

**EVALUATION OF RISK IN THE PRICE TO BOOK VALUE
RATIO OF FIRMS AT THE NAIROBI STOCK EXCHANGE.**

BY

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DECEMBER 2004

A research paper submitted to the department of Accounting and Finance, University of Nairobi in partial fulfillment of the Requirements for the Degree of Masters in Business Administration.

DECLARATION

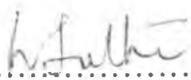
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DEDICATION

I Dedicate this paper to my Wife June Obell and daughter Annorelle.

ACKNOWLEDGEMENT

I am deeply indebted to Mr. Luther Otieno Odhiambo who worked patiently and tirelessly with me from the beginning of this study, constantly providing me with meaningful advice and criticism. His guidance and encouragement facilitated the realization of this work.

To my parents, brothers and sisters for their understanding support and encouragement.

To many others who contributed in one-way or the other to the fulfillment of this work, I express heartfelt gratitude.

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ABBREVIATIONS:

ASE	-	AMERICAN STOCK EXCHANGE
BV/MV	-	BOOK VALUE/MARKET VALUE
CAPM	-	CAPITAL ASSET PRICING MODEL
NYSE	-	NEWYORK STOCK EXCHANGE
N.S.E	-	NAIROBI STOCK EXCHANGE
PBV	-	PRICE TO BOOK VALUE
USA	-	UNITED STATE OF AMERICA

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1. List of securities listed at Nairobi Stock Exchange

ABSTRACT

This study examines the relationship between price to book value ratio and risk of stocks listed at the Nairobi Stock Exchange at single asset level. The price to book value (PBV) ratio belongs to a family of relative valuation ratios that is widely discussed in finance and investment literature. This research seeks an answer to the question, Do shares with high price to book ratio show high risk?

The study sample is all the securities listed in the NSE from 1996 to 2003. Secondary data sources from the NSE and annual reports of listed companies will form the database. Annual share prices are used to calculate price to book ratio and security returns. Security returns are calculated after adjusting the security prices for dividends, seasonal equity offerings and stock splits. The resulting security returns are then used in estimating risk inherent in the sampled shares listed at the NSE. Two rankings are extracted, one based on price to book ratio and another on risk. Each extracted ranking is then classified by assigning values, 1 and 0 depending on whether it is above or below the market average ratio or risk. The correspondence in the two rankings is then measured using cross tabulations.

The findings indicate that risk as derived from the variability in return on equity is related to price to book ratio. This suggest that earnings variability is a major factor in the changes in price to book ratio. However, the surprise result is the absence in the relationship between variability in return per share and price to book ratio given that return per share is derived from the market price per share.

The conclusion is that investors interested in analysing risk need not entirely rely on price to book ratio for that purpose and that largely, the differences in price to book ratio could be explained by other factors and not necessarily risk.

EVALUATION OF RISK IN THE PRICE TO BOOK VALUE RATIO OF FIRMS AT THE NAIROBI STOCK EXCHANGE

CHAPTER 1

INTRODUCTION

1.1 Background of the study

This study examines the relationship between price to book value ratio and risk of stocks listed at the Nairobi Stock Exchange at single asset level. Successful investing and management of assets require a sound understanding of both what the value that asset is and the sources of that value.

The investment selection processes require the investor to estimate and evaluate both risk and return and risk return trade off for alternative investments available, i.e. investors are in search of an investment variable that capture both risk and return. This is because different assessments of these risks can lead to very different valuations.

Valuation models such as price to book value (PBV) are suggested as useful in valuation of assets. The price to book value (PBV) ratio belongs to a family of relative valuation ratios that is widely discussed in finance and investment literature. Investors use this ratio, together with price to earnings ratio, price to cash flows ratios, and price to sales ratio, dividend yield as indicators of relative value, Reilley and Brown (2000). The assumption is that these ratios contain valuable information, in a risk return trade off perspective, in valuing assets.

At the same time these valuation ratios are competing in which case it is necessary identifying a model that has the highest information content. The value of any asset, real or financial depends on the earnings generated

by the asset and the variability of those earnings. Logically, an adequate model is the one that capture both the returns and risk inherent in any asset that is being valued.

The price to book value (PBV) is suggested as useful to investors in choosing shares that are to be acquired as an investment. The price to book value (PBV) ratio compares the value in stock market with the shareholders investment in the firm. In an efficient market, this ratio (PBV) compares a future driven value, namely the market price per share with a historical value, thus helping investors determine whether their investment have diminished or not. The price to book value (PBV) ratio is assumed to summarize the stock market investors' view or perception of the effectiveness of a firm's management's policy, its profitability potential, its liquidity, future profits and risk. The power of price to book ratio is that it can be used in valuation of non-dividend paying firms.

Earlier studies analyze the relation between portfolio performance and share past returns (trading strategies), company size, price to earnings ratio, price to book ratio, Fama and French (1992). Campbell and Shiller (2001), Kothari (1997), Lewellen (2000), Fama and French (1995), Gotzmann and Jorion (1993), Fama and French (1992), Fama and French (1988), Stambaugh (1986) seek to find out the valuation ratio with higher value in predicting future returns.

Rosenberg, Reid and Lanstein (1985) report a significant positive relationship between a firm's price to book value ratio and future stock returns. They consider the finding to be evidence against efficient market hypothesis.

The approach adopted by analysts is to compare the computed valuation ratios to ratios for aggregate market and/or other industries and/or other

securities (stocks) in the industry. The comparison can also take the form of trend analysis, that is, studying the performance of a company over a period of time (trend analysis).

From the above, it is important that investors and their investment advisors become familiar with the computation and factors that explain both the historical and future movements in these ratios. In any case, we need to estimate the future value because when investors buy a security such as a share they are actually buying future earnings and future cash flows. For example, we need to identify factors whose impact drive price to book value ratio and use such factors to estimate the future value of price to book value ratio. It is the future value of this ratio that ultimately serves as an input in company valuation.

Fama and French (1995) and Cohen Polk and Vuolteenaho (2002) show that a price to book ratio is a persistent variable that is useful in forecasting the returns on the firm's stock. They add that the return predictability related to price to book ratios has a large price level effect.

Rozeff (1984), Shiller (1984), and Fama and French (1988) suggest that the aggregate dividend yield is a proxy for risk premium. Their results indicate a positive relationship dividend yield and stock market returns i.e. investors can use dividend yield in constructing portfolios.

Reilley and Brown (2000 pp. 232) remark that "Given the results of Fama and French study, which cast doubt on CAPM and the use of beta as well as the significant support for BV/MV ratio as an indicator of returns, several studies followed..." Kothari, Shanken and Sloan (1995) using annual betas, found substantial compensation for beta risk and suggested that the relationship between return and price to book value ratio may be periodic and was not significant over a longer period".

Furthermore, Fama and French (1995) on examining whether the behaviour of stock price to size and book to market value reflected earnings changes, concluded that high book value to market value ratio

(value stock) securities experience low return on equity and that low book value to market value ratio (value stock) securities experience high return on equity. That variability in return on equity is linked to book value to market value ratio imply a relationship between book value to market value ratio and risk in a security. In this study we examine the evidence that price to book value ratio is significantly related to stock risks.

This project is linked to previous research in a number of ways. The previous studies list have linked book market ratio returns from shares. This study offers an exact recipe for incorporating risk information into valuation analysis. It is an endeavour to give more insight into the relationship between price book ratio and risk. Investors are comfortable with a situation where an investment valuation that they rely on to value a stock capture both expected return and risk in that asset. The question that arises is: *Is There Still Value in the Book-to-Market Ratio Or Market to Book Value Ratio?* Davis (2001). In which case the use of price to book value ratio as a proxy for risk need to be determined for securities listed at the Nairobi Stock Exchange.

Risk can be estimated using financial variables such as return on total assets, return on equity, dividends per share, growth rate in earnings after tax, beta coefficient, cash flow from operations. All these are variables useful in estimating risk. Even though there are different methods of estimating risk in a firm, not all measures of risk are related to price to book ratio.

We report a significant correspondence between variability (risk) return in equity and price to book ratio. At the NSE investors interested in estimating equity risk can as well as look at book to equity ratio. It means investors in firms with high variability ask for additional return thus the high price to book ratio.

1.2 Research Problem

Valuation has a long history as a key area of economic deliberation. John Burr Williams (1938) formalized the process in his book - Investment Value.

Techniques of estimating a company's future cash flows discounted at a rate that reflects risk are the same everywhere, except in emerging markets where the risks are much greater Mimi and Koller(2000). Furthermore, valuation is much more difficult in emerging markets because buyers and sellers face greater risks, information asymmetry and obstacles than they do in developed markets Mimi and Koller(2000).

Investment is the current commitment of shillings for a period of time in order to derive future benefits that will compensate the investor for the time the funds are committed, the expected rate of inflation and the uncertainty of future payments (risk). The modern portfolio theory emphasize on both return and risk. The implication is that rational and informed investors make investment decision under uncertainty Makowitz(1952).

Book to market ratio is suggested as useful in the capturing of both return and risk inherent in investments (Fama and French 1992). The arguments being that high book to market equity firms are assigned higher risks because of greater risk of distress. The relationship between price to book value ratio and both returns and risk is an important factor that current and potential investors use to determine shares to invest in.

Previous research relates price to book ratio to returns, yet investors look at both return and risk, Lewellen (2002), Campbell and Shiller (2001). Kothari (1997), Fama and French (1995), Gotzmann and Jorion (1993), Fama and French (1992), Fama and French (1988), Stambaugh (1986) point out that firms with high book to market equity ratio have persistently

low earnings, higher financial leverage, more earnings uncertainty and are more likely to cut dividends compared to firms with low book to market equity ratio. Fama and French (1992) point out that low PBV ratios may operate as a measure of risk since firms with prices well below book value are once more likely to be in trouble and go out of business.

Lewellen (1999) argument is that the explanatory power of price to book ratio or book to price ratio does not appear to be driven entirely by data snooping or survival biases but that it extends in markets outside United States of America (USA), (see Haugen and Baker, 1996; Chan and Chen, 1991). He concluded that price to book ratio is a proxy for a risk factor in returns. Fama and French (1993) provide evidence of a relation between risk and price to book ratio. The PBV ratio should capture changes in expected returns and consequently risk. Does it at the Nairobi Stock Exchange?

Baruch Lev (*Barron's*, Nov. 20, 2000) argues that book value of common equity is a poor measure of a firm's net assets. Others have extended this argument to conclude that the book-to-market ratio no longer has a place in investment analysis.

How can we ascertain whether ranking on price to book value ratio allows us to identify value stocks? We have to study variability in returns or risk. If price to book value ratio is still valid for distinguishing value stocks from growth stocks, we should see return and risk differences for firms at opposite ends of the price to book value ratio ranking. The research question is: Are there visible differences in the risk of two groups of firms namely, low price to book ratio and high price to book ratio? This research seeks an answer to the question, Do shares with high price to book ratio show high risk?

1.3 Research objectives

The purpose of this study is to establish the extent to which risk, measured as standard deviation of share returns, return on assets, and

return on equity explain variations in price to book value ratio of firms listed at the Nairobi Stock Exchange (NSE).

HYPOTHESIS

H₀: The low price to book value stocks ratio exhibit high risk (standard deviation).

H₁: The low prices to book value ratio exhibit low risk (standard deviation).

1.4 Importance of this study

1. Investors, investment advisors, and corporate managers of listed companies will learn the reliability of price to book value ratio as a valuation or investment ratio and specifically its relationship with risk. This study offers an exact recipe for incorporating risk information into valuation analysis.
2. Give insight to scholars who want to research further on investment ratios.

1.5 The principal assumption of this study

The principal assumption of the book to market-based model is that the ratio of book and market equity values is stationary. Among other things this rules out explosive bubble type behavior where prices diverge indefinitely from the intrinsic or fundamental value.

CHAPTER 2

LITERATURE REVIEW

This dissertation consolidates two views of fundamental analysis in finance literature. Accounting and finance research identify fundamental signals containing value relevant information. As a result of this search, two mythologies have emerged to accommodate empirical work. Lev and Thiagarajan (1993) study the link between market values and fundamental signals whereas Abarbanell and Bushee (1997) advocate investigating the relationship between fundamentals signals and future earnings. In this study an attempt is made to model the relationship between price to book ratio and risk.

2.1 Risk

Investors may be at conflict in the risk-return trade off they desire. An investor who seeks a portfolio with the same expected return as the market can invest in the index fund covering the whole market e.g. in NSE 20 share index fund. An investor who seeks a different expected return will take on additional activities such as, involving in short selling or investing in a less than fully diversified portfolio that is more risky than the market portfolio (Foster, 1986).

Diversifiable risks are those that could potentially be eliminated by diversification because they are peculiar to a company. Non-diversifiable risks can't be avoided, because they are derived from broader economic trends. Many practitioners in developed economies use the capital asset-pricing model (CAPM), developed in the mid-1960s by John Lintner, William Sharpe, and Jack Treynor (Sharpe, Alexander and Bailey, 1999). In CAPM, only non-diversifiable risks are relevant. In an efficient market, diversifiable or avoidable risks would not affect the expected rate of return.

The efficiency of market portfolio implies that expected returns on security are a positive linear function of their market risk as measured by beta and that market betas suffice to describe the cross section differences in expected returns (Sharpe, 1999).

It is advisable that large investors use more than one portfolio manager in order to benefit from diversification of judgment. Diversification of judgment refers to allocating investment funds to more than one investment manager to guard against the risk of poor judgment of one investment manager or the risk where a total portfolio is exposed to a particular investment manager's investment style: security selection, asset allocation style, and sector rotation style with attendant risk.

The relevant measure of risk for an investor who is fully diversified is beta while the one for an investor holding specialize asset and therefore not fully diversified is standard deviation. As far as an individual asset is concerned, standard deviation measures its total asset.

In this study, we employ standard deviation as a measure of risk to explain diversity of price to book value ratios across firms. The assumption is that in an emerging market, standard deviation could be more descriptive than beta as a measure of risk.

2.2 Return

Various studies attempt to establish the relationship between price to book ratio and share returns. Lewellen (2002) used dividend yield, book to market value and price to earnings ratio to predict aggregate market returns. They find a relationship between these ratios and future returns. Chan, Hamao and Lakonishok (1996) find that a firm's size, earnings yield, cash flow yield, and book to market ratio have a reliably positive impact on expected returns. Shiller and Campbell (1988) using vector autoregressive approach find that data on accounting returns are useful in predicting present value of dividends.

Shroff (1995) suggests that firms with a high price to earnings ratio and a high return on equity show better relationship with future returns than those with a low price to earnings ratio and a low return on equity. Kothari, Shanken and Sloan (1997) find that the relationship between price to book ratio and returns is periodic and largely insignificant. Kent, Titman, Wei (2001) report that in Japan the relationship between stock returns and price to book value is stronger than in USA.

Investors look at different returns depending on their availability and reliability. These returns are available in any standard finance textbook. We have returns in form of dividends, return on assets, return on equity and return per share. These returns are different because what they measure is different. Furthermore, the first two are accounting measure while the third one is market driven. From a series of any of the three measures of return we can derive a mean and its spread around its mean. It is the spread or standard deviation that is used as a proxy for a firm's risk. Theoretically we expect firms in different industries to show different returns and risks.

2.3 Explaining diversity in price to book value ratios

Damodaran (1996) assertion is that a difference in price to book value ratio across firms is attributable to: different expected growth rates, different payout ratio, different risk levels and different returns. Damodaran (1996) specific assertion is that the price to book value ratio becomes lower as risk in a firm increases.

Financial times UK publishes average market price to book ratio of firms in developed countries: USA 2.85 times, UK 3.10 times, Japan 3.20, and Kenya 1.70. It appears that stable economies i.e. economies with low risk, show high price to book value (PBV) ratio.

Possible explanations for the considerable variations in this ratio at a point in time include: differences across firms in the sign and magnitude of the one-year transitory component in reported earnings, expected (permanent)

earnings growth, risk and accounting methods (Foster, 1986). It has been found that a number of firm characteristics such as size, price to book ratio and earnings divided by price are related to excess return. It is therefore noticeable that book to market ratio contains information about the infinite future of conditional expected returns and profitability i.e. information on risk and returns.

It is possible that the risk captured by price to book ratio is the relative distress factor as suggested by Chan and Chen (1991). They suggest that the earning prospects of firms are associated with the risk factor in returns. Firms that the markets judge to have poor prospects have low prices and low ratio of price to book value ratio. Fama and French (1992) supposition is that, “Whatever the underlying economic causes our main result is straight forward: Two easily measured variables, size (ME) and price to book value ratio provide a simple and powerful characterization of the cross section of the average stock returns for 1963 – 1990”.

Researchers have given attention to the power of firm size (market capitalization) and the ratio of price to book value in explaining stock returns (Lewellen, 1999). The sufficient evidence of small firm and low price to book premiums has influence on the investment behaviour of investors and investment managers. The result has been an increase in funds that seek small – capitalisation stocks or implement value investing fundamentals associated with low price to book stocks (DeBondt and Thaler, 1985), assuming that such stocks have growth opportunity.

2.4 Book or Market Value

Price to Book value ratio (PBV) is the ratio of a firm's market value of equity to its book value of equity. The firm's accountants using historic cost information determine the book value of equity. Buyers and sellers of the stock using current information determine the market value of equity.

Edward and Bell (1961), Feltham and Ohlson (1995) equate the market value with book value plus discounted sum of abnormal earnings.

Technology has emerged as a dominant force in the world economies and the value created by technological improvement is immense, Davis (2001). The criticisms of current accounting procedures is that much of this technologically based economic value is created by investments that are not found anywhere on a firm's balance sheet Lev (.....). The value is based on intangibles such as product quality and company image that accountants find difficult attaching value to. Consequently, book value of common equity may be a downward-biased estimate of net asset value for some firms, especially in recent years. This new economy is pushing the book value (as currently calculated) to being obsolete. Extending this argument, some have argued that variables based on book value are also obsolete. As a result, ranking firms on price to book ratio is viewed by some as a waste of time Davis (2001). This assertion is contentious and need to be tested empirically.

The principle assumption of the price to book value ratio is that it stationary and that a point of time value can be relied on over a long period of time. In effect this among other things rules out explosive bouncy type behavior where prices diverge indefinitely from the intrinsic or fundamental values. Barring the existence of such infinitely live bubbles in asset prices, if price is high today, expected cash flow fundamental must be high and or expected returns low. Assumptions are made in order to derive the accounting approximate present-value model. The first assumption is that the variables are positive, The book equity, dividend and market value of equity are assumed to be strictly positive to allow for log transformations.

Rosenberg Reid and Lanstein(1985) on examining a sample of one thousand four hundred (1400) companies over the period 1980 to 1984 establish that excess returns could be earned by investing in companies, which had a low price to book value ratio.

As a common factor, the low market capitalization of companies, link the small firm size effect, the P/E affect and the book value effect. The reasons that could link the low price to book value ratio to excess returns from small firms include, market liquidity, information and transaction costs.

Investors ask for a premium on shares of small firms because they are difficult to dispose compared to shares of large companies i.e. low capitalization. It is possible that small firms probably do not present information as frequently or as of high quality as large firms. If that supposition holds then we expect the shares of small firms to be more risky than those of large firms.

Small firms do not release regular and quality information. This suggests that the cost of monitoring the performance of large portfolios of small firms will be greater than those monitoring smaller portfolio of large firms. The end results is that transaction cost of buying and selling the shares of small firms, that tend to have low price to book ratio, are higher than those of buying and selling the shares of large firms. Thus, reducing the apparent excess returns from investing in small firms. Again this is a testable proposition.

Chan and Lakonishok (1991) report that the price to book value ratio has a strong role in explaining the cross section of average returns on Japanese stocks. Capaul, Rowler and Sharpe (1993) conclude that stocks with low price to book value ratio earned excess returns in every international market they analyzed between 1981 and 1992.

Investors often look at the relationship between the price they pay for a stock and the book value of equity (or net worth) as a measure of how overvalued or undervalued a stock is. Stocks priced at less than book value are purchased on the assumption that in time their market share

price will reflect at least their stated book value i.e. what the company itself has paid for its own assets.

The price/ book value ratio that emerges can vary a cross industry (sectors) depending upon the growth potential and the quality of investments in each different industry (sectors). When valuing a business as a whole, this ratio is based on the value of the firm and the book value of all assets (rather than just equity). For those who believe that book value is not a good measure of the true value of the asset, an alternative ratio is to use the replacement cost of the asset. The ratio of the value of the firm to replacement cost is Tobin's Q.

2.5 Price to book value and returns

Ibbotson (1986), Professor in practice of finance at Yale School of Management and president of Ibbotson Associates, Inc. a consulting firm specializing in economics, investments, and finance, studied the relationship between stock prices as a percentage of book value and investments returns. To test this relationship, all stocks listed on the New York Stock Exchange were ranked on December 31 of each year according to stock prices as a percentage of book value and sorted into deciles (A decile is 10 percent of the stock listed on the New York Stock Exchange). The compound average annual values were measured for each decile for the 18-year period, December 1966 through December 31, 1984. His findings is that stocks with a low price to book value ratios had significantly better investment returns and risk over the 18 year period than stocks priced high as a percentage of book value.

Fama and French (1992) examined the effects of market capitalization and price as a percentage of book value on investments. All the finance NYSE

NYSE (American Stock Exchange) and NASDAQ companies included in the CRSP (Center for Research in Security Prices) file for which data was also available in the computer database were ranked according to the stock prices as a percentage of book value and sorted into deciles. Then each price value decile was ranked according to market capitalization and sorted into deciles. After examining investment returns from July 1963 to December 1990, they concluded that smaller market capitalization companies, at the lowest prices in relation to book values provided the best returns. Furthermore, within every market capitalization category, the best returns were produced with low prices in relation to book value. Through regression analysis the authors examined the power of the following characteristics to predict future investment return: market capitalization (new price/ earnings ratio led to price to book percentage. They conclude price to book ratio is consistency the most powerful for explain the cross section average stock returns.

Lanongshok, Vishny, and Sheifer (1993), ranked all companies listed on NYSE and ASE according to stock price as a percentage of book value and sorted the companies into deciles. Portfolios were initially formed on April 30 1968 and new portfolios were formed on each subsequent April 30. The study period ended on April 1990. The deciles portfolios were held for five years returns and the average cumulative totals five years returns were calculated. The investments returns were equally weighed (Reilly 2000). They also examined the consistency of investment returns for low price to book value of companies as compared to the high price to book value over 1 year 3 year and 5 year holding period from 1968 through 1990. The investment returns, for the companies in the high price to book value category, i.e. returns for the companies in the highest two deciles of the companies which had been ranked on the price to book value, were subtracted from the investments returns of the low price to book value companies which comprised the bottom two deciles as price to book value

ranking. Their conclusion is that the firms with lowest prices to book values provided the best returns.

Lanonishok, Vishny, and Sheifer (1993), conclude that the low price to book value stocks outperformed the high price to book value stocks in 16 of the 22 years or 73 percent of the time for the three year holding periods and that the low price to book companies beat high price to book companies in 18 out of the 20 year periods. For the five year holding periods the low price to book value companies were better choice than the high price to book companies every time.

2.6 Price to book value ratio and risk.

As an extension to their study above, Lokonishok, Vishny and Shleifer (May 1993) test whether the higher returns of low price to book value stocks were as a result of greater risks. They measured monthly investments returns in relation to price as a percentage to book value between April 30 1968 and April 30 1990 in 25 worst months for the stock market and the remaining 88 months in which the stock market declined. In addition monthly returns were examined in 25 best months for the stock market and the 122 remaining months in which the stock market increased. Lanonishok, Vishny, and Sheifer (1993) find that the low price to book value stocks outperformed the high price to book value stocks in the markets worst 25 months and in the other 88 months when the market declined. In the best 25 months for the market the low price to book value stocks also beat the high price to book value stocks. The monthly returns were as expected for both high and low price to book value stocks in the remaining 122 months when the stock markets increased.

Although price to book value is related to common equity return, the economic fundamentals driving it are not clearly understood. Fama and

French (1992) suggested that price to book value could be a measure of financial distress and that higher returns and higher low price to book value firms incorporate financial risk premium. Peavy, Senchack and Woodruff (1993), provided evidence that price to book value ratio does not proxy for financial distress. Fama and French (1992) assert that if assets are priced rationally, our results suggest that stock risks are multinational. One dimensional of risk proxy is size measured by total market value of equity. An alternative of risk proxy is price to book value ratio. Chan and Chen (1991) and Fama and French (1995) make a case that small firms and low price to book value ratio firms are particularly sensitive to adverse economic conditions and have sustained periods of low profitability. Therefore the higher risk premiums on such companies can be viewed as a rational consequence of investor's risk aversion.

Jenson, Johnson and Mercer (1997) suggest that as monetary and economic conditions change the risk concerns of investors shift thereby affecting the influence of risk factors such as size and price to book ratios on stock returns.

Lakonishok, Vishny and Shleifer (1993) conclude that the value strategy (low price to book value) appear to do somewhat better than glamour strategy (high price to book value). If anything the superior performance of value strategy is tilted toward negative return months rather than positive return month. This shows that the value strategy does not expose investors to greater downside risk. What rises must fall and what falls must rise.

Sharpe, Capaul, and Rowley, (1993) examined the comparative investment returns of low price to book value stocks ("value" stocks) and high price to book value stocks ("growth" stocks) in France, Germany, Switzerland, the United Kingdom and the United States. Each six months the stocks, which comprised a major index in each country, was ranked on the basis of price to book value ratio. The study used Standard and Poor's 500 index for the United States and Morgan Stanley Capital International Indexes for other

3.4 Price to Book Value Ratio

This is evaluation of a stock as a function of the company's asset value. The lower the price to book ratio the more interesting the stock is to the investor. If an investor's choice oriented towards undervalued equities, then a good combination may be low Price/Earnings ratio, low Price/Book value.

To calculate the price to book value (PBV) ratio, we need market price per share (MPS), number of shares in issue (NSI) and shareholder funds (or equity), (SHF). First we calculate book value per share (BVpS) i.e. shareholder funds (or equity), (SHF) divided by number of shares in issue (NSI).

$$PBV = \frac{MPS}{BVpS}$$

3.5 Data Analysis Method

1. Rank stocks on the basis of price to book value (PBV) ratio and categorise into two groups, as above and below the market average ratio.
2. Rank stocks on the basis of standard deviation and categorise into two groups, as above and below the market average risk.
3. Classify the results in 1 and 2 above by assigning values, 1 and 0 depending on whether it is above or below the market average ratio or risk.

The relationship between equity and risk has been highlighted in studies of developed economies (Wilcox 1984). Capaul, Rowley and (1993) conclude that value stocks, that is stock with low PBV ratio earned excess return in every market that they analyzed.

2.7 Firm characteristics and market efficiency

The question to ask is: How does the relationship between firm characteristics and excess returns of empirical findings reconcile with the concept of efficient markets? In finance literature, these are often referred to as market anomalies since in an efficient market it should not be possible to earn an excess return on basis of observable firm characteristics. In the finance literature we find five possible explanations for the existence of a relationship between firm characteristics and excess returns (Elton and Gruber 1995). First, it is possible that the relationship is erroneous. The second explanation is that firm's characteristic such as size, book to market ratio etc serve as a proxy for an omitted risk variable and once this variable is taken into account the relationship between specific firm characteristics and excess returns disappear. Financial analysts' reason that small firms have a lower probability of survival and survival probability is not adequately measured by beta, and that once the risk variable is taken into account the excess returns associated with size disappears. Third, Capital Asset Pricing model (CAPM) is a reasonable model of expected returns but has been misunderstood, causing apparent large returns when none exists. A fourth explanation of why the phenomena can continue to exist in an efficient market but not why it occurs in the first place is that trading costs eliminate the profitability of any trading costs eliminate the profitability of any trading rules designed to exploit the strategy. Finally markets may simply be inefficient "(Elton and Gruber, 1995).

CHAPTER 3

RESEARCH METHODOLOGY

3.1 The Population and the Sample

The study sample composed of all the securities listed in the NSE from 1992 to 2003.

3.2 Data collection design

In this study, secondary data sources from the NSE and annual reports of listed companies were employed. Annual share prices were used in calculating price to book ratio. Security returns adjusted for dividends, seasonal equity offerings and stock splits, if any, of stock that was traded on the NSE were computed and used in estimating risks. In addition accountants measures of return was used.

3.3 The Variables and Variable Measurements of the Study

The main strategy in this study was to compare the risk of *low* price to book stocks value ratio to risk of high price to book stocks to determine whether the risk factors of the two categories were significantly different. Assumptions are made in order to approximate the real world and in this study to approximate present – value model. The first assumption is that the variables are positive. The book equity, dividend, and market value of equity are assumed to be strictly positive to allow for meaningful interpretations.

Return

Annual return (R_j) of an individual stock was obtained as follows:

$$R_j = \frac{P_1 - P_0 + D_1}{P_0}$$

Where:

R_j = Return of asset j

P_1 = Price of share at period t

P_0 = Price of share at period t-1

D_1 = Dividend paid during the period

An array of alternative measures of return is to be computed. This includes: return on total assets, return on equity. The other variables are dividends, earnings after tax and changes in earnings after tax.

Risk

Stock returns may be riskier or more volatile, but this concept is a difficult one to express simply. To do so, we borrow a concept from statistics, called *standard deviation*. Standard deviation is a summary measure about the average spread of observations. It is the square root of the variance, which is calculated as:

$$\hat{\sigma}^2 = \frac{1}{T-1} \sum_{t=1}^T [R_t - \bar{R}]^2$$

We use standard deviation as a measure of investment risk. We calculate variability in return on assets, return on equity, dividend, earnings after tax and changes in earnings and proceed to use each as a proxy for risk.

4. Use cross tabulation for analysis.

3.5.1 Cross Tabulation

Cross Tabulation displays one-way, two-way, and multi-way tables containing counts, percents, and summary statistics, such as means, standard deviations, and maximums, for associated variables, in our case price to book ratio and risk. To use this procedure, your data must be in raw form, or they can be in frequency form if summary statistics for associated variables are not desired.

This approach enables the researcher to tally Unique Values, do Chi-Square tests, do Chi-Square Goodness of Fit Test; do Correspondence analysis; and Multiple Correspondence Analysis.

Tally Unique Values displays counts, cumulative counts, percents, and cumulative percents for each unique value of a variable when input data are in raw form.

3.5.2 Chi-Square tests

Chi-Square Test for Association tests for non-independence in a two-way classification. Use this procedure to test if the probabilities of items or subjects being classified for one variable depend upon the classification of the other variable. Your data must be in contingency table form to use this procedure. However, you can perform a chi-square test for association using the Cross-Tabulation procedure if your data are in raw form or frequency form.

Chi-Square Goodness of Fit Test tests if the sample outcomes result from a known discrete probability model.

3.5.3 Correspondence analysis

Simple Correspondence Analysis helps you to explore relationships in a two-way classification. Simple correspondence analysis decomposes a contingency table in a manner similar to how principal components analysis decomposes multivariate continuous data. Simple correspondence analysis performs an eigen analysis of the data, and variability is broken down into underlying dimensions and associated with rows and/or columns.

3.5.4 Multiple Correspondence Analysis

Multiple Correspondence Analysis extends simple correspondence analysis to the case of three or more categorical variables. Multiple correspondence analysis performs a simple correspondence analysis on a matrix of indicator variables where each column of the matrix corresponds to a level of a categorical variable. Rather than having the two-way table of simple correspondence analysis, here the multi-way table is collapsed into one dimension.

Chapter 4

EMPIRICAL RESULTS

The study covers the period 1992 to 2003. However, for analysis, year 2003 is excluded because the Nairobi Stock Exchange Market was excessively optimistic following the change in government. A series of regressions and cross tabs are generated to determine the relationship between market price to book ratio per share and risk.

4.1 Descriptive Statistics

The highest price to book ratio at NSE was reported in 2003 with a mean of 2.768 times. The same year experienced the highest variability in price to book ratio as measured by standard deviation (3.579). This was the first year of change in government hence the optimism.

Table 1: Yearly Average and Standard

Of (Variability in) Price to Book Ratio At

NSE 1992-2003

Year	Average	St Dev
2003	2.768	3.579
2002	1.291	1.761
2001	1.152	2.122
2000	1.099	1.193
1999	1.151	2.469
1998	1.429	1.059
1997	1.491	1.226
1996	1.534	1.661
1995	1.925	2.100
1994	2.698	2.655
1993	1.783	2.542
1992	0.979	1.004
Average	1.608	1.948
StDev	0.595	0.782

For the entire period of the study, the mean of price to book ratio for the entire market was 1.608; but increased from 0.979 in 1992 to 2.768 in 2003. From the investors' point of view, the difference between the book value and market value, beginning the period 1992 to 2003, changed in their favour. That means that the market as a whole experienced a growth rate of 10.951 percent i.e. from 0.979 in 1992 to 2.768 in 2003. The growth is computed using geometric mean.

The standard deviation of the price to book ratio for the period of the study is 0.595 and appear to be low. The question that might arise from investors is: How much of the growth in this ratio is accompanied by changes in risk if measured as variability in accounting or market returns?

In chapter three, the relevant measure of risk to be used in this study was identified as standard deviation of the earnings variable. It is the standard deviation of various returns, such as returns on assets, return on equity, return per share that are proxies for risk whose presence is to be detected in price to book ratio. The risk of a firm can also be estimated by determining the variability in a firm's earnings after tax, dividends per share and growth rate in earnings after tax and cash flow from operations.

The operationalized investigation is to discover whether those firms with a price to book ratio that is above the market average have also risk, when measured by standard deviation that is above the market average risk. To achieve this objective, the average price to book ratio is calculated and then used to divide the firms into two, those with a price to book ratio that is above average (coded 1) and those with a ratio below average (coded 0). The same procedure is adopted for risk i.e. the firms are divided as below (0) and above market average (1). The raw data are analyzed in appendix one. The results of the rankings are presented in table 2 below.

Table 2. Classification of Companies on Basis of Price to Book Ratio and Measures Of Risk as Above or Below Market Average

Security	RaPBrR	RaRTAR	RaRoER	RaRpSR	RaDPSR	RaGiER
ARM	0.00	0.00	0.00	1.00	0.00	0.00
Bamburi	0.00	0.00	0.00	0.00	0.00	0.00
BAT	1.00	1.00	0.00	0.00	0.00	0.00
Bauman	0.00	0.00	0.00	0.00	0.00	0.00
BBK	1.00	0.00	0.00	0.00	0.00	0.00
Bbond	1.00	1.00	0.00	1.00	1.00	1.00
BOC	1.00	0.00	1.00	0.00	0.00	0.00
Car & Gen	0.00	0.00	0.00	0.00	0.00	1.00
CARB	0.00	0.00	0.00	0.00	1.00	0.00
Security	RaPBrR	RaRTAR	RaRoER	RaRpSR	RaDPSR	RaGiER
Cberg	0.00	0.00	0.00	0.00	0.00	1.00
CFC	1.00	0.00	0.00	0.00	0.00	0.00
CMC	0.00	0.00	0.00	1.00	0.00	0.00
CityTrust	0.00	1.00	0.00	0.00	0.00	1.00
DTB	1.00	0.00	0.00	0.00	0.00	0.00
Dunlop	0.00	1.00	0.00	1.00	0.00	0.00
Eagads	0.00	1.00	0.00	1.00	0.00	1.00
EABL	0.00	0.00	0.00	0.00	0.00	0.00
EACAB	1.00	1.00	0.00	0.00	0.00	0.00
EAPort	0.00	1.00	1.00	1.00	0.00	0.00
EAPack	0.00	1.00	0.00	0.00	1.00	1.00
Express	0.00	1.00	1.00	0.00	0.00	0.00
Fires	1.00	1.00	1.00	0.00	0.00	0.00
GWK	0.00	1.00	0.00	1.00	0.00	0.00
HFCK	0.00	0.00	0.00	0.00	0.00	0.00
ICDC	0.00	1.00	0.00	0.00	0.00	0.00
Jubilee	0.00	0.00	0.00	0.00	0.00	0.00
Kakuzi	0.00	0.00	0.00	0.00	0.00	1.00
Kapchoru						
a	0.00	1.00	0.00	1.00	0.00	0.00
KCB	0.00	0.00	1.00	0.00	0.00	1.00
Kenol	0.00	1.00	0.00	1.00	0.00	0.00
KenAir	0.00	0.00	0.00	0.00	0.00	0.00
KPLC	0.00	1.00	1.00	0.00	0.00	0.00
Knmill	0.00	1.00	0.00	1.00	0.00	1.00
Limuru	1.00	1.00	1.00	1.00	1.00	1.00
Marshall	0.00	0.00	1.00	1.00	0.00	1.00
Lonhro	1.00	1.00	1.00	0.00	0.00	1.00
NBK	1.00	0.00	1.00	1.00	0.00	1.00
NIC	1.00	0.00	0.00	0.00	0.00	0.00
NMG	1.00	0.00	0.00	0.00	0.00	0.00

Pan	0.00	0.00	0.00	0.00	0.00	0.00
Rea	0.00	0.00	0.00	0.00	0.00	1.00
Sasini	0.00	1.00	0.00	0.00	0.00	0.00
SCHB	1.00	0.00	0.00	0.00	0.00	0.00
SNGroup	0.00	1.00	1.00	1.00	0.00	1.00
Total	1.00	1.00	1.00	0.00	0.00	0.00
TPS	0.00	0.00	0.00	0.00	0.00	0.00
Uchumi	1.00	1.00	1.00	0.00	0.00	0.00
Unga	0.00	1.00	0.00	1.00	0.00	1.00

Key: 1 = above average or HIGH ratio; 0 = below average or LOW ratio

Key: RaPBrR = Ranked Price to Book Ratio; RaRTAR = Ranked Risk of Return On Total Assets;
RaRoE = Ranked Risk of Return On Equity; RaRpSR = Ranked Risk of Return Per Share;
RaDPSR = Ranked Risk of Dividend Per Share; RaGiER = Ranked Risk of Growth In Earnings

4.1.1 Price To Book Ratio (PB Ratio) And Variability In Return To Total Assets

The theoretical relationship between standard deviation of is based on the assumption that the variability in returns from assets capture the risk the business is in and that the investors incorporate or discount the equivalent information or the same information in share prices. With such assumptions, firms with high business risk will exhibit high price to book ratio. The result of this relationship is summarized in table 3 below.

Table 3 CrossTabulated Statistics: RaPBrR, RaRTAR

Rows: RaPBrR		Columns: RaRTAR		
	0	1	All	
0	17 68.00 17	15 65.22 15	32 66.67 32	
1	8 32.00 8	8 34.78 8	16 33.33 16	

All	25	23	48
	100.00	100.00	100.00
	25	23	48

Chi-Square = 0.042, DF = 1, P-Value = 0.838

Key: 1 = above average or HIGH ratio; 0 = below average or LOW ratio

Key: RaPBrR = Ranked Price to Book Ratio; RaRTAR = Ranked Risk of Return On Total Assets;

RaRoE = Ranked Risk of Return On Equity; RaRpSR = Ranked Risk of Return Per Share;

RaDPSR = Ranked Risk of Dividend Per Share; RaGiER = Ranked Risk of Growth In Earnings

From table one there were a total of 48 firms, out of which 16 (33percent) firms had a price to book ratio that is above the average and 32 firm with the same ratio below the average or (66.67 percent). However twenty-three firms (or 47.92percent) had a return on total assets ratio above the market average compared to 25 firms (or 52.08percent) that had a ratio below the market average. The firms with both values below the market total 25 or 52.08percent and the mismatched ones are 23 or 47.9percent.

The chi – test of association is performed to detect the connection between price to book ratio and variability in return on total assets. The chi – square of 0.042 with a p – value of 0.838 indicates that there is not strong evidence that price to book ratio and risk of measured as standard deviation of returns from total assets is related.

4.1.2 Price To Book Ratio (PB Ratio) And Variability In Return On Equity

Investors rely on return on equity in assessing the expected return to owners of the business. Investors are assumed to be concerned about the variability in return on equity as calculated by accountants. In any case this is one of the variables available in the financial statements. Investors,

who are rational and believe return on equity, would discriminate stocks on the basis of their variability and expect different returns depending whether the variability is high or low. The result of this relationship is summarized in table 4 below.

Table 4. Cross Tabulated Statistics: RaPBrR, RaRoER

Rows: RaPBrR		Columns: RaRoER	
	0	1	All
0	26 74.29 26	6 46.15 6	32 66.67 32
1	9 25.71 9	7 53.85 7	16 33.33 16
All	35 100.00 35	13 100.00 13	48 100.00 48

Chi-Square = 3.376, DF = 1, P-Value = 0.066

1 cells with expected counts less than 5.0

Key: 1 = above average or HIGH ratio; 0 = below average or LOW ratio

Key: RaPBrR = Ranked Price to Book Ratio; RaRTAR = Ranked Risk of Return On Total Assets;

RaRoE = Ranked Risk of Return On Equity; RaRpSR = Ranked Risk of Return Per Share;

RaDPSR = Ranked Risk of Dividend Per Share; RaGiER = Ranked Risk of Growth In Earnings

The results show a better correspondence between price to book ratio and variability in return on equity (accounting). A total of 33 companies (68.75%) are correctly classified as either above average or below average.

The deduction is that the risk of return on equity is closer to price to book ratio than the risk of return to total assets. A chi - square of 3.376, with a p - value of 0.066 indicate correspondence between PB Ratio and

variability in return on equity i.e. companies with the above average PB Ratio are those whose variability in return in equity that is above the average.

4.1.3 Price To Book (PB Ratio) And Variability In Return Per Share

The price to book ratio is made up of market price per share and book value per share. The return per share is derived from market share price at two different points. Therefore a relationship between price to book ratio and return per share and by extension variability in return per share is likely. For each company, the return per share is calculated by taking into account annual changes in share price (capital gains) and dividends. The mean of returns and variability or standard deviation of computed returns is then derived from the returns series for each company. The results of cross tabulation connecting PB Ratio and variability (Risk) in return per share are in table 5 below:

Table 5. Cross Tabulated Statistics: RaPBrR, RaRpSR

Rows: RaPBrR		Columns: RaRpSR	
	0	1	All
0	20 60.61 20	12 80.00 12	32 66.67 32
1	13 39.39 13	3 20.00 3	16 33.33 16
All	33 100.00 33	15 100.00 15	48 100.00 48

Chi-Square = 1.745, DF = 1, P-Value = 0.186

Key: 1 = above average or HIGH ratio; 0 = below average or LOW ratio

Key: RaPBrR = Ranked Price to Book Ratio; RaRTAR = Ranked Risk of Return On Total Assets;

RaRoE = Ranked Risk of Return On Equity; RaRpSR = Ranked Risk of Return Per Share;

RaDPSR = Ranked Risk of Dividend Per Share; RaGiER = Ranked Risk of Growth In Earnings

The results show no evidence connecting the two variables. Only 23 companies less than half of the total sample have both the ratio that are above the market. The chi-square of 1.745 with a p-value of 0.186 confirms the lack of strong evidence that these variable are linked. Perhaps the information content in the share prices are not different from those in price to book ratio.

4.1.4 Price To Book (PB Ratio) And Variability In Dividend Per Share

Dividend is rewards to those who risk their money by investing in the shares of a company. There is a class of investors who believe that without dividends share are worthless; and that fluctuations in the value of a share and therefore price to book value can be traced to investors' expectations of changes in future dividends. However investors, analysts and finance professors are not in agreement as to whether dividends impact on the value of the firm or not. Modigliani and Millers (1961) assertion is that in a perfect market dividends have no impact on the value of the firm. To them the value of the firm depends on the investment identified by management. The results of cross tabulation connecting PB Ratio and variability (Risk) in dividend per share are in table 6 below:

Table 6. Tabulated Statistics: RaPBrR, RaDPSR

Rows: RaPBrR		Columns: RaDPSR	
	0	1	All
0	30	2	32
	68.18	50.00	66.67
	30	2	32
1	14	2	16
	31.82	50.00	33.33
	14	2	16
All	44	4	48
	100.00	100.00	100.00
	44	4	48

Chi-Square = 0.545, DF = 1, P-Value = 0.460

2 cells with expected counts less than 5.0

The chi-square of 0.545 with a p-value of 0.460 confirms the lack of strong evidence that these variable, variability in dividends and price to book ratio are linked. Perhaps the information content in the variability in dividend per share, just was in the case of variability in return of share prices are not telling us much about differences in price to book ratio across firms.

4.1.5 Price To Book (PB Ratio) And Variability Yearly Changes In Earnings

Earnings after tax are a popular measure of firm performance. This variable is a function of a firm's cost, revenue and tax position and is assumed to capture business risk. The retained earnings after tax that is available to ordinary shareholders is captured in the book value component of price to book ratio. The results of cross tabulation connecting PB Ratio and variability (Risk) changes in earnings after tax are in table 6 below:

Rows: RaPBrR Columns: RaGiER

	0	1	All
0	20 62.50 20	12 75.00 12	32 66.67 32
1	12 37.50 12	4 25.00 4	16 33.33 16
All	32 100.00 32	16 100.00 16	48 100.00 48

Chi-Square = 0.750, DF = 1, P-Value = 0.386

The chi-square of 0.750 with a p-value of 0.386 confirms the lack of strong evidence that these variables, price to book ratio and changes in earnings, are linked. However this result could be different if we look at each firm individually. Maybe we get these results because earnings after tax is an absolute measure, thus a relative measure like return on equity do offer a better indicator of the relationship.

In summary the findings above indicate that risk as derived from the variability in return on equity is related to price to book ratio. This suggests that earnings variability is a major factor in the changes in price to book ratio. The surprise result is the absence in the relationship between variability in return per share and price to book ratio given that return per share is derived from the market price per share.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The objective of this study was to determine whether there is a relationship between firms price to book ratio and a firms' risk. Risk can be estimated using financial variables such as return on total assets, return on equity, dividends per share, growth rate in earnings after tax, beta coefficient, cash flow from operations. All these are variables useful in estimating risk. Even though there are different methods of estimating risk in a firm, not all measures of risk are related to price to book ratio.

We report a significant correspondence between variability (risk) return in equity and price to book ratio. At the NSE investors interested in estimating equity risk can as well as look at price to book equity ratio. It means investors in firms with high variability ask for additional return thus the high price to book ratio. Fama and French (1992) suggested that price is to book value could be a measure of financial distress and that higher returns and higher low price to book value firms incorporate financial risk premium. Peevy, Senchack and Woodruff (1993), provided evidence that price to book value ratio does not proxy for financial distress. The conclusion based on the result of this study is that investors interested in analyzing risk need not entirely rely on price to book ratio for that purpose and that largely, the differences in price to book ratio is explained by other factors and not necessarily risk. This is because there is no correspondence between price to book ratio and different measures of risk except for variability in return on equity.

5.2 Limitations of the Study

This study covered a period of only twelve years using annual data. That meant that each company had only twelve observations. A study covering a

onger period is likely to have results different from the ones in this study. Secondly in this study we use standard deviation as a measure of risk. May be a study using market measure of risk (beta-coefficient) could yield different results. Third, accounting earnings and numbers are at times incorrigible and whenever accounting practice varies considerably the resulting price to book ratios may not be comparable across firms. Such variations result is loss of information; thus the weak result that we report above.

5.3 Recommendations For Further Research

Beta coefficient is suggested as useful in measuring market risk. A logical suggestion is a study in which the relationship between market risk and price to book ratio is estimated. It is possible designing a study that rely on weekly or monthly and not annual price to book ratios as in this study.

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APPENDICES

LIST OF SECURITIES LISTED ON THE NSE

Agricultural sector

1. Brooke bond ltd
2. Kakuzi ltd
3. Rea Vipingo ltd
4. Sasini Tea & Coffee
5. Williamson Tea Kenya ltd
6. Kapchorua Tea Co. Ltd
7. Kenya Orchards
8. Limuru Tea Ltd
9. Eaagards ltd

Commercial sector

10. African Lakes Corporation plc
11. Car & General (k) Ltd
12. Express Kenya
13. CMC holding
14. Hutching Biemer Ltd
15. Kenya Airways
16. Marshalls E.A Ltd
17. Standard Newspapers Ltd
18. Nation Media group ltd
19. Tourism Promotion Services ltd
20. Uchumi Supermarkets
21. A. Baumann & Co ltd

Finance & Investment sector

22. Barclays bank of Kenya Ltd
23. C.F.C bank ltd

24. Diamond trust Bank Kenya ltd
25. Housing Finance Co. ltd
26. ICDC Investment ltd
27. Jubilee Insurance Co. Ltd
28. Kenya commercial bank ltd
29. National bank of Kenya
30. NIC bank
31. Pan Africa Insurance ltd
32. Standard chartered bank ltd
33. City trust ltd

Industrial & allied sector

34. Athi River Mining co ltd
35. B.O.C Kenya ltd
36. Bamburi Cement ltd
37. B.A.T Ltd
38. Carbacid Investment ltd
39. Crown Berger Ltd
40. Dunlop Kenya
41. E.A Cables Ltd
42. E.A Portland Cement ltd
43. E.A. Breweries
44. Firestone E.A Ltd
45. Kenya National mills ltd
46. Kenya oil Co.Ltd.
47. Mumias Sugar Co. Ltd
48. Kenya Power and Lighting Co. Ltd
49. Total Kenya Co. Ltd
50. Unga Group Ltd
51. E.A Packaging Ltd

Source: NSE