PREDICTIVE ABILITY OF SELECTED ASSET PRICING MODELS ON THE NAIROBI STOCK EXCHANGE.

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This Management Project is my original work and has not been presented for a degree in any other University.

FLORENCE Y.B. OMOSA.

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

MR.K.M. MWARANIA.

TO

MY FATHER AND MOTHER FOR LOVE AND ENCOURAGEMENT

MY SISTERS: JOSSIE, EILEEN, GLORIA, MARIA AND

MY BROTHERS: DONYSIUS, JULIUS, OLIVER FOR LOVE AND JOY.

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FLORENCE Y.B. OMOSA.

CONTENTS

LIST OF TABLES

PAGE

ABSTRACT

This study is on the predictive ability of three selected asset pricing models on the Nairobi Stock Exchange (NSE). The main objective was to identify which of the selected models had the highest predictive ability.

The 57 companies quoted on the NSE as of February 1989 were surveyed. The focus was on companies that have ordinary shares in their capital structure. These companies were stratified into two groups: the actively traded and the non-actively traded companies. Though there were sixteen companies in the former group, only twelve were studied.

The major primary sources of data were the NSE daily price lists, and the annual reports and acounts of the companies.The data obtained from these sources were monthly prices; and the earnings per share (EPS), dividends per share (DPS) and capital employed respectively.

Forecasting of future share prices, DPS and EPS was done via the Box-Jenkins (1976) method of time-series analysis. The forecasted values for DPS and EPS were discounted and capitalized respectively for five separate periods to give rise to predicted share prices for the first five months after each company's financial year end. Each of the prices obtained was compared to the actual price for the same period. The differences between the two prices were subjected to t-tests. From the results of these tests, it was generally concluded that under the prevailing conditions in the NSE, no model qualified as a good predictor of share prices.

SECTION ONE

INTRODUCTION

RESEARCH PROBLEM

The pricing of assets has always been of interest to many parties. This is evidenced by the fact that over time, many scholars have developed models aimed at specifying appropriate pricing methods. These models have been developed in one of the two types of markets; perfect or imperfect, under certain or uncertain states of nature.

STATE OF NATURE	CAPITAL MARKETS PERFECT	CAPITAL MARKETS IMPERFECT
CERTAIN	r* is market determined and reflects the opportunity cost.	No unique r and at times no r.
UNCERTAIN	r is not unique.Each state of nature gives rise to its own r even in the same firm or for the same project.	Not known. Total darkness.

* Discount Rate

Most studies have been conducted under assumptions of the existence of perfect capital markets. Therefore the models can be classified into two main groups; those that price assets under conditions of certainty and those that price them under uncertainty in perfect capital markets. Under the first class, certainty of costs and benefits is assumed implying that risk is ignored. Examples of such models are: use of accounting ratios, payback period and the deterministic cash-flow methods. The second class consists of models that explicitly incorporate risk into the valuation or make adjustments for uncertainty. They include the Adjusted discounted cash-flow methods, the Capital asset pricing model (CAPM), the Arbitrage pricing model (APM), and the Option pricing model (OPM).

These models have been applied in various situations. For example, in the valuation of shares of private companies prior to these companies going public and/or to aid in the predicting of future prices of shares.
Since assets are an important part of a company's capital structure, this study will attempt to indicate which of the selected model(s), if any, is/are the most powerful in predicting the value of assets on the Nairobi Stock Exchange (NSE).

Many scholars have tried to address themselves to this question by undertaking studies on the predictive ability of a number of valuation models. These studies have given rise to controversy because the findings have not been in agreement and/or conclusive [Brown, 1978]. However, there is a general consensus that the positive theory models are more objective and give a better approximation than the normative ones.

Whereas in the past (upto the 1950s) [Markowitz, 1952] most analysts were satisfied with the *ad hoc* models, the increasing realization of the complexity and competitiveness of the investment scene has brought a change or modification of these models [Banz, 1981]. However, this does not tell us which model is better than the other. It instead calls for an empirical evaluation so as to determine the most appropriate model.

BACKGROUND ON THE NAIROBI STOCK EXCHANGE

The NSE was formally established in July 1954. It is one of the oldest stock exchanges in Sub-Saharan Africa.

Trading in equity securities dominates the secondary market in this exchange. Currently 68 equity securities (50 ordinary shares and 18 preference shares issued by 57 companies) are listed in the NSE [NSE-Daily Price Lists, February 1989]. Although this represents a decline in the number of listings since 1954 when there were 73 equity securities comprising 45 ordinary shares and 28 preference shares, it is sizeable by the standards of stock exchanges of the developing countries.

New issues of shares are currently controlled by the Government through a Capital Issues Committee set up in 1971. This committee approves issue price, the timing of sales and the allotment plan of shares. Since the committees' inception, there have been very few new public issues. Instead business firms have raised most of their finance from retained earnings, the development finance companies and family savings, and have relied on overdrafts for most of their debt financing.

In addition:

> "----- the development of the securities segment of the capital markets in Kenya has lagged development in other areas of the financial system ------. The capital markets have not therefore fulfilled their potential role of filtering greater efficiency in the mobilization and allocation of long-term finance."
> [Central Bank of Kenya (CBK) & the International Finance Corporation (IFC), 1984:28].

Apparently, formal valuation of shares is not carried out in the NSE [CBK and IFC, 1984]. Buying and selling of shares is carried out via the six stock brokers of the exchange. The purchase/selling price is usually obtained from the sellers'

and/or the buyers' quotations. This price is normally less by a quarter of the former's quotation or more by the same of the latter's quotation.
However, general buying and selling prices are determined by the supply and demand in the market

MOTIVATION FOR THE STUDY

In Kenya interest in share valuation has acquired special importance in recent years. This interest is reflected in the Government's concern over the functioning of the Money and Capital Markets, and in the high demand for shares of companies going public. The Government has recently announced that it is planning to set up a Capital Markets Development Authority. This body is to regulate the operations of securities markets.
However, few field studies have been carried out in the NSE. Due to lack of such studies, variables to which share prices are sensitive have not been empirically established. It is hoped that this study will help in the identification of these variables.

Asset pricing, particularly the pricing of shares is a worthy area to research because it directly affects both *insiders* and *outsiders* of a firm. Despite this, the need to price various securities by interested parties (individuals, companies, and the economy at large) appears to have attracted limited interest.

There is now growing realization that lack of development of capital markets in Kenya is retarding long-term investments, investment in equity, and the broader ownership of productive assets [CBK and IFC, 1984]. The need for market pricing of capital to lead to better capital allocation and better investment in Kenya cannot be overemphasized. The Sixth Five-Year Development Plan calls for K247.88 million in new gross fixed investment in agriculture, manufacturing, trade and finance by the year 2000 if Kenyan incomes are to grow by 1% per capita [The Sixth Development Plan, 1989-1993]. This means that a need for the valuation of assets and increased trade along these lines is desired. Yet valuation methods are many and without detailed analysis, each looks as convincing as the other, implying that an empirical analysis should be done so as to make a choice. This study therefore hopes to find out which of the selected valuation models (that is, if any) is the best in the prediction of share prices.

Share price behaviour is a significant input in investment decisions. Therefore how and how well analysts forecast price indicators are matters that have received much attention by scholars in the recent years [V. Zarnovitz, 1979]. This is important since the capital asset pricing foundation of much of the current research in finance rests upon assumptions about the properties of investors' expectations for stock market returns. The derivation of share prices depends heavily on the models used and on the prevailing environment, implying that there is need to study these models and the kind of prices that they give rise to so as to obtain the most appropriate model(s) if any, for the prediction of share values in the NSE. It is not surprising therefore that a similar research is being carried out.

It is hoped that from the study one can come up with some suggestions for various parties: academicians, financial analysts, investors, and students. This is possible after we have identified which (if any) of the selected models has the highest predictive ability.

SECTION TWO

LITERATURE REVIEW

MODELS OF EQUITY VALUATION

For a long time, various parties have been interested in the pricing of assets. This is evidenced by scholars who have developed models aimed at specifying valuation methods.

Probably there have been attempts to find explanatory predictors for equity share prices for as long as equity securities have existed. Present day equities evolved from the financial instruments created in the latter middle ages to finance exploration and trade. The lack of knowledge and even an implicit model to relate security value to underlying real values, led to some spectacular excesses in market pricing in former times. The speculative bubble created by public and private speculation in the shares of the Mississippi company in the early part of the eighteenth century is but one of a series of instances where share prices took on insincere value relative to real underlying worth [Mackay Charles,1932].

Formal attempts to develop models of equity valuation closely parallel the development of analytic economics. Such models seem to have evolved as applications of Fisher's interest rate theory and relate to similar attempts to develop models for interest bearing documents.

One of the early attempts to develop an econometric model of share price formation is the academic paper by Tinbergen (1938). He began with a discussion of what he called the simple static law (pp.55):

" Share prices vary proportionally with dividends and, inversely proportionally with the rate of interest, for which the long term rate may be taken."

He then elaborated the law into a "generalized static law" implying that expected dividends might differ from current constant dividends so prices may vary less than proportionally with changes.

Tinbergen's static theory of share price formation can thus be summarized as:

$$P = f(X_1, X_2, X_3)$$

where:

X_1 = long term interest rates

X_2 = dividend yields on nominal capital

X_3 = rate of change in share price (P)

The model was tested in a simple linear form on time series indexed data for different countries as part of Tinbergen's larger study of business cycles.

By today's standards the model is clearly deficient in the statistical procedures employed; but judged in its historical perspective or even by today's standards in terms of the insight of the theory formulation, the study remains an important contribution to the received literature on theory and research methodology in the area of equity valuation.

After these early models, Durand (1955,1957) developed a valuation model that has come to be known as the "Durand Model". Durand undertook his study of bank stock prices in 1952 as part of the National Bureau of Economic Research's financial research program. The purpose of the study was to measure the relative importance of some basic variables that might affect the market price of bank stocks. The question that concerned Durand was:

" Given a ratio of market price to book net worth, what level of the bank's rate of return would be necessary to maintain a ratio of at least 100%?" (1955:32)

Durand developed a model with the dividend payout rate as the influential factor. He also examined several other variables to see whether additional factors should be incorporated into the basic model. These factors included:

(a) total equity capital, as a measure of bank size,
(b) ratio of assets to capital,
(c) ratio of risk assets to capital,
(d) ratio of current dividend rate to average past dividend rate,
(e) average annual rate of increase in earnings as a measure of the slope coefficient of the regression of earnings on time for each bank, and
(f) the stability of earnings as measured by the standard of earnings about the trend line in (e).

None of these variables performed well enough to warrant being added to the basic regression. The parameter estimates for the model also turned out to be almost completely sample sensitive.

Instead of working directly on an equity valuation model, some researchers have preferred to work on solving the relative valuation problem. In such work the theory and testing relate to cost of capital or stock-holder required rate of return to variables that attempt to specify risk-return expectations in terms of operational measure - hence the term "cost of capital models." The model forms tended to be even more arbitrary than the models for explicit price expectations.

The most famous cost of capital model is undoubtedly the Modigliami-Miller Regression Model (1958, 1963). In their article, they state that one can at least find the following four approaches to the valuation of shares:

(1) the discounted cash-flow approach,
(2) the current earnings plus future investment opportunities approach,
(3) the stream of dividends approach, and
(4) the stream of earnings approach.

The models were not conclusive as far as parameter signs and non-tax advantages of leverage were concerned.

Other researchers have tried to formulate cost of capital models in terms of a more elaborate risk space. The result has almost completely arbitrary procedure in the specification of risk measures and the way such measures are incorporated into the model structure. Examples of such researchers include: Benishay (1961), Arditti (1967), Gonedes (1969), and Caltagirone (1969).

Perhaps the most elaborate attempt to find explanatory variables to describe the equity valuation process is the model proposed by Myron Gordon (1962). This was seen as an extension of B.J.Williams' (1938) well established financial principle which states that investment value of a common stock equals the *present worth* of all future dividends.
Gordon suggested six variables that might explain the value of common stock equities:

(1) the dividends of the firm,
(2) the expected growth rate of dividends,
(3) a measure of earnings instability,
(4) a measure of the firm's leverage,
(5) an index operating asset liquidity, and
(6) a measure of firm size.

Basically Gordon followed a linear procedure in developing this model. A simplified model framework was used to specify a consistent underlying theoretical framework. His methodological procedure and simplifications led him to almost the same result as those studies where variables are added on the basis of introspective considerations.

Other models that belong to the group of early models are: the use of ratios e.g price earnings ratios; the payback method; capitalization methods; and the deterministic discounting cash flow methods which mainly utilize accounting rates of return.

In summary, all the above asset pricing models mainly rested on the importance of the timing of cash-flows and the analysis of factors which determine the components of the cash-flows [Omosa, 1988:3]. Most of the models did not incorporate risk in their analysis and for those that did, it was on the basis of arbitrary rules of thumb. Therefore the models suffered from the following shortcomings:

1. Certainty. The models implicitly assumed that the costs and benefits involved were certain. They did not give any consideration to the risk that might exist due to uncertainties of the market.
2. They did not give guidelines for the estimation of future income and how to pay a price for it that properly reflects the degree of uncertainty of that income.
3. Qualitative factors, for example management, product lines, public policy and those whose prospects depend mainly on foreign operations were not considered. These are some of the qualitative factors that may so outweigh quantitative factors to make any attempt at valuation a mere guessing game.
4. Forces affecting value that are external to the particular company or security were also not incorporated in their analysis.

In recent years attention has been focused on: (i) the partial nature of, and (ii) the utilization of discount rates derived on *ad hoc* basis by most valuation models. In the former case, the result has been a number of attempts to reconcile existing models and to synthesize from these partial theories a more general theory of equity valuation. The second problem is being solved through the use of models that explicitly incorporate risk into their analysis. Therefore the basic paradigm and research methodology have not shifted. The new models still relate value to a complex set of expectations about firm financial variables, and still specify equilibrium stable parameter - testable hypotheses which are evaluated using standard regression procedures. Examples of models that belong to this group are: the discounted cash-flow methods that incorporate risk into their analysis; the Capital asset pricing model (CAPM); the Arbitrage pricing model (APM); the Option pricing model (OPM); and the Growth models.

The basic foundations of the models developed under uncertainty were laid down in the studies of the mean-variance theorem of Markowitz (1952) and Tobin (1958). Markowitz demonstrated formally that diversification of security holdings reduces risk, unless the returns to the securities are perfectly correlated. Tobin extended this analysis by incorporating the concept of a risk free rate, and lending and borrowing at the free rate.
The extension of these to equilibrium in the capital markets and the development of CAPM was accomplished by Treynor (1962), Sharpe (1964), Lintner (1965), and Mossin (1966). They applied the normative analysis of Markowitz to create a positive theory of the determination of asset prices. Given investor demands for securities implied by the Markowitz mean-variance portfolio selection model, and assuming fixed supplies of assets, they solved for equilibrium security forces in a single period world with no taxes.

Although total risk is measured by the variance of portfolio returns, Treynor, Sharpe, Lintner, and Mossin demonstrated that in equilibrium an individual security is priced to reflect its contribution to total risk, which is measured by the covariance of its return with the return on the market portfolio of all assets. This risk measure which is commonly called an asset's *systematic risk* gives rise to the risk premium. They therefore developed a general equilibrium model which they called the CAPM. The CAPM showed how in competitive equilibrium the premia that assets earn over the riskless rate is priced.

$$E(\tilde{R}_i) = R_f + [E(\tilde{R}_m) - R_f]\beta_i$$

where:

$E(\tilde{R}_i)$ = Expected return on asset i,

R_f = Riskless rate of interest,

$E(\tilde{R}_m)$ = Expected return on the market portfolio,

β_i = Beta which is the covariance between the return on asset i and the market return divided by the variance of the market, $Cov(\tilde{R}_i, \tilde{R}_m)/\sigma^2_m$

The measure of risk, it turns out, is the covariance between the asset and the market portfolio; rather than the own or intrinsic risk of the asset (measured by its variance).

The beta coefficient (β_i) is an index for systematic risk. This is the minimum level of risk that may be achieved via diversification across a large group of randomly selected assets.It is caused by general factors in the economy such as inflation, economic cycle and money rates. The higher a security's beta, *ceteris paribus*, the higher the non-diversifiable risk, and therefore the higher the required return on this security so as to entice risk averse investors. The model implies that in equilibrium the expected return on an asset is a positive linear function of risk, and that risky assets have different expected returns only because of differences in their risks. The CAPM therefore explicitly incorporates risk into its analysis and thus allows us to study the dual impact of profitability and risk upon the value of a firm's share.

The CAPM rested on assumptions and beliefs which denounced the then existing paradigm. It provided an explanation for the level of individual share price, was extendable to all valuations and provided a method for estimating the discount rate for a project. The CAPM was therefore a major breakthrough; for it was a turning point from a world of certainty to that of uncertainty.

It should be noted that, if very large changes take place in an economy, fundamental structural changes will occur. This means that the excess market return will not be constant since market risks are economically wide, that is, there will be a change in the price of risk. Fortunately Kenya's economy has not undergone any fundamental structural changes.

The decade of the 1960s ended with an obvious dormancy in much of the empirical research on share price models. This was because CAPM's attractiveness, simplicity and appealing nature made it gain recognition and thus became the glory of the decade running from mid-1960s to mid-1970s. The dormancy was also due to a feeling of *enough* had already been said in this area. Leading researchers in finance meeting in late 1969 to arrange a conference briefly discussed the possibility of a paper on equity price models. The consensus was reported to be:

> "Oh no, not another model of equity valuation.
> Who can stand it?"
> [M.Keenan, 1970:264].

However, the share price issue surfaced again in the early 1970s when Fama (1970) summarized that in an efficient market share prices incorporate all available and relevant information. He argued that in an efficient market for securities, given the available information, actual prices at every point represent very good estimates of intrinsic values.

INFLUENTIAL VARIABLES

From the above literature, it is clear that most studies contend that share prices are affected by either earnings or dividends of a company. It is also clear that the generally accepted models that utilize these variables discount their expected values. Theory tells us that stock prices are determined by expectations, and that value represents a discounting of expected future cash-flows. Though the expectations are not directly measurable, these expectations, if rational, must be derivable from existing measures of the economy.

The rational expectations theory developed by Muth (1961) and greatly extended by Lucas, Sargent and others postulates that expectations are rational if they fully incorporated all of the information available at the time of the forecast. The desirable properties of mathematical surrogates for rational expectations may be identified as follows:

1. in generating unbiased one-period ahead forecasts, information contained in the realizations of the series must be efficiently utilized.
2. the same information must be consistently applied in making multi-span forecasts. Forecasts are efficient when one-period ahead predictions share a common stochastic pattern with the realizations of the series, and multi-period forecasts are consistent when they are obtained recursively. Thus, when forecasts are efficient and consistent, they have validity in the context of the rational expectations theory.

The intrinsic value of a given security depends on the earning prospects of a company which in turn are related to economic and political factors, some of which affect other companies as well. This implies that the value is affected by overall market factors and the movement in the market index. To be more specific, Roll and Ross (1984) have argued that inflation, industrial production, risk premiums, and the slope of the term structure of interest rates are the main factors that affect expected return and thus prices.

It is generally agreed that a company's performance reflects the various factors that affect a security's value. Those for dividends argue that earnings are only a means to an end; and thus, a stock derives its value from its dividends, not its earnings. They argue that in the majority of cases, the price of common shares has been influenced more markedly by the dividend rate than by the reported earnings. That is, distributed earnings have had a greater weight in determining market prices than have retained and reinvested earnings. The *outside* or *noncontrolling* stockholders of any company can reap benefits from their investment in only two ways - through dividends and through an increase in the market value of their share. They also contend that since the market value in most cases has depended primarily upon the dividend rate, the latter could be held responsible for nearly all gains ultimately realized by investors [Graham, Dodd and Cottle, 1962].

This predominant role of dividends has found full reflection in a generally accepted theory of investment value which states that a common stock is worth the sum of all dividends expected to be paid on it in the future, each discounted to its present worth [B.J.Williams, 1938]. Williams concluded that the investment value of a stock is determined by discounting the expected stream of dividends at an appropriate discount rate. Gordon, M.J. (1959) tilled the area by discussing the controversy as to the relative importance of dividends and earnings. He concluded that dividends were the determinant of share value. James Walter (1956) had also arrived at the same conclusion.

It is also argued that dividends play a dominant role in the market price of the typical common stock, and the discounted value of near dividends is higher than the present value of distant dividends. Of the two companies with the same earning power and the same general position in an industry, that one paying the larger dividend will almost always sell at a higher price. Or, similarly, when a company raises its dividend, the price of its shares will also rise, even though there is no accompanying increase in earning power.

On the other hand, there are proponents for earnings. They contend that one major objective of earnings numbers is to provide information useful for valuing a firm's common stock securities. The earnings hypothesis is, according to Gordon (1959:102-103):

> "---- that the investor buys the income per share when he acquires a share stock. The rationale is that regardless of whether they are distributed to him, the stockholder has an ownership right in the EPS.He receives the dividend in cash and the retained earnings in a rise in the share's value, and if he wants additional cash, he can always sell a fraction of his equity."

Gordon asserts that this view is widely held and is set forth most systematically in Lutz and Lutz (1951).

Modigliani and Miller (MM) (1961) show that once one accepts a given investment program, the dividend-payout rationale in valuing shares becomes irrelevant. Instead share value is determined solely by *real* considerations - in this case the earning power of the firm's assets and its investment policy - and not by how the fruits of the earning power are packaged for distribution. Therefore MM assert and demonstrate that even in a world of uncertainty, dividend policy does not affect the value of shares. Gordon challenges this by saying that a dollar paid out on dividends is valued more highly in the market than a dollar retained, because the financial consequences of retention by the company are more uncertain than those of dividends received.

Nevertheless, MM have also shown that once the underlying assumptions are made explicit and understood, the two hypotheses are equivalent - at least in a world of certainty without taxes and transaction costs. In their article, they demonstrate rigorously that correct valuation formula can be derived mathematically from either the stream of earnings or the stream of dividends.

Bolton (1962) contends that the main ingredient of stock valuation is earning power, and earnings help in the understanding of the nature of stock values. Jahnke (1975) says that in essence prices reflect earnings expectations and expected rates of return. Niederhoffer and Regan's study (1972) demonstrated that stock prices are strongly dependent on earnings changes, both absolute and relative analysts' estimates.

Graham, Dodd and Cottle (1962) once said in "Security Analysis":

> "The most important single factor determining a stock's value is now held to be the indicated future earning power, that is, the estimated average earning for a future span of years."

Brown (1978) argues that earnings per share information is central to the valuation of the equity securities, therefore the determination of market efficiency in assimilating EPS information is especially important, but yet unsettled. Based on the sample of securities chosen, results indicate that the announcement of unusual EPS significantly affects stock prices. Lorie and Hamiliton (1973) also argue that:

(1) a company and income generating assets are valued due to the profits they generate and not for the dividends,
(2) once the earnings are high, dividends are most likely to increase, and
(3) some firms have never paid dividends but have some of the highest share prices.

Some scholars have postulated factors that should be considered in the valuation of stock prices: money supply, percentage change in the money supply, the relative change in the risk premium, past and expected rates of profitability, stability and growth, the abilities of management, investment opportunities, dividends, capital structure decisions,retained earnings, lagged prices, capital gains, size measure and various underlying facts and hypotheses that will govern sales volume, costs and profits after taxes. Various combinations of the above factors have been presented as the possible determinants of stock prices. However some studies have refuted some of these factors. For instance Kraft and Kraft (1977) contend that future values of the first three factors as a group must have no significance in explaining stock prices. They therefore have no casual influence on common stock prices.

However, of late, it has generally been agreed that once adjustments are made to earnings, either of the the two, that is, earnings or dividends can be used in the valuation of shares. This is true when the retained and reinvested amount is removed from the earnings figure so that double counting is avoided. This is because the retained earnings help in the generation of future earnings and hence dividends [Leroy & Porter, 1979 and Shiller, 1981]. These studies contend that either of these two variables cater for all the other variables; and if dynamic rates that cater for uncertainties are utilized, then most or all of the variables will have been considered. This is because a company's earning propects are related to economic and political factors.

The discount rate used is that which reveals the opportunity cost of making the investment, defined as the expected foregone return on assets of equal riskiness.
In a perfect and certain world, such a rate is completely market determined since, in equilibrium, the prices of shares of all corporations would be such that the rate of return on all investments would be the same. This market determined rate is the appropriate rate of discount for all investors for all securities. In a perfect and uncertain world, each project calls for its own rate depending on the prevailing conditions. In the real world (imperfect), the determination of the discount rate is more complex since varying degrees of uncertainty regarding the outcomes of alternative investments create different opportunity costs and thus different discount factors. Because of the

imperfections and uncertainties of the real world, it is unlikely that the discount rate for two securities chosen at random will be the same.

For a particular security, the appropriate rate is market determined. Risk for a security can either be measured in isolation or in relation to its sensitivity to movements in the market [Sharpe, 1970]. The appropriate rate of discount for future earnings or dividends in determining the present value of a stock is the expected rate of return on assets whose riskiness is similar to that of the security in question.

It should be noted that recent controversies in share valuation have mainly been on the determination of a suitable interest rate to utilize in the discounting or capitalization of dividends and/or earnings. The early methods applied rates obtained on an *ad hoc* basis or measured in isolation, that is, away from the sensitivity to movements in the market; while the recent ones recommend the use of rates that explicitly incorporate risk in the analysis. This is evidenced by for instance, the CAPM, the APM and the OPM. Recent studies have shown that such rates should be applied in the valuation of assets: Fisher (1978), Rosenbert et al (1979), Fisher (1980), etcetera.

FORMATION OF EXPECTATIONS

The market actions of stocks suggest that the formation of expectations may be a random series.Therefore it can be subjected to mathematical analysis and forecasting/prediction. A prediction is a statement about the probability distribution of the dependent variable conditional upon the value of the predictor variable. And predictive ability is the power to generate operational implications (that is predictions) and to have those predictions subsequently verified by evidence[Beaver et al,1968].

The disclosure of corporate forecasts of projected annual earnings was a topic of intensive debate within the investment community especially during the years 1970 to 1975. Questions of accuracy, objectivity, independent certification, and investment utility were examined [Patell, 1976:246].
Some scholars like Little (1962) argued that historical rates of growth in earnings provide no clue to future rates of growth. This meant that successive changes in EPS were statistically independent and that the study of the sequence of historical changes in earnings per share was useless as an aid in predicting future changes.

This was echoed by Fama's random walks hypothesis which says that the future path of the price level of a security is no more predictable than the path of a series of cumulated random numbers. In statistical terms the theory says that successive price changes are independent, identically distributed random variables, implying that the series of price changes has no memory, that is, the past cannot be used to predict the future in any meaningful way. Similar results were obtained in American firms by: Murphy (1966), Lintner & Glauber (1967 & 1969), and Brealey (1967).

However none of the foregoing evidence in support of the hypothesis that corporate earnings follow random walks is meant to imply that it is impossible to forecast corporate earnings. The randomness in corporate earnings merely means that one's ability to forecast changes in earnings will not be significantly enhanced by studying changes in historical rate of growth in earnings. Quite a number of studies have utilized and recommended the use of estimated values. Researches on prediction of share values usually use regression analysis or time-series analysis. The former has been applied by: Tabell (1960), Gordon (1962), modigliani & Miller (1963,1966), Makridakis (1979), etcetera. On the other hand, the latter has been utilized by for instance:

Molodovsky (1960), Kennelly (1968), Ball & Watts (1972), and Jahnke (1975). The use of forecasted data is also in line with a central theme of modern theory that expectations about firm characteristics are incorporated into security prices [Hawkins et al, 1984].

Since the relationship between the variables is not known, forecasting will be done through the use of time-series analysis, and in specific, the use of the Box-Jenkins models. This is because the forecasting methodology proposed by Box and Jenkins represents a structured search for an efficient forecasting model, and consistency is then achieved by utilizing this model recursively. The Box-Jenkins method of forecasting:

1. is not limited to specific kinds of patterns in the data
2. provides statistics on the error of forecast, e_t, so that the range of fluctuations about the forecast value, Y_t, can be determined,
3. can deal with any type of pattern of data and can discover an adequate model for it,
4. gives rise to simple computer output and the most likely forecasted value, and
5. gives enough signs to indicate changes when they occur and initiate the development of a new model to deal with the changed pattern.

The use of Box-Jenkins is in line with forecasting studies carried out by for example: Wheelwright & Makridakis (1973); Albrecht et al (1977) ; Watts & Leftwich (1977); Deschamps & Mehta (1980); and Hopwood (1980). From their study, Albrecht et al concluded that the B-J models have superior predictive ability.

Financial analysts have routinely studied historical changes in earnings in order to guide them in formulating views about earnings in future years. Using a number of observations over several periods of time, Makridakis (1973) concluded that some future time period can be forecasted. Elton & Gruber (1972) recommended the use of past data to forecast the future.They said that in almost all valuation models and in all empirical tests of cost of capital propositions, forecasts about earnings or growth rates are derived by mechanical extrapolation of past data. Fama (1976) recommended the use of 60 observations for forecasting.

It should be noted that the models selected have been assumed to have qualified as 'good' models as far as the following criteria are concerned:

1. *Parsimony*. This means that the model is simple and its key feature is that it contains a small number of parameters. When a model is constructed it is not intended to be an accurate description of the real world. On the contrary, the aim is to simplify the underlying processes in such a way that only the essential features are brought out. In the words of Friedman (1953:14):

"A hypothesis is important if it 'explains' much by little "

Similar sentiments are expressed by Popper (1959:142) when he says that:

> "Simple statements ----- are to be prized more highly than less simple ones because they tell us more; because their empirical content is greater; and because they are better testable."

2. *Identifiability*. A model is identifiable if only one set of parameter values is consistent with the data.

3. *Goodness of Fit*. The prediction based on some variable(s) should be reasonably close to the observed value, for all points in the sample. Examples of considerations that arise in determining whether the movements in a variable(s) are adequately captured by the model are:

(i) the coefficient of multiple correlation, R^2, for a regression model,

(ii) the residuals from the fitted model should be approximately random. If they are not, there is systematic aspect of behaviour which is not being picked up.

4. *Theoretical Consistency*. A good model should be

consistent with what is known *a prior*, irrespective of whether that knowledge stems from economic theory or common logic.

5. *Predictive Power.* The final criterion for judging a model is the accuracy of its predictions. To quote Friedman (1953:7):

> "---- the only relevant test of the validity of a hypothesis is comparison of its predictions with experience."

This factor is important because the model is tested outside the sample. The preferred specification is being validated against a set of completely fresh observations (as in the present study). The presupposition here is that the alternatives under consideration have met the tests of logic and each has a theory supporting it. For a good model the estimated parameters should exhibit reasonable stability over time and in different cross-section samples unless there are obvious market imperfections or anomalies that have not been incorporated into the model.

SECTION THREE

RESEARCH DESIGN

POPULATION

The 57 companies quoted on the NSE as of February 1989 were surveyed. The focus was on companies that have ordinary shares in their capital structure.

SAMPLING PLAN

Sampling Procedure. The quoted companies on the NSE were stratified into two groups: the actively traded and the non-actively traded companies.
Stratifying minimizes differences among sampling units within strata, and maximizes differences among strata. This sampling method may also be justified on its ease of application. Stratifying was done by observing changes in the shares' prices and the rate of buying and selling using the daily price lists supplied by Francis Drummond & Co., brokers of the NSE. These two factors are known to be indicators of activity on the exchange.
However, it should be noted that *actively traded* is used relatively. This is because in relation to other stock exchanges, especially the developed ones, there is no active trading on the NSE. For instance in the New York Stock Exchange, shares change hands within seconds of purchase [Blume & Crockett, 1974].

Sample Size. Originally the intention was to study the sixteen actively traded companies. But finally a sample of twelve was the only practical alternative. This is because, firstly, two of the companies were not quoted in January 1976 and December 1980, and, secondly, all the five annual reports required for each company could not be obtained for another two companies. The selection criteria therefore limited the sample to firms of sufficient size and stability to merit listing on the NSE and to those that are quoted on the stock exchange.

DATA COLLECTION

Before writing the project's proposal, a pilot study was conducted to ensure that the data to be used would be availed and hence the study would be feasible.
The major primary sources of data were the NSE daily price lists and the annual reports and accounts of the companies studied. The data consisted of annual earnings per share (EPS), dividends per share (DPS) and the capital employed. To derive EPS and DPS, ordinary shares for each company outstanding at the end of 1980 were utilized so that earnings and dividends for each company were divided by this total number of shares. The annual EPS and DPS were used as monthly figures for each's respective year. For example, if the annual DPS for company A for 19x1 was Shs.5, the DPS for January to December 19x1 would be Shs.5. This is because an investor's reaction to these figures is the same irrespective of whether they are looked at from a monthly or annual point of view. These gave rise to a total of 60 observations for each variable and is thus consistent with the usual practice [e.g see Fama, 1976]. 60 observations are recommended because it is expected that over such a period the parameters involved become almost constant. Monthly prices for ten years (1976-1985) were also obtained. The price used was an arithmetic mean of the sellers' and buyers' quotations at the end of each month. For example, if for firm A the prices quoted on 31st January are: Sellers:Shs.31 and Buyers:Shs.29, the monthly price to be used for January would be Shs.30 (31+29/2).

Adjustments (necessary to obtain a comparable figure) were made to the data for those firms which had made accounting changes over the period. Examples of these changes include: bonus issues; stock-splits; change of accounting methods and revaluation of assets. Adjustments were also made to any accounting manipulations that could be identified. This is because smoothing of reported income by accounting manipulations leave the fundamental economic position of the firm unchanged, and should therefore leave the share prices unchanged [Fama, Fisher, Jensen and Roll (1969) and Redcliffe & Gillespue (1979)].

Extraordinary items were excluded. This is in line with the existing literature. For instance Hopwood and McKeown (1981) recommend that the EPS number used should be primary EPS excluding extraordinary items and discontinued operations, adjusted for capital changes.

Any revaluations of fixed assets that had taken place during any of the years of interest for any of the companies were extrapolated backwards. This is because it was assumed that assets present at the end of the five years were present at the beginning of the said period. Therefore the revaluations should also apply to them so as to give a better picture of assets throughout, hence the retrospective revaluations. The revaluations were included only when they were considered material. Materiality was a matter of context. The simplest filter rule was used, that is, anything equal or greater than 10% of the value of total fixed assets was considered material [Kaplan, 1982].
An illustration of how the revaluation was extrapolated backward. Assume company A had had the following revaluations on its land and buildings.

1980: By Shs.2 million
1978: By Shs.500,000.

Adjustments to be made to previous years will be:

1978 & 1979: Increase by Shs. 2 million

1976 & 1977: Increase by Shs.2.5 million.

DATA ANALYSIS

Three models were selected and utilized in the prediction of share prices:

(i) The ARIMA models using past share prices.

(ii) Discounted DPS using discount factors derived from the companies' respective return on investment (ROI) and the capital asset pricing model (CAPM).

(iii) Capitalization of EPS using the same discount factors in (ii) above, less the growth rate of EPS.

Forecasting was done via the Box-Jenkins method of time series analysis. The actual specification was as per the Statisgraphics Package of the Compaq Micro Computer. The method assists one in estimating and forecasting models using the methods prescribed by Box and Jenkins (1976). The ARIMA modelling procedure uses a basic marquardt nonlinear least squares algorithm with optional backforecasting to estimate model parameters. The basic form of the model to be fitted (as per the Statisgraphics Manual:21-16) follows:

$$W_t = \mu + \frac{\Theta(B)\,\Theta_s(B)}{\phi(B)\,\phi_s(B)}\,a_t$$

This model expresses the data as a combination of the series' past values and the past values of the random input, where

t	indexes time
B	is the backwards operator
W_t	is the original data or a difference of that data
μ	is the constant time
$\Theta(B)$	is the nonseasonal moving average operator, $1 - \Theta_1 B - \Theta_2 B^2 ---...--- \Theta_q B^q$
$\phi(B)$	is the nonseasonal autogressive operator, $1 - \phi_1 B - \phi_2 B^2 ---...--- \phi_p B^p$
$\Theta_s(B)$	is the seasonal moving average operator,

$1 - \Theta_1 B^s - \Theta_2 B^{2s} ---...--- \Theta_Q B^{Qs}$

$\phi_s(B)$ is the seasonal autogressive operator,

$1 - \phi_1 B^s - \phi_2 B^{2s} ---...--- \phi_p B^{ps}$

a_t is the random error.

This model was chosen because it is not limited to specific kinds of patterns in the data and the number of observations that were used (60 observations) are consistent with the model's requirements. For the model's methodology, a rule of thumb requires at least 50 observations. Box and Jenkins (1976) suggested this rule on the basis that the largest *k* at which an estimate of an autocorrelation function is computed should not exceed the number of observations N divided by 4, $k<N/4$.

Using this model, future share prices, dividends per share and earnings per share were forecasted. The forecasted values for DPS and EPS were discounted and capitalized respectively. This was done for five periods giving rise to predicted share prices for the first five months after each company's financial year end. There were five companies with 30th June; four with 30th September; two with 31st December; and one with 28th February as their financial year ends.

Discounting DPS gives a price per share which is equal to the present value of estimated future dividends per share at time t from holding a particular share. Formally this can be written as:

$$P_{td} = \sum_{t=1}^{N} \frac{D_t}{(1+r)^t} + \frac{P_5}{(1+r)^5}$$

where:

P_{td} = price of a share at time t where t=1,...,N, and N=5.

r = the time preference rate. The rates used were those derived from ROI & CAPM

D_t = dividends per share at time t

P_5 = the share price at the end of period five

The price of a share is the capitalized value of the estimated earnings. Since the forecasted earnings exhibited some growth, the growth rate for each year was determined and then deducted from the capitalization rate. This was only possible because r was greater than the growth rate.

$$P_{te} = \frac{E_1}{r-g}$$

where:

P_{te} = price of a share at time t
E_1 = earnings per share at time 1
g = the growth rate of EPS

Each of the discounting models gave rise to two models due to the use of two rates (r); one an output of the early models and based on accounting numbers:

$$r = \frac{\text{Net Income}}{\text{Capital Employed}} = \text{Return on Investment.}$$

And the other an output of the capital asset pricing model:

$$E(\tilde{R}_i) = R_f + [\ E(\tilde{R}_m) - R_f\ ]\beta_i$$

where:

$E(\tilde{R}_i)$ = expected return on asset i
R_f = risk free rate
$E(\tilde{R}_m)$ = expected return on the market portfolio
β_i = beta which is the covariance between the return on asset i and the market return divided by the variance of the market, $Cov(\tilde{R}_i, \tilde{R}_m)/\sigma^2_m$

Parkinson's (1987:109) betas and interest free rate for his four groupings of Kenyan firms quoted on the NSE between 1974-1978 (agriculture, manufacturing, trading and financial & others), were used to derive a return on the market portfolio.

A risk free rate of 8% on Government stock issued in 1976 and redeemed in 1980 was utilized in the model.This rate was the closest that could be obtained. The stock was issued in March 1976 and redeemed in March 1981 [CBK, 1976]. This rate, together with the return on the market portfolio and Parkinson's betas were used to develop expected returns for each group. The rates developed were:

Agriculture	14.83%
Manufacturing	11.98
Trading	13.07
Financial & others	11.92

These were the CAPM rates used in the discounting of DPS and and capitalizing of EPS. The discounting was done through the use of the Lotus 1-2-3 Package of the Compaq Micro Computer. The capitalization of EPS was computed through the use of a hand calculator. This gave rise to five future prices for each model and for each company.

All the results of the above procedures were summarised using descriptive statistics such as means, percentages and standard deviations. For each company, there were five types of share prices each covering a period of five months running from each company's first month after its financial year end. The use of five periods is consistent with what some scholars recommend [e.g. see Deshamps & Mehta, 1980]. Each of the prices obtained was compared to the actual price for the same period as obtained from the price lists of the NSE. This was done by finding the difference between the actual and predicted prices and then testing whether the differences between the two were significant. The tests of significance were done through the use of Plotting and Descriptive Statistics, and in particular Estimation and Testing (One Sample Analysis) of the Statisgraphics Package of the Compaq Micro Computer. The tests carried out were t-tests because the standard deviation was not known and could therefore be computed from the sample, and the sample size was not large (it was less than 30). Gosset (1876-1937) under the pseudonym of Student recognized that the use of a sample standard deviation (s) for the standard deviation (σ) in calculating Z values for use with normal tables was not trusthworthy for small samples, and that an alternative table was required. He therefore developed a t-statistic:

$$t = \frac{\bar{Y} - \mu}{S_{\bar{y}}} = \frac{\bar{Y} - \mu}{\sqrt{S^2 / n}}$$

An important property of t for samples from normal populations is that its components, especially Y and s, show no sign of varying together.

The hypothesis test was:

H_o : There is no significant difference between the actual and predicted share prices.

H_a : There is a significant difference between the actual and predicted share prices.

at $\alpha = 0.05$

A model qualified as a good predictor depending on the number of companies for which it predicted share prices which were not significantly different from the actual ones.

Based on the above results of statistical analysis and on the knowledge from secondary data, interpretations were made and conclusions drawn.

SECTION FOUR

DATA ANALYSIS AND FINDINGS

The data collected was used in forecasting share prices, dividends per share (DPS) and earnings per share (EPS) as shown in appendix A.
For the ARIMA models, the future share prices were obtained from the projection of the historical prices. Table 4.1 shows a summary of the actual prices,prices predicted by the ARIMA models, and the differences between the actual and predicted prices for all the twelve companies studied.

For DPS and EPS, the output of the forecasts was fed into the discounted cash-flow and capitalization models to give rise to future share prices. Appendix B shows the discounting of DPS.
Tables 4.2, 4.3, 4.4 and 4.5 show the actual and predicted prices, and the differences between the two prices. The predicted prices for tables 4.2 and 4.3 were obtained from discounting DPS using ROI and CAPM rates respectively. Prices for tables 4.4 and 4.5 were obtained after capitalizing EPS using ROI and CAPM rates less the growth rate of the EPS. A summary of the ROI and CAPM rates used is also shown in table 4.6.

Table 4.1 : Predicted share prices as derived from historical prices using the ARIMA models.

Company		Prices(Shs)					
Brooke Bond Ltd.	:	Actual	26.00	27.50	26.50	26.00	23.50
July-Nov.,1980	:	Predicted	22.91	22.94	22.88	22.89	22.85
	:	Difference	3.09	4.56	3.62	3.11	0.65
CMC Holdings	:	Actual	10.60	10.63	10.75	9.88	9.38
Oct.1980-Feb.81	:	Predicted	10.79	10.78	10.80	10.80	10.82
	:	difference	-0.19	-0.15	-0.05	-0.92	-1.44
Diamond Trust	:	Actual	17.00	17.25	17.00	16.50	16.50
Oct.1980-Feb.81	:	Predicted	17.27	17.59	17.89	18.23	18.53
	:	Difference	-0.27	-0.34	-0.89	-1.73	-2.03
Kenya Breweries	:	Actual	17.00	17.25	18.88	18.75	15.25
July-Nov.,1980	:	Predicted	15.31	14.76	14.55	14.11	13.91
	:	Difference	1.69	2.49	4.33	4.64	1.34
E.A. Packaging	:	Actual	6.50	6.50	5.50	7.50	8.25
July-Nov.,1980	:	Predicted	8.30	8.37	8.43	8.50	8.56
	:	Difference	-1.80	-1.87	-2.93	-1.00	-0.31
George William	:	Actual	7.25	7.50	7.50	7.75	7.75
July-Nov.,1980	:	Predicted	8.00	7.99	7.99	7.99	7.99
	:	Difference	-0.75	-0.49	-0.49	-0.24	-0.24
Kakuzi Ltd.	:	Actual	13.00	13.23	13.75	13.75	15.25
	:	Predicted	9.29	13.03	9.57	12.03	9.79
March-July,1980	:	Difference	3.71	0.20	4.18	1.12	5.46
Kenya National	:	Actual	5.03	5.00	5.08	5.75	4.00
Jan.-May,1981	:	Predicted	5.11	5.04	4.96	4.91	4.86
	:	Difference	-0.08	-0.04	0.12	0.84	-0.86
Kenya Power	:	Actual	19.25	19.80	21.00	20.38	19.00
Jan.-May,1981	:	Predicted	19.06	19.18	19.28	19.38	19.47
	:	Difference	-0.19	-0.62	-1.72	-1.00	0.47
National Ind. Cr	:	Actual	18.00	18.00	18.00	19.00	20.50
July-Nov.,1980	:	Predicted	16.90	16.50	16.33	16.08	15.92
	:	Difference	1.10	1.50	1.67	2.92	4.58
Nation P & P	:	Actual	5.00	5.00	5.20	5.55	5.10
Oct.1980-Feb.81	:	Predicted	5.48	5.67	5.83	5.94	6.03
	:	Difference	-0.45	-0.67	-0.63	-0.39	-0.93
Sasini T & C Ltd	:	Actual	16.50	16.00	16.00	17.00	16.50
Oct.1980-Feb.81	:	Predicted	10.34	15.56	10.32	15.15	10.29
	:	Difference	6.16	0.44	5.68	1.85	6.21

Table 4.2 : Share prices predicted by discounted DPS using ROI rates.

Company		Prices(Shs)					
Brooke Bond Ltd.	:	Actual	26.00	27.50	26.50	26.00	23.50
July-Nov.,1980	:	Predicted	17.56	17.58	17.60	17.62	17.63
	:	Difference	8.44	9.92	8.90	8.38	5.89
CMC Holdings	:	Actual	10.60	10.63	10.75	9.88	9.38
Oct.1980-Feb.81	:	Predicted	7.89	7.91	7.93	7.95	7.97
	:	difference	2.71	2.72	2.82	1.93	1.41
Diamond Trust	:	Actual	17.00	17.25	17.00	16.50	16.50
Oct.1980-Feb.81	:	Predicted	11.25	11.40	11.56	11.71	11.87
	:	Difference	5.75	5.85	5.44	4.79	4.63
Kenya Breweries	:	Actual	17.00	17.25	18.88	18.75	15.25
July-Nov.,1980	:	Predicted	16.93	16.71	16.61	16.45	16.36
	:	Difference	0.07	0.54	2.27	2.30	-1.11
E.A. Packaging	:	Actual	6.50	6.50	5.50	7.50	8.25
July-Nov.,1980	:	Predicted	8.23	8.25	8.28	8.30	8.34
	:	Difference	-1.73	-1.75	-2.78	-0.80	-0.09
George William	:	Actual	7.25	7.50	7.50	7.75	7.75
July-Nov.,1980	:	Predicted	7.79	7.67	7.66	7.56	7.55
	:	Difference	-0.54	-0.17	-0.16	0.19	0.20
Kakuzi Ltd.	:	Actual	13.00	13.23	13.75	13.75	15.25
	:	Predicted	10.14	11.57	10.20	11.37	10.24
March-July,1980	:	Difference	2.86	1.68	3.55	2.38	5.01
Kenya National	:	Actual	5.03	5.00	5.08	5.75	4.00
Jan.-May,1981	:	Predicted	6.40	6.35	6.35	6.31	6.32
	:	Difference	-1.37	-1.35	-1.25	-0.56	-2.32
Kenya Power	:	Actual	19.25	19.80	21.00	20.38	19.00
Jan.-May,1981	:	Predicted	19.99	20.05	20.11	20.17	20.22
	:	Difference	-0.74	-0.25	0.89	0.21	-1.22
National Ind. Cr	:	Actual	18.00	18.00	18.00	19.00	20.50
July-Nov.,1980	:	Predicted	8.13	8.04	7.98	7.95	7.93
	:	Difference	9.89	9.96	10.02	11.05	12.57
Nation P & P	:	Actual	5.00	5.00	5.20	5.55	5.10
Oct.1980-Feb.81	:	Predicted	5.88	5.97	6.05	6.12	6.18
	:	Difference	-0.88	-0.97	-0.85	-0.57	-1.08
Sasini T & C Ltd	:	Actual	16.50	16.00	16.00	17.00	16.50
Oct.1980-Feb.81	:	Predicted	13.01	15.06	12.58	14.50	12.20
	:	Difference	3.49	0.94	3.42	2.50	4.30

Table 4.3 : Share prices predicted by discounted DPS using CAPM rates.

Company		Prices(Shs)					
Brooke Bond Ltd.	:	Actual	26.00	27.50	26.50	26.00	23.50
July-Nov.,1980	:	Predicted	16.60	16.62	16.64	16.65	16.67
	:	Difference	9.40	10.88	9.86	9.35	6.83
CMC Holdings	:	Actual	10.60	10.63	10.75	9.88	9.38
Oct.1980-Feb.81	:	Predicted	9.07	9.09	9.11	9.13	9.15
	:	difference	1.53	1.54	1.64	0.75	0.23
Diamond Trust	:	Actual	17.00	17.25	17.00	16.50	16.50
Oct.1980-Feb.81	:	Predicted	15.39	15.62	15.81	16.04	16.26
	:	Difference	1.61	1.63	1.19	0.04	0.24
Kenya Breweries	:	Actual	17.00	17.25	18.88	18.75	15.25
July-Nov.,1980	:	Predicted	14.10	13.93	13.86	13.73	13.66
	:	Difference	2.90	3.32	5.08	5.02	1.60
E.A. Packaging	:	Actual	6.50	6.50	5.50	7.50	8.25
July-Nov.,1980	:	Predicted	6.65	6.67	6.70	6.71	6.74
	:	Difference	-0.15	-0.17	-1.20	0.79	1.51
George William	:	Actual	7.25	7.50	7.50	7.75	7.75
July-Nov.,1980	:	Predicted	7.34	7.24	7.22	7.12	7.11
	:	Difference	-0.09	0.26	0.28	0.63	0.64
Kakuzi Ltd.	:	Actual	13.00	13.23	13.75	13.75	15.25
	:	Predicted	9.05	10.28	9.09	10.10	9.12
March-July,1980	:	Difference	3.95	2.97	4.66	3.65	6.13
Kenya National	:	Actual	5.03	5.00	5.08	5.75	4.00
Jan.-May,1981	:	Predicted	4.63	4.59	4.60	4.56	4.57
	:	Difference	0.40	0.41	0.48	1.19	-0.57
Kenya Power	:	Actual	19.25	19.80	21.00	20.38	19.00
Jan.-May,1981	:	Predicted	15.46	15.51	15.55	15.59	15.63
	:	Difference	3.79	4.29	5.45	4.79	3.37
National Ind. Cr	:	Actual	18.00	18.00	18.00	19.00	20.50
July-Nov.,1980	:	Predicted	15.21	15.06	14.96	14.89	14.83
	:	Difference	2.79	2.94	3.04	4.11	5.67
Nation P & P	:	Actual	5.00	5.00	5.20	5.55	5.10
Oct.1980-Feb.81	:	Predicted	5.60	5.68	5.75	5.82	5.88
	:	Difference	-0.60	-0.68	-0.55	-0.27	-0.78
Sasini T & C Ltd	:	Actual	16.50	16.00	16.00	17.00	16.50
Oct.1980-Feb.81	:	Predicted	12.06	13.88	11.65	13.36	11.29
	:	Difference	4.44	2.12	4.35	3.64	5.27

Table 4.4 : Share prices predicted by the capitalization of forecasted EPS using ROI rates.

Company		Prices(Shs)					
Brooke Bond Ltd.	:	Actual	26.00	27.50	26.50	26.00	23.50
July-Nov.,1980	:	Predicted	22.41	14.31	18.27	14.64	21.29
	:	Difference	3.59	13.19	8.23	11.36	2.21
CMC Holdings	:	Actual	10.60	10.63	10.75	9.88	9.38
Oct.1980-Feb.81	:	Predicted	53.31	53.82	54.42	54.98	55.60
	:	difference	-42.71	-43.19	-43.67	-45.10	-46.22
Diamond Trust	:	Actual	17.00	17.25	17.00	16.50	16.50
Oct.1980-Feb.81	:	Predicted	20.59	20.83	21.12	21.40	21.69
	:	Difference	-3.59	-3.58	-4.12	-4.90	-5.19
Kenya Breweries	:	Actual	17.00	17.25	18.88	18.75	15.25
July-Nov.,1980	:	Predicted	42.71	42.95	43.87	44.13	44.39
	:	Difference	-25.71	-25.70	-24.99	-25.38	-29.14
E.A. Packaging	:	Actual	6.50	6.50	5.50	7.50	8.25
July-Nov.,1980	:	Predicted	0.46	0.44	0.45	0.43	0.44
	:	Difference	6.04	6.06	5.05	7.07	7.81
George William	:	Actual	7.25	7.50	7.50	7.75	7.75
July-Nov.,1980	:	Predicted	14.93	11.65	14.81	11.74	14.72
	:	Difference	-7.68	-4.15	-7.31	-3.99	-6.97
Kakuzi Ltd.	:	Actual	13.00	13.23	13.75	13.75	15.25
	:	Predicted	9.41	7.78	9.17	7.60	8.95
March-July,1980	:	Difference	3.59	5.47	4.58	6.15	6.30
Kenya National	:	Actual	5.03	5.00	5.08	5.75	4.00
Jan.-May,1981	:	Predicted	22.12	17.36	22.15	17.28	22.12
	:	Difference	-17.09	-12.36	-17.07	-11.53	-18.12
Kenya Power	:	Actual	19.25	19.80	21.00	20.38	19.00
Jan.-May,1981	:	Predicted	37.76	46.32	34.48	42.20	31.22
	:	Difference	-18.51	-26.52	-13.48	-21.82	-12.22
National Ind. Cr	:	Actual	18.00	18.00	18.00	19.00	20.50
July-Nov.,1980	:	Predicted	15.59	15.77	15.96	16.15	16.34
	:	Difference	2.41	2.23	2.04	2.85	4.16
Nation P & P	:	Actual	5.00	5.00	5.20	5.55	5.10
Oct.1980-Feb.81	:	Predicted	7.30	5.94	7.31	6.00	7.34
	:	Difference	-2.30	-0.94	-2.11	-0.45	-2.24
Sasini T & C Ltd	:	Actual	16.50	16.00	16.00	17.00	16.50
Oct.1980-Feb.81	:	Predicted	18.34	16.79	18.39	16.30	18.49
	:	Difference	-1.84	-0.79	-2.39	0.70	-1.99

Table 4.5: Share prices predicted by capitalizing forecasted EPS using CAPM rates.

Company		Prices(Shs)					
Brooke Bond Ltd.	:	Actual	26.00	27.50	26.50	26.00	23.50
July-Nov.,1980	:	Predicted	19.32	12.97	16.17	13.25	18.52
	:	Difference	6.68	14.08	10.33	12.72	4.98
CMC Holdings	:	Actual	10.60	10.63	10.75	9.88	9.38
Oct.1980-Feb.81	:	Predicted	71.42	72.09	72.90	73.66	74.50
	:	difference	-60.82	-61.46	-62.15	-63.78	-65.12
Diamond Trust	:	Actual	17.00	17.25	17.00	16.50	16.50
Oct.1980-Feb.81	:	Predicted	37.21	37.62	38.14	38.64	39.19
	:	Difference	-20.21	-20.37	-21.14	-22.14	-22.69
Kenya Breweries	:	Actual	17.00	17.25	18.88	18.75	15.25
July-Nov.,1980	:	Predicted	24.33	24.47	24.63	24.77	24.92
	:	Difference	-7.33	-7.22	-5.75	-6.02	-9.67
E.A. Packaging	:	Actual	6.50	6.50	5.50	7.50	8.25
July-Nov.,1980	:	Predicted	2.69	2.15	2.57	2.16	2.48
	:	Difference	3.81	4.35	2.93	5.34	5.77
George William	:	Actual	7.25	7.50	7.50	7.75	7.75
July-Nov.,1980	:	Predicted	13.02	10.44	12.93	10.52	12.87
	:	Difference	-5.77	-2.94	-5.43	-2.77	-5.12
Kakuzi Ltd.	:	Actual	13.00	13.23	13.75	13.75	15.25
March-July	:	Predicted	7.95	6.68	7.77	6.54	7.59
	:	Difference	5.05	6.57	5.98	7.21	7.66
Kenya National	:	Actual	5.03	5.00	5.08	5.75	4.00
Jan.-May,1981	:	Predicted	6.57	6.04	6.54	6.00	6.50
	:	Difference	-1.54	-1.04	-1.46	-0.25	-2.50
Kenya Power	:	Actual	19.25	19.80	21.00	20.38	19.00
Jan.-May,1981	:	Predicted	24.73	28.60	23.10	26.82	21.42
	:	Difference	-5.48	-8.80	-2.10	-6.44	-2.42
National Ind. Cr	:	Actual	18.00	18.00	18.00	19.00	20.50
July-Nov.,1980	:	Predicted	43.72	44.19	44.75	45.28	45.86
	:	Difference	-25.72	-26.19	-26.75	-26.28	-25.36
Nation P & P	:	Actual	5.00	5.00	5.20	5.55	5.10
Oct.1980-Feb.81	:	Predicted	6.77	5.56	6.78	5.61	6.78
	:	Difference	-1.77	-0.56	-1.58	-0.06	-1.68
Sasini T & C Ltd	:	Actual	16.50	16.00	16.00	17.00	16.50
Oct.1980-Feb.81	:	Predicted	16.58	15.11	16.54	14.67	16.56
	:	Difference	-0.08	0.89	-0.54	2.33	-0.06

Table 4.6: Return on investment and capital asset pricing model rates used for each company.

Company	Discounting Rates	
	Mean ROI	CAPM
	%	%
Brooke Bond	13.34	14.83
CMC Holdings	15.70	11.98
Diamond Trust Ltd.	20.49	11.92
Kenya Breweries Ltd.	7.07	11.98
E.A. Packaging	6.74	11.98
George Williamson	13.15	14.83
Kakuzi Limited	11.57	14.83
Kenya National Mills	3.62	11.98
Kenya Power & Lighting Co.	6.56	13.07
National industrial Credit	31.33	11.92
Nation Printers & Publishers	11.69	13.07
Sasini Tea & Coffee Ltd.	12.48	14.83

The differences between the two prices exhibited do not tell us much as far as the two prices' relationship is concerned. Therefore a hypothesis test had to be carried out for each model and for each company. For each company, five t-tests were carried out on five sets of differences between the actual prices and:

(i) the ARIMA models' predicted prices
(ii) prices predicted by discounted DPS using ROI rates
(iii) prices predicted by discounted DPS using CAPM rates
(iv) prices predicted by capitalized EPS using ROI rates
(v) prices predicted by capitalized EPS using CAPM rates

The results of the analyses are shown in appendix C. Tables 4.6 to 4.10 show a summary of these results. They show the average of the differences in the two prices, their variance, standard deviation, the computed t-statistic and the decision rule.

The tables show that for some companies, the models qualify as good predictors of share prices.The results are as follows:

(i) the ARIMA models - three companies
(ii) discounted DPS using ROI - three companies
(iii) discounted DPS using CAPM - three companies
(iv) capitalized EPS using ROI - one company
(v) capitalized EPS using CAPM - one company

For these companies, the differences between the two prices are not significant. Possible causes of such small differences are; rounding errors, insignificant measurement and statistical errors, and other small errors.

Table 4.7: An analysis of the differences between the actual share prices and those predicted by the ARIMA models using historical share prices.

Company	Average	Variance	Standard Deviation	Computed T-statistic	Null Hypothesis
Brooke Bond	3.006	2.09013	1.44573	4.6493	REJECT
CMC Holdings	-0.55	0.36715	0.605929	-2.02967	DO NOT REJECT
Diamond Trust	-1.052	0.64022	0.800137	-2.93992	REJECT
K.Breweries	2.898	2.28457	1.51148	4.28727	REJECT
E.A.Packaging	-1.582	0.97607	0.987963	-3.58056	REJECT
G.Williamson	-0.442	0.04527	0.212767	-4.64517	REJECT
Kakuzi Ltd.	2.934	4.82518	2.19663	2.98668	REJECT
Kenya N.Mills	0.004	0.36688	0.605706	-0.0147667	DO NOT REJECT
Kenya Power	-0.612	0.68177	0.825694	-1.65736	DO NOT REJECT
National I.Cr	2.354	2.01128	1.4182	3.71155	REJECT
Nation P&P	-0.614	0.04508	0.212321	-6.46638	REJECT
Sasini T&C	4.068	7.41127	2.72236	3.34133	REJECT

<u>KEY</u>
$\alpha = 0.05$
Degrees of freedom = 4
Critical T = 2.132

Table 4.8: An analysis of the differences between the actual share prices and those predicted by discounted DPS using ROI rates.

Company	Average	Variance	Standard Deviation	Computed T-statistic	Null Hypothesis
Brooke Bond	8.306	2.20458	1.48478	12.5088	REJECT
CMC Holdings	2.318	0.38557	0.620943	8.34732	REJECT
Diamond Trust	5.292	0.30832	0.555266	21.311	REJECT
K.Breweries	0.814	2.16463	1.47127	1.23714	DO NOT REJECT
E.A.Packaging	-1.426	1.06533	1.03215	-3.08932	REJECT
G.Williamson	-0.096	0.09403	0.306643	-0.070004	DO NOT REJECT
Kakuzi Ltd.	3.096	1.61073	1.26915	5.45475	REJECT
Kenya N.Mills	-1.37	0.39335	0.62711176	-4.88445	REJECT
Kenya Power	-0.222	0.67207	0.819799	-0.605523	DO NOT REJECT
National I.Cr	10.694	1.32953	1.15305	20.7384	REJECT
Nation P&P	-0.87	0.03615	0.190132	-10.2318	REJECT
Sasini T&C	2.93	1.6439	1.28215	5.10993	REJECT

<u>KEY</u>

$\alpha = 0.05$

Degrees of freedom = 4

Critical T = 2.132

Table 4.9: An analysis of the differences between the actual share prices and those predicted by discounting DPS using CAPM rates.

Company	Average	Variance	Standard Deviation	Computed T-statistic	Null Hypothesis
Brooke Bond	9.264	2.22923	1.49306	13.8741	REJECT
CMC Holdings	1.138	0.38557	0.620943	4.09803	REJECT
Diamond Trust	0.942	0.57187	0.756221	2.7854	REJECT
K.Breweries	3.584	2.19348	1.48104	5.41111	REJECT
E.A.Packaging	0.156	1.06848	1.03367	0.337463	DO NOT REJECT
G.Williamson	0.344	0.09223	0.303694	2.53284	DO NOT REJECT
Kakuzi Ltd.	4.272	1.44712	1.20296	7.94079	REJECT
Kenya N.Mills	0.382	0.39247	0.626474	1.36347	DO NOT REJECT
Kenya Power	4.338	0.67012	0.818609	11.8495	REJECT
National I.Cr	3.71	1.47245	1.21345	6.83658	REJECT
Nation P&P	-0.576	0.03683	0.191911	-6.7113	REJECT
Sasini T&C	3.952	1.35817	1.16541	7.58272	REJECT

KEY

$\alpha = 0.05$

Degrees of freedom = 4

Critical T = 2.132

Table 4.10: An analysis of the differences between the actual share prices and those predicted by the capitalization of EPS using ROI rates.

Company	Average	Variance	Standard Deviation	Computed T-statistic	Null Hy-pothesis
Brooke Bond	7.716	22.7119	4.7657	3.62035	REJECT
CMC Holdings	-44.178	2.10227	1.44992	-68.1313	REJECT
Diamond Trust	-4.278	0.54757	0.73998	0.73998	REJECT
K.Breweries	-26.184	2.81723	1.67846	-34.8827	REJECT
E.A.Packaging	6.406	1.12613	1.06119	13.4983	REJECT
G.Williamson	-6.020	3.235	1.79861	-7.48418	REJECT
Kakuzi Ltd.	5.218	1.29007	1.13581	10.2726	REJECT
Kenya N.Mills	-15.234	9.28103	3.0468	-11.1815	REJECT
Kenya Power	4.338	0.67012	0.818609	11.8495	REJECT
National I.Cr	-18.51	34.9953	5.91568	-6.99659	REJECT
Nation P&P	-1.608	0.72937	0.854032	-4.21015	REJECT
Sasini T&C	-1.262	1.55217	1.24586	-2.26503	REJECT

KEY

$\alpha = 0.05$

Degrees of freedom = 4

Critical T = 2.132

Table 4.11: An analysis of the differences between the actual share prices and those predicted by the capitalization of EPS using CAPM rates.

Company	Average	Variance	Standard Deviation	Computed T-statistic	Null Hypothesis
Brooke Bond	9.758	15.0209	3.87568	5.62986	REJECT
CMC Holdings	-62.666	3.09788	1.76008	-79.6131	REJECT
Diamond Trust	-21.31	1.17895	1.08579	-43.8855	REJECT
K.Breweries	-7.198	2.40327	1.55025	-10.3823	REJECT
E.A.Packaging	4.44	1.316	1.14717	8.65446	REJECT
G.Williamson	-4.406	2.06113	1.43566	-6.86241	REJECT
Kakuzi Ltd.	6.494	1.05683	1.02802	14.1252	REJECT
Kenya N.Mills	-1.358	0.66912	0.817998	-3.71221	REJECT
Kenya Power	-5.048	7.94972	2.81952	-4.00339	REJECT
National I.Cr	-26.06	0.28675	0.53549	-108.02000	REJECT
Nation P&P	-1.13	0.5961	0.772075	-3.27268	REJECT
Sasini T&C	0.508	1.30807	1.243710	0.993192	DO NOT REJECT

<u>KEY</u>
$\alpha = 0.05$
Degrees of freedom = 4
Critical T = 2.132

Table 4.12 shows a summary for all companies and for all models, for the tests of significance. The number of times that a model qualifies as a good predictor of share prices is also shown in the table. The same results are also shown in terms of percentages. These percentages are quite small and thus one cannot say that the models are good predictors of share prices.

Table 4.12: A summary of the outputs of the t-tests.

Company	ARIMA models (A)	Discounted DPS ROI (B)	Discounted DPS CAPM (C)	Capitalized EPS ROI (D)	Capitalized EPS CAPM (E)	Model(s) Accepted
Brooke Bond	REJECT	REJECT	REJECT	REJECT	REJECT	NONE
CMC Holdings	DO NOT REJECT	REJECT	REJECT	REJECT	REJECT	A
Diamond Trust	REJECT	REJECT	REJECT	REJECT	REJECT	NONE
K.Breweries	REJECT	DO NOT REJECT	REJECT	REJECT	REJECT	B
E.A. Packaging	REJECT	REJECT	DO NOT REJECT	REJECT	REJECT	C
George William	REJECT	DO NOT REJECT	DO NOT REJECT	REJECT	REJECT	B & C
Kakuzi Limited	REJECT	REJECT	REJECT	REJECT	REJECT	NONE
Kenya National	DO NOT REJECT	REJECT	DO NOT REJECT	REJECT	REJECT	A & C
Kenya Power	DO NOT REJECT	DO NOT REJECT	REJECT	REJECT	REJECT	A & B
National Industrial Cr.	REJECT	REJECT	REJECT	REJECT	REJECT	NONE
Nation P&P	REJECT	REJECT	REJECT	REJECT	REJECT	NONE
Sasini T & C	REJECT	REJECT	REJECT	DO NOT REJECT	DO NOT REJECT	D & E
Frequency of Acceptance	3	3	3	1	1	11
Percentage(%)	25	25	25	8.33	8.33	18.33

For the ARIMA models, all the three companies that qualified belong to the trading class. For the discounted DPS using ROI rates, two companies belong to agriculture and one to trading. For the discounted DPS using CAPM rates; each of the three companies that qualified belongs to agriculture, manufacturing and trading. And for the capitalization of EPS using ROI and CAPM rates, an agricultural company qualified for both. In total, five agricultural, one manufacturing, and five trading companies' predicted prices were not significantly different from the actual ones. Though the results show that the agricultural and trading companies dominate as far as the companies with insignificant differences between the two prices are concerned, one cannot be conclusive as to whether the type of activity that a company engages in influences a model's predictive ability. This is because the total number of companies (eleven) that qualify for all the groups is very small (18.33%).

Out of the twelve companies, the ARIMA models were good predictors for three of them (25%). This is a small percentage and thus one cannot conclude that the models are good predictors of share prices. How do these results relate to the existing literature? The chartist theories make one basic assumption - that the past behaviour of a security's price is rich in information concerning its future behaviour. *History repeats itself* in that *patterns* of past price behaviour will tend to recur in the future. Thus if through careful analysis of price charts one develops an understanding of these *patterns*; this can be used to predict the future behaviour of prices and in this way increase expected gains [The Dow theory is the best known example of a chartist theory]. Therefore, as per these theories, it is the three companies that give concurring results.

By contrast, the hypothesis of random walks says that the future path of the price level of a security is no more predictive than the path of a series of cumulated random walk numbers. In statistical terms the theory says that:

> "Successive price changes are independent, identically distributed random variables -----."
> [Fama, 1965].

This implies that the series of price changes has no memory, that is, the past cannot be used to predict the future in any meaningful way. The trend in the price level is therefore just part of the expected return to equity [Modgliani & Miller, 1961]. If successive bits of new information arise independently across time, and if errors around intrinsic values do not tend to follow any consistent pattern, the successive price changes in a common stock will be independent [Osborne,F.M., 1959]. Laṭan'e and Tuttle (1967) showed empirically that *ex ante* stock price performance is independent of *ex post* prices. The random walk view has also been supported by McDonald and Fisher (1972). They say that early price behaviour has no value in predicting later behaviour. Therefore our ARIMA models' results generally agree (75%) with the random walk hypothesis that past prices cannot be used to predict future ones in any meaningful way.

The accounting information based; dividend based and CAPM based models produced prices which were generally significantly different from the actual ones.
The significant variations between the actual prices and the accounting information based models' predictions can be attributed to the type of data used, that is, accounting numbers. Most of the data used was obtained from annual reports and accounts, that is, accounting numbers. Therefore the manner in which the financial statements had been compiled played a critical role in the share valuation models, for it was from balance sheets and income statements that expectational measures

were derived. The items in these statements are only representations of the underlying stocks and flows that are the source of real value.

If any controlled adjustments were overlooked or not detected, the improvement of the quality of accounting income numbers that were variables in the predictive models, was not done. To the extent that our accounting measure variables misrepresent the real activity, we are likely to bias model structures that incorporate such measures. This is because the resultant price will be a product of the variables of the accounting data. Thus in most cases, the accounting results may have very little relationship to the actual cash-flows. This means that the prices predicted will be more of accounting numbers than economic meaning.

Earnings comprise retained and distributable earnings. The former is reinvested implying that it contributes to future earnings and hence dividends. This means that the EPS values used in the models are higher (due to double counting) than they should have been had retained earnings been adjusted for. Maybe this is why some of the prices predicted using EPS were very high.

The significant variations between the CAPM based models' predicted prices and the actual ones can be explained by the absence of a perfect market in the NSE. Perfect capital markets with certain and known states of nature were assumed by some models. And for those models where uncertainty was adjusted for, for instance CAPM, the assumption of the existence of a perfect market still left some problems unsolved. Due to lack of a perfect market in the NSE, the following shortcomings were faced:

(i) The determination of a truly market portfolio and of a risk free rate. Therefore the Parkinson (1987) results used to derive the return on the market portfolio may not be reliable.

(ii) The stability and sufficiency of beta has been questioned by among others: Litzenberger & Ramaswamy (1976), Kraus & Litzenberger (1976), Banz (1981), and Cohen, Zinberg & Zeikel (1982).

Therefore some of the assumptions of CAPM do not hold in imperfect markets.

For the dividend based models, possible causes of the variations are: lack of an efficient market; the existence of information differentials, the discount factors used, and measurement and evaluation problems. All these factors will be explained below.

There are also other factors which could be possible explanations for the variations.

Fama(1970) did a great deal to operationalize the notion of capital market efficiency. The efficient market hypothesis (EMH) implies that the return on a security is a *fair game* with respect to a given information set. A possible explanation is that the NSE is not efficient. However this cannot be supported by any empirical evidence because the EMH has not been tested in the exchange.Usually capital market efficiency has been tested in the large and sophisticated capital markets of developed countries (Copeland & Weston, 1983:317):

> "Therefore one must be careful to limit any conclusion to to the appropriate arena from which they are drawn."

This means that one can only propose lack of an efficient market as a possible factor but cannot be conclusive.

The differences in the prices could also be due to information differentials and the effects of noise. Generally, information has been said to vary from individual to individual due to the imperfection of markets especially in the strong form.

Information differentials may for instance arise from earnings announcements [Beaver,W., (1968); Ball & Brown (1968)]. A price change immediately following the public announcement indicates some consensus change in beliefs caused by the signal. Price changes in the days following the public announcement may indicate that not all the pertinent information related to the public announcement is released, and further information is released through other sources on subsequent days. As Morse (1981) says, there may also be an information-processing period, so that while the stock prices may react in an unbiased manner on the day of announcement, further processing of the information results in price increases for some securities and price decreases for others. This additional information-processing may therefore cause the actual prices to be significantly different from the estimated ones. Similarly, since companies in Kenya at best release quarterly financial statements, then more information may be obtained later meaning that the actual prices may differ from the expected ones.

Noise also causes markets to be inefficient but often prevents one from taking advantage of the inefficiencies [Fisher,B. 1986]. Noise could be in the form of expectations or uncertainty about future tastes and technology by sectors. Noise makes it very difficult to test either practical or academic theories about the way markets work. This means that the estimated and/or actual prices obtained above might be made up of both noise and information. The existence of noise could therefore have led to imperfect observations so that knowledge of expectations on the stocks was limited. These imply that the actual and/or predicted price of a stock as derived for the various firms might be a noisy estimate of its value and hence the cause of the variations.

The discount/capitalization factors chosen may not have been a reflection of the opportunity cost. For instance, the ROI rates were a product of accounting numbers. Also the rate used for each company for the five years predicted, was an arithmetic average of the rates derived from the years 1976-1980. Together with these, the rates utilized for the various companies were derived in relation to the company and not the asset in question.

In section one above, it was shown that capital markets can either be ; *perfect* or *imperfect*, with *certain* or *uncertain* states of nature. It was also shown that the rate chosen depends on the capital market and the state of nature assumed to be prevailing. Therefore, the use of a company discount/capitalization factor, which was the same for the five years might have distorted the predicted prices. This is because share prices are not only affected by overall market factors and the movement in the index, but also by factors specific to the company and project in question as well as the performance of the economy as a whole.

It should be noted that whatever parameters that may be used, differences in prices may still arise due to:

(a) Underspecification bias
(b) Heteroscedacticity
(c) Efficiency considerations
(d) Normality and other assumptions
(e) Measurement errors especially when predictions are involved.
(f) Joint hypotheses. This makes it hard to adequately explain the causes of variations. For instance, in the present study it is the accounting measure and prediction models that are jointly being tested.
(g) Thin-trading leading to delays in price adjustments.
(h) Performance evaluation. A test consistent with a hypothesis does not always mean that the test provides much support for the hypothesis, more so when the selection of the level of significance is arbitrary.

McDowall et al (1983) say that when error terms are correlated the standard error of ordinary least squares parameter estimates are biased. As a result of this bias in standard errors, t-statistics used to test the null hypothesis may seriously over-state the statistical significance of an impact. They say that:

> "In many social science time- series, serially correlated errors may inflate ----; the common t-statistic is thus inflated by 300% or 400%; and, as a result the statistical significance of an impact is vastly overstated. In many situations, a statistically insignificant difference between pre- and post- intervention series levels could actually have a t-statistic as high as 6.0."

Therefore empirical results appear to be highly dependent on the methodology employed in the tests [Omosa, 1989:65].

The above problems may have caused variations between predicted and actual prices because those very elements that would truly validate equity theory and contribute to its elaboration are excluded from consideration.

Apparently most valuation models have not been tested in the NSE and yet as stated above, a good model's estimated parameters should exhibit reasonable stability over time and in different cross-section samples unless there are obvious market imperfections or anomalies that have not been incorporated in the model. This means that the models used here have been assumed to stand these tests in the NSE, and that a casual relationship between the variables used and stock prices is also assumed to be present. If these assumptions do not hold in the NSE, then an explanation for the variations between the two prices may arise. If the assumptions hold, then the only alternative explanation for the significant variations between the two prices could be the existence of market imperfections or anomalies that were not incorporated into the model. In any case, in a world of uncertainty it is an unnecessarily strong proposition to assert that the best measure for variables for investor expectations are current and historical firm financial variables.

As far as the ARIMA models that were used to estimate future share prices, DPS and EPS are concerned; one can ascertain whether the models were contributory to the variations in the prices. The results of the chi-square on the first 20 residual autocorrelations (see appendix A) can be used to meet this end. If the correct model was used, the residuals must be randomly distributed around the model. Table 4.13 shows that all the computed chi-square values are less than the critical value implying that the residuals are randomly distributed around the models. Therefore, the errors (if any) attributable to the utilization of the right model are very insignificant.

Even if the right models were fitted, it does not guarantee perfect projections or projections that are not significantly different from the actual values. Therefore the projected DPS and EPS might have been significantly different from the actual DPS and EPS respectively. This is important because the estimated DPS and EPS were very significant in the determination of future share prices. This means that if the predicted DPS and EPS were significantly different from the actual ones, then their outputs (predicted prices) would also be significantly different, *ceteris paribus*.

Table 4.13: Computed Chi-Square values on the first twenty residual autocorrelations of the ARIMA models.

	ARIMA Models		Dividends Per Share		Earnings Per Share	
Company	X value	H	X value	H	X value	H
Brooke Bond	13.621	A	0.823012	A	0.647079	A
CMC Holdings	6.85499	A	6.64014	A	7.01062	A
Diamond T.	13.3639	A	1.78395	A	42.5552	A
K.Breweries	24.8113	A	3.26109	A	5.8518	A
E.A.Pack.	17.5328	A	3.08058	A	0.974528	A
George W.	9.91732	A	6.14885	A	3.14179	A
Kakuzi Ltd.	31.116	A	0.12444	A	0.847565	A
K.National M.	10.5269	A	0.891195	A	0.584842	A
Kenya Power	5.7356	A	0.562863	A	9.31498	A
National I.Cr	12.8104	A	3.97512	A	13.6016	A
Nation P&P	8.49726	A	16.6106	A	3.3351	A
Sasini T&C	18.6184	A	11.9587	A	10.5687	A

KEY
A = Accept

In summary, it can be said that the models selected were not good predictors of share prices on the NSE. This was mainly attributed to inefficiencies and imperfections in the market. However, it should be noted that these results are limited to the sample used.

SECTION FIVE

SUMMARY AND CONCLUSIONS

The aim of this study was to find out the predictive ability of selected asset pricing models on the NSE. The main objective was to identify as to which of the selected models, if any, had the highest predictive ability of share prices. Using the models, future share prices were predicted and then compared with the actual ones. T-tests were carried out on the differences to determine whether the two prices were significantly different from each other.

SUMMARY OF FINDINGS AND IMPLICATIONS

The tests of significance showed that out of the twelve companies studied, three sets of three companies' differences between the actual prices and those predicted by the ARIMA models and by the discounted DPS using ROI and CAPM rates were not significant. Similar findings but for only one company were exhibited by the capitalized EPS using ROI and CAPM rates. Though for some companies the models' predicted prices were not significantly different from the actual ones, the total number of companies that qualified for each model was quite small, 25% and 8.33%. It was therefore concluded that none of the selected models qualified as a good predictor of share prices on the NSE.

For the ARIMA models, this conclusion is consistent with existing studies, that past prices cannot be used to predict future ones in any meaningful way. Therefore, though the models can be said to be poor predictors of share prices in the exchange, the findings are in line with existing studies.

For the accounting based models, the poor prediction was attributed to the type of data used, that is, accounting numbers. This data was as good as the accounting principles utilized in the preparation of the financial statements. Therefore the content of the financial statements played a critical role in the valuation of the shares.

The EPS figures used had not been adjusted for retained and reinvested earnings. Since these earnings contribute to the generation of future EPS , then there was double counting involved in the EPS. This might explain the high share prices obtained from the capitalization of EPS.

The significant variations between the CAPM based models' predicted prices and the actual prices was attributed to the absence of a perfect market in the exchange. This meant that the determination of a truly market portfolio, and the stability and sufficiency of beta were issues that remained unsolved.

Other factors considered possible explanations for the variations between the two prices are summarized below.

Lack of an efficient market in the exchange. This implies that information differentials and noise may be present in the market. The former indicates that investors receive varying information or receive information at different rates, meaning that the actual price may be very different from what was expected. The latter makes it very difficult to test either practical or academic theories about the way markets work. Therefore some of the components of the actual and/or predicted prices might have been noise. This implies that the existence of noise could have been the cause of the significant variations between the two prices.

The discount/capitalization factors chosen may not have been a reflection of the opportunity cost. This is because the factors used were derived on company basis, and in some cases perfect markets and certain states of nature were assumed. Where uncertainty was catered for, for instance, where CAPM rates were used, there were still some major shortcomings, such as, the absence of a perfect market in the exchange. It was therefore hard to obtain appropriate rate(s) because this called for some field studies that would have taken longer than the time the present study was allocated.

The significant differences between the two prices were also attributed to the following possibilities:

(i) Statistical/Econometric problems,
(ii) Measurement errors especially during data collection,
(iii) Testing of joint hypotheses,
(iv) Thin-trading leading to delays in price adjustments,
(v) Problems of performance evaluation,
(vi) The existence of anomalies that were not incorporated in the models, and
(vii) Significant differences between actual DPS and EPS, and projected DPS and EPS respectively.

CONCLUSIONS

From the above findings and interpretations, it was concluded that the selected models were not good predictors of share prices on the NSE. This was mainly attributed to inefficiencies and imperfections in the market.

However, it is important to note that the valuation models used are only as good as the assumptions used in their dimension. They are also limited by the inaccuracies in estimating future cash-flows. At best, they are only a framework for analysis which is useful for structuring the way we conceptualize corporate valuation.

It should also be noted that our sample may be biased as a representation of all firms. The firms in our sample are large, have a continuous earnings history, are (and were in 1976) quoted on the NSE, are actively traded, and are heavily representative of a few industries. Since there is a positive association between the frequency of trading and size, selection criteria which require the inclusion of frequently traded stocks only led to samples with an inherent size bias. The longevity bias means that generalizations will be biased.

Since the observations for each variable used were limited, the results obtained might have been sensitive to the data used. For example, the prices used for each month were an arithmetic average of the sellers' and buyers' quotations on the last day of each month. This therefore shows that the raw data had some element of bias.

It is felt that studies should be carried out to test whether there are real inefficiencies in the market. This is because studies like the present one require the existence of such empirical evidence so as to be conclusive as far as the possible causes of the significant variations are concerned.

LIMITATIONS OF THE STUDY

For the study to be appreciated, the limitations met should be brought to light.

Sampling. The sample studied was that of firms which are actively traded on the NSE and were quoted in January 1976 to December 1980. This longevity bias meant that generalizations of the findings to the rest of the population would be biased.

Time was a limiting factor. Lack of adequate time led to the use of discount factors that were not the best. It would have been more appropriate to use a rate (or rates) that was (were) a reflection of the opportunity cost of funds. To obtain such required rates of return one had to, for instance, create experimental markets; or observe decision making by a large sample of informed persons over a long period of time; or interview senior and informed investment people. This would mean carrying out another research altogether for a longer period than that of the present study. Since this was not possible discount factors like the return on investment and the capital asset pricing model derived from the Parkinson study (1987) were used. These rates had some limitations implying that their output was also affected.

If the time for the study was longer than it was, more models could have been selected and tested for their ability to predict share prices. However, this was not possible and thus the number of models selected was limited. This meant that the findings were conditional upon the alternative measures chosen for the study. For example, another unspecified and untested measure might have been better than the measures considered.

Empirical evidence on the NSE. Studies on the exchange, if any, have been very limited. This made it hard for the researcher to be conclusive as far as some issues, for example, the efficiency of the market were concerned.

RECOMMENDATIONS FOR FURTHER STUDIES

It was hoped that from the study information and recommendations beneficial to all interested parties would be given.

Studies on the NSE, such as, tests of the efficient market hypothesis in the market, and the determination of various acceptable discount factors should be carried out. The studies are vital for they are usually considered as backbones of any other study on capital markets. Lack of such studies makes it hard for one to be conclusive as far as some issues in other studies are concerned.

Though most of the valuation models have been tested for in other markets, they should also be tested for locally before being accepted for use. This will tell us whether they qualify to be applied in our capital markets.

APPENDIX A

BROOKE BOND KENYA LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.29538	.37167	.79475	.43024
AR (2)	.48591	.34777	1.39720	.16807
MA (1)	-.72150	.34746	-2.07649	.04262
MEAN	37.41262	1.79619	20.82886	.00000
CONSTANT	8.66264			

ESTIMATED WHITE NOISE VARIANCE = 7.01217 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 12.6155
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.761522

FORECASTED SHARE PRICES:
39.0019 39.1393 38.6949 38.6304 38.3954 38.2946 38.1507 38.0592 37.9622
37.8891 37.8204 37.7646 37.7148 37.6729 37.6363 37.6052 37.5782 37.5551
37.5352 37.518 37.5033 37.4906 37.4797 37.4703

RESIDUALS:
2.9151 -0.858087 -3.65519 -1.6864 -5.97723 -0.0279565 0.95446 -0.259601
0.0676387 0.533676 -2.1334 1.37657 -1.19392 2.01419 0.561866 0.420061
0.282836 3.36268 -0.0623577 1.8296 -9.83082 1.05003 9.0586 0.531254
1.19104 1.72206 1.09971 1.02295 -0.0202848 -0.0305245 0.75815 0.67503
1.235 3.93329 -2.46646 -1.71827 1.0311 0.155101 1.12655 -0.0189613
-0.386357 1.35874 0.290185 0.825239 0.615354 -0.928536 1.75697 0.67902
1.95168 1.42128 1.6512 1.02787 3.03933 -0.124167 2.23185 -5.70364
1.57734 -0.76747

CMC HOLDINGS

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.24732	.30670	.80640	.42355
AR (2)	.75597	.30838	2.45145	.01749
MA (1)	-.83605	.25188	-3.31923	.00162
MEAN	5.02159	.36765	13.65860	.00000
CONSTANT	-.03160			

ESTIMATED WHITE NOISE VARIANCE = 0.447383 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 6.85499
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.98535

FORECSATED SHARE PRICES:
10.7853 10.7776 10.8024 10.8027 10.8215 10.8264 10.8418 10.8493 10.8629
10.8719 10.8843 10.8942 10.9061 10.9165 10.9281 10.9388 10.9502 10.9611
10.9724 10.9835 10.9948 11.0059 11.0172 11.0285

RESIDUALS:
0.27049 -0.0619761 -0.0238758 0.219868 -0.0833786 -0.018678 0.0273939 0.694308
0.0507564 0.245057 0.622431 -0.642446 0.436806 -0.0632225 -0.13739
0.508963 -0.266253 0.177912 0.808462 0.83767 0.57303 2.72569 0.157118
-1.49834 -0.248428 0.500651 0.939715 0.447326 0.229354 -0.0282274
0.24813 0.455251 -0.530567 0.539301 -1.10084 0.139736 -1.14147 0.427005
-0.310178 0.146829 -0.394535 -0.0100969 0.389639 0.280055 -0.568144
0.755661 0.178701 -1.68214 0.56452 -0.614506 0.246893 0.242555 -0.693604
0.0448537 -0.11792 0.1551 -4.65969E-3 0.128092

DIAMOND TRUST KENYA

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.24577	.25514	.96327	.33970
AR (2)	.79304	.25936	3.05762	.00347
MA (1)	-.62241	.32213	-1.93217	.05859
MEAN	3.43933	.81032	4.24441	.00009
CONSTANT	-.35969			

ESTIMATED WHITE NOISE VARIANCE = 1.26266 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 13.3639
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.711502

FORECASTED SHARE PRICES:
17.2723 17.5932 17.808 18.215 18.5292 18.8657 19.1975 19.5459 19.8947 20.2568
20.6223 20.9993 21.3819 21.7748 22.1748 22.5848 23.0027 23.4305 23.8671
24.3137 24.7697 25.2359 25.7121 26.1989

RESIDUALS:
0.33322 -0.0446769 -0.331026 0.73765 -0.700806 0.239945 0.282074 0.127841
0.139309 0.522777 0.0696253 0.795499 0.997431 -1.28995 -0.248995 1.59441
0.820401 -0.0687108 -0.355124 -0.11542 1.68365 -0.616207 2.11175
0.894198 -0.953471 -1.0771 1.14214 0.435248 -0.62578 -1.1022 -0.361642
-0.0295349 1.26376 -1.40985 -0.0666778 0.163991 -0.876099 -0.105853
0.311259 0.42876 -0.163779 -0.691498 1.25904 -1.92682 -0.641432 -1.85539
4.14173 1.57774 -0.477678 0.833118 0.107316 -0.118952 1.62536 -0.701857
-1.90513 1.74579 0.223185 -0.728654

KENYA BREWERIES

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>"t")
AR (1)	.11786	.50988	.23114	.81808
AR (2)	.74145	.49199	1.50706	.13762
MA (1)	-.87477	.47182	-1.85403	.06920
MEAN	10.36711	1.41821	7.30997	.00000
CONSTANT	1.98587			

ESTIMATED WHITE NOISE VARIANCE = 3.88799 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 24.8113
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.0990136

FORECASTED SHARE PRICES:
15.3084 14.7553 14.548 14.1134 13.9086 13.5622 13.3695 13.09 12.9141 12.6862
12.5289 12.3414 12.2027 12.0472 11.9261 11.7966 11.6915 11.5831 11.4924
11.4013 11.3233 11.2466 11.1798 11.115

RESIDUALS:
0.804554 -0.884724 -1.11879 -0.128312 0.0938148 -0.145287 2.90688 -1.01842
-0.975442 0.985692 0.351548 1.32 0.306001 -0.273986 0.0305863 0.317122
0.279515 0.131615 6.89978 1.43366 -7.80686 5.76504 -0.163464 1.54102
0.12106 0.47715 0.248192 0.505061 0.706742 0.516182 0.528195 0.579934
-0.622894 -0.132232 -2.8429 0.561046 1.6388 -0.556623 -0.751709 2.36293
0.0768541 0.867354 1.38224 1.14018 -1.97914 1.05703 0.199738 0.883628
0.901279 0.560182 0.432474 1.02887 0.721844 0.826087 2.0611 0.473279
-2.83099 0.81837

E.A. PACKAGING INDUSTRIES

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>"t")
AR (1)	.90954	.78526	1.15827	.25185
AR (2)	.07013	.77749	.09020	.92846
MA (1)	-.27208	.77786	-.34978	.72786
MEAN	11.78653	.78359	15.04165	.00000
CONSTANT	.17100			

ESTIMATED WHITE NOISE VARIANCE = 0.616408 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 17.5328
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.418871

FORECASTED SHARE PRICES:
8.29948 8.36688 8.43166 8.4953 8.55772 8.61897 8.67905 8.73799 8.79582 8.85254
8.90819 8.96279 9.01635 9.06889 9.12044 9.17101 9.22062 9.26929 9.31704
9.36388 9.40983 9.45491 9.49914 9.54253

RESIDUALS:
-1.44878 -0.141684 -1.04647 0.255196 -0.507975 -1.22222 0.254994 0.531595
-0.138759 -0.800939 -0.892122 0.249353 -0.0465027 0.271727 -1.16051
0.362771 1.04106 -0.297949 0.728705 1.14721 0.595577 -0.762419 0.859966
-0.100128 1.37935 -0.536773 -0.264831 -0.225661 0.267718 0.173626
-0.0456924 0.246447 0.689575 0.119318 -0.505511 -0.648269 -0.0122035
-0.15352 -0.488414 -0.183407 0.246059 -0.580643 -2.41847 -0.359512
-0.0622259 -0.0905119 -0.202816 -0.443115 -0.0236918 0.888842 -1.26898
0.657529 -0.251277 -0.0390749 -1.09681 2.10052 0.231636 -0.0822998

GEORGE WILLIAMSON LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>"t")
AR (1)	.15148	.56834	.26653	.79085
AR (2)	.84749	.56747	1.49344	.14114
MA (1)	-.82428	.62717	-1.31428	.19431
MEAN	3.02012	.35136	8.59552	.00000
CONSTANT	.00706			

ESTIMATED WHITE NOISE VARIANCE = 0.486716 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 9.91732
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.907048

FORECASTED SHARE PRICES:
7.99828 7.9946 7.99259 7.98917 7.98694 7.9837 7.98133 7.97822 7.97574 7.97273
7.97017 7.96723 7.96462 7.96173 7.95908 7.95623 7.95355 7.95074 7.94804
7.94524 7.94253 7.93975 7.93703 7.93426

RESIDUALS:
-0.124574 -6.57052E-3 -0.416942 0.0512485 -0.0471692 -6.92591E-3 -0.141643
6.04344E-3 0.474482 -0.514352 0.524212 0.234002 2.7268 1.13597 0.95761
0.443289 -0.787818 0.0185206 1.10949 -0.20943 1.46641 0.0697046
-0.0502553 -0.451375 -0.545001 0.161657 0.353256 0.379099 -0.970816
0.110798 0.0165393 -0.0774639 0.0886245 -0.120964 -1.37595 -0.530751
1.01705 0.0136364 -6.10272E-3 0.0101678 -0.123244 0.374902 -0.490057
-0.0149212 0.147179 -1.13613 0.482672 -1.71975 0.937004 0.528727
-3.93893E-4 0.046805 0.215525 0.288583 -0.0213789 0.272244 -7.6529E-3
0.261188

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>¯t¯)
AR (1)	.07545	.10149	.74345	.46043
AR (2)	.88812	.10296	8.62579	.00000
MA (1)	-1.11981	.06909	-16.20877	.00000
MEAN	9.26787	.42514	21.79961	.00000
CONSTANT	.54684			

ESTIMATED WHITE NOISE VARIANCE = 2.89997 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 31.116
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.0193332

FORECASTED SHARE PRICES:
9.28618 13.0279 9.56782 12.6298 9.78792 12.2929 9.95797 12.0065 10.0874 11.762 10.1839 11.552 10.2537 11.3708 10.3021 11.2136 10.3332 11.0763 10.3504 10.9556 10.3567 10.8489 10.3541 10.754

RESIDUALS:
0.913348 -0.446929 1.44801 1.18004 -0.386186 0.631736 -1.87816 1.4128 0.173472 1.45823 0.837622 1.43696 0.462363 1.23764 0.539405 1.19028 0.666579 0.724768 0.547105 -1.82524 0.421181 1.3194 0.981962 -0.320035 0.309514 1.03777 1.13464 -0.93924 1.55583 -0.414767 -1.07097 -0.416061 0.676439 -1.63882 -3.91131 -3.09166 2.66363 -1.39417 -0.536744 3.10892 2.42246 -1.47439 -1.88285 -0.148795 0.374753 -0.531328 1.22194 -0.810245 1.05747 -0.837691 1.82157 -1.44749 3.30981 -2.46497 1.54069 -3.45171 3.39616 -3.22874

KENYA NATIONAL MILLS

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>¯t¯)
AR (1)	.08104	.18176	.44588	.65746
AR (2)	.58056	.14810	3.92009	.00025
MA (1)	-.79476	.17814	-4.46139	.00004
MEAN	4.67375	.31826	14.68530	.00000
CONSTANT	1.53519			

ESTIMATED WHITE NOISE VARIANCE = 0.35134 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 10.5269
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.880073

FORECASTED SHARE PRICES:
5.11058 5.0437 4.95734 4.91151 4.85766 4.82669 4.79292 4.7722 4.75091 4.73716 4.72369 4.71461 4.70605 4.70009 4.69464 4.69074 4.68726 4.68471 4.68248 4.68082 4.67939 4.67831 4.6774 4.6767

RESIDUALS:
-1.42887 -0.511099 -0.232889 -0.933786 -0.365086 -0.28803 -0.025812 -0.292205 -0.443723 -0.353539 0.760899 -0.211523 -0.0598854 0.0695993 -0.30357 -0.381871 0.0957602 -0.158961 -0.10166 -0.1472 0.938993 -0.80936 0.665399 0.0267173 0.158834 2.36417 0.418584 -1.29689 0.418854 -0.0694964 0.468719 0.136821 0.305459 -0.45262 0.171086 -0.51466 0.694914 0.0526604 0.0290954 -0.347427 0.211308 0.477328 -0.350087 -0.0722536 -0.262247 -0.193894 0.103121 -0.12302 -0.141311 0.327775 -0.0893946 -0.114398 -0.0433515 -0.194343 -0.190564 0.515663 0.731232 -0.149211

KENYA POWER AND LIGHTING

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>¯t¯)
AR (1)	.81974	.37377	2.19317	.03262
AR (2)	.10302	.32161	.32033	.74996
MA (1)	.30792	.36267	.84903	.39961
MEAN	20.68266	1.60093	12.91917	.00000
CONSTANT	1.62066			

ESTIMATED WHITE NOISE VARIANCE = 4.50818 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 5.7356
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.994793

FORECASTED SHARE PRICES:
19.0577 19.1772 19.2812 19.3787 19.4694 19.5538 19.6323 19.7053 19.7733 19.8365 19.8953 19.9501 20.001 20.0484 20.0925 20.1336 20.1718 20.2073 20.2403 20.2711 20.2997 20.3264 20.3511 20.3742

RESIDUALS:
0.472402 -0.597193 -3.40736 -1.16862 0.345157 -0.591605 -3.45427 -2.01161 -1.51438 -0.876379 0.264973 0.864313 0.98052 -1.09912 -0.879586 -0.555828 -0.506308 -0.490271 1.7542 3.10336 0.237646 1.16743 1.53207 1.07583 1.77082 0.171001 1.03442 0.664368 0.960795 0.8922 -0.135367 0.387276 0.420538 0.655025 -1.47771 -0.270488 1.35208 1.55133 -9.8009 6.33386 3.417 2.13562 1.12625 0.988185 -0.759265 -0.0934798 0.266059 0.626767 0.662901 -0.508294 -1.06065 -0.519937 0.0045138 -0.190176 -3.04465 -2.02486 -0.856901 0.0675353

NATIONAL INDUSTRIAL CREDIT

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>~t~)
AR (1)	.31006	.63019	.49201	.62471
AR (2)	.47874	.53660	.89217	.37626
MA (1)	-.49510	.66617	-.74320	.46058
MEAN	14.77513	.98444	15.00868	.00000
CONSTANT	3.28942			

ESTIMATED WHITE NOISE VARIANCE = 2.36948 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 12.8104
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.748785

FORECASTED SHARE PRICES:
-0.366337 -0.630107 -1.13263 -0.119593 -0.274861 -0.885547 0.948032 -0.135601
-2.00497 -0.406852 -1.28059 1.86261 -0.0474288 -0.0486272 -1.12555
-0.401996 -0.281483 -0.341148 4.68839 1.14799 1.3521 -2.04838 9.10271E-3
1.05699 -0.44436 -0.077561 0.677408 1.26828 0.426314 0.364428 1.39507
1.07474 1.09956 0.692876 -6.34514 0.559762 0.354781 0.030326 0.243763
1.44089 -1.73658 1.73858 0.735409 -0.973227 0.291157 0.628627 0.686833
1.76362 1.52605 0.615497 1.58757 -0.45376 -0.284275 0.462783 0.451973
1.45732 2.14952 -2.63701

RESIDUALS:
-0.366337 -0.630107 -1.13263 -0.119593 -0.274861 -0.885547 0.948032 -0.135601
-2.00497 -0.406852 -1.28059 1.86261 -0.0474288 -0.0486272 -1.12555
-0.401996 -0.281483 -0.341148 4.68839 1.14799 1.3521 -2.04838 9.10271E-3
1.05699 -0.44436 -0.077561 0.677408 1.26828 0.426314 0.364428 1.39507
1.07474 1.09956 0.692876 -6.34514 0.559762 0.354781 0.030326 0.243763
1.44089 -1.73658 1.73858 0.735409 -0.973227 0.291157 0.628627 0.686833
1.76362 1.52605 0.615497 1.58757 -0.45376 -0.284275 0.462783 0.451973
1.45732 2.14952 -2.63701

NATION PRINTERS AND PUBLISHERS

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>~t~)
AR (1)	.33168	1.43527	.23109	.81812
AR (2)	.32410	1.02105	.31742	.75215
MA (1)	-.35881	1.47399	-.24343	.80860
MEAN	6.30471	.27335	23.06484	.00000
CONSTANT	2.16912			

ESTIMATED WHITE NOISE VARIANCE = 0.398446 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 8.49726
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.954727

FORECASTED SHARE PRICES:
5.47602 5.67181 5.82621 5.94088 6.02896 6.09533 6.14589 6.18417 6.21326
6.23531 6.25205 6.26475 6.27439 6.2817 6.28725 6.29146 6.29466 6.29708
6.29892 6.30032 6.30138 6.30218 6.30279 6.30325

RESIDUALS:
0.302381 -0.384921 -1.21422 0.159608 -0.410259 -0.14833 -0.184885 1.03934
-0.814524 -0.792782 0.0325724 -0.384975 -0.42253 -0.194483 -0.110862
0.126972 0.376932 7.96972E-3 1.02831 0.143937 0.797341 0.162348
0.0221689 0.866411 -0.944445 0.588845 0.446982 0.187316 0.171974
-0.213099 -0.0296213 0.453709 0.826455 0.363836 0.0756465 0.131972
1.3659 -1.78951 -0.354147 -0.308015 0.167244 -0.54498 -0.493503 0.232995
-0.112495 -0.150579 0.613086 0.0903154 0.0348173 -1.44527 0.0833205
0.855154 0.334483 0.214287 -0.456778 -1.29939 -0.387996 -0.109893

SASINI TEA AND COFFEE

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>~t~)
AR (1)	.01747	.11705	.14924	.88193
AR (2)	.94314	.11510	8.19436	.00000
MA (1)	-1.12698	.07500	-15.02619	.00000
MEAN	7.39645	.46779	15.81160	.00000
CONSTANT	.65821			

ESTIMATED WHITE NOISE VARIANCE = 6.04742 WITH 53 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 18.6104
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.350872

FORECASTED SHARE PRICES:
10.3404 15.5622 10.3156 15.1408 10.285 14.7505 10.2494 14.3897 10.2093 14.0411
10.1654 13.7117 10.1183 13.4001 10.0684 13.1054 10.0162 12.8265 9.96207
12.5626 9.90642 12.3126 9.84957 12.0759

RESIDUALS:
1.3814 -1.42009 0.326527 0.562945 -1.29831 0.069521 -0.299876 1.27102 1.00014
1.00665 3.10046 -2.02637 1.97528 0.46295 -0.965057 -9.90643E-3 0.309932
-0.0574373 3.06453 0.803250 -3.01092 1.51768 5.07030 3.49212 0.0172816
1.90808 1.66048 -0.761708 1.25076 -1.76201 1.39118 -1.20246 1.17046
-0.9633 -11.9035 0.084339 0.434602 0.680796 -0.520667 0.842805 1.91539
0.743194 -1.37883 0.693446 -1.97026 2.32774 0.0735452 0.676035 -1.39891
2.16114 -2.16412 4.05391 -3.10835 2.18751 -2.36712 3.99325 -4.7212

BROOKE BOND KENYA LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.05854	.22196	.26375	.79297
AR (2)	.86953	.20920	4.15642	.00012
MA (1)	-.93112	.21386	-4.35385	.00006
MEAN	1.75061	.16096	10.87596	.00000
CONSTANT	.18356			

ESTIMATED WHITE NOISE VARIANCE = 0.12596 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 0.823012
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 1

NUMBER OF ITERATIONS PERFORMED: 6

FORECASTED DPS:
1.52346 1.5194 1.53956 1.53721 1.5546 1.55358 1.56864 1.56863 1.58173 1.58249
1.59392 1.59525 1.60527 1.60701 1.61582 1.61785 1.62564 1.62786 1.63476
1.63709 1.64323 1.64561 1.65109 1.65349

RESIDUALS:
-0.071934 0.0734088 -0.0619221 0.0640866 -0.053242 0.0560044 -0.0457166
0.0489974 -0.0391922 0.0429225 2.04646 0.0591673 0.100949 0.0620454
0.0982691 0.0645407 0.0959457 0.066704 0.0939314 0.0685796 0.0921851
0.0702056 -0.329329 0.0672717 0.063193 0.0669907 0.0634546 0.0667471
0.0636814 0.066536 0.0638781 0.0663529 0.0640485 0.0661941 -1.4358
0.0505433 -0.0291231 0.0450555 -0.0240134 0.0402977 -0.0195833 0.0361728
-0.0157425 0.0325966 -0.0124127 0.0294962 -0.509526 0.0216371 -0.0381722
0.0175171 -0.034336 0.0139452 -0.0310102 0.0108485 -0.0281267 8.16368E-3
-0.0256269 5.83603E-3

CMC HOLDINGS

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.25520	2.74709	.09290	.92633
AR (2)	.76406	2.77703	.27514	.78426
MA (1)	-.74924	2.80016	-.26757	.79005
MEAN	.44848	.02469	18.16813	.00000
CONSTANT	-.01248			

ESTIMATED WHITE NOISE VARIANCE = 9.42504E-4 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 6.64014
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.987748

NUMBER OF ITERATIONS PERFORMED: 5

FORECASTED DPS:
0.80389 0.807764 0.811726 0.815696 0.819736 0.823801 0.827926 0.832084
0.836296 0.840549 0.844852 0.8492 0.853597 0.858041 0.862535 0.867078
0.871671 0.876314 0.881008 0.885753 0.890551 0.895401 0.900305 0.905262

RESIDUALS:
-8.76302E-4 6.27319E-4 -4.90253E-4 3.44819E-4 -2.07594E-4 1.06235E-4
-1.68776E-4 9.72126E-5 -1.02077E-4 4.72387E-5 0.0799354 -3.35918E-4
-1.31866E-3 -5.02352E-4 -1.13403E-3 -7.2069E-4 -1.03038E-3 -7.98347E-4
-9.72193E-4 -8.41941E-4 -9.39531E-4 -8.66412E-4 0.199079 -1.76791E-3
-4.09852E-3 -2.35233E-3 -3.66065E-3 -2.68041E-3 -3.41404E-3 -2.86457E-3
-3.27686E-3 -2.96796E-3 -3.1994E-3 -3.02594E-3 -3.15591E-3 -3.05857E-3
-3.13151E-3 -3.07686E-3 -3.1178E-3 -3.08713E-3 -3.11011E-3 -3.09289E-3
-3.10579E-3 -3.09613E-3 -3.10337E-3 -3.09794E-3 [illegible] -3.40 [illegible]
-4.21691E-3 -3.6121E-3 -4.06525E-3 -3.72573E-3 -3.98011E-3 -3.78952E-3
-3.93232E-3 -3.82533E-3 -3.90549E-3 -3.84543E-3

DIAMOND TRUST LTD

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.27020	10.52622	.02644	.97901
AR (2)	.73884	10.62300	.06955	.94481
MA (1)	-.72659	10.59393	-.06859	.94557
MEAN	.66730	.05461	12.22072	.00000
CONSTANT	-.01397			

ESTIMATED WHITE NOISE VARIANCE = 6.12642E-3 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 1.78395
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.999999

NUMBER OF ITERATIONS PERFORMED: 4

RESIDUALS:
1.41694E-3 9.8475E-4 -7.60296E-4 5.07638E-4 -4.13631E-4 2.55754E-4
-2.30615E-4 1.22776E-4 -1.33995E-4 5.25727E-5 -8.20854E-5 1.55099E-5
-5.60559E-5 -4.05688E-6 -4.18384E-5 1.43868E-5 -3.43333E-5 -1.98404E-5
-3.03708E-5 -2.27194E-5 -2.82788E-5 -2.42395E-5 -2.71744E-5 -2.50414E-5
-2.65914E-5 -2.54655E-5 -2.62836E-5 -2.56892E-5 -2.61211E-5 -2.58073E-5
-2.60353E-5 -2.58696E-5 -2.599E-5 -2.59025E-5 0.079974 -4.1543E-4
-1.11223E-3 -6.05941E-4 -9.73804E-4 -7.06518E-4 -9.00725E-4 -7.59616E-4
-8.62145E-4 -7.87648E-4 -8.41777E-4 -8.02447E-4 0.569169 -3.58552E-3
-8.56505E-3 -4.94697E-3 -7.57583E-3 -5.66572E-3 -7.05359E-3 -6.04518E-3
-6.77788E-3 -6.24551E-3 -6.63232E-3 -6.35127E-3

KENYA BREWERIES LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>"t")
AR (1)	.26775	2.74298	.09761	.92260
AR (2)	.75576	2.77990	.27187	.78676
MA (1)	-.73844	2.80187	-.26355	.79313
MEAN	1.16683	.03522	33.13116	.00000
CONSTANT	-.03428			

ESTIMATED WHITE NOISE VARIANCE = 1.99422E-3 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 3.26109
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.999874

NUMBER OF ITERATIONS PERFORMED: 5

FORECASTED DPS:
1.70726 1.71448 1.7219 1.72934 1.73695 1.74461 1.7524 1.76028 1.76828 1.77637
1.78459 1.79291 1.80134 1.80988 1.81855 1.82732 1.83622 1.84524 1.85437
1.86363 1.87302 1.88253 1.89217 1.90194

RESIDUALS:
-1.78711E-3 1.2452E-3 -9.93972E-4 6.59513E-4 -5.61481E-4 3.40146E-4
-3.25648E-4 1.65998E-4 -1.97051E-4 7.10378E-5 0.249873 -1.52774E-3
-4.82447E-3 -2.39004E-3 -4.18771E-3 -2.86025E-3 -3.8405E-3 -3.11665E-3
-3.65116E-3 -3.25646E-3 -3.54792E-3 -3.33269E-3 0.0765084 -3.8693E-3
-4.97638E-3 -4.15887E-3 -4.76255E-3 -4.31677E-3 -4.64595E-3 -4.40207E-3
-4.58237E-3 -4.44982E-3 -4.5477E-3 -4.47542E-3 -4.5288E-3 -4.48938E-3
-4.51849E-3 -4.497E-3 -4.51287E-3 -4.50115E-3 -4.5098E-3 -4.50341E-3
-4.50813E-3 -4.50465E-3 -4.50722E-3 -4.50532E-3 0.195493 -5.74328E-3
-8.29507E-3 -6.41074E-3 -7.8022E-3 -6.77469E-3 -7.53344E-3 -6.97315E-3
-7.38689E-3 -7.08137E-3 -7.30698E-3 -7.14038E-3

E.A. PACKAGING INDUSTRIES

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>"t")
AR (1)	.06791	.09451	.71848	.47556
AR (2)	.88847	.08991	9.88117	.00000
MA (1)	.95288	.08376	11.37637	.00000
MEAN	.33301	.05261	6.33020	.00000
CONSTANT	.03639			

ESTIMATED WHITE NOISE VARIANCE = 0.0191695 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 3.08058
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.999916

NUMBER OF ITERATIONS PERFORMED: 10

FORECASTED DPS:
0.50902 0.493327 0.500276 0.486305 0.492064 0.480453 0.484336 0.474284
0.477052 0.468308 0.470174 0.462533 0.463671 0.456959 0.457515 0.45159
0.451681 0.446423 0.446147 0.441456 0.440092 0.436687 0.4359 0.43211

RESIDUALS:
-0.0396796 0.0398582 -0.0359286 0.0362041 -0.032523 0.0330391 -0.0294311
0.030093 -0.0266239 0.0274182 0.725925 9.43021E-3 0.0257854 0.0102015
0.0250505 0.0109018 0.0243132 0.0115376 0.0237774 0.0121148 0.0232274
0.0126387 0.272728 7.92E-3 0.0381236 9.3929E-3 0.0367668 0.0106451
0.0355349 0.0118109 0.0344164 0.0128846 0.033401 0.0138829 -0.567521
0.0271783 -6.39542E-3 0.0255949 -4.18675E-3 0.0241574 -3.51708E-3
0.0220523 -2.27344E-3 0.0216673 -1.14434E-3 0.0205915 -0.200119
0.0254237 -0.0169394 0.0234258 -0.0150358 0.021612 -0.013307 0.0199652
-0.0117383 0.01847 -0.0103137 0.0171126

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	-.00956	.11378	-.08399	.93337
AR (2)	.91745	.11096	8.26790	.00000
MA (1)	-1.09300	.11145	-9.80705	.00000
MEAN	.60937	.02132	28.58716	.00000
CONSTANT	.08087			

ESTIMATED WHITE NOISE VARIANCE = 0.0144131 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 6.14885
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.992128

NUMBER OF ITERATIONS PERFORMED: 15

FORECASTED DPS:
1.05455 0.963497 1.01442 0.930391 0.977911 0.900367 0.944705 0.873139 0.914501
0.848447 0.887026 0.826056 0.862033 0.805753 0.839297 0.787343 0.818615
0.770651 0.799799 0.755516 0.782681 0.741794 0.767108 0.729354

RESIDUALS:
-0.0208682 0.0247095 -0.0251068 0.0293423 -0.0301704 0.0348768 -0.0362196
0.0414885 -0.0434462 0.0493872 0.447921 0.017103 0.0292625 0.0159723
0.0304985 0.0146214 0.031975 0.0130075 0.0337389 0.0110796 0.0358462
8.77637E-3 0.0383636 6.02485E-3 0.041371 2.73778E-3 0.0449637 -1.1891E-3
0.0492558 -5.88031E-3 0.0543833 -0.0114846 0.0605088 -0.0181798
-0.562173 0.0263893 -0.0389172 0.0324626 -0.0455553 0.0397181 -0.0534855
0.0483857 -0.0629592 0.0587404 -0.0742768 0.0711106 0.412203 0.0441683
-0.0122941 0.0494191 -0.0180333 0.055692 -0.0248895 0.0631858 -0.0330802
0.0721383 -0.0428652 0.0828332

KAKUZI LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.20614	3.40581	.06053	.95196
AR (2)	.77208	3.36164	.22967	.81921
MA (1)	-.78636	3.46331	-.22705	.82124
MEAN	.66360	.07497	8.85125	.00000
CONSTANT	.02757			

ESTIMATED WHITE NOISE VARIANCE = 0.0179307 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 0.12444
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 1

NUMBER OF ITERATIONS PERFORMED: 6

FORECASTED DPS:
1.24284 1.23576 1.22877 1.22186 1.21504 1.2083 1.20164 1.19507 1.18857 1.18216
1.17582 1.16956 1.16338 1.15727 1.15124 1.14528 1.13939 1.13357 1.12783
1.12216 1.11655 1.11102 1.10555 1.10015

RESIDUALS:
-0.0159034 0.0130805 -9.71123E-3 8.21125E-3 -5.88224E-3 5.20029E-3 -3.51455E-3
3.33844E-3 -2.05047E-3 2.18714E-3 0.890855 8.22391E-3 0.0137039
9.39472E-3 0.0127833 0.0101187 0.012214 0.0105663 0.011862 0.0108431
0.0116443 0.0110143 0.0215097 0.0111951 0.0115052 0.0112785 0.0115197
0.01133 0.0114792 0.011361* 0.0114541 0.0113816 0.0114306 0.0113938
-0.308571 8.40184E-3 5.07236E-3 7.69053E-3 5.63171E-3 7.25068E-3
5.97759E-3 6.97869E-3 6.19146E-3 6.81051E-3 6.32372E-3 6.70651E-3
0.0564055 7.01713E-3 7.24991E-3 7.06686E-3 7.2108E-3 7.09761E-3
7.18662E-3 7.11663E-3 7.17167E-3 7.12839E-3 7.16242E-3 7.13566E-3

KENYA NATIONAL MILLS LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t value	prob(>|t|)
AR (1)	-.01028	.10815	-.16279	.86644
AR (2)	1.01020	.10705	9.44122	.00000
MA (1)	-1.09354	.11625	-9.35016	.00000
MEAN	.01581	.00056	1.88674	.07027
CONSTANT	.00002			

ESTIMATED WHITE NOISE VARIANCE = 1.04429E-3 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 0.091195
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 1

NUMBER OF ITERATIONS PERFORMED: 26

FORECASTED DPS:
0.53285 0.499364 0.533424 0.498706 0.534021 0.498026 0.534641 0.497321 [illegible]

FORECASTED DPS:
0.53285 0.499364 0.533424 0.498706 0.534021 0.498026 0.534641 0.497321
0.535285 0.496592 0.535954 0.495838 0.53665 0.495057 0.537372 0.494249
0.538122 0.493412 0.538901 0.492546 0.53971 0.491649 0.54055 0.49072

RESIDUALS:
-4.65721E-3 5.12217E-3 -5.63157E-3 6.19361E-3 -6.80977E-3 7.4892E-3
-8.23444E-3 9.05582E-3 -9.95715E-3 0.0109502 -0.0120402 0.0132408
-0.0145591 0.0160107 -0.0176049 0.0193599 -0.0212879 0.0234099
-0.0257414 0.028307 -0.0311265 0.0342287 0.442362 1.24052E-3 -1.2547E-3
1.48913E-3 -1.52808E-3 1.78975E-3 -1.85865E-3 2.15326E-3 -2.25837E-3
2.59281E-3 -2.74172E-3 3.12432E-3 -3.32618E-3 3.76701E-3 -4.03291E-3
4.54415E-3 -4.88748E-3 5.48387E-3 -5.92083E-3 6.62017E-3 -7.17035E-3
7.99419E-3 -8.68126E-3 9.65564E-3 -0.0105083 0.0116647 -0.0127174
0.014094 -0.0153888 0.0170315 -0.018619 0.0205835 -0.0225249 0.0248786
-0.0272479 0.0300722

KENYA POWER AND LIGHTING COMPANY LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.05587	.07248	.77079	.44419
AR (2)	.91251	.07114	12.82752	.00000
MA (1)	-1.06616	.07962	-13.39086	.00000
MEAN	1.45968	.00599	243.80304	.00000
CONSTANT	.04279			

ESTIMATED WHITE NOISE VARIANCE = 5.22483E-4 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 0.562863
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 1

NUMBER OF ITERATIONS PERFORMED: 26

FORECASTED DPS:
1.39384 1.40154 1.39635 1.40309 1.39873 1.40464 1.40099 1.40617 1.40313 1.4077
1.40518 1.4092 1.40712 1.41068 1.40899 1.41213 1.41076 1.41356 1.41247
1.41496 1.4141 1.41632 1.41566 1.41766

RESIDUALS:
9.43672E-3 -0.0103671 0.010747 -0.0117642 0.0122365 -0.0133522 0.0139295
-0.0151572 0.0158541 -0.0172091 -0.131958 -1.2369E-3 -3.73046E-3
-1.07191E-3 -3.90636E-3 -8.84372E-4 -4.10631E-3 -6.71193E-4 -4.33359E-3
-4.28872E-4 -4.59195E-3 -1.53423E-4 -4.88562E-3 1.59681E-4 -5.21944E-3
5.15589E-4 -5.5989E-3 9.20152E-4 -6.03023E-3 1.38002E-3 -6.52053E-3
1.90276E-3 -7.07785E-3 2.49696E-3 -7.71137E-3 3.17239E-3 -8.43149E-3
3.94015E-3 -9.25005E-3 4.81288E-3 -0.0101805 5.80491E-3 -0.0112382
6.93256E-3 0.0875595 -3.98866E-3 2.36546E-3 -4.40908E-3 2.8137E-3
-4.88697E-3 3.32321E-3 -5.43019E-3 3.90238E-3 -6.04768E-3 4.56072E-3
-6.74958E-3 5.30906E-3 -7.54743E-3

NATIONAL INDUSTRIAL CREDIT

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.33130	2.39240	.13848	.89038
AR (2)	.70185	2.43710	.28799	.77446
MA (1)	-.67761	2.45301	-.27624	.78342
MEAN	1.17218	.08050	14.43705	.00000
CONSTANT	-.05006			

ESTIMATED WHITE NOISE VARIANCE = 0.0110096 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 3.97512
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.999504

NUMBER OF ITERATIONS PERFORMED: 5

FORECASTED DPS:
2.27161 2.29322 2.31555 2.33811 2.36125 2.38476 2.40879 2.43325 2.45822
2.48366 2.50961 2.53606 2.56304 2.59054 2.61859 2.64719 2.67634 2.70607
2.73639 2.76731 2.79881 2.83095 2.86371 2.89712

RESIDUALS:
-3.00888E-3 2.31647E-3 -1.02874E-3 9.00093E-4 -9.23242E-4 3.66401E-4
-5.07492E-4 8.47364E-5 -3.16538E-4 -4.46268E-5 0.0797711 -8.16761E-4
2.35767E-3 -1.31359E-3 -2.02105E-3 -1.54163E-3 -1.06649E-3 -1.64636E-3
-1.78824E-3 -1.69449E-3 -1.70294E-3 -1.71653E-3 0.128252 -2.08486E-3
-5.26574E-3 -3.65244E-3 -4.74567E-3 -4.00488E-3 -4.50605E-3 -4.16671E-3
-4.39719E-3 -4.24101E-3 -4.34604E-3 -4.27513E-3 0.115676 -5.3599E-3
-7.56666E-3 -6.07133E-3 [illegible]
[illegible] 0.74330 -0.0133449
-0.0270104 -0.017751 -0.0240314 -0.0197771 -0.0229598 -0.0207065
-0.0220301 -0.0211332 -0.0217409 -0.0213291

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>¦t¦)
AR (1)	.06593	.36680	.18084	.85764
AR (2)	.05340	.35734	2.38816	.02046
MA (1)	-.93551	.32364	-2.89062	.00553
MEAN	.99100	.03992	24.82593	.00000
CONSTANT	.07244			

ESTIMATED WHITE NOISE VARIANCE = 7.05923E-3 WITH 54 DEGREES OF FREEDOM.
CHI SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 16.6106
PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.481036

FORECASTED DPS:
0.641304 0.651334 0.670176 0.679979 0.696705 0.706173 0.721071 0.730133
0.743444 0.752056 0.763983 0.772118 0.782834 0.790483 0.800132 0.807295
0.816002 0.82269 0.830561 0.836787 0.843914 0.849697 0.856161 0.861523

RESIDUALS:
-7.13886E-3 7.4046E-3 -6.20099E-3 6.52721E-3 -5.38019E-3 5.75934E-3
-4.66183E-3 5.08731E-3 -4.03314E-3 4.49916E-3 0.246517 3.62344E-3
0.0175047 4.51861E-3 0.0166673 5.30204E-3 0.0159344 5.98769E-3 0.0152929
6.58775E-3 0.0147316 7.11293E-3 -0.48576 8.2945E-3 0.0272019 6.00544E-3
-0.0250605 4.0021E-3 -0.0231863 2.2488E-3 -0.0215461 7.14337E-4
-0.0201106 -6.28599E-4 0.101146 -1.97719E-3 -7.91178E-3 -2.35989E-3
-7.55376E-3 -2.69483E-3 -7.24042E-3 -2.98796E-3 -6.96619E-3 -3.2445E-3
-6.72619E-3 -3.46903E-3 -0.256516 -3.30455E-3 -0.0268384 -4.82218E-3
-0.0254187 -6.15038E-3 -0.0241761 -7.31281E-3 -0.0230886 -8.33014E-3
-0.0221369 -9.2205E-3

SASINI TEA AND COFFEE LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>¦t¦)
AR (1)	.00297	.11508	.02578	.97953
AR (2)	.87462	.10962	7.97882	.00000
MA (1)	-1.09371	.11416	-9.58077	.00000
MEAN	1.11511	.16576	6.72727	.00000
CONSTANT	.34595			

ESTIMATED WHITE NOISE VARIANCE = 0.753955 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 11.9587
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.802635

NUMBER OF ITERATIONS PERFORMED: 23

FORECASTED DPS:
2.29768 1.89256 2.15171 1.79816 2.02377 1.71521 1.91162 1.64233 1.81331 1.5783
1.72715 1.52204 1.65161 1.47261 1.58541 1.42918 1.52737 1.39102 1.4765
1.3575 1.43191 1.32805 1.39282 1.30217

RESIDUALS:
-0.208025 0.258025 0.251305 0.301161 -0.303076 0.357783 -0.365005 0.425516
-0.439084 0.506537 4.8123 0.0872038 0.58463 0.0405903 0.635611
-0.0151688 0.696596 0.0818679 0.769545 -0.161653 0.856807 -0.257093
-3.57881 0.0676523 0.0502466 0.0692834 0.0484626 0.0712345 0.0463287
0.0735684 0.0437761 0.0763602 0.0407226 0.0796998 -0.0929299 0.0962625
3.00174E-3 0.104976 6.51307E-3 0.115448 -0.017942 0.129948 -0.0316132
0.1429 0.0479663 0.160786 0.0675289 0.182182 -0.0889292 0.207779
-0.110801 0.238387 0.152404 0.27501 0.192457 0.31881 0.240538
0.371217

BROOKE BOND KENYA LTD

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>¦t¦)
AR (1)	.03504	.19437	.18026	.85762
AR (2)	.77440	.10314	4.18357	.00001
MA (1)	-.95754	.18331	-5.22356	.00000
MEAN	2.33151	.22540	10.34004	*.00000
CONSTANT	.24071			

ESTIMATED WHITE NOISE VARIANCE = 0.213616 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 0.647079
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 1

NUMBER OF ITERATIONS PERFORMED: 6

FORECASTED EPS:
2.08417 2.06212 2.10006 2.08249 2.11649 2.10125 2.13113 2.11854 2.14483
2.13449 2.15764 2.14921 2.16961 2.16279 2.1808 2.17532 2.19124 2.1869
2.20079 2.1976 2.21008 2.20749 2.21856 2.21663

RESIDUALS:
-0.0925907 0.096315 -0.0845699 0.088342 -0.0772145 0.0815918 -0.0704712
0.0751347 -0.0642883 0.0692144 2.73138 0.0845053 0.123619 0.0061662
0.122029 0.087609 0.12057 0.0790852 0.119233 0.0903654 0.110008
0.0915392 -0.553116 0.0876398 0.0733381 0.0870325 0.0739196 0.0864757
0.0744528 0.0859652 0.0749416 0.0854971 0.0753898 0.0850679 -1.6842
0.0716043 -0.035504 0.0670562 -0.031149 0.0628861 -0.027156 0.0590627
-0.0234949 0.0555571 0.0201381 0.0523478 -0.77706 0.0437519 -0.0624646

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>"t")
AR (1)	.35229	3.08332	.11426	.90946
AR (2)	.67360	3.13085	.21515	.83046
MA (1)	-.65148	3.13893	-.20755	.83636
MEAN	2.63182	.33230	7.92004	.00000
CONSTANT	-.13304			

ESTIMATED WHITE NOISE VARIANCE = 0.166008 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 7.01062
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.983411

FORECASTED EPS:
7.82028 7.90055 7.98291 8.066 8.15075 8.23657 8.32389 8.41246 8.50248 8.59386 8.68669 8.78095 8.87668 8.9739 9.07264 9.17291 9.27474 9.37816 9.48319 9.58985 9.69818 9.80819 9.91991 10.0334

RESIDUALS:
-0.0126207 7.49244E-3 -5.61088E-3 2.92569E-3 -2.63573E-3 9.87435E-4 -1.37294E-3 1.64784E-4 -8.37047E-4 -1.84373E-4 0.84939 -3.54159E-3 -0.0204325 -9.42839E-3 -0.0165974 -0.0119269 -0.0149696 -0.0129874 -0.0142708 -0.0134374 -0.0139855 -0.0136285 2.27614 -0.022355 -0.0674737 -0.0380797 -0.0572293 -0.0447537 -0.0520814 -0.0475863 -0.0510359 -0.0487886 -0.0502527 -0.0492989 0.13008 -0.050195 -0.0539974 -0.0515202 -0.0531341 -0.0520827 -0.0527676 -0.0523214 -0.0526121 -0.0524227 -0.0525461 -0.0524657 1.70748 -0.0591285 -0.0937512 -0.0711952 -0.08589 -0.0763166 -0.0825535 -0.0784903 -0.0811374 -0.0794129 -0.0805364 -0.0798044

DIAMOND TRUST KENYA .

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>"t")
AR (1)	.47580	5.44828	.08733	.93073
AR (2)	.55046	5.54109	.09934	.92124
MA (1)	-.52165	5.47077	-.09535	.92439
MEAN	.93160	.19068	4.88560	.00001
CONSTANT	-.06343			

ESTIMATED WHITE NOISE VARIANCE = 0.0409198 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 42.5552
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 5.5734E-4

FORECASTED EPS:
3.95122 4.0023 4.0548 4.10789 4.16205 4.21705 4.27303 4.32994 4.38783 4.4467 4.0658 4.56747 4.6294 4.69239 4.75645 4.8216 4.88786 4.95525 5.02379 5.0934 5.16438 5.23648 5.30981 5.38439

RESIDUALS:
-5.51374E-3 2.39329E-3 -1.73145E-3 4.20236E-4 -7.02197E-4 -1.16675E-4 -4.22115E-4 -2.62781E-4 -3.45898E-4 -3.0254E-4 0.559675 1.11454E-3 -0.015766 -6.96021E-3 -0.0115538 -9.15753E-3 -0.0104075 -9.75547E-3 -0.0100956 -9.91818E-3 -0.0100107 -9.96246E-3 0.940012 -7.55218E-3 -0.0361852 -0.0212487 -0.0290404 -0.0249758 -0.0270961 -0.0259901 -0.0265671 -0.0262661 -0.0264231 -0.0263412 0.773616 -0.0243218 -0.0484397 -0.0358585 -0.0424215 -0.0389979 -0.0407838 -0.0398522 -0.0403382 -0.0400846 -0.0402169 -0.0401479 0.599816 -0.0385332 -0.0578281 -0.0477628 -0.0530134 -0.0502744 -0.0517032 -0.0509579 -0.0513467 -0.0511439 -0.0512497 -0.0511945

KENYA BREWERIES LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>"t")
AR (1)	.31287	3.22687	.09696	.92312
AR (2)	.70839	3.26745	.21680	.82910
MA (1)	-.69108	3.28024	-.21068	.83393
MEAN	1.50308	.08358	17.98440	.00000
CONSTANT	-.04758			

ESTIMATED WHITE NOISE VARIANCE = 0.0101747 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 5.8518
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.994127

FORECASTED EPS:
2.77584 2.79168 2.80785 2.82413 2.84069 2.8574 2.87435 2.89149 2.90887 2.92645 2.94425 2.96228 2.98053 2.99901 3.01772 3.03667 3.05585 3.07527 3.09494 3.11485 3.13501 3.15542 3.17609 3.19701

RESIDUALS:
-3.43237E-3 2.22497E-3 -1.68471E-3 1.01719E-3 -8.50044E-4 4.40369E-4 -4.51411E-4 1.64881E-4 -2.61027E-4 3.33108E-5 0.64983 -2.59652E-3 -0.0121713 -5.55434E-3 -0.0101272 -6.96698E-3 -9.15094E-3 -7.64165E-3 -8.68467E-3 -7.96306E-3 -8.46201E-3 -8.11779E-3 0.101644 -8.62566E-3 -0.0103432 -9.15624E-3 -9.97652E-3 -9.40964E-3 -9.0014E-3 -9.53066E-3 -9.71776E-3 -9.58846E-3 -9.67782E-3 -9.61608E-3 0.210341 -0.0104981 -0.0137263 -0.0114953 -0.0130371 -0.0119716 -0.0127079 -0.0121991 -0.0125507 -0.0123077 -0.0124757 -0.0123596 0.25756 -0.0134507 -0.0174258 -0.0146787 -0.0165772 -0.0152651 -0.0161719 -0.0155453 -0.0159783 -0.015679 -0.0158858 -0.0157429

I.A. PACKAGING INDUSTRIES

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t value	prob(>|t|)
AR (1)	.09554	.25985	.36767	.71455
AR (2)	.85138	.24808	3.43185	.00116
MA (1)	-.88520	.28255	-3.12054	.00251
MEAN	.20570	.10731	1.91691	.06055
CONSTANT	.05180			

ESTIMATED WHITE NOISE VARIANCE = 0.05894 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 0.974528
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 1

FORECASTED EPS:
0.311222 0.304581 0.304986 0.299371 0.29918 0.294381 0.293759 0.289614
0.288689 0.285072 0.283939 0.28075 0.279481 0.276645 0.275294 0.272751
0.271357 0.269058 0.267652 0.265561 0.264164 0.26225 0.260878 0.259117

RESIDUALS:
-0.0637814 0.0615714 -0.0506439 0.0498108 -0.0401158 0.0403861 -0.0316789
0.0328334 -0.0249178 0.0267809 1.5105 0.0361018 0.0533666 0.0379112
0.0517468 0.0393612 0.0504487 0.0405233 0.0494085 0.0414545 0.0485749
0.0422007 -0.162093 0.0408537 0.0379662 0.040551 0.0382371 0.0403085
0.0384542 0.0401142 0.0386282 0.0399585 0.0387676 0.0398337 -0.721121
0.0326943 4.93076E-3 0.0297846 7.53554E-3 0.0274528 9.62294E-3 0.0255842
0.0112957 0.0240867 0.0126363 0.0228366 -0.526289 0.0169233 -9.61352E-3
0.0141421 -7.12383E-3 0.0119134 -5.12866E-3 0.0101273 -3.52977E-3
8.69599E-3 -2.24846E-3 7.54897E-3

GEORGE WILLIAMSON

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	-.05292	.10875	-.48663	.62849
AR (2)	.90440	.10577	8.55099	.00000
MA (1)	-1.11691	.10857	-10.28712	.00000
MEAN	1.74379	.03479	50.13052	.00000
CONSTANT	.29407			

ESTIMATED WHITE NOISE VARIANCE = 0.117283 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 3.14179
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.999903

FORECASTED EPS:
1.68684 1.68911 1.69517 1.69691 1.7023 1.70359 1.7084 1.70931 1.71361 1.7142
1.71806 1.71839 1.72186 1.72198 1.72511 1.72506 1.72789 1.72769 1.73026
1.72994 1.73229 1.73188 1.73402 1.73353

RESIDUALS:
-0.0474765 0.0598895 -0.0600284 0.0739088 -0.0756867 0.0913977 -0.0952202
0.113215 -0.119588 0.140431 1.54001 0.0662459 0.183872 0.0524944
0.199232 0.0353397 0.218392 0.0139394 0.242294 -0.012757 0.272111
-0.0460604 -0.900692 -0.0101819 0.0895249 -0.0218384 0.102544 -0.0363797
0.118785 -0.0545197 0.139046 -0.0771491 0.164321 -0.105379 -1.39415
-0.0388562 -0.114597 -0.0300015 -0.124487 -0.0189554 -0.136824
-5.17561E-3 -0.152215 0.0120145 -0.171415 0.0334588 0.184634 -3.77647E-3
-5.25677E-3 -3.60341E-3 -5.45006E-3 -3.38752E-3 -5.69114E-3 -3.11821E-3
-5.99194E-3 -2.78224E-3 -6.36725E-3 -2.36313E-3

KAKUZI LTD

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	-.04421	.13405	-.32981	.74202
AR (2)	.96752	.12921	7.48705	.00000
MA (1)	-1.11944	.14684	-7.62345	.00000
MEAN	1.31396	.10495	12.52040	.00000
CONSTANT	.20324			

ESTIMATED WHITE NOISE VARIANCE = 0.267551 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 0.942565
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 1

FORECASTED EPS:
1.67422 1.54576 1.65227 1.52327 1.63003 1.50041 1.61332 1.48195 1.59616
1.46508 1.58032 1.4484 1.56572 1.4329 1.55259 1.4185 1.53992 1.40511
1.52055 1.39267 1.5101 1.38108 1.5085 1.3703

RESIDUALS:
-0.0739745 0.111781 0.110552 0.13311 0.149352 0.173789 -0.187949 0.216796
-0.236316 0.27114 3.12307 0.0617014 0.17743 0.0702675 0.19023 0.0859339
0.206269 0.0378033 0.22637 0.0154821 0.251599 -0.0127153 -0.758376
0.0301893 0.155334 0.0152419 0.172066 -3.40958E-3 0.193035 -0.0269627
0.219312 -0.0563702 0.252241 -0.0932402 -1.18649 0.0182512 7.30573E-3
0.0198944 5.00711E-3 0.0215776 3.91788E-3 0.0236869 1.59661E-3 0.0263302
-1.40239E-3 0.0296426 -0.11511 0.042069 -0.0274573 0.0603733 -0.0367536
0.0607799 -0.0484031 0.0738209 -0.0630018 0.0901633 [illegible] 0.110643

UNGA NATIONAL MILLS LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.03423	.10885	[illegible]	[illegible]
AR (2)	[illegible]	.10565	9.27959	.00000
MA (1)	1.00092	.12096	-8.45182	.00000
MEAN	.62403	.00943	71.45659	.00000
CONSTANT	.04244			

ESTIMATED WHITE NOISE VARIANCE = 5.61542E-3 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 0.584842
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 1

FORECASTED EPS:
0.280623 0.224218 0.225122 0.268243 0.269851 0.263558 0.264863 0.258648
0.760143 0.753998 0.755678 0.749595 0.751452 0.745425 0.747455 0.741475
0.743623 0.737734 0.740095 0.73419 0.73671 0.730834 0.733509 0.727654

RESIDUALS:
-6.41109E-3 7.31211E-3 -7.64514E-3 8.65714E-3 -9.11112E-3 0.0102549 -0.0108526
0.012153 -0.0129214 0.0144079 0.054621 0.0132227 -0.0102838 0.0153365
-0.0125872 0.0178476 -0.0153246 0.0208306 -0.0185259 0.0243742
-0.0224.382 0.0288838 0.432974 8.19418E-3 0.0201906 7.1154E-3 0.0213664
5.83388E-3 0.0227632 4.31151E-3 0.0244225 2.50304E-3 0.0263936
3.54689E-4 -0.0512649 2.2183E-3 0.0223572 4.07315E-4 0.024331
-1.74402E-3 0.0266758 -4.29967E-3 0.0294613 -7.33561E-3 0.0327702
-0.0109421 -0.313299 4.09232E-3 1.29761E-3 4.34364E-3 1.0237E-3
4.64218E-3 6.98308E-4 4.29684E-3 3.11763E-4 5.41814E-3 -1.47427E-4
5.91862E-3

KENYA POWER AND LIGHTING COMPANY

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	-.08655	.08712	-.99350	.32490
AR (2)	1.05603	.08698	12.14169	.00000
MA (1)	-1.11017	.03203	-34.66547	.00000
MEAN	1.58497	.11687	13.56210	.00000
CONSTANT	.16492			

ESTIMATED WHITE NOISE VARIANCE = 0.801722 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 9.31498
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.998829

FORECASTED EPS:
4.70905 4.9104 4.59628 4.8361 4.48362 4.76739 4.3706 4.70461 4.25667 4.64817
4.14125 4.59857 4.02366 4.55636 3.90312 4.52221 3.77879 4.49692 3.64969
4.48138 3.51469 4.47665 3.37254 4.48397

RESIDUALS:
-0.0646988 0.0735058 -0.0799244 0.0904088 -0.0986895 0.111241 -0.121817
0.136917 -0.150321 0.168561 5.77455 0.06682 0.109388 0.0621304 0.114595
0.0563505 0.121011 0.049227 0.12892 0.0404475 0.138666 0.029627 -1.79932
0.062339 0.054852 0.0631638 0.0539363 0.0641804 0.0528978 0.0654332
0.0514169 0.0669774 0.0497026 0.0688805 1.53759 0.0360407 0.12952
0.0257424 0.140953 0.0130499 0.155044 -2.59314E-3 0.17241 -0.0218728
0.193814 -0.0456343 -1.92981 -0.024149 0.130726 -0.0412112 0.149668
-0.0622398 0.173013 -0.088157 0.201785 -0.120099 0.237247 -0.159467

NATIONAL INDUSTRIAL CREDIT

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.41224	3.84781	.10714	.91500
AR (2)	.61388	3.90966	.15702	.87542
MA (1)	-.59011	3.89884	-.15132	.88029
MEAN	1.33021	.22247	5.97922	.00000
CONSTANT	-.07501			

ESTIMATED WHITE NOISE VARIANCE = 0.0684725 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 13.6016
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.695077

FORECASTED EPS:
4.70457 4.7592 4.81521 4.87184 4.92957 4.98814 5.04772 5.10823 5.16975 5.23226
5.2958 5.36036 5.42598 5.49266 5.56044 5.62931 5.69931 5.77044 5.84274
5.91621 5.99088 6.06676 6.14388 6.22225

RESIDUALS:
-7.37964E-3 3.83984E-3 -2.70162E-3 1.1247E-3 -1.10946E-3 1.7984E-4 -6.22384E-4
-1.49189E-4 -4.28721E-4 -2.63766E-4 0.229639 -8.44194E-4 -6.02530E-3
-2.96791E-3 -4.77215E-3 -1.70249E-3 -4.33574E-3 -3.96488E-3 -4.10377E-3
-4.05466E-3 -4.13824E-3 -4.08824E-3 1.55839 -7.76298E-3 -0.0429342
-0.0220768 -0.0342174 -0.0270614 -0.03129 -0.0287971 -0.0302718
-0.0294016 -0.0299151 -0.029612 0.470399 -0.030938 -0.0421124
-0.0354725 -0.0333908 -0.0370706 -0.03443 -0.0376378 -0.038113
-0.0370326 -0.0379981 -0.0379084 0.972942 -0.0402977 -0.042921
-0.0495207 -0.0524484 -0.0527999 -0.0555433 -0.0539244 -0.0548797
[illegible]

NATION PRINTERS AND PUBLISHERS

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.02450	.08313	.29472	.76954
AR (2)	.93133	.08130	11.45474	.00000
MA (1)	1.07709	.08761	12.29363	.00000
MEAN	.66246	.05161	12.83538	.00000
CONSTANT	.07306			

ESTIMATED WHITE NOISE VARIANCE = 0.066302 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 3.3351
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.999852

FORECASTED EPS:
1.28635 1.18768 1.25637 1.16617 1.23793 1.14843 1.20073 1.12545 1.17529
1.10622 1.15905 1.08772 1.12782 1.07222 1.10584 1.05281 1.08496 1.05634
1.06511 1.02053 1.04625 1.00564 1.02827 0.99026

RESIDUALS:
-0.0579167 0.0649229 -0.0673858 0.075122 -0.0783711 0.0862641 -0.0911153
0.100831 -0.1059 0.116605 0.738948 0.0426361 -3.18374E-3 0.0461682
-6.78811E-3 0.0502658 -0.0114016 0.0550194 -0.0165217 0.0605342
-0.0224615 0.066932 0.270648 0.0438784 8.73003E-3 0.0465878 5.81175E-3
0.049731 2.42621E-3 0.0533776 -1.5014E-3 0.0576079 -6.05788E-3 0.0625156
0.838656 -0.0181388 0.113075 -0.0282534 0.123969 -0.0399876 0.136608
-0.0536005 0.15127 -0.069393 0.16828 -0.0877142 -1.38199 0.0505209
-0.0302289 0.0567455 -0.0369354 0.0639668 -0.0447113 0.0723443
-0.0537346 0.0820632 -0.0642027 0.0933382

SASINI TEA AND COFFEE LTD.

SUMMARY OF FITTED MODEL

parameter	estimate	stnd.error	t-value	prob(>|t|)
AR (1)	.00194	.10855	.01785	.98582
AR (2)	.86109	.10345	8.32336	.00000
MA (1)	-1.10849	.11400	-9.72400	.00000
MEAN	2.79411	.18322	15.24990	.00000
CONSTANT	.63528			

ESTIMATED WHITE NOISE VARIANCE = 1.20116 WITH 54 DEGREES OF FREEDOM.
CHI-SQUARE TEST STATISTIC ON FIRST 20 RESIDUAL AUTOCORRELATIONS = 10.5687
WITH PROBABILITY OF A LARGER VALUE GIVEN WHITE NOISE = 0.878088

FORECASTED EPS:
4.04841 3.54215 3.87563 3.44033 3.72664 3.35237 3.59819 3.27638 3.48743
3.21073 3.39192 3.15402 3.30958 3.10502 3.23858 3.06269 3.17736 3.02613
3.12457 2.99454 3.07905 2.96725 3.03981 2.94367

RESIDUALS:
-0.257745 0.322128 -0.320657 0.391866 -0.397961 0.477557 -0.492948 0.58285
-0.609665 0.712229 5.87692 0.139047 0.79042 0.0683779 0.868757
-0.0184576 0.965013 -0.125157 1.08329 -0.256265 1.22862 -0.417365
-4.6028 0.0483734 0.0677216 0.0462743 0.0700485 0.0436949 0.0729077
0.0405256 0.0764209 0.0366312 0.0807378 0.0318459 -0.493958 0.090016
-0.0578834 0.106062 -0.0756704 0.125779 -0.0975261 0.15006 -0.124382
0.179775 -0.15738 0.216354 0.362072 0.199459 -0.102495 0.232219
-0.138809 0.272473 -0.18343 0.321935 -0.238259 0.382712 -0.30563
0.457392

APPENDIX B

KEY
D=Dividends per share
f=forecasted
pv=present value

BROOKE BOND

Df1	Df2	Df3	Df4	Df5	Pricesf	ROI	CAPM
1.52346	1.51940	1.53956	1.53721	1.55460	22.8502	0.882301	0.870852
1.51940	1.53956	1.53721	1.55460	1.55358	22.8461	0.778455	0.758384
1.53956	1.53721	1.55460	1.55358	1.56864	22.8156	0.686831	0.660440
1.53721	1.55460	1.55358	1.56864	1.56863	22.8045	0.605992	0.575146
1.55460	1.55358	1.56864	1.56863	1.58173	22.7793	0.534667	0.500867

	pvROI1	pvROI2	pvROI3	pvROI4	pvROI5
	1.344150	1.340568	1.358355	1.356281	1.371625
	1.182784	1.198478	1.196649	1.210186	1.209392
	1.057418	1.055804	1.067748	1.067048	1.077391
	0.931537	0.942075	0.941457	0.950583	0.950577
	0.831194	0.830649	0.838701	0.838695	0.845699
pvPrices:	12.217247	12.215055	12.198748	12.192813	12.179339
Summation:	17.564332	17.582631	17.601659	17.615609	17.634026

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	1.326709	1.323173	1.340729	1.338683	1.353827
	1.152288	1.167577	1.165795	1.178984	1.178210
	1.016788	1.015236	1.026721	1.026047	1.035993
	0.884121	0.894122	0.893536	0.902197	0.902192
	0.778649	0.778138	0.785681	0.785676	0.792237
pvPrices:	11.44491	11.442857	11.427581	11.422021	11.409399
Summation:	16.603467	16.621105	16.640045	16.653610	16.671860

CMC Holdings

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
0.80389	0.807764	0.811726	0.815696	0.819736	10.8215	0.864304	0.893016
0.807764	0.811726	0.815696	0.819736	0.823801	10.8264	0.747021	0.797478
0.811726	0.815696	0.819736	0.823801	0.827926	10.8418	0.645654	0.712161
0.815696	0.819736	0.823801	0.827926	0.832084	10.8493	0.558041	0.635972
0.819736	0.823801	0.827926	0.832084	0.836296	10.8629	0.482317	0.567933

	pvROI1	pvROI2	pvROI3	pvROI4	pvROI5
	0.694805	0.698153	0.701578	0.705009	0.708501
	0.603417	0.606377	0.609342	0.612360	0.615397
	0.524094	0.526657	0.529265	0.531890	0.534553
	0.455192	0.457446	0.459715	0.462017	0.464337
	0.395373	0.397333	0.399323	0.401328	0.403360
pvPrices:	5.2193934	5.2217567	5.2291844	5.2328018	5.2393613

Summation:	7.8922754	7.9077247	7.9284094	7.9454078	7.9655113

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	0.717887	0.721346	0.724884	0.728430	0.732037
	0.644174	0.647334	0.650500	0.653721	0.656963
	0.578080	0.580907	0.583784	0.586679	0.589617
	0.518759	0.521329	0.523914	0.526537	0.529182
	0.465555	0.467864	0.470207	0.472568	0.474960
pvPrices:	6.1458869	6.1486698	6.1574159	6.1616754	6.1693993
Summation:	9.0703439	9.0874518	9.1107069	9.1296134	9.1521603

Diamond Trust

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
1.32656	1.33299	1.33963	1.34623	1.35297	18.5292	0.829944	0.893495
1.33299	1.33963	1.34623	1.35297	1.35973	18.8657	0.688807	0.798333
1.33963	1.34623	1.35297	1.35973	1.36659	19.1975	0.571672	0.713307
1.34623	1.35297	1.35973	1.36659	1.37349	19.5459	0.474456	0.637337
1.35297	1.35973	1.36659	1.37349	1.38048	19.8947	0.393772	0.569457

	pvROI1	pvROI2	pvROI3	pvROI4	pvROI5
	1.100971	1.106307	1.111818	1.117296	1.22889
	0.918173	0.922747	0.927293	0.931936	0.936592
	0.765829	0.769602	0.773455	0.777319	0.781241
	0.683726	0.641924	0.645132	0.648386	0.651660
	0.532761	0.535423	0.538125	0.540842	0.543594
pvPrices:	7.2962801	7.4287844	7.559479	7.6966281	7.8339758
Summation:	11.252742	11.404789	11.555261	11.712408	11.869953

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	1.185275	1.191020	1.196953	1.202850	1.208872
	1.064171	1.069472	1.074741	1.080121	1.085518
	0.955568	0.960276	0.965083	0.969905	0.974799
	0.858002	0.862297	0.866606	0.870978	0.875376
	0.770459	0.774308	0.778215	0.782144	0.786125
pvPrices:	10.551582	10.743204	10.93215	11.130549	11.329176
Summation:	15.385058	15.600579	15.813749	16.036549	16.259867

Kenya Breweries

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
1.70726	1.71448	1.7219	1.72934	1.73695	13.9086	0.933968	0.893016
1.71448	1.7219	1.72934	1.73695	1.74461	13.5622	0.872297	0.797478
1.7219	1.72934	1.73695	1.74461	1.76026	13.3695	0.814697	0.712161
1.72934	1.73695	1.74461	1.76028	1.76828	13.0900	0.760902	0.635972
1.73695	1.74461	1.76028	1.76828	1.77637	12.9141	0.710658	0.567933

	pvROI1	pvROI2	pvROI3	pvROI4	pvROI5
	1.594526	1.601270	1.608200	1.61548	1.622256
	1.495535	1.502008	1.508498	1.515136	1.521818
	1.402828	1.408889	1.415089	1.421330	1.434096
	1.315858	1.321648	1.327477	1.339400	1.345487
	1.234378	1.239822	1.250958	1.256643	1.262392
pcPrices:	9.8842578	9.6380859	9.5011421	9.3025132	9.1775084
Summation:	16.927384	16.711724	16.611365	16.450172	16.363559

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	1.524611	1.531059	1.537685	1.544329	1.551125
	1.367261	1.373178	1.379111	1.385180	1.391289
	1.226271	1.231569	1.236989	1.242444	1.253603
	1.099812	1.104651	1.109523	1.119489	1.124576
	0.986472	0.990822	0.999722	1.004265	1.008860
pvPrices:	7.8991529	7.7024209	7.5929802	7.4342429	7.3343435
Summation:	14.10358	13.933702	13.856012	13.729951	13.663798

E.A. Packaging

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
0.50902	0.493327	0.500276	0.486805	0.492064	8.55772	0.936855	0.893016
0.493327	0.500276	0.486805	0.492064	0.480453	8.61897	0.877698	0.797478
0.500276	0.486805	0.492064	0.480453	0.484336	8.67905	0.822277	0.712161
0.486805	0.492064	0.480453	0.484336	0.474284	8.73799	0.770355	0.635970
0.492064	0.480453	0.484336	0.474284	0.477052	8.79582	0.721712	0.567933

	pvROI1	pvROI2	pvROI3	pvROI4	pvROI5
	0.476878	0.46276	0.468686	0.456066	0.460993
	0.432992	0.439091	0.427268	0.431884	0.421692
	0.411365	0.400288	0.404613	0.395065	0.398259
	0.375012	0.379064	0.370119	0.373110	0.365367
	0.355128	0.346748	0.349551	0.342296	0.344294
pvPrices:	6.1762092	6.220414	6.2637745	6.3063122	6.3480488
Summation:	8.2275872	8.247783	8.2840125	8.3047352	8.3386549

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	0.454563	0.440549	0.446754	0.434724	0.439421
	0.393417	0.398959	0.386216	0.392410	0.383151
	0.356277	0.346663	0.350429	0.342160	0.344925
	0.309594	0.312939	0.305554	0.308024	0.301631
	0.279459	0.272865	0.275070	0.269361	0.270933
pvPrices:	4.8602115	4.8949974	4.9291189	4.9625928	4.9954364
Summation:	6.6535235	6.6669944	6.6951449	6.7092738	6.7354994

George Williamson

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM

1.05455	0.963497	1.01442	0.930391	0.977911	7.98694	0.883782	0.870852
0.963497	1.014420	0.930391	0.977911	0.900367	7.98370	0.781071	0.758384
1.01442	0.930391	0.977911	0.900367	0.944705	7.98133	0.690297	0.660440
0.930391	0.974911	0.900367	0.44705	0.873139	7.97822	0.610072	0.575146
0.977911	0.900367	0.944705	0.873139	0.914501	7.97574	0.539171	0.500867

	pcROI1	pvROI2	pvROI3	pvROI4	pvROI5
	0.931992	0.851521	0.896526	0.822263	0.864260
	0.752560	0.792334	0.726702	0.763818	0.703251
	0.700251	0.642246	0.675049	0.621521	0.652127
	0.567606	0.596597	0.549289	0.576338	0.532678
	0.527262	0.485452	0.509358	0.470771	0.493073
pvPrices:	4.3063264	4.3045795	4.3033016	4.3016248	4.3002877
Summation:	7.7859994	7.6727315	7.6602276	7.5563378	7.5456787

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	0.918357	0.839063	0.883410	0.810233	0.851616
	0.730700	0.769320	0.705593	0.74632	0.682824
	0.669964	0.614468	0.645852	0.594639	0.623921
	0.535111	0.562442	0.517842	0.543343	0.502182
	0.489804	0.450964	0.473172	0.437327	0.458044
pvPrices:	4.0003946	3.9987718	3.9975848	3.9960279	3.9947849
Summation:	7.3443326	7.2350308	7.2234558	7.1232021	7.1133739

Kakuzi Ltd.

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
1.24288	1.23581	1.23886	1.22197	1.21517	9.78792	0.896298	0.870852
1.23581	1.22886	1.22197	1.21517	1.20846	12.29290	0.803350	0.758384
1.22886	1.22197	1.21517	1.20846	1.20846	9.95797	0.720041	0.660440
1.22197	1.21517	1.20846	1.20848	1.20846	12.00650	0.645372	0.575146
1.21517	1.20848	1.20846	1.20846	1.20183	10.0874	0.579446	0.500867

	pvROI1	pvROI2	pvROI3	pvROI4	pvROI5
	1.113991	1.107654	1.1101425	1.095249	1.089154
	0.992788	0.987205	0.981670	0.976207	0.970817
	0.884830	0.879869	0.874973	0.870141	0.870141
	0.788625	0.784236	0.779906	0.779906	0.779906
	0.702910	0.699028	0.699028	0.699028	0.695193
pvPrices:	5.66178931	7.1107788	5.7601479	6.9451118	5.8350161
Summation:	10.144929	11.568773	10.197151	11.365645	10.240229

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	1.082365	1.076208	1.070155	1.064155	1.058233
	0.937218	0.931947	0.926722	0.921565	0.916476
	0.811589	0.807038	0.802547	0.798116	0.798116
	0.702811	0.698900	0.695041	0.695041	0.695041
	0.608639	0.605278	0.605278	0.605278	0.601958
pvPrices:	4.9024461	6.1571079	4.9976185	6.0136596	5.0524457

Summation: 9.0450701 10.276481 9.0873645 10.097817 9.1222717

Kenya National Mills

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
0.53285	0.499364	0.533424	0.498706	0.534021	4.85766	0.965064	0.893016
0.499364	0.533424	0.498706	0.534021	0.498026	4.82669	0.931349	0.797478
0.533424	0.498706	0.534021	0.498026	0.534641	4.79292	0.898812	0.712161
0.498706	0.534021	0.498026	0.534841	0.497321	4.77220	0.867412	0.635972
0.534021	0.498026	0.534641	0.497321	0.535285	4.7509	0.837109	0.567933

	pvROI1	pvROI2	pvROI3	pvROI4	pvROI5
	0.514234	0.481918	0.514488	0.481283	0.515364
	0.465082	0.496804	0.464469	0.497360	0.463836
	0.479448	0.448243	0.479984	0.447632	0.480542
	0.432583	0.463216	0.431993	0.463754	0.431382
	0.447033	0.416902	0.447552	0.416311	0.448091
pvPrices:	4.0663909	4.0404656	4.0121964	3.9948515	3.9770295
Summation:	6.4047739	6.3475496	6.3509864	6.3011935	6.3162465

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	0.475843	0.445940	0.476356	0.445352	0.476889
	0.398232	0.425394	0.397707	0.425870	0.397165
	0.379884	0.355158	0.380309	0.354675	0.380750
	0.317163	0.339622	0.316730	0.340016	0.316282
	0.303288	0.282845	0.303640	0.282445	0.304006
pvPrices:	2.7588254	2.7412365	2.7220574	2.7102898	2.6981985
Summation:	4.6332364	4.5901985	4.5968014	4.5585498	4.5732925

Kenya Power

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
1.40083	1.40173	1.40254	1.40341	1.40420	19.4694	0.938438	0.884407
1.40173	1.40254	1.40341	1.40420	1.40502	19.5380	0.880666	0.782177
1.40254	1.40341	1.40420	1.40502	1.40502	19.6323	0.826451	0.691763
1.40341	1.40420	1.40502	1.40502	1.40579	19.7053	0.775573	0.611801
1.40420	1.40502	1.40502	1.40579	1.40558	19.7733	0.727829	0.541081

	pvROI1	pcROI2	pvROI3	pvROI4	pvROI5
	1.314592	1.315437	1.316197	1.317013	1.317755
	1.234456	1.235170	1.235936	1.236632	1.237354
	1.159131	1.159850	1.160503	1.161180	1.161180
	1.088448	1.089060	1.089696	1.089696	1.090293
	1.022016	1.022613	1.022613	1.023173	1.023749
pcPrices:	14.170374	14.231803	14.288937	14.342069	14.391561
Summation:	19.989019	20.053934	20.113884	20.169766	20.221834

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	1.238905	1.239701	1.240417	1.2411886	1.241885
	1.096401	1.097034	1.097715	1.0983330	1.098974
	0.970226	0.970828	0.971374	0.971941	0.971941
	0.85608	0.859091	0.859593	0.859593	0.860064
	0.759787	0.760230	0.760230	0.760647	0.761075
pvPrices:	10.534522	10.580181	10.622664	10.662163	10.698956
Summation:	15.45845	15.507075	15.551995	15.593865	15.632897

National Industrial Credit

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
1.73943	1.71087	1.67906	1.67733	1.67698	15.9232	0.761440	0.893495
1.71087	1.67906	1.67733	1.67698	1.67687	15.7566	0.579791	0.798333
1.67906	1.67733	1.67698	1.67698	1.67684	15.6290	0.441477	0.713307
1.67733	1.67698	1.67687	1.67684	1.67683	15.5098	0.336158	0.637337
1.67698	1.67687	1.67684	1.67683	1.67683	15.4117	0.255964	0.569457

	pvROI1	pvROI2	pvROI3	pvROI4	pvROI5
	1.324472	1.302725	1.278504	1.277187	1.276920
	0.991948	0.973505	0.972502	0.972299	0.972235
	0.741266	0.740502	0.740348	0.740299	0.740286
	0.563848	0.563731	0.563694	0.563684	0.563680
	0.429247	0.429219	0.429212	0.429209	0.429209
pvPrices:	4.0757659	4.0331223	4.0004613	3.9699504	3.9448403
Summation:	8.1265499	8.0428073	7.9847223	7.9526294	7.92971733

	pvCAPM1	pvCAPm2	pvCAPM3	pvCAPM4	pvCAPM5
	1.554172	1.528654	1.500232	1.498586	1.498373
	1.365845	1.340450	1.339069	1.338790	1.338702
	1.197686	1.196452	1.196202	1.196124	1.196102
	1.069024.	1.068801	1.068731	1.068712	1.068705
	0.954963	0.954906	0.954889	0.954883	0.954883
pvPRices:	9.0675777	8.9727061	8.9000434	8.8321641	8.7763004
Summation:	15.209275	15.061971	14.959168	14.88936	14.833068

Nation Printers & Publishers

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
0.641304	0.651334	0.670176	0.670176	0.679979	6.02896	0.895335	0.884407
0.651334	0.670176	0.679979	0.696705	0.706173	6.09533	0.801625	0.752177
0.670176	0.679979	0.696705	0.706173	0.721071	6.14589	0.717723	0.691763
0.679979	0.696705	0.706173	0.721071	0.730133	6.18417	0.642603	0.611801
0.696705	0.706173	0.721071	0.730133	0.743444	6.21326	0.575345	0.541081

pvROI1	pvRoI2	pvROI3	pvROI4	pvROI5
0.574182	0.583162	0.600032	0.608809	0.623784
0.522125	0.537230	0.545088	0.558436	0.566035

	0.481001	0.488036	0.500041	0.506836	0.517529
	0.436956	0.447704	0.453788	0.463362	0.469185
	0.400845	0.406293	0.414864	0.420078	0.427736
pvPrices:	3.4687319	3.5069176	3.536007	3.5580312	3.574768
Summation:	5.9838429	5.9693446	6.149822	6.1156142	6.179091

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	0.567174	0.576044	0.592708	0.601378	0.616171
	0.509458	0.524196	0.531864	0.544946	0.552352
	0.463603	0.470384	0.481955	0.488504	0.498810
	0.416012	0.426245	0.432037	0.441152	0.446696
	0.376974	0.382097	0.390158	0.395061	0.402264
pvPrices:	3.2621557	3.2980672	3.3254243	3.3461368	3.3618759
Summation:	5.5953787	5.6770352	5.7541483	5.8171808	5.8781719

Sasini Tea & Coffee

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
2.29768	1.89256	2.15171	1.79816	2.02377	10.285	0.889046	0.870852
1.89256	2.15171	1.79816	2.02377	1.71521	14.7585	0.790404	0.758384
2.15171	1.79816	2.02377	1.71521	1.91162	10.2494	0.702706	0.660440
1.79816	2.02377	1.71521	1.91162	1.64233	14.3897	0.624739	0.575146
2.02377	1.71521	1.91162	1.64233	1.81331	10.2093	0.555422	0.500867

	pvROI1	pvROI2	pvROI3	pvROI4	pvROI5
	2.042745	1.682574	1.912971	1.598648	1.799226
	1.495887	1.700721	1.421273	1.599596	1.355709
	1.512020	1.263579	1.422116	1.205289	1.343308
	1.123381	1.264328	1.071558	1.194263	1.026027
	1.124047	1.952666	1.061756	0.912187	1.007153
pvPrices:	5.7125152	9.1971255	5.6927422	7.9923559	5.8704695
Summation:	13.010597	15.06164	12.582419	14.502341	12.201894

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	2.000940	1.648140	1.873822	1.565932	1.762405
	1.435287	1.631822	1.363696	1.534795	1.300788
	1.421077	1.187578	1.336580	1.132794	1.262511
	1.034205	1.163964	0.986497	1.099461	0.944590
	1.013641	0.859093	0.957469	0.822590	0.908228
pvPrices:	5.151417	7.3920456	5.1335862	7.2073256	5.1133512
Summation:	12.06569	13.882644	11.65165	13.362889	11.291865

	0.481001	0.488036	0.500041	0.506836	0.517529
	0.436956	0.447704	0.453788	0.463362	0.469185
	0.400845	0.406293	0.414864	0.420078	0.427736
pvPrices:	3.4687319	3.5069176	3.536007	3.5580312	3.574768
Summation:	5.9838429	5.9693446	6.149822	6.1156142	6.179091

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	0.567174	0.576044	0:592708	0.601378	0.616171
	0.509458	0.524196	0.531864	0.544946	0.552352
	0.463603	0.470384	0.481955	0.488504	0.498810
	0.416012	0.426245	0.432037	0.441152	0.446696
	0.376974	0.382097	0.390158	0.395061	0.402264
pvPrices:	3.2621557	3.2980672	3.3254243	3.3461368	3.3618769
Summation:	5.5953787	5.6770352	5.7541483	5.8171808	5.8781719

Sasini Tea & Coffee

Df1	Df2	Df3	Df4	Df5	Prices	ROI	CAPM
2.29768	1.89256	2.15171	1.79816	2.02377	10.285	0.889046	0.870852
1.89256	2.15171	1.79816	2.02377	1.71521	14.7585	0.790404	0.758384
2.15171	1.79816	2.02377	1.71521	1.91162	10.2494	0.702706	0.660440
1.79816	2.02377	1.71521	1.91162	1.64233	14.3897	0.624739	0.575146
2.02377	1.71521	1.91162	1.64233	1.81331	10.2093	0.555422	0.500867

	pvROI1	pvROI2	pvROI3	pvROI4	pvROI5
	2.042745	1.682574	1.912971	1.598648	1.799226
	1.495887	1.700721	1.421273	1.599596	1.355709
	1.512020	1.263579	1.422116	1.205289	1.343308
	1.123381	1.264328	1.071558	1.194263	1.026027
	1.124047	1.952666	1.061756	0.912187	1.007153
pvPrices:	5.7125152	9.1971955	5.6927422	7.9923559	5.6704695
Summation:	13.010597	15.06164	12.582419	14.502341	12.201894

	pvCAPM1	pvCAPM2	pvCAPM3	pvCAPM4	pvCAPM5
	2.000940	1.648140	1.873822	1.565932	1.762405
	1.435287	1.631822	1.363696	1.534795	1.300788
	1.421077	1.187578	1.336580	1.132794	1.262511
	1.034205	1.163964	0.986497	1.099461	0.944590
	1.013641	0.859093	0.957469	0.822590	0.908228
pvPrices:	5.151417	7.3920456	5.1335862	7.2073258	5.1133512
Summation:	12.06569	13.882644	11.65165	13.362899	11.291865

APPENDIX C

```
************************** S T A T G R A P H I C S ***************************
                              Onesample Analysis
                                   3.09 4.56 3.62 3.11 0.65
Sample Statistics: Number of Obs.  5
                   Average         3.006
                   Variance        2.09013
                   Std. Deviation  1.44573
                   Median          3.11

Confidence Interval for Mean:      95   Percent
                   Sample 1        1.21025 4.80175      4 D.F.

Confidence Interval for Variance:  0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0   Computed T statistic = 4.6493
                     vs Alt: NE    Sig. Level = 9.66653E-3
                 at Alpha = 0.05   so reject HO.


************************** S T A T G R A P H I C S ***************************
                              Onesample Analysis
                                   ¯0.19 ¯0.15 ¯0.05 ¯0.92 ¯1.44
Sample Statistics: Number of Obs.  5
                   Average         -0.55
                   Variance        0.36715
                   Std. Deviation  0.605929
                   Median          -0.19

Confidence Interval for Mean:      95   Percent
                   Sample 1        -1.30263 0.202627    4 D.F.

Confidence Interval for Variance:  0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0   Computed T statistic = -2.02967
                     vs Alt: NE    Sig. Level = 0.112254
                 at Alpha = 0.05   so do not reject HO.


************************** S T A T G R A P H I C S ***************************
                              Onesample Analysis
                                   ¯0.27 ¯0.34 ¯0.89 ¯1.73 ¯2.03
Sample Statistics: Number of Obs.  5
                   Average         -1.052
                   Variance        0.64022
                   Std. Deviation  0.800137
                   Median          -0.89

Confidence Interval for Mean:      95   Percent
                   Sample 1        -2.04585 -0.0581457  4 D.F.

Confidence Interval for Variance:  0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0   Computed T statistic = -2.93992
                     vs Alt: NE    Sig. Level = 0.0423923
                 at Alpha = 0.05   so reject HO.


************************** S T A T G R A P H I C S ***************************
                              Onesample Analysis
                                   1.69 2.49 4.33 4.64 1.34
Sample Statistics: Number of Obs.  5
                   Average         2.898
                   Variance        2.28457
                   Std. Deviation  1.51148
                   Median          2.49

Confidence Interval for Mean:      95   Percent
                   Sample 1        1.02058 4.77542      4 D.F.

Confidence Interval for Variance:  0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0   Computed T statistic = 4.28727
                     vs Alt: NE    Sig. Level = 0.0127737
                 at Alpha = 0.05   so reject HO.
```

```
************************** S T A T G R A P H I C S **************************
                          Onesample Analysis
                                    ¯1.8 ¯1.87 ¯2.93 ¯1 ¯0.31
Sample Stat[illegible] Number of Obs.      5
                  Average               -1.582
                  Variance              0.97607
                  Std. Deviation        0.987963
                  Median                -1.8

Confidence Interval for Mean:           95    Percent
                  Sample 1              -2.80915 -0.354847       4 D.F.

Confidence Interval for Variance:       0       Percent
                  Sample 1


Hypothesis Test for HO: Mean = 0        Computed T statistic = -3.58056
                     vs Alt: NE         Sig. Level = 0.0231561
                  at Alpha = 0.05       so reject HO.


************************** S T A T G R A P H I C S **************************
                          Onesample Analysis
                                    ¯0.75 ¯0.49 ¯0.49 ¯0.24 ¯0.24
Sample Statistics: Number of Obs.       5
                  Average               -0.442
                  Variance              0.04527
                  Std. Deviation        0.212767
                  Median                -0.49

Confidence Interval for Mean:           95    Percent
                  Sample 1              -0.706279 -0.177721      4 D.F.

Confidence Interval for Variance:       0       Percent
                  Sample 1


Hypothesis Test for HO: Mean = 0        Computed T statistic = -4.64517
                     vs Alt: NE         Sig. Level = 9.69638E-3
                  at Alpha = 0.05       so reject HO.


************************** S T A T G R A P H I C S **************************
                          Onesample Analysis
                                    3.71 0.2 4.18 1.12 5.46
Sample Statistics: Number of Obs.       5
                  Average               2.934
                  Variance              4.82518
                  Std. Deviation        2.19663
                  Median                3.71

Confidence Interval for Mean:           95    Percent
                  Sample 1              0.205557 5.66244         4 D.F.

Confidence Interval for Variance:       0       Percent
                  Sample 1


Hypothesis Test for HO: Mean = 0        Computed T statistic = 2.98668
                     vs Alt: NE         Sig. Level = 0.0404707
                  at Alpha = 0.05       so reject HO.


************************** S T A T G R A P H I C S **************************
                          Onesample Analysis
                                    ¯0.08 ¯0.04 0.12 0.84 ¯0.86
Sample Statistics: Number of Obs.       5
                  Average               -4E-3
                  Variance              0.36688
                  Std. Deviation        0.605704
                  Median                -0.04

Confidence Interval for Mean:           95    Percent
                  Sample 1              -0.75635 0.74835         4 D.F.

Confidence Interval for Variance:       0       Percent
                  Sample 1


Hypothesis Test for HO: Mean = 0        Computed T statistic = -0.0147667
                     vs Alt: NE         Sig. Level = 0.988925
                  at Alpha = 0.05       so do not reject HO.
```

```
+++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++
                            Onesample Analysis
                                        ¯0.19 ¯0.62 ¯1.72 ¯1 0.47
Sample Statistics: Number of Obs.       5
                   Average              -0.612
                   Variance             0.68177
                   Std. Deviation       0.825694
                   Median               -0.62

Confidence Interval for Mean:           95    Percent
                   Sample 1             -1.6376 0.413598      4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1

Hypothesis Test for HO: Mean = 0        Computed T statistic = -1.65736
                     vs Alt: NE         Sig. Level = 0.172787
                   at Alpha = 0.05      so do not reject HO.
```

```
+++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++
                            Onesample Analysis
                                        1.1 1.5 1.67 2.92 4.58
Sample Statistics: Number of Obs.       5
                   Average              2.354
                   Variance             2.01128
                   Std. Deviation       1.4182
                   Median               1.67

Confidence Interval for Mean:           95    Percent
                   Sample 1             0.592453 4.11555      4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1

Hypothesis Test for HO: Mean = 0        Computed T statistic = 3.71155
                     vs Alt: NE         Sig. Level = 0.0206261
                   at Alpha = 0.05      so reject HO.
```

```
+++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++
                            Onesample Analysis
                                        ¯0.45 ¯0.67 ¯0.63 ¯0.39 ¯0.93
Sample Statistics: Number of Obs.       5
                   Average              -0.614
                   Variance             0.04508
                   Std. Deviation       0.212321
                   Median               -0.63

Confidence Interval for Mean:           95    Percent
                   Sample 1             -0.877724 -0.350276      4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1

Hypothesis Test for HO: Mean = 0        Computed T statistic = -6.46638
                     vs Alt: NE         Sig. Level = 2.94613E-3
                   at Alpha = 0.05      so reject HO.
```

```
+++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++
                            Onesample Analysis
                                        6.16 0.44 5.68 1.85 6.21
Sample Statistics: Number of Obs.       5
                   Average              4.068
                   Variance             7.41127
                   Std. Deviation       2.72236
                   Median               5.68

Confidence Interval for Mean:           95    Percent
                   Sample 1             0.686539 7.44946      4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1

Hypothesis Test for HO: Mean = 0        Computed T statistic = 3.34133
                     vs Alt: NE         Sig. Level = 0.0288
                   at Alpha = 0.05      so reject HO.
```


+++++++++++++++++++++++++

```
************************** S T A T G R A P H I C S **************************
                             Onesample Analysis
                                   8.44 9.92 8.9 8.38 5.89
Sample Statistics: Number of Obs.      5
                   Average             8.306
                   Variance            2.20458
                   Std. Deviation      1.48478
                   Median              8.44

Confidence Interval for Mean:          95    Percent
                   Sample 1            6.46174 10.1503       4 D.F.

Confidence Interval for Variance:      0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0       Computed T statistic = 12.5088
                    vs Alt: NE         Sig. Level = 2.34971E-4
                 at Alpha = 0.05       so reject HO.
```

```
************************** S T A T G R A P H I C S **************************
                             Onesample Analysis
                                   2.71 2.72 2.82 1.93 1.41
Sample Statistics: Number of Obs.      5
                   Average             2.318
                   Variance            0.38557
                   Std. Deviation      0.620943
                   Median              2.71

Confidence Interval for Mean:          95    Percent
                   Sample 1            1.54672 3.08928       4 D.F.

Confidence Interval for Variance:      0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0       Computed T statistic = 8.34732
                    vs Alt: NE         Sig. Level = 1.12593E-3
                 at Alpha = 0.05       so reject HO.
```

```
************************** S T A T G R A P H I C S **************************
                             Onesample Analysis
                                   5.75 5.85 5.44 4.79 4.63
Sample Statistics: Number of Obs.      5
                   Average             5.292
                   Variance            0.30832
                   Std. Deviation      0.555266
                   Median              5.44

Confidence Interval for Mean:          95    Percent
                   Sample 1            4.6023 5.9817        4 D.F.

Confidence Interval for Variance:      0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0       Computed T statistic = 21.311
                    vs Alt: NE         Sig. Level = 2.66673E-5
                 at Alpha = 0.05       so reject HO.
```

```
************************** S T A T G R A P H I C S **************************
                             Onesample Analysis
                                   0.07 0.54 2.27 2.3 -1.11
Sample Statistics: Number of Obs.      5
                   Average             0.814
                   Variance            2.16463
                   Std. Deviation      1.47127
                   Median              0.54

Confidence Interval for Mean:          95    Percent
                   Sample 1            -1.01347 2.64147      4 D.F.

Confidence Interval for Variance:      0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0       Computed T statistic = 1.23714
                    vs Alt: NE         Sig. Level = 0.283701
                 at Alpha = 0.05       so do not reject HO.
```

```
+++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++++
                           Onesample Analysis
                                    ¯1.73 ¯1.75 ¯2.78 ¯0.8 ¯0.09
Sample Statistics: Number of Obs.        5
                   Average               -1.43
                   Variance              1.05185
                   Std. Deviation        1.0256
                   Median                -1.73

Confidence Interval for Mean:            95    Percent
                   Sample 1              -2.7039 -0.156101       4 D.F.

Confidence Interval for Variance:        0      Percent
                   Sample 1

Hypothesis Test for H0: Mean = 0         Computed T statistic = -3.11777
                        vs Alt: NE       Sig. Level = 0.0356033
                   at Alpha = 0.05       so reject H0.

+++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++++
                           Onesample Analysis
                                    ¯0.54 ¯0.17 ¯0.16 0.19 0.2
Sample Statistics: Number of Obs.        5
                   Average               -0.096
                   Variance              0.09403
                   Std. Deviation        0.306643
                   Median                -0.16

Confidence Interval for Mean:            95    Percent
                   Sample 1              -0.476883 0.284883      4 D.F.

Confidence Interval for Variance:        0      Percent
                   Sample 1

Hypothesis Test for H0: Mean = 0         Computed T statistic = -0.70004
                        vs Alt: NE       Sig. Level = 0.522478
                   at Alpha = 0.05       so do not reject H0.

+++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++++
                           Onesample Analysis
                                    2.86 1.68 3.55 2.38 5.01
Sample Statistics: Number of Obs.        5
                   Average               3.096
                   Variance              1.61073
                   Std. Deviation        1.26915
                   Median                2.86

Confidence Interval for Mean:            95    Percent
                   Sample 1              1.51959 4.67241         4 D.F.

Confidence Interval for Variance:        0      Percent
                   Sample 1

Hypothesis Test for H0: Mean = 0         Computed T statistic = 5.45475
                        vs Alt: NE       Sig. Level = 5.48925E-3
                   at Alpha = 0.05       so reject H0.

+++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++++
                           Onesample Analysis
                                    ¯1.37 ¯1.35 ¯1.25 ¯0.56 ¯2.32
Sample Statistics: Number of Obs.        5
                   Average               -1.37
                   Variance              0.39335
                   Std. Deviation        0.627176
                   Median                -1.35

Confidence Interval for Mean:            95    Percent
                   Sample 1              -2.14902 -0.590982      4 D.F.

Confidence Interval for Variance:        0      Percent
                   Sample 1

Hypothesis Test for H0: Mean = 0         Computed T statistic = -4.88445
                        vs Alt: NE       Sig. Level = 8.13446E-3
                   at Alpha = 0.05       so reject H0.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                          Onesample Analysis
                                     ¯0.74 ¯0.25 0.89 0.21 ¯1.22
Sample Statistics: Number of Obs.     5
                   Average            -0.222
                   Variance           0.67207
                   Std. Deviation     0.819799
                   Median             -0.25

Confidence Interval for Mean:         95    Percent
                   Sample 1           -1.24028 0.796276       4 D.F.

Confidence Interval for Variance:     0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = -0.605523
                   vs Alt: NE         Sig. Level = 0.577508
                   at Alpha = 0.05    so do not reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                          Onesample Analysis
                                     9.87 9.96 10.02 11.05 12.57
Sample Statistics: Number of Obs.     5
                   Average            10.694
                   Variance           1.32953
                   Std. Deviation     1.15305
                   Median             10.02

Confidence Interval for Mean:         95    Percent
                   Sample 1           9.26179 12.1262       4 D.F.

Confidence Interval for Variance:     0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = 20.7384
                   vs Alt: NE         Sig. Level = 3.19407E-5
                   at Alpha = 0.05    so reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                          Onesample Analysis
                                     ¯0.88 ¯0.97 ¯0.85 ¯0.57 ¯1.08
Sample Statistics: Number of Obs.     5
                   Average            -0.87
                   Variance           0.03615
                   Std. Deviation     0.190132
                   Median             -0.88

Confidence Interval for Mean:         95    Percent
                   Sample 1           -1.10616 -0.633837      4 D.F.

Confidence Interval for Variance:     0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = -10.231[illegible]
                   vs Alt: NE         Sig. Level = 5.14267E-4
                   at Alpha = 0.05    so reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                          Onesample Analysis
                                     3.49 0.94 3.42 2.5 4.3
Sample Statistics: Number of Obs.     5
                   Average            2.93
                   Variance           1.6439
                   Std. Deviation     1.28215
                   Median             3.42

Confidence Interval for Mean:         95    Percent
                   Sample 1           1.33744 4.52256       4 D.F.

Confidence Interval for Variance:     0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = 5.10993
                   vs Alt: NE         Sig. Level = 6.[illegible]45E-3
                   at Alpha = 0.05    so reject HO.
```

```
+++++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                           Onesample Analysis
                                     9.4 10.88 9.86 9.35 6.83
Sample Statistics: Number of Obs.    5
                   Average           9.264
                   Variance          2.22923
                   Std. Deviation    1.49306
                   Median            9.4

Confidence Interval for Mean:        95     Percent
                   Sample 1          7.40946 11.1185      4 D.F.

Confidence Interval for Variance:    0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0     Computed T statistic = 13.8741
                     vs Alt: NE      Sig. Level = 1.56471E-4
                 at Alpha = 0.05     so reject HO.


+++++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                           Onesample Analysis
                                     1.53 1.54 1.64 0.75 0.23
Sample Statistics: Number of Obs.    5
                   Average           1.138
                   Variance          0.38557
                   Std. Deviation    0.620943
                   Median            1.53

Confidence Interval for Mean:        95     Percent
                   Sample 1          0.366724 1.90928     4 D.F.

Confidence Interval for Variance:    0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0     Computed T statistic = 4.09803
                     vs Alt: NE      Sig. Level = 0.0148769
                 at Alpha = 0.05     so reject HO.


+++++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                           Onesample Analysis
                                     1.61 1.63 1.19 0.04 0.24
Sample Statistics: Number of Obs.    5
                   Average           0.942
                   Variance          0.57187
                   Std. Deviation    0.756221
                   Median            1.19

Confidence Interval for Mean:        95     Percent
                   Sample 1          2.69477E-3 1.88131   4 D.F.

Confidence Interval for Variance:    0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0     Computed T statistic = 2.7854
                     vs Alt: NE      Sig. Level = 0.0495444
                 at Alpha = 0.05     so reject HO.



+++++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                           Onesample Analysis
                                     2.9 3.32 5.08 5.02 1.6
Sample Statistics: Number of Obs.    5
                   Average           3.584
                   Variance          2.19348
                   Std. Deviation    1.48104
                   Median            3.32

Confidence Interval for Mean:        95     Percent
                   Sample 1          1.74439 5.42361      4 D.F.

Confidence Interval for Variance:    0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0     Computed T statistic = 5.41111
                     vs Alt: NE      Sig. Level = 5.6302E-3
                 at Alpha = 0.05     so reject HO.
```

```
************************** S T A T G R A P H I C S **************************
                              Onesample Analysis
                                   ¯0.15 ¯0.17 ¯1.2 0.79 1.51
Sample Statistics: Number of Obs.  5
                   Average         0.156
                   Variance        1.06848
                   Std. Deviation  1.03367
                   Median          -0.15

Confidence Interval for Mean:      95    Percent
                   Sample 1        -1.12793 1.43993      4 D.F.

Confidence Interval for Variance:  0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0   Computed T statistic = 0.337463
                    vs Alt: NE     Sig. Level = 0.752733
                 at Alpha = 0.05   so do not reject HO.


************************** S T A T G R A P H I C S **************************
                              Onesample Analysis
                                   ¯0.09 0.26 0.28 0.63 0.64
Sample Statistics: Number of Obs.  5
                   Average         0.344
                   Variance        0.09223
                   Std. Deviation  0.303694
                   Median          0.28

Confidence Interval for Mean:      95    Percent
                   Sample 1        -0.0332195 0.72122      4 D.F.

Confidence Interval for Variance:  0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0   Computed T statistic = 2.53284
                    vs Alt: NE     Sig. Level = 0.0644698
                 at Alpha = 0.05   so do not reject HO.


************************** S T A T G R A P H I C S **************************
                              Onesample Analysis
                                   3.95 2.97 4.66 3.65 6.13
Sample Statistics: Number of Obs.  5
                   Average         4.272
                   Variance        1.44712
                   Std. Deviation  1.20296
                   Median          3.95

Confidence Interval for Mean:      95    Percent
                   Sample 1        2.77779 5.76621      4 D.F.

Confidence Interval for Variance:  0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0   Computed T statistic = 7.94079
                    vs Alt: NE     Sig. Level = 1.36182E-3
                 at Alpha = 0.05   so reject HO.


************************** S T A T G R A P H I C S **************************
                              Onesample Analysis
                                   0.4 0.41 0.48 1.19 ¯0.57
Sample Statistics: Number of Obs.  5
                   Average         0.382
                   Variance        0.39247
                   Std. Deviation  0.626474
                   Median          0.41

Confidence Interval for Mean:      95    Percent
                   Sample 1        -0.396146 1.16015      4 D.F.

Confidence Interval for Variance:  0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0   Computed T statistic = 1.36347
                    vs Alt: NE     Sig. Level = 0.24443
                 at Alpha = 0.05   so do not reject HO.
```

```
+'++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                              Onesample Analysis
                                        3.79 4.29 5.45 4.79 3.37
Sample Statistics: Number of Obs.       5
                   Average              4.338
                   Variance             0.67012
                   Std. Deviation       0.818609
                   Median               4.29

Confidence Interval for Mean:           95    Percent
                   Sample 1             3.3212 5.3548       4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1


Hypothesis Test for H0: Mean = 0        Computed T statistic = 11.8495
                      vs Alt: NE        Sig. Level = 2.90412E-4
                    at Alpha = 0.05     so reject H0.
```

```
+++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                              Onesample Analysis
                                        2.79 2.94 3.04 4.11 5.67
Sample Statistics: Number of Obs.       5
                   Average              3.71
                   Variance             1.47245
                   Std. Deviation       1.21345
                   Median               3.04

Confidence Interval for Mean:           95    Percent
                   Sample 1             2.20277 5.21723      4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1


Hypothesis Test for H0: Mean = 0        Computed T statistic = 6.83658
                      vs Alt: NE        Sig. Level = 2.39473E-3
                    at Alpha = 0.05     so reject H0.
```

```
+++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                              Onesample Analysis
                                        ¯0.6 ¯0.68 ¯0.55 ¯0.27 ¯0.78
Sample Statistics: Number of Obs.       5
                   Average              -0.576
                   Variance             0.03683
                   Std. Deviation       0.191911
                   Median               -0.6

Confidence Interval for Mean:           95    Percent
                   Sample 1             -0.814374 -0.337626      4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1


Hypothesis Test for H0: Mean = 0        Computed T statistic = -6.7113
                      vs Alt: NE        Sig. Level = 2.56584E-3
                    at Alpha = 0.05     so reject H0.
```

```
+++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                              Onesample Analysis
                                        4.44 2.12 4.35 3.64 5.21
Sample Statistics: Number of Obs.       5
                   Average              3.952
                   Variance             1.35817
                   Std. Deviation       1.16541
                   Median               4.35

Confidence Interval for Mean:           95    Percent
                   Sample 1             2.50444 5.39956      4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1


Hypothesis Test for H0: Mean = 0        Computed T statistic = 7.58272
                      vs Alt: NE        Sig. Level = 1.62219E-3
                    at Alpha = 0.05     so reject H0.
```

```
+++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                          Onesample Analysis
                                   3.59 13.19 8.23 11.36 2.21
Sample Statistics: Number of Obs.          5
                   Average                 7.716
                   Variance                22.7119
                   Std. Deviation          4.7657
                   Median                  8.23

Confidence Interval for Mean:              95    Percent
                   Sample 1                1.79651 13.6355        4 D.F.

Confidence Interval for Variance:          0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0           Computed T statistic = 3.62035
                      vs Alt: NE           Sig. Level = 0.0223502
                   at Alpha = 0.05         so reject HO.


+++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                          Onesample Analysis
                                   ¯42.71 ¯43.19 ¯43.67 ¯45.1 ¯46.22
Sample Statistics: Number of Obs.          5
                   Average                 -44.178
                   Variance                2.10227
                   Std. Deviation          1.44992
                   Median                  -43.67

Confidence Interval for Mean:              95    Percent
                   Sample 1                -45.979 -42.377        4 D.F.

Confidence Interval for Variance:          0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0           Computed T statistic = -68.1313
                      vs Alt: NE           Sig. Level = 2.78061E-7
                   at Alpha = 0.05         so reject HO.


+++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                          Onesample Analysis
                                   ¯3.59 ¯3.58 ¯4.12 ¯4.9 ¯5.19
Sample Statistics: Number of Obs.          5
                   Average                 -4.276
                   Variance                0.55103
                   Std. Deviation          0.742314
                   Median                  -4.12

Confidence Interval for Mean:              95    Percent
                   Sample 1                -5.19803 -3.35397      4 D.F.

Confidence Interval for Variance:          0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0           Computed T statistic = -12.8806
                      vs Alt: NE           Sig. Level = 2.09488E-4
                   at Alpha = 0.05         so reject HO.


************************* S T A T G R A P H I C S ***************************
                          Onesample Analysis
                                   ¯25.71 ¯25.7 ¯24.99 ¯25.38 ¯29.14
Sample Statistics: Number of Obs.          5
                   Average                 -26.184
                   Variance                2.81723
                   Std. Deviation          1.67846
                   Median                  -25.7

Confidence Interval for Mean:              95    Percent
                   Sample 1                -28.2688 -24.0992      4 D.F.

Confidence Interval for Variance:          0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0           Computed T statistic = -34.8827
                      vs Alt: NE           Sig. Level = 4.03029E-6
                   at Alpha = 0.05         so reject HO.
```

```
+++++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                                  Onesample Analysis
                                        6.04 6.06 5.05 7.07 7.81
Sample Statistics: Number of Obs.       5
                   Average              6.406
                   Variance             1.12613
                   Std. Deviation       1.06119
                   Median               6.06

Confidence Interval for Mean:           95    Percent
                   Sample 1             5.08789 7.72411      4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0        Computed T statistic = 13.4983
                      vs Alt: NE        Sig. Level = 1.74307E-4
                   at Alpha = 0.05      so reject HO.
```

```
+++++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                                  Onesample Analysis
                                        ¯7.68 ¯4.15 ¯7.31 ¯3.99 ¯6.97
Sample Statistics: Number of Obs.       5
                   Average              -6.02
                   Variance             3.235
                   Std. Deviation       1.79861
                   Median               -6.97

Confidence Interval for Mean:           95    Percent
                   Sample 1             -8.25406 -3.78594     4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0        Computed T statistic = -7.48418
                      vs Alt: NE        Sig. Level = 1.70441E-3
                   at Alpha = 0.05      so reject HO.
```

```
+++++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                                  Onesample Analysis
                                        3.59 5.47 4.58 6.15 6.3
Sample Statistics: Number of Obs.       5
                   Average              5.218
                   Variance             1.29007
                   Std. Deviation       1.13581
                   Median               5.47

Confidence Interval for Mean:           95    Percent
                   Sample 1             3.8072 6.6288      4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0        Computed T statistic = 10.2726
                      vs Alt: NE        Sig. Level = 5.06274E-4
                   at Alpha = 0.05      so reject HO.
```

```
+++++++++++++++++++++++++++ S T A T G R A P H I C S +++++++++++++++++++++++++++
                                  Onesample Analysis
                                        ¯17.09 ¯12.36 ¯17.07 ¯11.53 ¯18.12
Sample Statistics: Number of Obs.       5
                   Average              -15.234
                   Variance             9.28103
                   Std. Deviation       3.04648
                   Median               -17.07

Confidence Interval for Mean:           95    Percent
                   Sample 1             -19.018 -11.45     4 D.F.

Confidence Interval for Variance:       0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0        Computed T statistic = -11.1815
                      vs Alt: NE        Sig. Level = 3.64198E-4
                   at Alpha = 0.05      so reject HO.
```

```
+++++++++++++++++++++++++++  S T A T G R A P H I C S  +++++++++++++++++++++++++++
                             Onesample Analysis
                                      ¯18.51 ¯26.52 ¯13.48 ¯21.82 ¯12.22
Sample Statistics: Number of Obs.     5
                   Average            -18.51
                   Variance           34.9953
                   Std. Deviation     5.91568
                   Median             -18.51

Confidence Interval for Mean:         95    Percent
                   Sample 1           -25.8579 -11.1621      4 D.F.

Confidence Interval for Variance:     0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = -6.99659
                     vs Alt: NE       Sig. Level = 2.19613E-3
                  at Alpha = 0.05     so reject HO.


+++++++++++++++++++++++++++  S T A T G R A P H I C S  +++++++++++++++++++++++++++
                             Onesample Analysis
                                      2.41 2.23 2.04 2.85 4.16
Sample Statistics: Number of Obs.     5
                   Average            2.738
                   Variance           0.72187
                   Std. Deviation     0.849629
                   Median             2.41

Confidence Interval for Mean:         95    Percent
                   Sample 1           1.68267 3.79333      4 D.F.

Confidence Interval for Variance:     0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = 7.20591
                     vs Alt: NE       Sig. Level = 1.96606E-3
                  at Alpha = 0.05     so reject HO.


+++++++++++++++++++++++++++  S T A T G R A P H I C S  +++++++++++++++++++++++++++
                             Onesample Analysis
                                      ¯2.3 ¯0.94 ¯2.11 ¯0.45 ¯2.24
Sample Statistics: Number of Obs.     5
                   Average            -1.608
                   Variance           0.72937
                   Std. Deviation     0.854032
                   Median             -2.11

Confidence Interval for Mean:         95    Percent
                   Sample 1           -2.6688 -0.547204      4 D.F.

Confidence Interval for Variance:     0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = -4.21015
                     vs Alt: NE       Sig. Level = 0.0135846
                  at Alpha = 0.05     so reject HO.

+++++++++++++++++++++++++++  S T A T G R A P H I C S  +++++++++++++++++++++++++++
                             Onesample Analysis
                                      ¯1.84 ¯0.79 ¯2.39 0.7 ¯1.99
Sample Statistics: Number of Obs.     5
                   Average            -1.262
                   Variance           1.55217
                   Std. Deviation     1.24586
                   Median             -1.84

Confidence Interval for Mean:         95    Percent
                   Sample 1           -2.80949 0.28549      4 D.F.

Confidence Interval for Variance:     0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = -2.26503
                     vs Alt: NE       Sig. Level = 0.0861993
                  at Alpha = 0.05     so do not reject HO.
```

```
************************** S T A T G R A P H I C S ***************************
                                Onesample Analysis
                                     6.68 14.08 10.33 12.72 4.98
Sample Statistics: Number of Obs.    5
                   Average           9.758
                   Variance          15.0209
                   Std. Deviation    3.87568
                   Median            10.33

Confidence Interval for Mean:        95    Percent
                   Sample 1          4.944 14.572       4 D.F.

Confidence Interval for Variance:    0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0     Computed T statistic = 5.62986
                     vs Alt: NE      Sig. Level = 4.89689E-3
                  at Alpha = 0.05    so reject HO.


************************** S T A T G R A P H I C S ***************************
                                Onesample Analysis
                                     ¯60.82 ¯61.46 ¯62.15 ¯63.78 ¯65.12
Sample Statistics: Number of Obs.    5
                   Average           -62.666
                   Variance          3.09788
                   Std. Deviation    1.76008
                   Median            -62.15

Confidence Interval for Mean:        95    Percent
                   Sample 1          -64.8522 -60.4798      4 D.F.

Confidence Interval for Variance:    0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0     Computed T statistic = -79.6131
                     vs Alt: NE      Sig. Level = 1.49196E-7
                  at Alpha = 0.05    so reject HO.


************************** S T A T G R A P H I C S ***************************
                                Onesample Analysis
                                     ¯20.21 ¯20.37 ¯21.14 ¯22.14 ¯22.69
Sample Statistics: Number of Obs.    5
                   Average           -21.31
                   Variance          1.17895
                   Std. Deviation    1.08579
                   Median            -21.14

Confidence Interval for Mean:        95    Percent
                   Sample 1          -22.6587 -19.9613      4 D.F.

Confidence Interval for Variance:    0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0     Computed T statistic = -43.8855
                     vs Alt: NE      Sig. Level = 1.61201E-6
                  at Alpha = 0.05    so reject HO.


************************** S T A T G R A P H I C S ***************************
                                Onesample Analysis
                                     ¯7.33 ¯7.22 ¯5.75 ¯6.02 ¯9.67
Sample Statistics: Number of Obs.    5
                   Average           -7.198
                   Variance          2.40327
                   Std. Deviation    1.55025
                   Median            -7.22

Confidence Interval for Mean:        95    Percent
                   Sample 1          -9.12357 -5.27243      4 D.F.

Confidence Interval for Variance:    0      Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0     Computed T statistic = -10.3823
                     vs Alt: NE      Sig. Level = 4.85532E-4
                  at Alpha = 0.05    so reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                          Onesample Analysis
                                          3.81 4.35 2.93 5.34 5.77
Sample Statistics: Number of Obs.         5
                   Average                4.44
                   Variance               1.316
                   Std. Deviation         1.14717
                   Median                 4.35

Confidence Interval for Mean:             95    Percent
                   Sample 1               3.01509 5.86491      4 D.F.

Confidence Interval for Variance:         0      Percent
                   Sample 1

Hypothesis Test for HO: Mean = 0          Computed T statistic = 8.65446
                        vs Alt: NE        Sig. Level = 9.80599E-4
                     at Alpha = 0.05      so reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                          Onesample Analysis
                                          ¯5.77 ¯2.94 ¯5.43 ¯2.77 ¯5.12
Sample Statistics: Number of Obs.         5
                   Average                -4.406
                   Variance               2.06113
                   Std. Deviation         1.43566
                   Median                 -5.12

Confidence Interval for Mean:             95    Percent
                   Sample 1               -6.18924 -2.62276      4 D.F.

Confidence Interval for Variance:         0      Percent
                   Sample 1

Hypothesis Test for HO: Mean = 0          Computed T statistic = -6.86241
                        vs Alt: NE        Sig. Level = 2.36121E-3
                     at Alpha = 0.05      so reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                          Onesample Analysis
                                          5.05 6.57 5.98 7.21 7.66
Sample Statistics: Number of Obs.         5
                   Average                6.494
                   Variance               1.05683
                   Std. Deviation         1.02802
                   Median                 6.57

Confidence Interval for Mean:             95    Percent
                   Sample 1               5.21709 7.77091      4 D.F.

Confidence Interval for Variance:         0      Percent
                   Sample 1

Hypothesis Test for HO: Mean = 0          Computed T statistic = 14.1252
                        vs Alt: NE        Sig. Level = 1.45814E-4
                     at Alpha = 0.05      so reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                          Onesample Analysis
                                          ¯1.54 ¯1.04 ¯1.46 ¯0.25 ¯2.50
Sample Statistics: Number of Obs.         5
                   Average                -1.358
                   Variance               0.66912
                   Std. Deviation         0.817998
                   Median                 -1.46

Confidence Interval for Mean:             95    Percent
                   Sample 1               -2.37404 -0.341962      4 D.F.

Confidence Interval for Variance:         0      Percent
                   Sample 1

Hypothesis Test for HO: Mean = 0          Computed T statistic = -3.71221
                        vs Alt: NE        Sig. Level = 0.0206142
                     at Alpha = 0.05      so reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                                Onesample Analysis
                                      ¯5.48 ¯8.8 ¯2.1 ¯6.44 ¯2.42
Sample Statistics: Number of Obs.     5
                   Average            -5.048
                   Variance           7.94972
                   Std. Deviation     2.81952
                   Median             -5.48

Confidence Interval for Mean:         95    Percent
                   Sample 1           -8.55014 -1.54586      4 D.F.

Confidence Interval for Variance:     0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = -4.00339
                    vs Alt: NE        Sig. Level = 0.0160846
                 at Alpha = 0.05      so reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                                Onesample Analysis
                                      ¯25.72 ¯26.19 ¯26.75 ¯26.28 ¯25.36
Sample Statistics: Number of Obs.     5
                   Average            -26.06
                   Variance           0.28675
                   Std. Deviation     0.53549
                   Median             -26.19

Confidence Interval for Mean:         95    Percent
                   Sample 1           -26.7251 -25.3949      4 D.F.

Confidence Interval for Variance:     0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = -108.82
                    vs Alt: NE        Sig. Level = 4.27638E-8
                 at Alpha = 0.05      so reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                                Onesample Analysis
                                      ¯1.77 ¯0.56 ¯1.58 ¯0.06 ¯1.68
Sample Statistics: Number of Obs.     5
                   Average            -1.13
                   Variance           0.5961
                   Std. Deviation     0.772075
                   Median             -1.58

Confidence Interval for Mean:         95    Percent
                   Sample 1           -2.089 -0.171002       4 D.F.

Confidence Interval for Variance:     0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = -3.27268
                    vs Alt: NE        Sig. Level = 0.0307115
                 at Alpha = 0.05      so reject HO.
```

```
++++++++++++++++++++++++++ S T A T G R A P H I C S ++++++++++++++++++++++++++
                                Onesample Analysis
                                      ¯0.06 0.88 ¯0.54 2.32 ¯0.06
Sample Statistics: Number of Obs.     5
                   Average            0.508
                   Variance           1.30807
                   Std. Deviation     1.14371
                   Median             -0.06

Confidence Interval for Mean:         95    Percent
                   Sample 1           -0.912606 1.92861      4 D.F.

Confidence Interval for Variance:     0     Percent
                   Sample 1


Hypothesis Test for HO: Mean = 0      Computed T statistic = 0.993192
                    vs Alt: NE        Sig. Level = 0.376834
                 at Alpha = 0.05      so do not reject HO.
```

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