.

Some variables that influence stock price volatility like leverage and size of the firm, political, social and economic factors differ from one place to another. Since 1992, various reforms have been implemented in Kenya aimed at privatization and liberalization of economy. These changes are expected to have influence in the operations of the NSE that may result to improved efficiency. Therefore NSE is unique and different from developed stock markets.

Few studies on stock price volatility have been carried out in NSE. Therefore this study focused on determinants of stock price volatility.

In order to analyze this problem the following hypothesis will be tested:

H_o: $b_1 = b_2 = b_3 = b_4 = b_5 = 0$.

The earning volatility, payout ratio, size, long-term debt and growth in assets do not determine stock price volatility.

H_A: $b_1 \neq b_2 \neq b_3 \neq b_4 \neq b_5$

At least one of the variables is a determinant of stock price volatility. The hypotheses shall be tested using. Two-tailed t-test at confidence levels of 99%, 95% and 90%.

1.3 OBJECTIVE OF THE STUDY

The objectives of this study were two folds:

1. To establish the level of volatility of stock prices in Kenya
2. To identify the determinants of stock price volatility.

1.4 IMPORTANCE OF THE STUDY

The study is expected to be of benefit to the following parties:-

To investors. The study will help investors to be at a better position to make decisions on which company to invest to maximize their wealth. They will also understand the factors that influence stock price movements.

To managers. They will implement policies that will help to reduce stock price volatility and result to high and stable stock prices.

To financial analyst: They have more materials to help them advice their clients appropriately.

To academicians: The study will add to the body of knowledge in the finance discipline and form a basis for future research.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1.THE EFFICIENT MARKET HYPOTHESIS

According to the Efficient Market Hypothesis, security prices reflect information. The Hypothesis states that at any given time, security prices fully reflect all available information. The implication of this is that if markets are efficient and currently prices fully reflect all information, then buying and selling of securities in an attempt to outperform the market will effectively be a game of change rather than skill.

Fama (1970) persuasively made the argument that in an active market and includes many well-informed and intelligent investors; securities will be appropriately priced will reflect all the available information. If a market is efficient, no information or analysis can be expected to result in out performance of an appropriate market benchmark.

The debate about efficiency of securities markets has resulted in many numerous empirical studies attempting to determine whether specific markets are in fact efficient ,and if so to what degree.

Fama (1970), made a distinction between three forms of EMH. These are the weak form, the semi-strong form and the strong form of EMH. According to the strong form of

EMH, security prices reflect all available information including private information. Seyhun (1986, 1998) provides sufficient evidence that insiders usually profit from trading on information not already incorporated into security prices. This indicates that strong form of EMH does not hold in a world with un-even playing ground (information asymmetry).

The weak form of EMH supposes that current prices reflect past information. Fama, 1991 expanded the concept of the weak form EMH to include predicting future returns with the use of accounting or macro-economic variables. The semi-strong form of EMH suggests that market prices reflect all publicly available information. Patell and Wolfson (1984) and Gosnell, Keown and Pinkerton (1996) provide evidence that public information impact on stock prices within minutes of its becoming available. If this form holds it will be useless to analyze financial statements because the market will have captured such information.

The semi-strong form of EMH has formed the basis of most of the empirical research on EMH, although recent research has expanded to include the weak form of EMH (Russel and Torbey, 2002). The paradox of EMH is that if every investor believed a market was efficient, then the market not be efficient because no one would analyze securities. In effect, the efficient markets depends on market participants who believe the market is inefficient and trade in securities in attempt to outperform the market.

2.2 THE RANDOM WALK THEORY

According to the Random Walk Theory, security prices follow a treadles random walk, hence there are no predictable variations in equity returns, and if there are any, they are statistically insignificant.

The theory consists of two distinct hypotheses, one economic and the other statistical. The economic argument assumes that security markets air, for all purposes. The statistical arguments, on the other hand assets that, for any particular security, price changes are independent random variables (Chone and King, 1971). Accordingly, price movements do not follow any pattern or trend and past price movements cannot be used to predict future price movements.

Much literature has been reviewed with regard to stock price behavior. Many of these have focused on the predictability of prices from past prices. .These include Fama and French (1995); Campbell and Shiler (1987); and Harris (1986). These have concentrated on the use of financial models in predicting prices. The models include the dividend yield model, price earnings ratio model and the term structure variables.

Despite the strong evidence that stock markets are efficient (Fama, 1965, 1970, 1991), there have been other studies, which have documented anomalous behavior in the stock markets that seem to contradict the EMH and the Random Walk Theory.

Fundamental anomalies concentrate on value premium strategy investing. A value strategy involves purchasing stocks whose prices are low relative to some measure of their underlying value. Among those studies that confirm that portfolios with low price/earnings ratios: low price to cashflow ratios; and high book to market ratios produce superior risk adjusted returns both in the US and World wide markets include DeBondt and Thaler (1985 and 1987). Chopra, Lakonishok and Ritter (1992), and Fama and French (1995). Daniel and Titman (1995), concluded that value premium occurs because the market temporarily under prices value stocks and overprices growth stocks.

Technicians/chartists believe that past prices and charts can be used to predict future prices. If so, then this could be as a result of technical anomalies. Technical analysis techniques attempt to forecast securities prices by studying past prices and related statistics. Jegadeesh and Titman (1993) did extensive discussion of technical anomalies. According to Sherden (1998), technical analysis is doomed to fail by the statistical fact that stock prices are rarely random, the market patterns from the past provide no clue about its future.

Other extensively discussed anomalies are the Calendar Anomalies. The documented calendar anomalies include the January effect. Turn of the Month Effect, The Monday

Effect and the Holiday Effect. The Turn of the Month Effect has it that stocks consistently slow higher returns on the last day of the month (Hensel and Ziemba, 1996).

According to the Monday Effect anomaly, Mondays tend to be the worst day to be invested in stocks since it has the lowest returns compared to any other day of the week. (Harris, 1986). Behavioral Finance theorists have tried to attribute the Monday effect to the fact that investors (people) are generally in better moods on Mondays after the weekend rest, than on the other days of the week. This boosts their investment activities causing price pressure that leads to the anomaly. Just like the Monday effect, the Holiday Effect is a stock anomaly whereby stock prices have been shown to be consistently higher in the day immediately after a holiday.

The January Effect is the tendency of stock markets to rise between December and January of the subsequent year. Rozeff and Kinney (1976), Samuel (2003), Riepe (2001) and Coutts and Sheikh (2000) have extensively studied it.

2.3 FACTORS INFLUENCING RETURNS

Sharpe (1963) developed a simplified single-index model to predict security returns. The major characteristic, and the primary shortcoming of the single index model is that the only factor influencing a security's return is its sensitivity to changes in the market portfolio return.

King (1966) published the first important study providing that stock prices for firms in the same industry exhibit a common movement that goes beyond the market. Employing monthly, closing stock prices for 63 in six industries during the June 1927 to December 1960 period, his study documents that while 50% of stock price movement could be explained by movements in the market index 20% of the residue variance was accounted for industry affiliation.

Meyers (1973) and Livingston (1977) in similar studies confirmed King's findings. The Meyers study involved 60% of the same companies used by King and 60 additional companies, using data through December 1967. Meyers concluded that although there were strong industry affects, King might have overstated the percent of residual variance explained by industry association. The recognition that factors other than movement in the market index affect security returns led to the development of multi-index models.

Sharpe (1982) studied monthly returns for stocks of 2,197 firms from 1931 through 1979, his findings shared that R^2 for a regression model was significantly improved using divided yield, company size and bond beta in addition to market index.

Paris and Chen (1984) conducted a test of an Arbitrage pricing theory and found that factors such as the general market index, price volatility and interest rate risk influence stock price. Chen, Roll and Ross (1986) tested an APT model for significance of several factors in explaining security returns. There results indicated that the following factors are significant in explaining the variability of security returns, spread between long and

short interest rates, expected and unexpected inflation, industrial production, and the spread between returns on high and low grade bonds.

Chan (1991) provides improved framework for analyzing stock returns and macro-economic factors. He shows that using the test period 1954-1986, state variable, such as lagged, production growth rate, the default risk premium the term premium, the short term interest rates and the market dividend price ratio are important indicators of current economic growth, which is in turn negatively correlated with market excess return. He further found that four variables including earnings yield, size, book to market ratio and cash flow yield, of which the last two variable have the most significant positive effects on expected stoke returns.

2.4 FACTORS INFLUENCING STOCK PRICE VOLATILITY

2.4.1 DIVIDEND

Agency cost argument, as developed by Jensen and Mecking (1976) proposed that dividend payments reduce costs and increase cash flow, that is payment of dividends motivates managers to disgorge cash rather than investing at below the cost of capital or wasting it on organizational inefficiencies. (Rozeff, 1982 and Easterbrook 1984). Some authors have stressed that importance of information content of dividend (Asquth and Mullin, 1983; and Born Moser, 1983).

Miller and Ruck (1985) suggested that dividend announcement provide the missing piece of information about the firm and allows the market to estimate the firms current earnings

investors may have greater confidence that reported earnings reflect economic profits when announcements are accompanied by ample dividends. If investors are more certain in their opinions, they may react less to questionable resources of information and their expectation of value may be insulated from irrational influence.

Compbell, John Y and Robert J. Shiller (1988) suggest that while returns are too volatile to accord with market efficiency, the sources of stock return volatility is nonetheless information about future dividends. This suggests for example that the stock market crash of 1987 would likely be due to genuine information about future dividends and that while investors overreaction would be at work, it would likely be overreaction to fundamentals rather than to each other.

2.4.2 Leverage

Black (1976) suggested the leverage effect that price movements are negatively correlated with volatility. However, he argued that the measured effect of stock price changes on volatility was too large to be explained solely by leverage effects. While the impact of leverage in level and volatility of earnings is universally acknowledged, its influence on stock price is more controversial subject. Under certain assumption, stock prices are unaffected by leverage, since the increase in earning per share is offset by a corresponding rise in the capitalization rate or fall in the price earnings ratio. Such an offset is likely to occur when the injection of leverage raises company's debt to the level that the market regards as risky (Merton, 1974).

Given the operating risk, there should be a direct link between stock price volatility and leverage under conditions of asymmetric information there is also likely to be a link between borrowing and dividend policy.

2.4.3 Growth in Assets

According to Donaldson (1961) firms with low payout and low dividend yield may tend to be valued more in terms of future investment opportunities. Consequently, its stock price may be more sensitive to changing estimates of rate of return over distant time period.

Stock price volatility could be inversely linked to growth and investment opportunities, this is in accordance to the duration and rate of return effect discussed by Gordon (1963) assume timing differentials in the firms underlying cash flows.

2.4.4 Size

Small firms are likely to be less diversified in their activities and less subject to investors' scrutiny. Institutions appear to concentrate their research activities and investment policies on larger listed companies. The market in the stocks of small listed firm could conceivably be less informed, more illiquid and as a consequence subject to greater price volatility.

Baskin (1989) suggests that firms with a more dispersed body of shareholders may be more disposed towards using dividend policy as signaling device.

2.5 Risk Definition and Concept

Risk is the uncertainty associated with the expected returns. Scholars have however defined risk in more precise ways. Different Scholars have used various definitions of capture the concept of risk. In finance theory these varied definitions are attributable to various schools of thought being the volatility and the variability schools which are basically differentiated on the basis of their perception of risk.

March and Shapira (1987) belong to the variability school and they perceived risk as the variation in the distribution of possible outcomes, their distribution and the subjective values. This perception compares with Roblchecks (1969), who perceives risk as the possibility that actual returns may vary from expected returns. From this perception risk is qualified in terms of variability measures co-variances and coefficient of variation.

Proponents of the volatility school of thought on the other hand perceived risk as the volatility of returns in relation to market returns. Under this definition, then, those securities whose return are highly correlated with the market returns are said to have low volatility, while those returns that have little correlation with the market returns are said to be highly volatile.

2.6 MEASUREMENT OF RISK

The more a firm relies on debt financing the riskier its common stock is. Risk can be divided into two ie, the unsystematic and systematic risk. The risk that potentially can be eliminated through diversification is the unsystematic risk. The risk that cannot be

diversified is called the systematic risk or markets risk or unavoidable risk. Example includes variation in general economic conditions such as GNP, interest rate and inflation.

2.6.1 THE BETA

The (market) systematic risk of a security is measured in terms of its sensitivity to the market movements. The sensitivity is known as the security's Beta. The capital asset pricing model provides a measure of risk, and is used by many different firms to calculate the discount rate.

The beta of stock is simply the slope of the regression line, when excess returns above risk-free rate for stock are regressed against returns for the market portfolio.
Unsystematic risk derives from the variability of the stock excess return not associated with the movements in the excess return of he market as whole. The risk is described by dispersion of the estimates involved in predicting a stock's characteristic line (Van Horne, 1995).

2.6.2 STANDARD DEVIATION

A commonly used measure of risk is the standard deviation or variance. It is rough average measure of how far each of outcomes falls away from the expected value. Generally, the larger the standard deviation, the greater the risk variance measures the deviations about expected cash flow of each of the possible cash flows. Standard deviation is the square root of variance.

2.6.3 COEFFICIENT OF VARIATION

Coefficient of variation is a relative, measure of risk. It is defined as the standard deviation of the probability distribution dividend by its expected value.

$$\text{Coefficient of variation} = CV = \frac{\text{Standard deviation}}{\text{Expected value}}$$

Generally, the larger the coefficient of variation, the greater the risk.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN.

The was research was a explorative study aimed at determining the determinants of stock price volatility at NSE. Hence, tables, correlation and regression equation were used to summarize and analyze the data.

3.2 POPULATION.

The population for the study was all the companies quoted at the Nairobi Stock Exchange (NSE) as at 31 December 2002. The study covered those companies that trade in ordinary shares and therefore exclude those trading exclusively in preferred shares.

3.3 SAMPLE

The sample comprised of companies continuously listed at the Nairobi Stock exchange for the period between 1998 to 2002. Simple random sampling was used to select 16 companies for the study.

3.4 DATA COLLECTION

Date required was collected from the NSE inform of secondary data. The annual data of these firms is taken from various issue of "Balance sheet analysis published in Nairobi stock exchange. Price data was taken from Daily stock prices and other publication of Nairobi Stock Exchange and Capital Market Authority (CMA). Therefore secondary data design was used for this purpose.

3.5 DATA ANALYSIS

3.5.1 VARIABLE DEFINATION

3.5.1.1 PRICE VOLATILITY (PV)

Estimating standard deviation of monthly stock returns derives the depended variable in the regression (volatility). The monthly standard deviation was subsequently obtained. The annualized standard deviation was determined by multiplying the monthly standard deviation by the square root of 12 (12 trading months in a year)

Daily Returns $(R_d) = \frac{P_1 - Po}{Po} \times 100$ Where Po = opening daily price of stocks

P_1 = closing daily price

Monthly standard deviation $\delta_m = \sqrt{\frac{\Sigma (R_d - E(R_d))^2}{n}}$

Where

Rd = Daily returns of stock

E(Rd) = mean returns of stock

n = Number of days in a month

δ_m = monthly standard deviation

Annualized standard deviation of stocks $\delta_y = \delta_m \times \sqrt{12}$

3.5.1.2 Earning volatility EV.

In order to develop this variable the ratio of operating earnings (before taxes and interest) to total assets was calculated. The next step was to calculate an average of the squared deviation from the overall average. A square root transformation is then applied to the mean squared deviation to obtain estimates of standard deviation.

$$\text{Ratio } X_{it} = \frac{\text{EBIT}}{\text{Total Assets}}$$

$$E(x) = x_{it}/n$$

$$\delta^2 = \Sigma \frac{(xi - E(x))^2}{n}$$

Where n = number of years
i = 1, 2 .....n
X_{it} =The earning index of company i during year t.
E (x)= The mean return over the period.

$$\delta = \sqrt{\Sigma \frac{(xi - E(x))^2}{n}}$$

δ^2 = variance of earnings
δ = standard deviation of earnings

3.5.1.3 Payout Ratio (POR)

To begin, total cumulative individual company earnings and dividends were calculated for all years. Payout is the ratio of total dividends to total earnings. POR was computed using total earning and total dividends over the five-year period. The use of this

procedure controls the problem values in individual years attributable to low or possibly negative net income. The payout ratio is set to one in cases where total dividend exceeds earnings.

$$POR = \frac{\sum_{t=1}^{n} d_t}{\sum_{t=1}^{n} E_t}$$

Where d_t = year dividend of company i paid.
$t = 1 \ldots\ldots n$
E_t = earning of campany i du ring year t.

3.5.1.4 Size (SZ)

The variable corporate size was constructed on the basis of market value of the company's common stock. The variable was constructed by taking the average market value of common stocks. The value of real size was averaged over the period.

$$Z_n = \frac{\text{Total market value of common stock}}{\text{Number of years}}$$

$$Z_n = \frac{\sum_{t=i}^{n} Mv_t}{n}$$

Where MV_t = market value of company i of common stock during year t
n = number of years
Z_n = average size of company i over the period.

3.5.1.5 Long-term debt (DT)

Long-term debt was measured via the debt ratio.

The ratio of the sum of all the long-term debt (debt with maturity more than a year) to total assets was taken. An average is taken over all available years.

Long-term Debt (A)

$$DA_t = \frac{\text{Sum of all the long term debt in ayear}}{\text{Total Assets in a year}}$$

$$D = \Sigma DA_t/n$$

Where $t = 1 \ldots n$

DA_t = yearly ratio.

D = Average debt ratio over the period.

3.4.1.6 Growth in Assets (Asg)

The annual growth rate was calculated by taking the ratio of the change in total assets in a year. Then the ratio was averaged over the years.

$$\text{Year growth rate (R)} = \frac{T_E - T_b}{T_b}$$

$$ASg = \frac{\sum_{t=1}^{n} R}{n}$$

where $t = 1, 2 \ldots n$

n = number of years

R =Company growth rate as measured by change in assets.

T_b = Beginning of year total assets.

T_E = End of the year total assets

ASG = Average growth rate over the period.

3.4.2 THE STOCK PRICE VOLATILITY MODEL

The following regression was adopted.

$$PV = a + b_1 EV + b_2 PoR + b_3 Sz + b_4 DT + b_5 ASG + e$$

Where

PV = Price volatility

a = constant

EV = Earning volatility

POR =Dividend payout ratio

DT = Long-term debt

Sz = Size

Asg = Growth in assets.

e = Unexpected random error.

Abroad description of the characteristics of the variables used in the study will be done. This involved the use of descriptive statistical method. The mean and standard deviation of each variable in the study was calculated.

The analysis utilized cross-sectional generalized least squares that involved regressing the dependent variable price volatility (PV) against the independent variables. This provided the relationship between price volatility and the dependent variables.

The correlation coefficient (r) and coefficient of determination (r^2) were estimated.

Test of significance was undertaken using the t-statistics at 95% confidence level.

CHAPTER FOUR

4 DATA ANALYSIS INTERPRETATION AND DISCUSSIONS.

4.1 STOCK PRICE VOLATILITY.

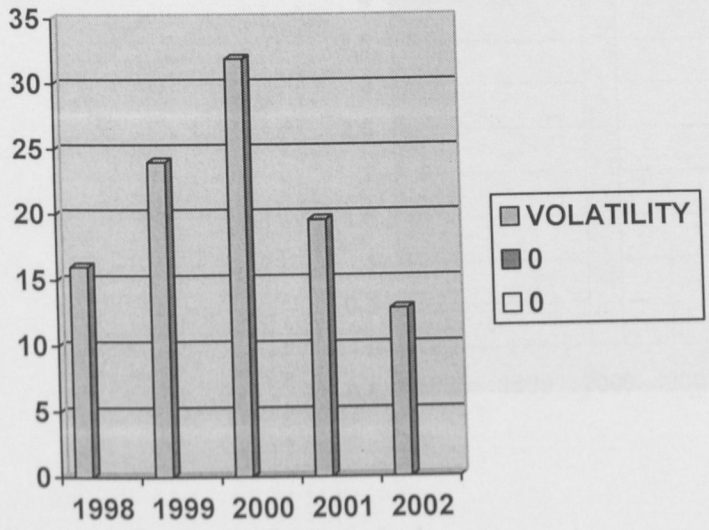
TABLE 1a: STOCK PRICE VOLATILITY SUMMARY BY SECTOR.

YEAR	AGRICULTURE	COMMERCIAL	FINANCE AND INVESTMENT	INDUSTRIAL AND ALLIED	ALTERNATIVE INVESTMENT MARKET	OVERALL MEAN
1998	12.4%	9.4%	17.2%	30.30%	10.10%	16%
1999	17%	10.01%	55.26%	19.33%	19.48%	24.22%
2000	7.44%	17.0%	13.1%	77.23%	44.2%	31.9%
2001	29.05%	26.2%	16.86%	20.77%	4.8%	19.53%
2002	10.59%	18.13%	21%	10%	4.22%	12.8%
MEAN	15.294%	17.97%	24.6%	31.526%	16.50%	21.2%

Source: Research Data Analysis

The highest stock price volatility was registered in the year 2000 and the lowest in the year 2002. The stock price volatility increased from 1998 to 2000 and started folling after 2000 to 2002. The high volatility in 1999 and 2000 may be attributed to uncertainty in the banking sector as a motion in parliament sought to regulate the level of interest rates that banks can charge. Banking sector is important since a change in interest rates affects the whole market.

GRAPH 1. COMPARATIVE STOCK PRICE VOLATILITY BY YEARS.



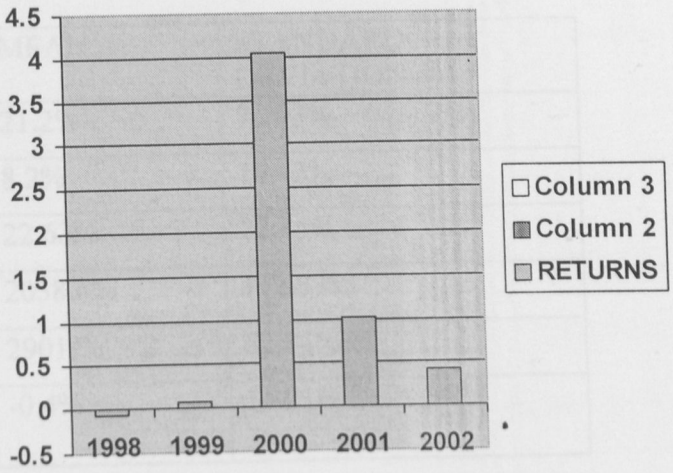
Source: Research data analysis

Industrial and allied witnessed the highest volatility, while agriculture sector had the lowest volatility followed by alternative investment market registered a high volatility. Industries and allied sector largely comprises of manufacturing concerns which have endured the full impact of liberalization of Kenyan Economy, which has resulted in the influx of imported low priced commodities.

TABLE 1b: ANNUAL RETURNS.

YEAR	1998	1999	2000	2001	2002	MEAN
RETURNS	-.067%	0.0804%	4.104%	1.008%	0.408%	1.095%

GRAPH 2: COMPARATIVE ANNUAL RETURNS



Sources: Research data analysis

The results show that, the highest return (4.044%) were witnessed in the year 2000 which was also the highest, and also the year with highest volatility.

The lowest returns of –0.67 were observed in the year 1998, which still was the year with lowest volatility.

Generally the NSE registered high price volatility, the highest being from industrial and allied in the year 2000 i.e. 77.23%. The high price volatility supports the evidence that NSE is weak form efficiency.

TABLE 2: DESCRIPTIVE STATISTICS OF NAIROBI STOCK EXCHANGE

VARIABLES	MEAN	STANDARD DEVIATION
PV	21.2%	7.793%
EV	8.2%	10.43%
POR	22.63%	22.43%
SZ	2038.8%	197.37%
DT	2901.%	62.14%
ASG	-0.4%	15.21%

Sources: Research Data Analysis

The data gives a broad description of the characteristics of the variable used in the study. It is assumed that stock prices follow a normal distribution. Standard deviation explains the variability of variable, mean explains the concentration of occurrence.

The size has the highest standard deviation of 1.9737 (197%). This depicts that firms have different sizes hence we have large, medium and small firms. Asset growth has a mean of –0.004 with standard deviation of 15.21%. These mean that on average firms listed in Nairobi Stock Exchange had almost negative or zero growth during the period of study. However, high standard deviation means that same firms experience positive growth rate in assets while others collapse and are forced into liquidation.

The payout ratio is high hence companies pay dividend from earnings or reserves in order to enhance their image and attract investors.

Generally, earning volatility is low with a mean of 8.2%. This shows that firm's earnings do not differ from year to year but they differ from company, to company since the standard deviation is 10.43%.

Long-term debt is 29.01% therefore company use debt for growth since it is a cheap source of finance compared to Equity finance. A very high standard deviation of 62.14% show that firms have different debt level hence different capitals structure.

Our dependent variable price volatility (21.2%) is high compared to returns (1.095%). This means that, in general Daily stock prices at NSE do fluctuate so much. The standard deviation is low meaning that the daily stock movements do not differ so much from one company to another.

4.2 REGRESSION RESULTS

TABLE 3: CORRELATION MATRIX

VARIABLES	PV	EV	POR	SZ	DT	ASG
PV	1					
EV	-0.213	1				
POR	-0.231	-0.094	1			
SZ	0.271	0.062	-0.474	1		
DT	0.118	-0.222	-0.195	-0.132	1	
ASG	-0.123	-0.066	-0.202	-0.075	0.040	1

Sources: Research data analysis

Table 3 reports the correlation between the variable utilized for the overall period. The correlation between price volatility and payout ratio is –0.213. This confirms our expectation that firms, which pay high dividends, experience low stock price volatility. This is because paying large dividends reduces risk and thus influences stock price and is a proxy for future earnings. These evidence supports Gordon growth model which can be used to predict that high-dividend will be less sensitive to fluctuation in discount rates and thus ought to display lower price volatility.

Negative correlation between payout ratio and earning volatility shows that firms with volatile earnings are expected to pay low dividends and to be regarded as more risky.

The negative correlation between price volatility and asset growth and negative correlation between asset growth and earnings volatility shows-that growing firms experience volatile earnings which increases firms risk hence influencing stock price volatility.

The positive correlation between debt and asset growth means that firms use debt to increase their size. Small firms pay high dividend to enhance their image as evidenced by negative correlation between payout ratio and size.

The negative correlation between earnings volatility and price volatility does not support the hypothesis that firms with volatile earnings experience high stock price volatility.

The positive relationship between size and price volatility is against the theory that large firm experience low stock price volatility.

TABLE 4: REGRESSION RESULTS BY SECTORS

MARKET SECTORS	REGRESSIONRESULTS (EQUATION).	R	R2
AGRICUTURE	PV=-0.018+1.4EV-0.17POR+0.004SZ+0.039DT-0.25ASG	1	1
COMMERCIAL	PV=-0.006+0.0015EV+1.002POR+1.9SZ+0.002DT+0.0071ASG	1	1
FINANCE & INVESTMENT	PV=-0.04+0.38EV+0.063POR+0.003SZ+0.4DT+0.23ASG	1	1
INDUSTRIAL AND ALLIED	PV=34.8-100EV-98.3POR+1.4SZ-7DT+750ASG	1	1
ALTERNATIVE INVESTMENT	PV=0.1+0.44EV-0.02POR-0.004SZ+0.2DT-0.9ASG	1	1
OVERALL(NSE)	PV=-0.219EV-0.229POR+0.162DT+0.027SZ-0.275ASG	0.464	.216

Sources: Research data analysis.

The table reports regression results for NSE. . The R squared for each sector was one (1), meaning that the model explained well the volatility of each sector taken independently. However, the R squared for the whole market (NSE) is 0.216. This can be attributed to the increase in the number of companies considered in the whole market i.e. NSE.

TABLE 5:REGRESSION RESULTS SUMMARY.

REGRESSED VARIABLES	MULTIPLE R	R SQUARED
PV V/s DT	0.118	0.014
PV V/s EV	0.213	0.04
PV V/s POR	0.23	0.05
PV V/s ASG	0.22	0.051
PV V/s SZ	0.27	0.073
PV V/s EV & DT	0.22	0.051
PV V/s ASG & DT	0.25	0.06
PV V/s ASG & EV	0.32	0.103
PV V/s POR & EV	0.33	0.109
PV V/s SZ,DT & ASG	.37	.0138
PV V/s SZ,POR & EV	0.38	0.144
PV V/s SZ,POR,DT &ASG	039	0.156
PV V/s SZ,POR,DT, EV & ASG	0.464	0.216

Source: Research Data Analysis

The table shows that there is a linear relationship between the dependent variable and each independent variable. The explanatory power of the model increases as the number of independent variable increases. This shows that a number of factors do influence stock price volatility. The entire variables are significant in the model since they improve

the explanatory power of the model (21.6%). Therefore to improve the model more variable should be included in the regression model. Size is the most important single factor since it can explain 7.4% of the stock price volatility.

Earning volatility, payout ratio Asset growth has negative beta'-hence they show an inverse linear relationship with stock price volatility.

4.3 TESTS OF SIGNIFICANCE FOR THE INDEPENDENT VARIABLES

Statistical tests were carried out to find out whether independent variables were significant determinant of price volatility. Tests were carried out on five major variables, that is: EV, POR, DT, SZ and Asg. The test followed the following steps:

1. Making assumptions (the hypothesis)

   H_O: $b_1 = b_2 = b_3 = b_4 = b_5 = 0$

   H_A: $b_1 \neq b_2 \neq b_3 \neq b_4 \neq b_5$

2. Obtaining the sampling distribution
3. Selecting a significance level and critical region the level of significance was 0.05
4. Computing the test statistic
5. Making decision

A statistical decision is made by rejecting the null hypothesis if the statistic lies in the critical region or fails to reject null hypothesis.

TABLE 6a: HYPOTHESIS TEST AT 95% CONFIDENCE LEVEL.

Variable	beta	t-computed	t-critical	Ho
EV	-0.219	-0.875	2.1448	Accept
POR	-0.229	-.645	2.1448	Accept
DT	0.162	0.477	2.1448	Accept
SZ	0.027	0.088	2.1448	Accept –
Asg	-0.275	-0.926	2.1448	Accept

Source. Research Data Analysis

Table 6a shows the results of the hypothesis test of the independent variable. It depicts that earning volatility, payout ratio, long term debt, size and asset growth are insignificant i.e. they have little explanation power on price volatility. The null hypothesis is accepted. However, earning volatility, payout ratio and asset growth seem to move in opposite direction to price volatility. Long term debt and size move in the same direction (positive) with price volatility.

TABLE 6b:HYPONTESES TEST AT 90% CONFIDENCE LEVEL

VARIABLES	BETA	t- COMPUTED	t-CRITICAL	HO
EV	-0.219	-0.875	2.977	Accept
POR	-.229	-0.645	2.977	Accept
DT	0.162	0.477	2.977	Accept
SZ	0.027	0.088	2.977	Accept
ASG	-0.275	-0.926	2.977	Accept

Source: Research data analysis

Table 6b shows the results of the hypothesis test at 99% confidence level. It depicts that all the five variables are insignificant determinants of stock price volatility. Therefore null hypothesis was accepted.

TABLE 6c: HYPONTESES TEST AT 90% CONFIDENCE LEVEL

VARIABLES	BETA	t- COMPUTED	t-CRITICAL	HO
EV	-0.219	-0.875	1.76	Accept
POR	-.229	-0.645	1.76	Accept
DT	0.162	0.477	1.76	Accept
SZ	0.027	0.088	1.76	Accept
ASG	-0.275	-0.926	1.76	Accept

Source: Research data analysis.

Table6c shows the results of the hypothesis test at 90% confidence level. It confirms that all the five independent variable are insignificant determinants of stock price volatility. The results confirm the acceptance of null hypothesis.

4.4 DISCUSSION

The study had the objective of establishing the level of volatility of stock prices at NSE and then identifying the determinants of stock price volatility. The study utilized annualized standard deviation of daily stock returns for one month to measure stock price volatility.

It was revealed that stock price volatility at NSE was high 21.2%. This is because NSE is weak form efficiency meaning that stock price reflect past information only. Industrial and allied observed the highest stock price volatility of 31.5%. This can be attributed to the effect of liberalization of economy. The sector was more affected compared to the other sector.

Agriculture sector registered the lowest level of volatility 15.3%. This is due to the fact that agriculture depends largely on Natural factors like land and rains and other internal factors.

The level of stock price volatility was highest in the year 2000. The uncertainty was brought about by motion in parliament, which sought to control the interest rates in financial sector. The year 2000 was also a beginning of new millennium and was characterized by many uncertainties and expectations. All these factors, taken together had impact on economy and hence stock prices. The level of volatility increased from 1999 to 2000 and declined in the following years.

The study revealed a negative relationship between earning volatility, payout ratio (a measure of dividend policy) and asset growth with stock price volatility. This means that a high payout ratio and high asset growth will result to low stock price volatility.

There is positive correlation between level of campanys long-term debt and price-stock volatility. This is because debt is more risk than equity hence debt increases the operating risk of a firm making the stock more volatile. a positive correlation was observed between size and price volatility. This means that the higher the debt the more price volatility. Therefore, the large the company the greater the volatility meaning small company's stock are more stable.

The regression results showed that there is a linear negative relationship between price volatility and three selected variables i.e. payout ratio, earning volatility and asset growth. The other two factors long-term debt and size have linear relationship with price volatility.

In the regression equation five independent variable were regressed against price volatility and t-test carried on them to find out whether they are determinant of stock volatility. The result revealed that the five factors; payout ratio, size, long-term debt and Assets growth do influence stock price volatility. The results of t-test failed to reject null hypothesis since the variable were insignificant.

R squared showed that only 22% of price volatility can be explained by the five factors. The R squared improved as the number of the variables in the model increased, meaning that the model can be improved by adding more independent variables and that there are other factors which do influence stock price volatility.

CHAPTER FIVE

5.0 RESEARCH CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The objectives of the study were to establish the level of volatility of stock price in Kenya and identify the determinants of stock price volatility.

The objectives were achieved by extracting secondary data generated from financial reports and daily stock price data in Nairobi Stock Exchange. A sample of 16 companies selected randomly was used for this study. The model used for analysis was cross-sectional generalized least squares multiple regression. T-test was used to determine whether the factors were significant determinant of stock price volatility.

5.2 SUMMARY OF RESEARCH FINDINGS

This study revealed that companies quoted at Nairobi Stock Exchange experience stock price volatility. However, the level of stock price volatility is high. The results support the widely known hypothesis that security prices follow a treadles random walk. Industrial and allied sector had the highest stock price volatility while agriculture sector had the lowest. For the period considered (1998-2002), the highest volatility was registered in the year 2000.

Results of the regression showed that stock price volatility is inversely related to payout ratio, earnings volatility and asset growth while it is positively related to long-term debt

and size. The five independent variables, dividend payout, Earning volatility, long-term debt, size and Asset growth improve the explanatory power of the model hence we concluded that, they do influence stock price volatility. The R squared showed that the explanatory power of the model improves, as more factors are included in the model hence stock price volatility is influenced by multiples of factors. However, among the factors considered payout ratio and size have the highest influence.

The study failed to reject the null hypotheses, hence payout ratio, size, earning volatility long-term debt and Asset growth are insignificant determinants of price stock volatility.

5.3 THE IMPLICATION OF THE STUDY

The study failed to reject the null hypothesis, and revealed high stock volatility. This is in accordance to the study by Dickson and Muragu (1994) that NSE is efficient in the weak form as outlined in Literature Review. Therefore past information is reflected in the share price as it arrives in the market.

The results also imply that there are either many factors or alternative factors which affect/influence stock price volatility outside those studied. This is in accordance to the widely known hypothesis that stock price movements are mainly due to informed traders private information revealed during trading (Roll, 1988). Therefore payout ratios, earnings volatility, long-term debt, size and Assets growth can not be solely used to determine stock price volatility. This supports the study by Nyamute (1998) that macro-

economic variable like inflation, money supply, interest rates and exchange rates may impact more greatly on the performance of stock prices at NSE.

The results show that NSE is an emerging market and different from developed market. This is because the stock price volatility is high and the factors considered are not significant determinants as hypothesized in developed market.

The positive relationship between price volatility and debt implies that firms use debt to finance investment and that debt increases the operating risk of a firm. Therefore high debt firm have high stock price volatility, meaning big company's stock are highly volatile.

The negative linear relationship between payouts ratio and price volatility is consistent with theory that firms that have high payout ratio have lower volatility in their prices. This is because high dividend payout reduces firm's risk and agency cost as revealed in the literature review. Firms use dividend to attract investors. (Jansen, 1976).

According to Dickson and Muragu (1994) NSE is efficient in the weak form. This means, share prices reflect only past security price information. Information is reflected immediately in the share price hence leading to high stock volatility.

As outlined in literature review (Fama 1991) expanded the concept of weak form EMH and concluded that public information impact on stock prices within minutes of its

becoming available. This explains why stock prices are highly volatile at NSE. Stock prices react to the random news.

5.5 LIMITATION OF THE STUDY

The study has several limitations. It is highly important that users be aware of some of these so that they make appropriate decisions/conclusion from the study findings.

a) The population under study was well defined, a sample of only sixteen companies was selected. Further still, the procedure that was applied in selecting the said sample was subjective and judgmental. It is therefore difficult to generalize the results for this analysis to be representative of the market.

b) The t-distribution used in this study assumed that sampling was done from a population that is approximately normal. However, the users should note that there are cases where the statistical approach used bring in bias rendering the assumption useless.

c) The results depends very much on the model used in deriving the variable and determining the beta's (analyzing) of the variable.

d) The researcher also feels that the time frame chosen for the study may have not been appropriate to enable him to draw generalized conclusions. The period of study i.e. 1998-2002 may not have been very active in the NSE as anticipated. Returns based on price for same company were found to be zero.

5.6 SUGGESTIONS FOR FURTHER RESEARCH

a) **The issue of the role of expectations in shares prices formation should be re-addressed. As indicated in literature review, the price of firms share is influenced by all factors that affect the expectations of the firm and it shares. It would therefore be interesting for one to look at the question of the role of actual changes in dividends on share returns, the role of expected changes in dividends and finally the role of the changes in expectations.**

b) A study to determine the impact of dividend policy on stock price risk while controlling for over factors.

c) A study on determinants of stock price volatility that incorporates macro-economic factors and even political and social factors.

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APPENDIX 1

NAME OF THE COMPANY----------

YEAR	DIVIDENTS KSH	SIZE KSH	EARNING KSH	LONG-TERM DEBT. KSH	TOTAL ASSETS. KSH.
1998					
1999					
2000					
2001					
2002					

APPENDIX 2.

LIST OF SAMPLE COMPANIES:

BROOKBOND KENYA LIMITED.

KAKUZI COMPANY LIMITED.

KENYA AIRWAYS LIMITED.

UCHUMI SEPER MARKETS LIMITED.

BARCLAYS BANK OF KENYA LIMITED.

ICDC INVESTMENT COMPANY LIMITED.

JUBILEE INSURANCE COMPANY LIMITED.

KENYA COMMERCIAL BANK LIMITED.

ATHIRIVER MINING COMPANY LIMITED.

BAMBURI CEMENT COMPANY LIMITED.

EAST AFRICAN BREWERIES LIMITED.

CITY TRUST LIMITED.

LIMURU TEA COMPANY LIMITED.

STANDARD NEWSPAPER GROUP LIMITED.

REA VIPNGO PLANTATION LIMITED.

APPENDIX 2

BROOKEBOND LIMITED						
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.0102	0.07772	0.413	0.00695	20.35095065	-0.009361
1999	0.02075	0.056	0.5697	0.221	22.34916748	0.06868
2000	0.0214	0.101	0.441	0.205	22.27948755	-0.0528
2001	0.0128	0.053	0.037	0.2412	21.9814427	-0.0024
2002	0	0.034	0.562	0.231	21.69376062	-0.0212
MEAN	0.01303	0.064344	0.40454	0.18103	21.7309618	-0.003416
STDEV	0.008768	0.025698	0.217116	0.098226	0.814188883	0.044691

KAKUZI LIMITED						
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.012	0.0482	1	0.0985	21.73979961	1.2322
1999	0.014	-0.0051	0	0.174	21.25694819	-0.0742
2000	0.0107	-0.1	0	0.5915	19.77773412	1.5644
2001	0.025	0.032	0	0.0505	19.20236998	-0.71
2002	0.0153	0.003	0	0.1544	19.85295755	0.051
MEAN	0.0154	-0.00438	0.2	0.21378	20.36596189	0.41268
STDEV	0.005652	0.057633	0.447214	0.216639	1.077545609	0.952148

CMC HOLDING LTD						
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.014	0.06	1	0.021	20.58903134	0.01013
1999	0.025	0.05	1	0.012	20.40634169	-0.1879
2000	0.015	0.0344	1	0.0923	19.77773412	-0.0518
2001	0.121	0.03404	1	0.0785	19.20236998	0.2016
2002	0.083	0.0541	1	0.0598	19.85295755	-0.079
MEAN	0.0516	0.046508	1	0.05272	19.96568693	-0.021394
STDEV	0.048123	0.011768	0	0.035162	0.550777134	0.143777

KENYA AIRWAYS LIMITED						
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.23	0.10723	0.3215	0.2333	21.93811651	-0.1124
1999	0.43	0.0805	0	0.3415	22.02968371	-0.1314
2000	0.109	0.1244	0.2023	0.3487	21.96514584	-0.2279
2001	0.1029	0.08785	0.2821	0.3723	21.97179038	-0.014045
2002	0.067	0.0478	0.2615	0.3455	22.01075635	0.0495
MEAN	0.18778	0.089556	0.21348	0.32826	21.98309856	-0.087249
STDEV	0.148704	0.028961	0.126868	0.054422	0.036771894	0.107731

	UCHUMI SUPERMARKET LIMITED					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.012	3.21	0.0034	0	21.73849652	0.00302
1999	0.00883	3.261	0.0031	0	21.78105613	0.01305
2000	0.0372	3.192	0.0025	0	21.66522432	-0.19143
2001	0.026	4.082	0.0121	0	21.72756745	0.163
2002	0.0298	3.125	0.0038	0.002	20.71925782	-0.2329
MEAN	0.022766	3.374	0.00498	0.0004	21.52632045	-0.049052
STDEV	0.012025	0.398765	0.004008	0.000894	0.453060063	0.162485
	BARCLAYS BANK OF KENYA.					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.011	0.318	0.00337	0	23.72197617	-0.012
1999	0.024	0.19	0.0031	0	23.67167587	-0.2318
2000	0.032	0.132	0.0025	0	23.35999904	-0.228
2001	0.022	0.182	0.0125	0	23.32034984	-0.0141
2002	0.0357	0.115	0.0038	0	23.6509869	0.0495
MEAN	0.02494	0.1874	0.005054	0	23.54499756	-0.08728
STDEV	0.009611	0.079692	0.004189	0	0.189270715	0.132683
	ICDC INVESTMENT COMPANY LTD.					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.03	0.199	0.5605	0	20.82685379	-0.23
1999	0.0516	0.144	0.265	0	21.31578542	-0.461
2000	0.3433	0.146	1	0	21.36460165	0.1155
2001	0.0305	0.095	0.405	0	21.49497956	-0.077
2002	0.0723	0.1203	0.359	0	20.76691931	-0.0633
MEAN	0.10554	0.14086	0.5179	0	21.15382795	-0.14316
STDEV	0.134054	0.038543	0.289909	0	0.333035508	0.215768
	JUBILEE INSURANCE COMPANY LIMITED.					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.0269	0.0411	0.3053	0.368	20.80022688	-0.054
1999	0.1	0.026	0.4536	0.399	20.64746412	-0.014
2000	0.0368	0.0224	0.5372	0.3895	20.31680023	-0.0085
2001	0.035	0.034	0.295	0.438	20.13986952	-0.13459
2002	0.033	0.032	0.37	0.4548	20.13986952	-0.022
MEAN	0.04634	0.0311	0.39222	0.40986	20.40884605	-0.046618
STDEV	0.030228	0.007262	0.102819	0.035694	0.301366354	0.052241

	KENYA COMMERCIAL BANK LTD					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.21	0.018	0	0	22.65483073	0.01002
1999	0.4242	-0.0298	0	0	21.9857811	0.0401
2000	0.01661	-0.01044	0	0	21.774472	0.0263
2001	0.0211	0.0028	0	0	21.61770352	0.128
2002	0.058	-0.07	0	0	21.65668897	0.0875
MEAN	0.145982	-0.017888	0	0	21.93789526	0.058384
STDEV	0.174339	0.034018	0	0	0.425616143	0.048469
	ATHIRIVER MINING LTD.					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.0113	0.01092	0	0.169	17.71748323	-0.02
1999	0.1014	0.0162	0	0.1465	19.88219853	-0.045
2000	0.1083	0.0359	0	0.1091	19.51929303	-0.029
2001	0.128	0.0405	0.335	0.1179	19.6503213	0.0078
2002	0.0393	0.058	0.453	0.12491	19.89567256	-0.0891
MEAN	0.07766	0.032304	0.1576	0.133482	19.33299373	-0.03506
STDEV	0.049779	0.019085	0.219798	0.024196	0.916993971	0.035776
	BAMBURI CEMENT COMPANY LTD					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.02	0.0493	0.4784	0	23.29324423	-0.071
1999	0.0581	0.065	0.408	0.164	22.97741608	-0.0911
2000	0.08	0.0344	0.559	0.197	23.23616351	-0.0263
2001	0.0467	0.083	0.303	0.18	22.52520923	-0.122
2002	0.01465	0.1741	0.61	0.203	23.48829212	0.3453
MEAN	0.04389	0.08116	0.47168	0.1488	23.10406503	0.00698
STDEV	0.027108	0.055009	0.121769	0.084568	0.37147787	0.192292
	EAST AFRICAN BREWERIES LTD					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.202	0.0331	0.0995	0.0662	22.19132553	0.022
1999	0.0325	0.103	0.466	0.0812	22.71127383	0.0195
2000	0.8044	0.128	0.399	0.0623	22.55747095	0.0385
2001	0.033	0.165	0.0381	0.0765	22.85219372	-0.069
2002	0.046	0.1884	0.369	0.014	22.91993657	-0.084
MEAN	0.22358	0.1235	0.27432	0.06004	22.64644012	-0.0146
STDEV	0.332485	0.060305	0.192102	0.026839	0.289992699	0.057223

	CITY TRUST LIMITED.					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0	0.186	0.201	0.054	18.48115639	0
1999	0.02	0.0513	0.736	0.054	18.39947836	0
2000	0	0.05	0.812	0.0076	18.23821022	0.042
2001	0	0.047	0.844	0	18.02748918	-0.00013
2002	0	0.035	1	0	18.10467882	0.012
MEAN	0.004	0.07386	0.7186	0.02312	18.2502026	0.010774
STDEV	0.008944	0.063018	0.304896	0.02836	0.191406088	0.018218
	LIMURU TEA COMPANY LIMITED.					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.042	0.089	0.441	0	18.68304501	0.012
1999	0.0668	-0.89	0	0.067	18.68304501	-0.00013
2000	0.442	0.346	0.65	0.041	18.68304501	0.042
2001	0.048	0.315	0.42	0.17	19.28103584	0
2002	0.0422	0.592	0.4	0.21	21.58362094	0
MEAN	0.1282	0.0904	0.3822	0.0976	19.38275836	0.010774
STDEV	0.175712	0.576317	0.236113	0.088799	1.25727283	0.018218
	STANDARD NEWS PAPERS GROUP LTD					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0	0.02	0	0.122	18.85078843	-0.022
1999	0	0.034	0	0.284	19.14159063	-0.135
2000	0	-0.2432	0	0.52	18.36736179	-0.164
2001	0.064	-0.21	0	0.33	18.07062988	-0.106
2002	0.022	0.003	0	0.21	20.00848237	-0.15
MEAN	0.0172	-0.07924	0	0.2932	18.88777062	-0.1154
STDEV	0.027842	0.135477	0	0.149255	0.751719935	0.056469
	REA VIPINGO PLANTATION LIMITED					
YEAR	PV	EV	POR	DT	SZ	ASG
1998	0.011	0.058	0	0.00522	19.7816573	-0.0701
1999	0.1026	-0.0078	0	0.01115	19.43591142	-0.09024
2000	0.0422	-0.0545	0	0.0186	19.21818794	0.1823
2001	0.2526	0.0105	0	0.2065	18.97456586	0.004
2002	0.0906	0.0572	0	0.146	18.84594848	0.036
MEAN	0.0998	0.01268	0	0.077494	19.2512542	0.012392
STDEV	0.093064	0.047364	0	0.092776	0.37327881	0.108207

APPENDIX 4.

DAILY STOCK RETURNS 1998.

Company / Day	Brookebond	Kakuzi Ltd	Cmc Holdings Ltd	Kenya Airways	Uchumi Supermarkets	Barclays Bank	ICDC Investment	Jubilee Insurance	Kenya Commercial Bank	Athiriver Mining	Bamburi Cement	East African Breweries	City Trust	Limuru Tea Ltd	Standard News Paper Group Ltd	Rea Vipingo Plantation Ltd.
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000		0.0123	0.0000	(0.0093)	0.0000	(0.0244)	0.0057	0.0000	0.0000	(0.0253)	0.0000	0.0000	0.0000	0.0435
4	0.0000	0.0000	0.0000	0.0183	0.0000	0.0000	0.0000	0.0000	(0.0056)	0.0000	0.0100	(0.0130)	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0111	0.0000
7	0.0000	0.0000	0.0089	0.0180	0.0000	0.0093	0.0052	0.0000	(0.0114)	0.0909	0.0000	0.0132	0.0000	0.0000	(0.0110)	0.0000
8	0.0000	0.0000	0.0088	0.0000	0.0000	0.0093	(0.0052)	0.0000	0.0345	0.0000	0.0000	0.0065	0.0000	0.0000	0.0111	0.0000
9	0.0000	0.0431	0.0000	0.0176	0.0052	0.0000	0.0052	(1.0000)	(0.0222)	0.0000	0.0693	(0.0065)	0.0000	0.0000	0.0165	0.0000
10	0.0000	0.0000	(0.0175)	(0.0173)	0.0000	0.0000	0.0000	(0.0500)	0.0000	0.0000	0.0000	0.0000	0.0222	0.0000	0.0000	(0.1667)
11	0.0000	0.0000	0.0179	0.0059	0.0000	0.0185	(0.0052)	0.0000	0.0000	0.0000	(0.0370)	(0.0130)	0.0000	0.0000	0.0000	0.0169
12	0.0000	0.0000	(0.0175)	0.0000	0.0000	0.0000	0.0000	0.0500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(0.1333)	(0.0270)	0.0000
14	0.0000	0.0000	0.0000	(0.0058)	(0.0052)	(0.0182)	0.0000	0.0000	(0.0114)	(0.0417)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0059	0.0052	0.0000	0.0000	0.0000	0.0115	0.0435	0.0096	0.0000	0.0000	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000	(0.0058)	(0.0052)	0.0000	0.0104	(0.0667)	0.0000	0.0000	0.0000	0.0066	(0.0217)	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000	0.0118	0.0000	0.0093	(0.0052)	0.0000	0.0000	0.0000	(0.0095)	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000		0.0000	(0.0698)	0.0000	0.0000	0.0000	0.0179	0.0000	0.0000	0.0192	(0.0096)	0.0000	0.0000	(0.1111)	0=.1/6
19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0175)	0.0000	0.0000	0.0000	0.0192	0.0000	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0000	0.0000	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	0.0000	(0.0083)	0.0000	0.0250	(0.0052)	0.0092	0.0000	0.0000	0.0000	(0.0417)	(0.0189)	(0.0095)	0.0000	0.0000	0.1188	(0.0082)
22	0.0000	0.0000	0.0000	(0.0244)	0.0052	(0.0091)		0.0089	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0213)	(0.0082)
23	0.0000	0.0167	0.0000	0.0000	0.0000	(0.0092)	0.0000	0.0088	(0.0455)	(0.0435)	0.0192	0.0189	0.0000	0.0000	0.0000	0.0083
24	0.0000	(0.0082)	0.0000	0.0188	0.0000	0.0000	0.0000	(0.0088)	0.0238	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0082
25	0.0000	0.0000	0.0000	0.0000	0.0000	0.0091	0.0000	0.0088	0.0233	(0.0833)	(0.0189)	0.0000	0.0000	0.0000	0.0000	(0.0164)
26	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0052	0.0000	0.0000	0.0000	0.0000	0.0192	0.0000	0.0000	0.0000	0.0000
27	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000
28	0.0000	0.0000	0.0179	(0.0061)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0192	0.0000	0.0000	0.0000	(0.0145)	0.0000
29	0.0000	0.0000	(0.0088)	0.0494	0.0000	0.0000	(0.0103)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0083
30	0.0000	0.0000	0.0000	(0.0118)	0.0000	0.0090	0.0000	(0.0088)	0.0341	0.0909	0.0000	0.0000	0.0000	0.0000	(0.0149)	0.0000

DAILY STOCK RETURNS JUNE 2000.

Company / Day	Brookebond	Kakuzi Ltd	Cmc Holdings Ltd	Kenya Airways	Uchumi Supermarkets	Barclays Bank	ICDC Investment	Jubilee Insurance	Kenya Commercial Bank	Athiriver Mining	Bamburi Cement	East African Breweries	City Trust	Limuru Tea Ltd	Standard News Paper Group Ltd	Rea Vipingo Plantation Ltd
1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6286	0.0000
6.0000	(0.0132)	(0.0149)	0.0000	(0.0235)	(0.0118)	0.0122	0.0053	0.0000	0.0000	(0.0093)	0.0000	(0.0261)	0.0000	0.0000	0.0000	0.0000
7.0000	0.0133	0.0076	0.0000	(0.0120)	0.0119	0.0241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0385)	0.0000	0.0000	0.0000
8.0000	0.0000	0.0000	0.0000	0.0121	(0.0118)	0.0176	0.0105	0.0000	0.0000	0.0185	0.0000	0.1161	(0.0081)	0.0000	0.0000	0.0000
9.0000	0.0000	0.0000	0.0000	0.0180	0.0119	(0.0058)	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0092)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12.0000	0.0000	0.0000	0.0000	0.0122	0.0000	0.0000	(0.0052)	0.0000	0.0000	(0.0185)	0.0000	(0.0880)	0.0403	0.0000	0.0000	0.0000
13.0000	0.0132	0.0000	0.0000	0.0000	(0.0405)	(0.0116)	0.0052	0.0000	0.0000	(0.0187)		0.0000	(0.0388)	0.0000	0.0000	(0.1452)
14.0000	0.0000	0.0000	0.0000	(0.0060)	0.0181	0.0059	0.0000	0.0000	0.0367	0.0000	0.0000	0.0081	0.0000	0.0000	0.0000	0.0000
15.0000	0.0000	0.0000	0.0000	0.0909	(0.0059)	(0.0427)	0.0104	0.0000	0.0000	0.0000	0.0088	0.0000	0.0000	0.0000	0.0000	0.0000
16.0000	0.0000	0.0000	0.0000	(0.1235)	(0.0060)	0.0305	(0.0103)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0235	0.0000	0.0000	0.0000	(0.0087)	1.6800	0.0000	0.0000	0.0000
19.0000	0.0000	0.0000	0.0000	0.0063	0.0000	0.0059	0.0104	0.0000	0.0000	0.0000	(0.0250)	0.0000	0.0000	0.0000	(0.1572)	0.0000
20.0000	0.0000	0.0000	0.0000	0.0123	0.0000	0.0059	0.0000	0.0000	0.0000	0.0000	(0.0513)	0.0000	0.0000	0.0000	0.0000	0.0000
21.0000	0.0000	0.0000	0.0000	(0.0062)	0.0118	0.0058	0.0051	0.0000	0.0000	0.0000	(0.0273)	0.0263	(0.0079)	0.0000	0.0000	(0.0375)
22.0000	0.0000	0.0000	0.0000	0.0438	(0.0058)	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0654)	0.0000	0.0476	0.0000	0.0000	(0.0130)
23.0000		0.0000	(0.0449)	0.0000	0.0118	0.0174	0.0102	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0395)
25.0000	0.0000	0.0000	0.0000	(0.0424)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0254	(0.0303)	0.0000	0.0000	0.0000
26.0000	0.0000	0.0000	(0.0118)	0.0000	0.0000	(0.0057)	0.0101	0.0000	0.0000	0.0000	0.0000	(0.0254)	0.0156	0.0000	0.0000	(0.0370)
27.0000	0.0000	0.0000	0.0000	0.0063	0.0000	(0.0115)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0154)	0.0000	0.0000	0.0000
28.0000	(0.0133)	0.0000	0.0000	0.0000	(0.0174)	0.0000	(0.0400)	0.0000	0.0000	0.0000	(0.1000)	0.0000	(0.0154)	0.0000	0.0000	0.0000
29.0000	(0.0135)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0115	0.0000	0.0000	(0.1176)	0.0087	0.0156	0.0000	0.0000	(0.0769)
30.0000	0.0137	0.0000	0.0000	0.0000	0.0118	0.0000	0.0313		(0.0175)	0.0111	0.0086	0.0231	0.0000	0.0000	0.1667	0.0125

APPENDIX 4.

DAILY STOCK RETURNS 2002

Company / Day	Brookebond	Kakuzi Ltd	Cmc Holdings Ltd	Kenya Airways	Uchumi Supermarkets	Barclays Bank	ICDC Investment	Jubilee Insurance	Kenya Commercial Bank	Athiriver Mining	Bamburi Cement	East African Breweries	City Trust	Limuru Tea Ltd	Standard News Paper Group Ltd	Rea Vipingo Plantation Ltd
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0182)	0.0000	0.0000	(0.0143)	0.0000	(0.0147)	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0470	(0.0179)	(0.0062)	0.0000	0.0000	0.0048	0.0000	(0.0030)	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	(0.0172)	0.0000	(0.0385)	0.0000	0.0124	0.0125	0.0000	0.0096	0.0000	0.0000	0.0019	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0303	0.0061	0.0247	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	(0.0967)	0.0267	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	(0.0627)	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0095)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	(0.0195)	0.0000	0.0061	0.0120	0.0000	0.0144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	(0.0066)	0.0000	0.0061	0.0000	0.0161	(0.0047)	(0.0541)	0.0150	0.0427	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	(0.0200)	0.0000	0.0120	0.0000	(0.0635)	(0.0286)	0.0286	(0.0059)	0.0175	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	(0.0408)	0.0000	0.0238	(0.0476)	(0.0639)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0233	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0028	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	0.0000	(0.0175)	(0.0709)	(0.0071)	0.0000	(0.0227)	0.0000	0.0000	(0.0020)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0150	0.0000	0.0000	0.0000	0.0059	0.0345	0.0000	0.0000	(0.0658)	0.0000
19	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0116)	0.0406	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0000	0.0143	(0.0147)	0.0000	(0.0244)	0.0129	0.0050	0.0000	0.0000	(0.0333)	0.0000	0.0000	0.0000	0.0000
21	0.0000	0.0000	0.0000	0.0282	0.0000	0.0176	(0.0283)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0141)	0.0000
22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000	0.0000	(0.0179)	0.0000	0.0000	0.0000	0.0100	0.0000	0.0000	(0.0115)	0.0000	0.0000	0.0000	0.0000
24	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0116)	(0.0129)	0.0000	(0.0995)	0.0000	0.0000	(0.0174)	0.0000	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0058)	(0.0104)	0.0000	0.0000	0.0000	0.0000	0.0178	0.0000	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000	0.0000	(0.0179)	0.0118	0.0000	0.0000	0.0348	0.0000	0.0000	0.0012	0.0000	0.0000	0.0000	0.0714
27	0.0000	0.0000	0.0000	0.0342	0.0091	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28	0.0000	0.0000	0.0000	(0.0486)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

APPENDIX 4

DAILY STOCK RETURNS 2001.

DAILY STOCK RETURNS JUNE2001

Company / Day	Brookebond	Kakuzi Ltd	Cmc Holdings Ltd	Kenya Airways	Uchumi Supermarkets	Barclays Bank	ICDC Investment	Jubilee Insurance	Kenya Commercial Bank	Athiriver Mining	Bamburi Cement	East African Breweries	City Trust	Limuru Tea Ltd	Standard News Paper Group Ltd	Rea Vipingo Plantation Ltd.
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(0.0415)	0.0000
5	0.0101	0.0000	0.0000	0.0417	0.0000	0.0069	0.0105	0.0000	0.0158	0.1250	0.0000	0.0066	0.0000	0.0000	0.0000	0.0392
6	0.0000	0.0000	0.1364	(0.1371)	0.0291	0.0274	0.0052	0.0000	0.0207	(0.0556)	0.0000	0.0033	0.0000	0.0000	0.0000	(0.0377)
7	0.0000	(0.0311)	(0.1200)	0.0056	(0.0056)	0.0067	(0.0156)	(0.0033)	(0.0025)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0227	(0.0278)	(0.0227)	0.0066	0.0265	0.0000	0.0188	0.0588	0.0000	(0.0253)	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0057	0.0000	0.0000	0.0000	0.0000	0.0368	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(0.1176)
12	(0.0100)	0.0000	0.0000	(0.0114)	0.0058	0.0000	(0.0208)	0.0033	0.0164	0.0750	0.0000	0.0260	0.0000	0.0000	0.0000	0.1333
13	0.0000	0.0000	0.0000	0.0115	0.0000	0.0000	0.0213	0.0000	(0.0166)	(0.0698)	0.0000	0.0063	0.0000	0.0000	0.0000	0.0980
14	0.0000	0.0000	(0.0222)	0.0057	(0.0058)	0.0000	0.0000	0.0299	(0.0112)	0.0625	0.0000	(0.0189)	0.0000	0.0000	0.0000	(0.0714)
15	0.0000	(0.0256)	0.0000	(0.0056)	0.0000	0.0065	0.0000	0.0000	0.0028	0.0000	(0.0089)	0.0128	0.0000	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000	0.0057	(0.0233)	0.0065	0.0000	0.0129	0.0085	0.0000	0.0000	(0.0190)	0.0000	0.0000	0.0000	0.2692
19	0.0000	0.0000	(0.0011)	(0.0169)	0.0000	0.0130	0.0213	0.0000	0.0000	0.0353	0.0000	0.0065	0.0000	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0000	0.0057	(0.0114)	(0.0064)	0.0000	0.0000	0.1264	(0.0114)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	0.0000	0.0000	0.0000	(0.0057)	0.0000	0.0065	0.0000	0.0000	0.0164	(0.0345)	0.0090	0.0000	0.0000	0.0000	0.0000	0.0000
22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063	(0.0208)	0.0000	(0.0027)	0.0238	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000	(0.0115)	(0.0058)	(0.0062)	0.0106	0.0000	0.0541	0.0000	0.0357	0.0064	0.0000	0.0000	0.0000	0.0000
24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25	0.0099	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0191	0.0000	0.0000	0.0625	0.0000
26	0.0000	0.0000	0.0000	0.0581	0.0000	0.0063	0.0000	(0.0064)	0.0215	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
27	0.0000	0.0000	0.0000	0.0000	(0.0233)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28	0.0000	0.0000	0.0000	0.0116	0.0284	0.0062	(0.0053)	0.0000	(0.0053)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29	0.0000	0.0000	0.0115	(0.0057)	0.0110	0.0110	0.0000	0.0000	0.0000	0.0000	(0.0431)	0.0000	0.0000	0.0000	0.0000	(0.1818)
30	(0.0098)	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0465	0.0450	0.0000	0.0000	0.0000	0.0000	

SUMMARY OUTPUT: PV vs EV & POR

Regression Statistics	
Multiple R	0.329794682
R Square	0.108764532
Adjusted R Square	-0.028348617
Standard Error	0.079023652
Observations	16

ANOVA

	df	SS	MS	F	Significance F
Regression	2	0.009907233	0.004953617	0.793247	0.473097877
Residual	13	0.081181589	0.006244738		
Total	15	0.091088822			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.114263628	0.033809573	3.379623566	0.004932	0.041222501	0.187304755	0.041222501	0.187304755
EV	-0.176695559	0.196501676	-0.899206371	0.384896	-0.601211538	0.247820421	-0.601211538	0.247820421
POR	-0.087940832	0.091374647	-0.962420483	0.3534	-0.285343717	0.109462053	-0.285343717	0.109462053

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.068318136	-0.059759136	-0.812308817
2	0.102904942	-0.082453942	-1.120800402
3	0.10652149	-0.04202549	-0.571254506
4	0.101506308	-0.014639308	-0.198992823
5	0.041283931	-0.012661931	-0.172114234
6	0.097531719	-0.066240719	-0.900413283
7	0.06191654	-0.02762154	-0.37546092
8	0.096928497	0.085633503	1.164020336
9	0.102794978	-0.040605978	-0.551959016
10	0.102346074	-0.005225074	-0.071024689
11	0.063060105	-0.008202105	-0.111491606
12	0.079498375	0.214503625	2.915758104
13	0.037204414	-0.032205414	-0.437769737
14	0.034744287	-0.013302287	-0.180818622
15	0.078433356	0.081776644	1.111593863
16	0.101744849	0.023029151	0.313036353

SUMMARY OUTPUT: PV vs EV & ASG

Regression Statistics	
Multiple R	0.320361231
R Square	0.102631318
Adjusted R Square	-0.035425402
Standard Error	0.079295095
Observations	16

ANOVA

	df	SS	MS	F	Significance F
Regression	2	0.009348566	0.004674283	0.7434	0.494664684
Residual	13	0.081740256	0.006287712		
Total	15	0.091088822			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.09336128	0.02559806	3.647201373	0.002953	0.038060044	0.148662516	0.038060044	0.148662516
EV	-0.170853491	0.196740824	-0.868419111	0.400913	-0.595886119	0.254179136	-0.595886119	0.254179136
ASG	-0.123009903	0.134933807	-0.911631459	0.378558	-0.414516613	0.168496807	-0.414516613	0.168496807

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.089556034	-0.080997034	-1.097227657
2	0.02060094	-0.00014994	-0.002031159
3	0.091835718	-0.027339718	-0.370357948
4	0.101831943	-0.014964943	-0.202722854
5	0.032809056	-0.004187056	-0.056720027
6	0.093262983	-0.061971983	-0.839504498
7	0.108791977	-0.074496977	-1.009174532
8	0.098436007	0.084125993	1.139614153
9	0.078567926	-0.016378926	-0.221877392
10	0.095485334	0.001635666	0.022157579
11	0.085719484	-0.030861484	-0.418065608
12	0.058447554	0.205554446	2.784546709
13	0.080796506	-0.075797506	-1.026792172
14	0.04565159	-0.02420959	-0.32795561
15	0.081333052	0.078876948	1.068507889
16	0.083611896	0.041162104	0.557603127

SUMMARY OUTPUT: PV vs ASG & DT

Regression Statistics	
Multiple R	0.250043262
R Square	0.062521633
Adjusted R Square	-0.081705808
Standard Error	0.081047849
Observations	16

ANOVA

	df	SS	MS	F	Significance F
Regression	2	0.005695022	0.002847511	0.433493	0.657276579
Residual	13	0.085393838	0.006568754		
Total	15	0.091088822			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.075335525	0.022495298	3.348945451	0.005231	0.026737398	0.123933652	0.026737398	0.123933652
DT	0.013719202	0.033704436	0.40704442	0.690598	-0.05909479	0.086533195	-0.05909479	0.086533195
ASG	-0.112981942	0.137725068	-0.820344061	0.426806	-0.410518805	0.184554921	-0.410518805	0.184554921

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.078311244	-0.069752244	-0.924465356
2	0.020238511	0.000212489	0.002816236
3	0.076516709	-0.012020709	-0.159317154
4	0.092164644	-0.005297644	-0.070212628
5	0.082303567	-0.053681567	-0.711471724
6	0.087661167	-0.056370167	-0.747105232
7	0.096026472	-0.061731472	-0.818161594
8	0.086754515	0.095807485	1.269789985
9	0.067076545	-0.004887545	-0.064777356
10	0.115498478	-0.018377478	-0.243566956
11	0.078998378	-0.024140378	-0.319945886
12	0.080476605	0.213525395	2.829971046
13	0.074167734	-0.069168734	-0.916731781
14	0.073675034	-0.052233034	-0.692273509
15	0.089300221	0.070909779	0.939806819
16	0.077568176	0.047205824	0.625645091

SUMMARY OUTPUT: PV vs DT & EV

Regression Statistics	
Multiple R	0.224878816
R Square	0.050570482
Adjusted R Square	-0.095495598
Standard Error	0.08156282
Observations	16

ANOVA

	df	SS	MS	F	Significance F
Regression	2	0.004606406	0.002303203	0.346216	0.713686933
Residual	13	0.086482416	0.006652494		
Total	15	0.091088822			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.089163306	0.029758901	2.996189432	0.010314	0.024873121	0.153453492	0.024873121	0.153453492
EV	-0.146563986	0.207096208	-0.707709656	0.491619	-0.593968058	0.300840085	-0.593968058	0.300840085
DT	0.009369683	0.034759418	0.269558096	0.791731	-0.065723461	0.084462826	-0.065723461	0.084462826

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.087157685	-0.078598685	-1.035135023
2	0.083390086	-0.062939086	-0.828900024
3	0.087953976	-0.023457976	-0.308938656
4	0.08799365	-0.00112665	-0.014837843
5	0.030720142	-0.002098142	-0.027632274
6	0.077567164	-0.046276164	-0.609451385
7	0.083851902	-0.049556902	-0.652658314
8	0.091939945	0.090622055	1.193481323
9	0.084186726	-0.021997726	-0.289707347
10	0.110411726	-0.013290726	-0.175037232
11	0.082495284	-0.027637284	-0.363979638
12	0.080455898	0.213546102	2.812375912
13	0.079987926	-0.074988926	-0.987594932
14	0.051934248	-0.030492248	-0.401579164
15	0.071889677	0.088320323	1.163167798
16	0.084801964	0.039972036	0.526426799

SUMMARY OUTPUT: PV vs EV, POR & SZ

Regression Statistics	
Multiple R	0.379794578
R Square	0.144243921
Adjusted R Square	-0.069695098
Standard Error	0.080596636
Observations	16

ANOVA

	df	SS	MS	F	Significance F
Regression	3	0.013139009	0.00437967	0.674229	0.584211278
Residual	12	0.077949813	0.006495818		
Total	15	0.091088822			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.065716155	0.257483379	-0.255224434	0.802872	-0.626725131	0.495292821	-0.626725131	0.495292821
EV	-0.179466382	0.206451583	-0.869310379	0.388227	-0.616212855	0.25728009	-0.616212855	0.25728009
POR	-0.052805187	0.105671081	-0.499712752	0.626314	-0.283042689	0.177432316	-0.283042689	0.177432316
SZ	0.008448892	0.011978324	0.705348413	0.494058	-0.017649634	0.034547418	-0.017649634	0.034547418

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.034410205	-0.025851205	-0.359807095
2	0.100833895	-0.080382895	-1.119068973
3	0.099431406	-0.033335406	-0.470750884
4	0.110235797	-0.023368797	-0.324171212
5	0.043641507	-0.015019507	-0.208350129
6	0.117479363	-0.086188363	-1.195602243

7	0.079114206	-0.044819206	-0.621730608
8	0.096088524	0.086473476	1.199557322
9	0.110949932	-0.048760932	-0.676410109
10	0.093095316	0.004025684	0.055844165
11	0.075677658	-0.020819658	-0.288809641
12	0.100586624	0.193415376	2.683051981
13	0.037629052	-0.032630052	-0.452643045
14	0.027689125	-0.006247125	-0.086659922
15	0.064442837	0.095767163	1.328479063
16	0.086432554	0.038341446	0.531871329

SUMMARY OUTPUT: PV vs POR, SZ, DT & ASG

Regression Statistics	
Multiple R	0.395127226
R Square	0.156125525
Adjusted R Square	-0.150737921
Standard Error	0.083594004
Observations	16

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0.01422129	0.003555323	0.508779	0.730693481
Residual	11	0.076867532	0.006987957		
Total	15	0.091088822			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.058936705	0.289062005	-0.20388949	0.842163	-0.695158209	0.5772848	-0.695158209	0.5772848
POR	-0.060188387	0.119881818	-0.502064351	0.62552	-0.324046624	0.203669849	-0.324046624	0.203669849
SZ	0.007269682	0.013211573	0.550251113	0.593145	-0.021808807	0.036348172	-0.021808807	0.036348172
DT	0.012432961	0.037049138	0.33558029	0.743501	-0.069111685	0.093977606	-0.069111685	0.093977606
ASG	-0.124075883	0.14935513	-0.830744031	0.423783	-0.452804473	0.204652708	-0.452804473	0.204652708

RESIDUAL OUTPUT

Observation		*Predicted PV*	*Residuals*	*Standard Residuals*
	1	0.026956285	-0.018397285	-0.256996901
	2	0.031339983	-0.010888983	-0.152111305
	3	0.084313004	-0.019817004	-0.276829366
	4	0.113266168	-0.026399168	-0.368777484
	5	0.103965836	-0.075343836	-1.052499475
	6	0.123982121	-0.092691121	-1.294828638
	7	0.086610417	-0.052315417	-0.730808942
	8	0.090171961	0.092390039	1.290622737
	9	0.088327984	-0.026138984	-0.3651429
	10	0.116575148	-0.019454148	-0.271760531
	11	0.067891431	-0.013033431	-0.182067704
	12	0.095031332	0.198970668	2.779477857
	13	0.027508321	-0.022509321	-0.314439106
	14	0.053905952	-0.032463952	-0.453498182
	15	0.086580236	0.073629764	1.028555113
	16	0.080311821	0.044462179	0.621104827

SUMMARY OUTPUT: PV vs SZ, DT & ASG

Regression Statistics	
Multiple R	0.369848434
R Square	0.136787864
Adjusted R Square	-0.07901517
Standard Error	0.080946987
Observations	16

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.012459845	0.004153282	0.633855	0.607275598
Residual	12	0.078628977	0.006552415		
Total	15	0.091088822			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.148022115	0.220968235	-0.66987961	0.515618	-0.629470532	0.333426302	-0.629470532	0.333426302
SZ	0.010890884	0.010718539	1.016079168	0.329641	-0.012462806	0.034244575	-0.012462806	0.034244575
DT	0.018404687	0.033976871	0.541682809	0.597951	-0.055624554	0.092433928	-0.055624554	0.092433928
ASG	-0.101647859	0.13800522	-0.73655083	0.475549	-0.402335398	0.199039679	-0.402335398	0.199039679

RESIDUAL OUTPUT

Observation		*Predicted PV*	*Residuals*	*Standard Residuals*
	1	0.02278165	-0.01422265	-0.196442225
	2	0.032442765	-0.011991765	-0.165629394
	3	0.07206111	-0.00756511	-0.10448876
	4	0.108529879	-0.021662879	-0.2992613
	5	0.09341577	-0.06479377	-0.894926912
	6	0.119645103	-0.089354103	-1.234340548
	7	0.101652468	-0.067357468	-0.930336529
	8	0.087409113	0.095152887	1.314244864
	9	0.084363625	-0.022174625	-0.306274331
	10	0.119415141	-0.022294141	-0.307925077
	11	0.083274992	-0.025416992	-0.351093456
	12	0.103668959	0.190333041	2.628866332
	13	0.049087663	-0.044988663	-0.621380194
	14	0.057629984	-0.036187984	-0.499825849
	15	0.074522383	0.085687617	1.183511229
	16	0.065937305	0.058836695	0.812646981

SUMMARY OUTPUT: PV vs EV

Regression Statistics	
Multiple R	0.212752877
R Square	0.045263787
Adjusted R Square	-0.022931657
Standard Error	0.078815244
Observations	16

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.004123025	0.004123025	0.663736	0.428885586
Residual	14	0.086965797	0.006211843		
Total	15	0.091088822			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.092904076	0.025438271	3.652138013	0.002614	0.038344363	0.14746379	0.038344363	0.14746379
EV	-0.158964402	0.195120149	-0.814700085	0.428886	-0.577455873	0.259527069	-0.577455873	0.259527069

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.088878939	-0.080319939	-1.054859836
2	0.08426754	-0.06381654	-0.83811699
3	0.091041522	-0.026545522	-0.348628318
4	0.088299513	-0.001432513	-0.018813521
5	0.029512252	-0.000890252	-0.01169188
6	0.080326813	-0.049035813	-0.643998368
7	0.086787603	-0.052492603	-0.689397172
8	0.091752093	0.090809907	1.192626952
9	0.08750644	-0.02531744	-0.332499639
10	0.089866267	0.007254733	0.095278048
11	0.084156265	-0.029298265	-0.384780712
12	0.083318221	0.210683779	2.766957502
13	0.082717637	-0.077718637	-1.020696361
14	0.051541539	-0.030099539	-0.39530402
15	0.071380296	0.088829704	1.166620497
16	0.08538506	0.03938894	0.517303816

SUMMARY OUTPUT: PV vs POR

Regression Statistics	
Multiple R	0.230936353
R Square	0.053331599
Adjusted R Square	-0.014287573
Standard Error	0.078481531
Observations	16

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.004857913	0.004857913	0.788705	0.38949525
Residual	14	0.08623091	0.006159351		
Total	15	0.091088822			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.09795059	0.028334431	3.456945745	0.003851	0.037179226	0.158721954	0.037179226	0.158721954
POR	-0.080237279	0.090348056	-0.888090817	0.389495	-0.274014761	0.113540202	-0.274014761	0.113540202

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.060112069	-0.051553069	-0.679936999
2	0.096345845	-0.075894845	-1.000982356
3	0.092775607	-0.028279607	-0.372981689
4	0.090986619	-0.004113619	-0.054254799
5	0.095654039	-0.067032039	-0.884090197
6	0.095439886	-0.064148886	-0.846064089
7	0.056392221	-0.022097221	-0.291441776
8	0.083302312	0.099259688	1.30914289
9	0.092960714	-0.030771714	-0.405850266
10	0.090157865	0.006963135	0.091837263
11	0.060104238	-0.005246238	-0.069192999
12	0.075952449	0.218049551	2.875870613
13	0.037972502	-0.032973502	-0.434889797
14	0.067345789	-0.045903789	-0.60542825
15	0.087087827	0.073122173	0.964413402
16	0.094154019	0.030619681	0.403849048

SUMMARY OUTPUT: PV vs SZ

Regression Statistics	
Multiple R	0.271252177
R Square	0.073577744
Adjusted R Square	0.007404725
Standard Error	0.077637763
Observations	16

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.00670211	0.00670211	1.111899	0.309528245
Residual	14	0.084386712	0.006027622		
Total	15	0.091088822			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.13856161	0.207986517	-0.666204769	0.516109	-0.58464872	0.307525501	-0.58464872	0.307525501
SZ	0.010709957	0.010156755	1.054466436	0.309528	-0.011074135	0.032494049	-0.011074135	0.032494049

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.025686847	-0.017127847	-0.228355447
2	0.08625854	-0.06580754	-0.877372976
3	0.07649725	-0.01200125	-0.160005565
4	0.096882235	-0.010015235	-0.133527201
5	0.092698153	-0.064076153	-0.854289414
6	0.113753988	-0.082462988	-1.099430206
7	0.088450535	-0.054155535	-0.722023684
8	0.080413426	0.102148574	1.361886472
9	0.097270591	-0.035081591	-0.46772208
10	0.073598856	0.023522144	0.313606815
11	0.084763333	-0.029905333	-0.398710098
12	0.104316553	0.189685447	2.528963774
13	0.057054175	-0.052055175	-0.694020828
14	0.064566175	-0.043124175	-0.5749491
15	0.066294974	0.093915026	1.252113453
16	0.06823237	0.05654163	0.753836086

SUMMARY OUTPUT: PV vs DT

Regression Statistics	
Multiple R	0.11828638
R Square	0.013991668
Adjusted R Square	-0.056437499
Standard Error	0.080095629
Observations	16

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.001274485	0.001274485	0.198663	0.662617395
Residual	14	0.089814338	0.00641531		
Total	15	0.091088822			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.0754926	0.022230198	3.395948137	0.004348	0.027813525	0.123171676	0.027813525	0.123171676
DT	0.014834043	0.03328136	0.44571625	0.662617	-0.056547438	0.086215524	-0.056547438	0.086215524

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.078192782	-0.069633782	-0.899896941
2	0.078959168	-0.058508168	-0.756117503
3	0.076296754	-0.011800754	-0.152504458
4	0.080362062	0.006504938	0.084065147
5	0.075498335	-0.046876335	-0.605796063
6	0.0754926	-0.0442016	-0.571229708
7	0.076011792	-0.041716792	-0.53911783
8	0.081570108	0.100991892	1.305146624
9	0.0754926	-0.0133036	-0.171926166
10	0.113567287	-0.016446287	-0.212539987
11	0.077704949	-0.022846949	-0.295257551
12	0.075699491	0.218302509	2.821184715
13	0.075835267	-0.070836267	-0.915436092
14	0.076928387	-0.055486387	-0.717066184
15	0.07956321	0.08064679	1.042221146
16	0.07956321	0.04521079	0.584271753

SUMMARY OUTPUT: PV vs ASG

Regression Statistics	
Multiple R	0.224885437
R Square	0.05057346
Adjusted R Square	-0.017242722
Standard Error	0.078595777
Observations	16

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.004606677	0.004606677	0.745743	0.402386097
Residual	14	0.086482145	0.006177296		
Total	15	0.091088822			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%

Intercept	0.079306008	0.019657139	4.034463402	0.00123	0.037145601	0.121466416	0.037145601	0.121466416
ASG	-0.115242337	0.133449635	-0.863564271	0.40238	-0.401463593	0.170978919	-0.401463593	0.170978919

RESIDUAL OUTPUT

Observation	*Predicted PV*	*Residuals*	*Standard Residuals*
1	0.079794048	-0.071235048	-0.9381583
2	0.019836503	0.000614497	0.008092868
3	0.079752227	-0.015256227	-0.200922947
4	0.091878221	-0.005011221	-0.065997274
5	0.086408048	-0.057786048	-0.761036342
6	0.091878246	-0.060587246	-0.797927829
7	0.099921134	-0.065626134	-0.864289473
8	0.085220245	0.097341755	1.281980956
9	0.070881794	-0.008692794	-0.114483203
10	0.084354775	0.012766225	0.168129874
11	0.080955126	-0.026097126	-0.343696484
12	0.084354775	0.209647225	2.76103251
13	0.0777916	-0.0727926	-0.958671101
14	0.076257849	-0.054815849	-0.721919121
15	0.089710087	0.070499913	0.928476649
16	0.077743322	0.047030678	0.619389215

SUMMARY OUTPUT:AGRICULTURE SECTOR

Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	-6.98492E-10
Standard Error	2.6994E-22
Observations	3

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.008176878	0.001635376	2.24431E+40	#NUM!
Residual	4294967293	3.12964E-34	7.28675E-44		
Total	4294967298	0.008176878			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.018132479	0	65535	#NUM!	-0.018132479	-0.018132479	-0.018132479	-0.018132479
EV	1.387573132	0	65535	#NUM!	1.387573132	1.387573132	1.387573132	1.387573132
POR	-0.166130071	0	65535	#NUM!	-0.166130071	-0.166130071	-0.166130071	-0.166130071
SZ	0.004022439	6.51078E-16	6.17813E+12	0	0.004022439	0.004022439	0.004022439	0.004022439
DT	0.03938583	0	65535	#NUM!	0.03938583	0.03938583	0.03938583	0.03938583
ASG	-0.246343275	0	65535	#NUM!	-0.246343275	-0.246343275	-0.246343275	-0.246343275

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.008559	2.08167E-17	64644.31221
2	0.020451	3.46945E-18	10774.05203
3	0.124774	0	0

SUMMARY OUTPUT: COMMERCIAL SECTOR

Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	-6.98492E-10
Standard Error	2.11758E-22
Observations	3

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.001726629	0.000345326	7.70102E+39	#NUM!
Residual	4294967293	1.92593E-34	4.48416E-44		
Total	4294967298	0.001726629			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.000606441	1.11476E-14	-54401188244	0	-0.000606441	-0.000606441	-0.000606441	-0.000606441
EV	0.00147379	0	65535	#NUM!	0.00147379	0.00147379	0.00147379	0.00147379
POR	1.001757613	0	65535	#NUM!	1.001757613	1.001757613	1.001757613	1.001757613
SZ	1.87087E-05	4.96614E-16	37672445398	0	1.87087E-05	1.87087E-05	1.87087E-05	1.87087E-05
DT	0.002353104	5.4086E-14	43506684960	0	0.002353104	0.002353104	0.002353104	0.002353104
ASG	0.007082428	1.08335E-13	65375196106	0	0.007082428	0.007082428	0.007082428	0.007082428

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.064496	-1.38778E-17	-65536.00002
2	0.086867	0	0
3	0.028622	0	0

SUMMARY OUTPUT: FINANCIAL

Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	-4.65661E-10
Standard Error	1.20256E-21
Observations	4

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.015274366	0.003054873	2.11243E+39	#NUM!
Residual	4294967294	6.21112E-33	1.44614E-42		
Total	4294967299	0.015274366			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.036343735	0	65535	#NUM!	-0.036343735	-0.036343735	-0.036343735	-0.036343735
EV	0.381925182	0	65535	#NUM!	0.381925182	0.381925182	0.381925182	0.381925182
POR	0.06293523	0	65535	#NUM!	0.06293523	0.06293523	0.06293523	0.06293523
SZ	0.002787993	1.47264E-15	1.89329E+12	0	0.002787993	0.002787993	0.002787993	0.002787993
DT	0.395089932	0	65535	#NUM!	0.395089932	0.395089932	0.395089932	0.395089932
ASG	0.277144287	0	65535	#NUM!	0.277144287	0.277144287	0.277144287	0.277144287

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.031291	2.08167E-17	18333.79054
2	0.034295	-2.08167E-17	-18333.79054
3	0.182562	-2.77556E-17	-24445.05405
4	0.062189	6.245E-17	55981.37162

SUMMARY OUTPUT: INDUSTRIAL & ALLIED

Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	-6.98492E-10
Standard Error	2.50493E-19
Observations	3

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.032579381	0.006515876	7.72151E+34	#NUM!
Residual	4294967293	3.62435E-28	8.43868E-38		
Total	4294967298	0.032579381			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	34.81075054	0	65535	#NUM!	34.81075054	34.81075054	34.81075054	34.81075054
EV	-100.0823968	0	65535	#NUM!	-100.0823968	-100.0823968	-100.0823968	-100.0823968
POR	-98.34357062	0	65535	#NUM!	-98.34357062	-98.34357062	-98.34357062	-98.34357062
SZ	1.386439606	0	65535	#NUM!	1.386439606	1.386439606	1.386439606	1.386439606
DT	-6.954800906	0	65535	#NUM!	-6.954800906	-6.954800906	-6.954800906	-6.954800906
ASG	750.1426732	0	65535	#NUM!	750.1426732	750.1426732	750.1426732	750.1426732

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.097121	-1.34615E-15	-3426.879034
2	0.054858	-2.07265E-14	-52763.33853
3	0.294002	1.52101E-14	38720.20022

SUMMARY OUTPUT: ALTERNATIVE INVESTMENTS MARKET

Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	-6.98492E-10
Standard Error	1.01831E-21
Observations	3

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.014539128	0.002907826	2.80418E+39	#NUM!
Residual	4294967293	4.45371E-33	1.03696E-42		
Total	4294967298	0.014539128			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.098779449	6.64646E-14	1.4862E+12	0	0.098779449	0.098779449	0.098779449	0.098779449
EV	0.043504515	1.57161E-13	2.76814E+11	0	0.043504515	0.043504515	0.043504515	0.043504515
POR	-0.021457964	0	65535	#NUM!	-0.021457964	-0.021457964	-0.021457964	-0.021457964
SZ	-0.004020586	1.73E-16	-2.32661E+13	0	-0.004020586	-0.004020586	-0.004020586	-0.004020586
DT	0.2	2.44493E-13	8.1802E+11	0	0.2	0.2	0.2	0.2
ASG	-0.891310936	6.21064E-13	-1.43514E+12	0	-0.891310936	-0.891310936	-0.891310936	-0.891310936

RESIDUAL OUTPUT

Observation	Predicted PV	Residuals	Standard Residuals
1	0.004999	-1.38778E-17	-18004.12384
2	0.021442	4.85723E-17	63014.43345
3	0.16021	0	0