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**An Empirical Analysis of the Predictability of Stock Returns using the Price  
Earnings Ratio and the Price-to-Book Ratio:  
A Case Study of the Nairobi Stock Exchange**

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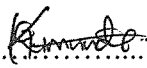
**November 13, 2015**

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## ABSTRACT

The purpose of this study is to establish whether the Return Performance of the Stocks listed on the Nairobi Stock Exchange is predictable using the Price Earnings Ratio and the Price-to-Book Ratio. The two multiples have been attested to provide a cross sectional explanation according to studies done by scholars in both developed and emerging markets. The study mimics the approach used by Basu, 1977 (P/E), and Lakonishok, et al, 1993 (P/B). The results found for the P/E Ratio suggest the ratio has weak predictability power of the Returns on the NSE. This is as compared to other studies in developed markets that have evidenced strong evidence on the dominance of value investing over growth investing. The P/B Ratio is however found to have conflicting effects on the returns in the NSE compared to empirical literature such that the high P/B stock portfolio evidenced a higher return over the low P/B stock portfolio

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## LIST OF ABBREVIATIONS

BH	Buy and Hold Strategy
CAPM	Capital Asset Pricing Model
EMH	Efficient Market Hypothesis
NSE	Nairobi Stock Exchange
NYSE	New York Stock Exchange
P/E Ratio	Price Earnings Ratio
P/B Ratio	Price-to-Book Ratio
REA	Reallocation Strategy

## CHAPTER ONE: INTRODUCTION

### 1.1 BACKGROUND OF THE STUDY

It is common wisdom that asset prices are barely predictable. The rationale for this idea is the Efficient Market Hypothesis (EMH), Harry Markowitz, 1972, who suggested that asset prices evolve according to a random walk process. The logic of the random walk idea is that if the flow of information is unrestrained and information is immediately reflected in stock prices, tomorrow's price change will reflect only tomorrow's news and will be independent of price changes today. This ideology has shifted numerous over the past decades. Accumulating empirical evidence has now suggested that asset prices are partially predictable.

Given the disparate views aimed at establishing what exactly drives stock returns performance, the main question becomes which factors investors should consider when formulating expectations for stock returns. And today, what do those factors suggest is a reasonable range to expect for stock returns going forward? It has been found that many commonly cited signals have had very weak and erratic correlations with actual subsequent returns, even at long investment horizons (Vanguard Research, October 2012).

This study, therefore, aims to establish the explanatory power of the Price-Earnings Ratio and the Price-to-Book Ratio on the Stock Returns in the Nairobi Stock Exchange. The study takes on a descriptive design by unfolding which between the two multiples; one being earnings based and the other being book value based respectively, explains the Stock Return Performance better based on portfolio performance measures.

### 1.1.1 PRICE-EARNINGS RATIO

The Price Earnings Ratio (henceforth referred to as the P/E Ratio) is the ratio of the market price per share to the earnings per share. Analysts and market strategists often compare the P/E Ratio of a market to its historical average to make judgments about whether the market is under or over-valued. A market which is trading at a P/E Ratio that is much higher than its historical norms is often considered to be over-valued. One that is trading at a ratio lower is considered under-valued.

P/E Ratio is one of several "valuation ratios" that scale a firm's stock price by some measure of the firm's assets or potential to generate income for shareholders. The dependence of P/E Ratios on current earnings makes them particularly vulnerable to the year-to-year swings that often characterize reported earnings. In making comparisons, therefore, it may make much more sense to use normalized earnings.

### 1.1.2 PRICE TO BOOK RATIO

The market value of the equity in a firm reflects the market's expectations of the firm's earning power and cash flows. The Book Value of Equity is the difference between the Book Value of Assets and the Book Value of Liabilities, a number that is largely determined by accounting conventions. The Price to Book Ratio is computed by dividing the market value of equity by the current book value of equity. The Book Value of Equity is stated on a per share basis and is the asset value minus total liabilities and preferred stock (if issued by the firm).

Fama and French, in developing the alternate three-factor model, point out that Low Price-to-Book Ratios (High Book to Market Ratios) may operate as a measure of risk, since firms with prices well below book value are more likely to be in trouble and go out of business. The low ratio is a measure of the distress risk the company may be going through. Investors therefore have to evaluate for themselves whether the additional returns made by such firms justifies the additional risk taken on by investing in them.

### 1.1.3 GROWTH VS. VALUE INVESTING

Growth and value are two fundamental approaches in stock and stock mutual fund investing. The Price-to-Book ratio and the Price-Earnings Ratio are two of the ratios commonly used to identify growth and value stocks in a market.

Value investing was a paradigm that was developed by Graham & Dodd, 1934, in their book *Security Analysis*. The book has come to be known in recent times as 'the bible of value investing'. Most value investors nowadays claim to have been inspired by the writings of the two. According to David Abrams, who wrote "The Great Illusion of the Stock Market and the Future of Value Investing" he quotes that the world likes to categorize things into neat little boxes. Therefore you will find that investors have been categorized either as value, growth or momentum investors. Abrams adds that he has not come across any successful investor whose strategy wasn't based on a value approach. But, the question in this study remains "Does the widespread notion that value investing outperforms growth investing hold in this market?". Which strategy -- growth or value -- is the most likely to produce higher returns in an emerging market such as the NSE --over the long term-- based on returns on portfolios of stocks grouped using P/E Ratios and P/B Ratios?

The science of growth versus value investing is mostly a matter of differing investor perceptions and psychology. If a company is trading for less than its book value (or has a P/B less than one), it usually indicates to investors that either the market believes the asset value is overstated, or the company is earning a very poor (even negative) return on its assets. Such stocks, known as value stocks, have relatively low Price Earnings and Price-to-Book Ratios. Lower price may reflect investor reaction to recent company problems, such as disappointing earnings, negative publicity, or legal problems, all of which may raise doubts about the companies' long-term prospects.<sup>1</sup>

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<sup>1</sup> (Growth vs. Value: Two Approaches to Stock Selection)

A company with a very high share price relative to its asset value, on the other hand, (a P/B Ratio greater than one) is likely to be one that has been earning a very high return on its assets<sup>2</sup>. Such stocks, known as growth stocks, usually have high price-to-earnings and price-to-book ratios, which means that these stocks are relatively high-priced in comparison with the companies' net asset values.

## 1.2 STATEMENT OF THE PROBLEM

According to Campbell H. , 1995, the emergence of new equity markets in Europe, Latin America, Asia, the Mideast and Africa has provided a new menu of opportunities for investors. These markets exhibit high expected returns as well as high volatility and importantly, low correlations with developed countries' equity market. Empirical studies done on the Stock Market Returns performance have created a focal, one-eyed view of the attested ability and role of two valuation multiples in explaining stock returns of developed markets. (See 2.3 EMPIRICAL STUDIES ON STOCK RETURN PREDICTABILITY USING VALUATION MULTIPLES

As aforementioned, the low correlation between equity markets in developed countries and emerging countries such as Kenya provides us with the speculation that the conclusions derived from empirical studies on Stock Return Predictability might differ for the two types of markets<sup>3</sup>. This is especially useful for any international potential investor looking to diversify their portfolio in the emerging and developed markets. This study therefore seeks to establish whether the two multiples

In addition, the clash between growth and value investing has been prevalent for many years now, with each side offering statistics to support its arguments. Most studies show that value investing has outperformed growth over extended

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<sup>2</sup> (McClure)

<sup>3</sup> According to (Bekaert, Erb, Harvey, & Viskanta, 1997) provided evidence that emerging equity markets are not integrated to the developed markets of the World as evidenced by very low correlation with the rest of the World and amongst themselves.

periods of time on a value-adjusted basis. In the context of this study, this would mean that stocks that have low P/E Ratios and P/B Ratios provide higher returns.

This study consequently seeks to determine whether the behaviour of stock returns on the NSE corresponds to this common notion that the value stocks tend to outperform the growth stocks, these having being categorized on the basis of the Price-Earnings Ratio and the Price-to-Book Ratio. The result should provide evidence for any potential investor on the behaviour of stock returns to earnings of the company and their book values.

The use of the two explanatory ratios as our independent variables is motivated by the difference in the approach to analysis of a firm's performance. The P/E Ratio use an earnings based approach while the Price-to-Book Ratio use a book value approach to analyse firm performance. The two ratios are similar in their categorization of stocks as either value or growth but using different bases to determine this.

### **1.3 RESEARCH OBJECTIVE**

To determine whether the Performance of Stock returns on the Nairobi Stock Exchange is predictable using the Price Earnings Ratio and the Price-to-Book Ratio based on value versus growth investing strategies.

### **1.4 RESEARCH QUESTIONS**

1. What is the difference between the Stock Return performance of the portfolios formed on the basis of the Price-Earnings and the Price-to-Book Ratios and their respective systematic risk measures?
2. What is the performance of the portfolios formed using the Sharpe, Jensen and Treynor Measures?

### **1.5 JUSTIFICATION OF THE STUDY**

This study aims to establish the ability of the Price-Earnings and the Price-to-Book Ratios in explaining the Returns of Securities listed on the Nairobi Stock

Exchange. It is fair to say (from tentative exploration of empirical studies done) that the scholar's view on stock return predictability using multiples has majorly been shaped by empirical studies on the U.S. stock market. Therefore, this study contributes to the validity of stock return predictability in an emerging such as the one seen in Kenya, which is useful for any international potential investors looking to diversify their portfolios.

This study will also prove useful for investment analysts who wish to understand the behaviour of stock returns to inform their investment style strategies (choice between value and growth investing). According to (Penman, Autumn 1996), value investing is being used widely by investment analysts and individual traders alike to evaluate common stock, especially using the Price Earnings Ratio and the Price-to-Book Ratio. This study contributes auxiliary understanding to the existing body of knowledge on the relationship between value and growth investing strategies for the Nairobi Stock Exchange. There is currently limited knowledge on this aspect and this research study therefore serves as a source of reference for future research.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 INTRODUCTION

Two competing explanations for the presence of predictable variation in stock returns have been suggested: (1) market inefficiency in which prices take swings from their fundamental values; and (2) markets are efficient and the predictable variation can be explained by time-varying equilibrium returns. This section outlines the main theories and studies done on the stock return predictability of various markets. It aims to highlight the main standpoints of scholars on the efficiency of markets and those who aim to prove predictability using various multiples.

The initial trickle of evidence in favor of predictability was provided by Lo and MacKinley, 1988, when they tested the validity of the random walk hypothesis by examining the uni-variate time series properties of stock prices. This has been supplemented by convincing evidence that financial and accounting variables appear to have predictive power for stock returns.

### 2.2 THEORETICAL REVIEW OF STOCK RETURN PREDICTABILITY

#### 2.2.1 MARTINGALES AND RANDOM WALKS

The random-walk theory is a special case of the efficient-markets theory of stock prices. In general, the efficient-markets theory allows the equilibrium rate of return required by investors to vary over time. The random-walk theory assumes that this required rate of return is constant.

Perhaps the earliest model of financial asset prices was the Martingale Model, its origin lying in the history of games of chance and the birth of probability theory. The Italian mathematician Girolamo Cardano proposed a theory of gambling in his 1565 manuscript *Liber de Ludo Aleae* (*The Book of Games of Chance*) published posthumously (Cardano, 1963), in which he wrote:

*The most fundamental principle of all in gambling is simply equal conditions, e.g., of opponents, of bystanders, of money, of situation, of the dice box, and of the die itself. To the extent to which you depart from that equality, if it is in your opponent's favor, you are a fool, and if in your own, you are unjust.*

If  $P_t$  is taken to be an asset's price at date  $t$ , then the Martingale Hypothesis states that tomorrow's price is expected to be equal to today's price, given the asset's entire price history. Alternatively, the asset's expected price change is zero when conditioned on the asset's price history; hence its price is just as likely to rise as it is to fall. (Campbell, Mackinlay, & Lo, 1997) From a forecasting perspective, the martingale hypothesis implies that the "best" forecast of tomorrow's price is simply today's price, where "best" means minimal mean-squared error.

This study seeks to refute the implication provided by the Martingale and Random Walk Theory of Stock Prices i.e. that they are unpredictable. It aims to test whether there is a semblance of predictability in Stock returns in the local market based on valuation ratios that can prove useful in making gains from the movements in stock prices.

### **2.2.2 THE EFFICIENT MARKET HYPOTHESIS**

The Efficient Market Hypothesis by Eugene Fama, (Fama E. , 1970), was widely accepted by academic financial economists; as seen in, Fama, Efficient Capital Markets: II, 1981. The EMH was built on the proposal that stock prices reflect all relevant information available in the market at a particular time. In his 1970 paper, Fama made the split between various forms of market efficiency based in the information content reflected in the prices, the weak, semi strong and strong form of efficiency.

The theme of Fama's second paper (Fama E. F., Efficient Capital Markets: II, 1981) is that the market efficiency literature should be judged on how it improves ability to describe the time-series and cross-section behavior of security returns. Malkiel, 2003, in his paper on the Efficient Market Hypothesis and its Critics, examines the attacks on the efficient market hypothesis and the

belief that stock prices are partially predictable. However, according to Malkiel, 2003 considerable empirical research has been conducted to determine if future stock returns can be predicted on the basis of initial valuation parameters. It is claimed that valuation ratios, such as the price-earnings multiple or the dividend yield of the stock market as a whole, have considerable predictive power.

## **2.3 EMPIRICAL STUDIES.ON STOCK RETURN PREDICTABILITY USING VALUATION MULTIPLES**

### **2.3.1 PRICE-EARNINGS RATIO<sup>4</sup>**

The price-earnings effect was the earliest described asset pricing 'anomaly' even before the Capital Asset Pricing Model (CAPM) itself was formulated by Sharpe (1964). A large body of academic work has demonstrated the effect and has attempted to decide whether it is real or a proxy for other factors. (Anderson & C, 2006)

Basu, Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis, 1977, made an attempt to empirically test and determine the relationship between the performance of investments in equity securities and their price earnings ratios. According to the study, it was seen that during the period from 1957 to 1971 the low P/E ratio portfolios had on average, a higher absolute and risk adjusted returns compared to the high P./E ratio portfolios. The price ratio hypothesis formed on the relationship between the two variables therefore seemed valid. Since the systematic risk between the portfolios formed (highest to lowest) did not vary much, the trend of returns could not be attributed to risk characteristics

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<sup>4</sup>A criticism that is commonly directed against use of the conventional price-earnings ratio as an indicator of stock market valuation is that the denominator of the ratio, earnings, has become biased downward because the new economy involves substantial investments in intangibles, which are, following conventional accounting procedures, deducted from earnings as current expenses. This study aims to adjust for this bias by taking a moving average of the Earnings as suggested by (Graham & Dodd, 1934).

of the portfolios. The portfolios performance measures used by Basu (the Treynor Measure, the Sharpe measure and the Jensen Measure) all indicate that the low P/E portfolios outperform the High P/E portfolios. This study seeks to employ the methodology used by the above in studying the predictability if stock returns on the NSE.

Basu, 1983, also found that the ratio can predict future stock returns. This so-called P/E effect has been viewed as evidence of market inefficiency. The 1977 study done by Basu relates closest to this study in assessing the evidence of Market Inefficiency in the NSE caused by the P/E ratio. This study will use the performance measures used by Basu in a quite similar methodology framework.(see.

### 3.5.3 MEASURING PORTFOLIO PERFORMANCE)

Jaffe, Keim, and Westerfield (1989) indicate that the earnings predictor, P/E, also predicts stock returns, after controlling for beta, size, and "January" effects in returns. The seeming paradox of P/E ratios leading both prices and earnings may be explained by P/E being a measure of risk which is related to expected (future) returns.

Campbell & Shiller, 1998, use the price earnings ratio and the dividend price ratio as forecasters of the market using aggregate annual US data from 1871-2000. They concluded that though the two ratios were poor at forecasting dividend growth, earnings growth and productivity growth, they were rather useful in forecasting future price changes. In their analysis of the forecasting ability of the price earnings ratio, they followed the advice given by Benjamin Graham and David Dodd, in their now famous 1934 textbook *Security Analysis* (Graham & Dodd, 1934). The two said that for purposes of examining valuation ratios, one should use an average of earnings of "not less than five years, preferably seven or ten years". They smooth earnings by taking an average of real earnings over the past ten years. The price-smoothed-earnings ratio was found to have little ability to predict future growth in smoothed earnings; the R2 statistics are 1% over one year and 5% over ten years. However, the ratio was

found to be a good forecaster of ten-year growth in stock prices, with an R<sup>2</sup> statistic of 30%. The fit of this relation was substantially better than the results they found for the dividend-price ratio.

### 2.3.2 PRICE TO BOOK RATIO

Ibbotson, 1986, in *Decile Portfolios of the New York Stock Exchange, 1967 - 1984*, (Working Paper, Yale School of Management), studied the relationship between stock price as a percentage of book value and investment returns. In order to test this relationship, all stocks listed on the New York Stock Exchange were ranked on December 31 of each year, according to stock price as a percentage of book value, and sorted into deciles. The compound average annual returns were measured for each decile for the 18-year period, December 31, 1966 through December 31, 1984. Ibbotson found that stocks with a low price-to-book value ratio had significantly better investment returns over the 18-year period than stocks priced high as a proportion of book value.

De Bondt & Thaler, 1987, in their paper *Further Evidence on Investor Overreaction and Stock Market Seasonality* found additional evidence that supported the overreaction hypothesis and that was consistent with two alternative hypotheses based on firm size and difference in risk. All companies listed on the New York and American Stock Exchanges, except companies that were part of the S&P 40 Financial Index, were ranked according to stock price in relation to book value and sorted into quintiles, five groups of equal number

The investment return in excess of or (less than) the equal weighted NYSE Index was computed over the subsequent four years for all of the stocks in each selection period. The four-year returns in excess of or (less than) the market index were averaged. They examined the earnings pattern of the cheapest companies (on the basis of price-to-book) to the glamour companies. It was discovered that earnings of the cheaper companies grew faster than the earnings of the more expensive companies over the period of the study. They attributed the earnings outperformance to a mean reversion tendency.

Fama & French, 1992 in the Working Paper, *The Cross-Section of Expected Stock Returns*, examined the effects of market capitalization and price as a percentage of book value on investment returns. All non-financial New York Stock Exchange, American Stock Exchange and NASDAQ companies included in the Center for Research in Security Prices file for which data was also available in the COMPUSTAT database were ranked according to stock price-book value percentages and sorted into deciles. They then ranked each price/book value decile according to market capitalization and sorted into deciles. The study sought to examine investment returns from July 1963 to December 1990. Average annual equal-weighted investment returns for each of the ten market capitalization deciles which comprised each of the ten price/book value deciles smaller market capitalization companies at the lowest prices in relation to book value provided the best returns. The best returns were produced by stocks with low prices in relation to book value.

Lakonishok, Vishny, & Shleifer, May 1993, examined the effect of price as a percentage of book value on investment returns in *Contrarian Investment, Extrapolation and Risk*. They suggested that the alternate reason why value investment strategies work is that they are fundamentally riskier. In their paper they try to shed light as to why the value strategies work. The professors ranked all companies listed on the New York Stock Exchange and the American Stock Exchange according to stock price as a percentage of book value and sorted then companies into deciles. The computed returns using a buy and hold strategy where the decile portfolios were held for five years. The return were calculated for the average annual year-by-year investment returns, the average annual five-year returns and the average cumulative total five-year returns were calculated. The portfolios were rebalanced at the end of each year and stocks which disappeared in the previous year were no longer analyzed in the subsequent portfolio rebalancing. Portfolios were initially formed on April 30, 1968, and new portfolios were formed on each subsequent April 30. The investment returns were equal-weighted.

According to Jensen, Johnson and Mercer, (1997), price-to-book-value ratio with size are prominent measures in explaining cross-sectional stock returns. Historically, average returns on shares of small-capitalization firms and low price-to-book firms have exceeded those on large-capitalization firms and high price-to-book firms. However, when they considered the influence on stock returns of the Federal Reserve's policy stance, they found that size and price-to-book effects depend largely on the monetary environment.

### 2.3.3 THE BOOK-TO-MARKET EQUITY

Stattman, 1980, and Rosenberg, Reid, & Lanstein, 1985, document that stocks with high book-to-market equity ratios (B/M, the ratio of the book value of a common stock to its market value) have high average returns that are not captured by their betas.

Fama & French's, *The Cross Section of Expected Returns*, 1992, concluded that BE/ME provided a simple and powerful characterization of the cross section of the average stock market returns from 1963 to 1990. They show that firms with high BE/ME ratios have persistently low earnings, higher financial leverage and more earnings uncertainty as compared to their counterparts thus have higher returns. Their argument was based on the hypothesis that high book-to-market stocks reflect unidentified state variables that produce un-diversifiable risks in returns that are not captured by the market return and are priced separately from market betas. In support of this claim, they show that returns on high book-to-market (value) stocks co-vary more with one another than with returns on low book-to-market (growth) stocks. They introduced a factor to the CAPM to model the BE/ME ratio, HML(high minus low) which is the difference between the returns on diversified portfolios of high and low B/M stocks.

Using a different measure of distress risk, Shumway, 1996, finds that firms with higher distress risk do have higher average stock returns. His study explores the hypothesis that firm size, past returns, and book-to-market equity predict stock returns because of a premium for default or distress risk. Small size, low past returns, and high leverage all forecast default. However, book-to-market is only

weakly correlated with default risk. The firm-specific probability of default is both statistically and economically significant in returns regressions. Furthermore, both size and past returns lose their ability to forecast returns when combined with default risk in regressions.

The results of Fama and French 1992 are contrasted by those of Dichev, 1998, who found that using a measure of bankruptcy risk to identify firms with high likelihood of financial distress these firms have low average stock returns. If bankruptcy risk is systematic, one would expect a positive association between bankruptcy risk and subsequent realized returns. Dichev, 1998 used Ohlson's measure of the likelihood of bankruptcy as a proxy for distress risk and showed that the firms with the highest risk of distress includes many firms with high BE/ME ratios and low past stock returns but actually includes more firms with low BE/ME ratios and high past stock returns.

According to Griffin & Lemmon, 2002, a prominent explanation for the book to market premium that is assigned to firms that have high book to market is because of the greater risk of distress they face. Behaviouralists have a view based on evidence that stocks with high ratios of book value to market price are typically firms that have fallen on bad times, while low B/M is associated with growth firms. The behaviouralists argue that sorting firms on book-to-market ratios exposes investor overreaction to good and bad times. Investors over-extrapolate past performance, resulting in stock prices that are too high for growth (low B/M) firms and too low for distressed (high B/M, so-called value) firms.

#### **2.3.4 EARNINGS YIELD**

The Earnings Yield is calculated as the earnings per share for the most recent 12-month period divided by the current market price per share. The earnings yield (which is the inverse of the P/E ratio) shows the percentage of each dollar invested in the stock that was earned by the company. The earnings yield is used by many investment managers to determine optimal asset allocations.

There has been empirical research on the relationship between earnings yield, size and common stock returns that has revealed some anomalies with respect to the pricing of equities. The common problem in these studies, in particular, has been the inability of researchers to unravel the effects between the earnings yield and the firm size has been attributed to the use of relatively short periods and the failure of scholars to separate month of January from the rest of the year.

Basu, 1977, tests for the empirical relationship between earnings' yield, firm size and returns on the common stock of NYSE firms. The results from the study indicated that portfolios of high (low) earnings' yield securities trading on the NYSE appear to have earned higher (lower) absolute and risk-adjusted rates of return, on average, than portfolios consisting of randomly selected securities and that this effect is clearly significant even when experimental control has been exercised over differences in firm size. The evidence presented in his study indicates that the *earnings yield* effect, however, is not completely independent of firm size and that the effect of both variables on expected returns is considerably more complicated. As noted by Basu, his results suggest a violation in the joint hypothesis that (i) the single-period capital asset pricing model (CAPM) has descriptive validity; and (ii) security price behavior on the NYSE is consistent with market efficiency.

Ball, 1978, pointed out that the E/P (earnings yield) ratio can be viewed as a direct proxy for expected returns.' therefore, one would expect the E/P variable to be an important factor in explaining expected returns in the event the asset pricing model employed is mis-specified or there are deficiencies in the empirical implementation of the model for example, the use of an incomplete version of the market portfolio. He also concluded that since E/P and dividend-price ratios constitute measures of yields they are likely to be correlated with 'true' yields or expected returns on common stock.

Reinganum, 1981, argued that portfolios based on firm size or earnings/price (E/P) ratios experience average returns systematically different from those

predicted by the CAPM. He added that the 'abnormal' returns persist for at least two years. He proceeds to state that this persistence reduces the likelihood that these results are being generated by market inefficiency; rather, providing an indication that the equilibrium pricing model is mis-specified. However, Reinganum contrasts the results found by Basu,1977. The data reveals that an *E/P* effect does not emerge after returns are controlled for the firm size effect; the firm size effect largely subsumes the *E/P* effect, whereas Basu, 1977, concludes the opposite

Cook & Rozeff, December 1984, demonstrate that equity returns are related to size and earnings/price ratio as well as the month of January. They argued that Reinganum's finding that size subsumes earnings/price ratio is caused by a fortuitous choice of methods and that Basu's finding that earnings/price ratio subsumes size appears to be sample-specific.

Jaffe, Keim, & Westerfield, March 1989, examined the earnings yield effect and firm size effect however using a substantially longer period from 1951-1956 than previously done works on the same effects, data that was reasonably free of survivorship bias, both portfolio and seemingly unrelated regressions tests and an emphasis on the important difference between January and other months. His results indicate that the earnings yield effect is only significant both in January and the other eleven months, but that the size effect was significantly negative only in January. They found evidence of consistently high returns for firms of all sizes with negative earnings.

## **2.4 SEMINAL WORKS**

### **2.4.1 DISCUSSION OF THEORETICAL FRAMEWORKS**

In this study, the objective is to establish if the P/E effect and the P/B effect exist in the Nairobi Stock Exchange. The multiples have been considered to be risk proxies in stock markets and as such have an effect on the cross sectional returns of the stocks. The factors that stipulate the existence of these presumed effects are the risk adjusted returns, the absolute returns and the rewards to the risk

factors. The main hypothesis in this study per say is whether the above factors indicate any relationship between stock returns and the P/E Ratio and the P/B Ratio.

Various scholars have taken different approaches in empirically testing for the relationship. However, the basis of the test has been seen to be similar; ranking the stocks based on the P/E or the P/B Ratio and forming portfolios based on the ranking.

Basu, 1977, formed portfolios on stocks from 1957 to 1971 on the basis of the rankings of the P/E Ratio and used portfolio performance measures (the Treynor Measure, the Sharpe measure and the Jensen Measure) to determine the relationship. Campbell & Shiller, 1998, use the price earnings ratio and the dividend price ratio where they smoothed earnings by taking an average of real earnings over the past ten years. Campbell & Shiller, 1998, concluded that the two ratios were rather useful in forecasting future price changes.

Ibbotson, 1986 ranked all stocks listed on the NYSE on December 31 of each year, according to stock price as a percentage of book value, and sorted into deciles. The compound average annual returns were measured for each decile for the 18-year period. De Bondt & Thaler, 1987, ranked all NYSE Stocks according to stock price in relation to book value and sorted into quintiles. The four-year returns in excess of or (less than) the market index were averaged.

Fama & French, 1992 examined all non-financial NYSE, American Stock Exchange and NASDAQ companies and ranked them according to stock price-book value percentages and sorted them into deciles. The price/book value deciles were then ranked according to market capitalization and sorted into deciles.

Lakonishok, Vishny, & Shleifer, 1993, ranked all companies listed on the NYSE and the American Stock Exchange according to stock price as a percentage of book value and sorted then companies into deciles. The computed returns using a buy and hold strategy where the decile portfolios were held for five years. Portfolios were rebalanced at the end of each year.

All the studies highlighted above found that the P/E ratio and the P/B Ratio were useful in predicting stock returns of companies where companies with Lower Ratios had higher risk adjusted and absolute returns compared those with Higher Ratios.

#### **2.4 2 RELATIONSHIP BETWEEN LITERATURE AND RESEARCH OBJECTIVES**

The empirical studies on the P/E Ratio noted above have found evidence pointing to the predictive power of the P/E Ratio when it comes to stock returns under certain assumptions and conditions. In addition, the studies that looked at the performance of stocks selected on the basis of P/B Ratio also present uniform findings: lower price-to-book value stocks tend to outperform higher price-to-book value stocks.

This study relates to the scholarly work done above by attempting to test for the existence of a similar relationship on stocks listed in the NSE in an attempt to establish which between value or growth strategies has prominence in this market. This study will use the same framework of analysis in ranking the stocks based on their P/E and P/B Ratios. The study mostly tends towards the study done by Basu, 1977, for his work done on the P/E Ratio and that done by Lakonishok, et al, 1993, on the P/B Ratio.

#### **2.4 RESEARCH GAP**

Empirical Research in Financial Economics as seen above has provided evidence that variables such as the Price Earnings (P/E) Ratios, the Price-to-Book Ratios, the dividend yields, book-to-market ratios and the earnings yield have significant explanatory power for the variation in cross section of expected returns. According to Harvey (1995), emerging equity markets have much higher explanatory power than developed market returns; hence emerging market returns are more predictable than developed markets returns.

However, there has been conflicting evidence on the front of emerging markets about their predictability and efficiency. Sharma & .Kennedy, 1977 tested the popular random walk hypothesis on Bombay Stock Exchange and provided

evidence that proved it as a weak-form efficient market meaning that it is unpredictable based on past price data. This was also similarly concluded by Branes, 1986 who carried out a similar test on the Kuala Lumpur Stock Exchange. Chang, Fawson, Glover, & Fang, 1996 also proved that the Taiwan Stock Exchange is also weak-form efficient.

From the literature review, it is clear that the empirical studies done on the African emerging markets have not been as abundant as the ones done in other emerging markets, especially those in Asia and the Middle East. Most of the empirical research done on the African Stock Markets has been done on the Johannesburg Stock Exchange where most have concluded that the market is weak form efficient.<sup>5</sup>

The insufficiency of studies on Return Predictability on African Stock Markets, relative to those done in Developed Markets such as the US Market and the European Markets, drives the impetus to carry out this study in an effort to establish whether the Kenyan Market behaves in the same way as developed markets have been claimed to behave. This study, as aforementioned in Section 1.5 JUSTIFICATION OF THE STUDY, aims to create a reference for any further studies to be carried out on Stock Return Behaviour in this market and other similar or neighbouring African markets.

In addition to the knowledge insufficiency in African markets as an aggregate, this study also seeks to develop the extent of understanding of the Nairobi Stock Exchange which in recent years has become a hub for investors in the East African Region. Research on the predictability of this market needs to be built upon by carrying out much more research on the many aspects of stock returns.

This study aims to contribute to this gap by testing the extent of Return Predictability in the Nairobi Stock Exchange which is one of the fastest developing Stock Markets in Africa. The study aims to establish whether the

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<sup>5</sup> See Thomson & Ward, (1995), Jefferis & Smith, (2005) and Smith, Jefferis, & Ryoo, (2002).

results obtained from empirical studies on developed markets such as the NYSE still stand ground in emerging markets.

## **2.5 CONCEPTUAL FRAMEWORK**

### **2.5.1 VARIABLES OF INTEREST**

The variables of interest in this study primarily include:

- The excess returns on the portfolios formed from stocks of firms listed on the NSE (Calculated as the log returns on the stock less the return on the 91-day Treasury Bill). The excess returns that will be calculated for each of the portfolios to be formed will be the dependent variable in estimating the coefficients of the regression
- The excess return on the market (Calculated as the log returns on the market less the return on the 91-Day Treasury Bill). The excess returns on the market act as the independent variable in the regression estimation of the coefficients
- The Price Earnings Ratios and the Price to Book Ratios of the stocks listed on the NSE for the formation of portfolios.

### **2.5.2 THEORIES UNDERPINNING THE STUDY AND RELATIONSHIP BETWEEN VARIABLES**

The essential theories underpinning this study are the P/E Effect and the P/B Effect. The theories surround the idea that the P/E Ratio and the P/B Ratio are useful in predicting the Cross sectional Returns on a Stock Market. More recently, some economists have argued that the average Price-Earnings Ratio for a stock market index such as the S&P 500 can help predict long-term changes in that index. A low P/E Ratio tends to be followed by rapid growth in stock prices in the subsequent decade and a high P/E Ratio by slow growth in stock prices.

Fama & French, *The Cross Section of Expected Returns*, 1992, point out that Low Price-to-Book Ratios (High Book to Market Ratios) may operate as a measure of risk, since firms with prices well below book value are more likely to be in

trouble and that such business are seen as undervalued by the market causing a rise in prices and therefore returns in the future.

Another theory underlying this study is the basic CAPM Framework which relates excess stock returns to the excess returns on the market (the Market Risk Premium). In the basic CAPM, the market risk premium is the primary risk factor for stock returns. The CAPM has been improved over the years to incorporate more proxies of risk such as Size, Book to Market, and the Degree of Investment.

The relationship between the excess market returns and the excess stock returns is identified by the systematic risk measure i.e. Beta. This study however does not primarily focus on finding the exact relationship between the variables, but rather the performance of the portfolios formed on the basis of the Price-Earnings Ratios and the Price to Book Ratios of each stock listed.

## **CHAPTER THREE: METHODOLOGY**

### **3.1 INTRODUCTION**

The methodology employed is based on portfolio performance analysis based on measures provided by Sharpe, Jensen and Treynor. Based on the previous scholarly work and review done on developed markets, the P/E and the P/B ratio could quite possibly be used in building successful value investing strategies in predicting stock market highs and lows.

### **3.2 RESEARCH DESIGN**

The study adopts a descriptive design. This is because the purpose of the research is to provide an empirical analysis into the relationship between the valuation multiples (the Price/Earnings Ratio and the Price-to-Book Ratio) and the performance of the Stock Market in Kenya. It seeks provides a better picture and understanding of low (value) and high (growth) ratio stock investing strategies in the Nairobi Stock Exchange based on the type of stocks that provide higher returns.

The study also has a comparative design to it in comparing the performance of the low and high ratio portfolios in the market based on their average returns over the study period, their systematic risk, their differential measures, and rewards to variability and volatility.

### **3.3 POPULATION AND SAMPLE SELECTION**

This study focuses exclusively on the capability of the P/E ratio and the P/B ratio on explaining stock return performance of 47 firms listed on the Nairobi Stock Exchange from the year 2005 -2013. The timeline of the study was chosen arbitrarily, though it laterally captures major events that could have affected the performance of stock prices in the market. Politically, there are the 2002 general elections, the 2005 referendum and the 2007 elections. Economically, there is the

effect of the global 2008-2009 financial crisis and the 2011 exchange rate crisis for the Kenyan Shilling.

These number of firms studied is expected to change during our period of study with some firms delisting and new ones being listed. However, the study will maintain the number of portfolios based on 20% percentile ranks as explained in the data analysis.

The NSE 20 Share Index provides a proxy for the returns on the market portfolio. The Index was reviewed in 2007 and constitutes the portfolio of stocks that truly reflects the behaviour of the market. As a proxy for the risk free rate we use the return on 91-Day Treasury Bills.

### **3.4 DATA COLLECTION**

The data used in this study is primarily quantitative. The study relies on statistical and historical data relating to the following:

- The Daily Prices of all stocks listed on the NSE from December 2005-December 2013
- The Annual EPS for each stock from the year 2005-2013 for the calculation of the P/E Ratio
- The Book Values of each firm trading in the NSE from the year 2005-2013 for the calculation of the P/B Ratio

The Daily Price Data used in this study was sourced from the Nairobi Stock Exchange compilations. The data on Earnings per Share and the Book Values has been collected from Avention One Stop Reports<sup>6</sup> for each of the companies under study and/or Financial Statements of the listed companies that are presented to the NSE.

In the literature collected so far in the study, journal articles have been the primary source of all theories and empirical studies done. Some of the empirical

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<sup>6</sup> Avention One Stop Reports are prepared by Avention Inc.

studies have been working Papers that proceeded to become journal articles from various Scholarly and Research-dedicated Websites.

The reliability of the secondary data in this study arises from the simple fact that the data has been compiled by industry professionals (for the NSE Stock Price Data, EPS Values and Book Values) and professional scholars (for the journal articles). **Reliability** is the extent to which we can rely on the source of the data and, therefore, the data itself.

In assessing the adequacy of secondary data as a data collection method, we regard quantity as a criterion in assessing the strength of the evidence. This study relies on data from 2005-2013 in estimating the relationship between the stock return performance and the Price Earnings Ratio and the Price to Book Ratio. The 9 year analysis using monthly stock returns computed from the daily price data gives a medium term horizon analysis of the relationship.

### 3.5 DATA ANALYSIS

#### 3.5.1 CREATION OF PORTFOLIOS

##### 3.5.1.1 P/E RATIO PORTFOLIOS

This study relies on the methodology adopted by (Basu, Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis, 1977)..

Beginning from the year 2005, the Price-Earnings Ratio of all the stocks in the sample is computed<sup>7</sup>. The ratio is calculated as the closing price as at the end of period divided by the EPS for that financial year.

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<sup>7</sup>Benjamin Graham and David Dodd, in their now famous 1934 textbook Security Analysis (Graham & Dodd, 1934) suggested that for purposes of examining valuation ratios, one should use an average of earnings of “*not less than five years, preferably seven or ten years* “. However, given the much shorter horizon of our analysis and the possible unavailability of data on some stocks for as far back as even 1999, this study will use the EPS as is.

The Earnings Yield of each company stock is calculated from the ratios (1/ Price-Earnings Ratio). The stocks are ranked on the basis of the Earnings Yield such that the highest Earnings Yield Stocks have the Lowest Price Earnings Ratio. In one setting, we include firms which have negative earnings. On calculating their Earnings Yield they have the lowest, which categorizes them in the portfolio with the highest Price Earnings Ratios. The stocks with negative earnings are excluded in a separate analysis.

The study forms 5 portfolios for every multiple's analysis (5 formed for on the basis of the P/E Ratio), every year. The firms in the portfolio will represent 20% percentiles of the ranking. The portfolio composition has been rebalanced every year such that the composition of the High P/E portfolio in a given year is not necessarily the same as that in another year.

#### 3.5.1.2 P/B RATIO PORTFOLIOS.

The second analysis of this study is to empirically test for the relation between stock return performance on the Nairobi Stock Exchange and the Price-to-Book Ratio. The methodology used in the formation of portfolios is adopted from the study done by (Lakonishok, Vishny, & Shleifer, May 1993.). Their study used the Book to Market Strategy (which is the reciprocal of the Price-to-Book Ratio). Consequently, for those stocks that had a high (low) B/M Ratio, we can conclude that they have a low (high) P/B Ratio. The same approach is taken in this study.

The first step is to rank all companies listed on the Nairobi Stock Exchange based on their computed Book to Market Ratios. Similar to the ranking done above for the P/E Ratios, firms which have negative book values are included in one setting and excluded in a separate analysis.

5 portfolios are also created based on 20% percentiles. The portfolios are rebalanced at the end of each year since a buy and hold strategy is considered and stocks which have been delisted in a particular year will no longer analyzed in the subsequent portfolio formations.

### 3.5.2 ESTABLISHING RETURNS OF THE P/E AND P/B PORTFOLIOS

All the portfolios are taken to be a buy and hold strategy for simplification.

The stock return<sup>8</sup> will be computed on a monthly basis based on end of month closing prices. The holding period return will be calculated as the natural logarithm of the ratio of the price at the end of month  $t$  to the price at the end of month  $t-1$ . The holding period return on a single security for single month will be denoted as  $H_{it}$  (the monthly holding period return of stock  $i$  in month  $t$ ).

The stocks are placed in their portfolios based on the P/E Ratio rankings, and the monthly returns on each portfolio computed assuming an equally weighting:

$$R_k^t(BH) = \sum_{i=1}^n W_i H_{it}$$

Come the next year, the portfolios are generated again based on the newly computed P/E Ratios and the P/B Ratios; the returns have been calculated on each of the portfolios for each of the next twelve months again.

### 3.5.3 MEASURING PORTFOLIO PERFORMANCE

The next step involves an analysis of the relative performance of each of the portfolios formed on the basis of each of the two multiples. The first step involves running an ordinary least squares regression using 9 years of monthly data on the excess returns of the individual portfolios (dependent variable) and the excess monthly market return (independent variable) in order to establish the beta of each portfolio. The beta provides a measure of systematic risk for each portfolio. The regression equation is as follows:

$$R_{pt} - R_{ft} = \delta_{pf} + \widehat{\beta}_{pf} [R_{Mt} - R_{ft}]$$

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<sup>8</sup>The benefit of using *returns*, versus prices in our analysis is for *normalization*, therefore enabling empirical testing of analytic relationships between two or more variables despite the fact that the price series may have unequal values.

- ✓  $R_{pt}$  is the continuously compounded return<sup>9</sup> on the P/E or P/B portfolios in month t
- ✓  $R_{Mt}$  is the continuously compounded return on the market portfolio (NSE 20-Share Index) in month t
- ✓  $R_{ft}$  is the continuously compounded risk free rate of return in month t based on the yields of the 91- day t-bills expiring at the end of each month
- ✓  $\eta_{pf}$  is the estimated intercept (differential measure of return)
- ✓  $\widehat{\beta}_{pf}$  is the estimated slope coefficient i.e. the systematic risk

Although monthly returns have been used in estimating the equation above, the comparison of the performance of returns on the portfolios has been based on an average of the annual return. (Annual return is simply the sum of the monthly returns).

Additionally, in assessing the performance of the portfolios, Friend & Blume, September, 1970 reiterated the idea of one-parameter measures of the investment performance of an asset or a portfolio. The rationale of this technique was a result of the Theory of Equilibrium in the Capital Markets, which was independently discovered by Sharpe, 1964, Lintner, 1965 and Treynor, 1965. The underlying principle of one-parameter measures of investment performance is to use a single measure of the relationship between risk and return which uses market data to combine the two dissimilar measurements of performance into a single measure which adjusts for differences in risk.

In this study, therefore, the three performance measures as employed by Sharpe, Jensen and Treynor are used to measure the portfolios' performance.<sup>10</sup>

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<sup>9</sup>The use of natural log returns enables us to calculate a rate of return on the holding, quoted in terms of a continuously compounded rate.

<sup>10</sup>The importance of these one-parameter measures of performance, and the associated theory of equilibrium in the capital markets, lies not only in their usefulness for analyzing investment management and market efficiency-areas of investigation to which they have already been applied but also in their relevance and potential utility for cost of capital problems.

### 3.5.3.1 THE SHARPE MEASURE

The Sharpe Measure of the portfolio is calculated as:

$$\frac{E(R_p) - R_F}{Var(R_p)}$$

The Sharpe Ratio is a measure of the reward to variability. In this context it should be expected that the Low P/E and P/B portfolios have a higher reward.

### 3.5.3.2 THE JENSEN MEASURE

If securities have not been correctly priced in the market, the returns take the following form:

$$E(R_p) - R_F = \eta_p + [E(R_M) - R_F]\beta_p$$

where  $\eta_p$  is a measure of disequilibrium. If  $\eta_i = 0$ , the portfolio or asset is in equilibrium.  $\eta_i$  is the simplest measure of portfolio performance and is known as the Jensen Measure. If  $\eta_i$  is greater than zero, the expected return is larger than one would anticipate on the basis of the equilibrium relationship.

In this context, the Jensen Measure is therefore the differential measure which indicates the excess or deficit return over or below that implied by the risk measure of the portfolio.

Based on this, the study forms two hypotheses for testing which are specifically contrary to Basu, 1977, findings:

- a) Hypothesis 1a: The differential rate of return (Jensen Measure) of low P/E and low P/B portfolios is NOT significantly different from zero

$$H_0: \eta_L = 0$$

$$H_1: \eta_L > 0$$

- b) Hypothesis 1b: The differential rate of return of high P/E and high P/B portfolios is NOT significantly different from zero

$$H_0: \eta_H = 0$$

$$H_1: \eta_H < 0$$

The basis of the null hypotheses is that markets price stocks efficiently and that value stocks and growth stocks do not earn greater or lesser returns (respectively). Rejection of the null implies that the P/E and P/B do affect the risk adjusted (differential) returns in the NSE.

### 3.5.3.3 THE TREYNOR MEASURE

The Treynor measure differs from the Sharpe measure which calculates the cost/return per unit of total risk. The Treynor measure is the reward to volatility.

$$\frac{E(R_p) - R_F}{\beta_p} = \frac{\eta_p}{\beta_p} + [E(R_M) - R_F]$$

The left side of the equation is the Treynor Measure of the portfolio. In this context it is expected that the Low P/E and P/B portfolios will have a higher measure compared to higher P/E and P/B portfolios.

## CHAPTER FOUR: RESULTS AND DISCUSSION

### 4.1 PRICE EARNINGS RATIO

The table below presents the results of the creation of portfolios based on P/E ratio. These portfolios are ranked from "High" P/E ratio to "Low." Use of the inverse of P/E (Earnings Yield) results in those stocks with negative earnings placed in "Portfolio 1 High". The "Portfolio 1\* High" is that which excludes those stocks with negative earnings firms; this approach mimics that by Basu, 1977.

**Table 1: P/ E Portfolio Results**

P/E BASED PORTFOLIOS	P 1 HIGH	P 1* HIGH	P 2	P 3	P 4	P 5 LOW
Average Excess Return	-0.1272	-0.0022	-0.0518	-0.0741	0.0340	0.0165
Beta Portfolio	0.8708	1.0186	0.8512	0.7934	1.0908	1.1294
T-Stat	12.0000	7.5700	8.9700	1.8900	3.9300	6.5100
P Value	0.0000	0.0000	0.0000	0.1000	0.0060	0.0000
Jensen Measure	-0.0988	0.0310	-0.0241	-0.0483	0.0695	0.0533
T-Stat	-4.6800	0.7900	-0.8700	-0.4000	0.8600	1.0600
P Value	0.0020	0.4550	0.4120	0.7040	0.4190	0.3260
Volatility	0.2742	0.3336	0.2691	0.4199	0.4020	0.3677
Sharpe Ratio	-0.4638	-0.0067	-0.1927	-0.1765	0.0845	0.0448
Treynor Measure	-0.1460	-0.0022	-0.0609	-0.0934	0.0312	0.0146
Adjusted R-Squared	0.9470	0.8756	0.9086	0.2440	0.6423	0.8320

These return results presented above do not directly contradict those found in the study of returns from April of 1957 to March of 1971 conducted by Basu. According to Basu's study, it was seen that during the period, the low P/E ratio portfolios had on average, a higher absolute and risk adjusted returns compared to the high P/E ratio portfolios.

For the results presented above, the only tell tale sign of any relationship between the P/E Ratio and the returns of stocks on the Nairobi Stock Exchange

is that the lowest P/E portfolio earns a higher return (1.65%) compared to the highest P/E portfolios (-12.72% and -0.22%).

However, for the intermediate portfolios, the sample reveals no monotonic relationship between expected excess returns and the P/E as it decreases (transition of returns from Portfolio 2 to Portfolio 4) as compared to the results found by Basu. The trend of the returns for the intermediate portfolios shows a decrease in returns as the P/E increases between Portfolio 2 and Portfolio 3 then an increase in the returns between Portfolio 3 and 4.

The same is seen for the Sharpe Ratio and the Treynor Measure. As much as the Low P/E Portfolio registers a higher Sharpe and Treynor Measure compared to both the High P/E Portfolios, the transition of the returns within the intermediate portfolios is not smooth and would in fact suggest the absence of any monotonic relationship between the P/E Ratio and the Returns of the Portfolios.

According to Basu, 1977, the systematic risk (beta) between the portfolios formed (highest to lowest) did not vary much and as a result the trend of returns could not be attributed to risk characteristics of the portfolios. The same results are seen here. However, there seems to be a positive correlation of 0.84997 between the beta of the portfolio and the average excess returns of the portfolios of stocks on the NSE.

Following from this, it is clear from the table above that the ability of the Excess Market Returns (NSE 20 Index) are quite successful in explaining the returns on the stock portfolios of the NSE without controlling for other effects such as firm size, Calendar effects, Book to Market Effects, etc. The Adjusted R-Squared varies from 0.2440 to 0.9470.

Given the high Adjusted R-Squared, it cannot be said that CAPM does not fit the data well in explaining the cross section of the returns. However, the P/E as a proxy for risk may have a say in the returns for the extreme portfolios (highest and lowest) but the factor is not well described in a linear fashion as has been evidenced by the intermediate returns.

On measuring P/E portfolio performance using the Jensen measure, the study forms two hypotheses for testing: (See Section 3.5.3.2 THE JENSEN MEASURE for explanation)

- a) **Hypothesis 1a:** The differential rate of return of LOW P/E portfolios is NOT significantly different from zero

$$H_0: \eta_L = 0$$

$$H_1: \eta_L > 0$$

- b) **Hypothesis 1b:** The differential rate of return of HIGH P/E portfolios is NOT significantly different from zero.

$$H_0: \eta_H = 0$$

$$H_1: \eta_H < 0$$

On the basis of the p-values, the null is rejected when the p-value is smaller than the level of significance (0.1, 0.05, and 0.01)

P/E RATIO PORTFOLIOS	P 1 HIGH	P 1* HIGH	P 2	P 3	P 4	P 5 LOW
P Value	0.0020	0.4550	0.4120	0.7040	0.4190	0.3260

### Hypothesis 1a

Based on the p-values of the Jensen Measure, the Jensen measure of the low P/E portfolio is not significantly different from zero at all significance levels. (Fail to reject null). This is contrary to Basu's findings where the low P/E Portfolios were found to have significantly positive differential returns.

### Hypothesis 2a

The Jensen Measure of the high P/E Portfolio 1 (including stocks with negative earnings) is significantly different from zero (reject null) while that of the high P/E Portfolio 1\* (excluding) is not significantly greater than zero at all significance levels (fail to reject null).

Therefore, having formed portfolios excluding the negative earnings stocks, the Jensen Measure of the portfolios is not significantly different from zero for both

high P/E and low P/E portfolios. This is contradictory to Basu, 1977, whose results suggest that low P/E Portfolios will have a positive risk-adjusted return; while stocks with high P/Es will have a negative risk-adjusted rate of return.

#### 4.2 PRICE TO BOOK RATIO

The table below presents the results of the creation of portfolios based on P/B ratio. These portfolios are ranked from "High" P/B ratio to "Low." Use of the inverse of P/B (BE/ME) results in those stocks with negative book values placed in "Portfolio 1 High". The "Portfolio 1\* High" is that which excludes the negative book value firms. This approach mimics that used for the P/E Portfolios.

**Table 2: P/B Portfolio Results**

P/B BASED PORTFOLIOS	P 1 HIGH	P 1* HIGH	P 2	P 3	P 4	P 5 LOW
Average Excess Return	0.0120	0.0222	0.0038	0.0238	-0.1619	0.0033
Beta Portfolio	0.8709	0.9353	1.0774	0.9969	1.1565	0.9486
T-Stat	5.8100	6.6600	6.4100	4.0100	7.3600	5.0300
P-Value	0.0010	0.0000	0.0000	0.0050	0.0000	0.0020
Jensen Measure	0.0404	0.0527	0.0389	0.0563	-0.1242	0.0343
T-Stat	0.9300	1.2900	0.8000	0.7800	-2.7200	0.6200
P-Value	0.3850	0.2380	0.4520	0.4620	0.0300	0.5520
Volatility	0.2958	0.3110	0.3598	0.3636	0.3718	0.3196
Sharpe Ratio	0.0406	0.0715	0.0106	0.0655	-0.4354	0.0104
Treynor Measure	0.0138	0.0238	0.0035	0.0239	-0.1400	0.0035
Adjusted R-Squared	0.8038	0.8442	0.8336	0.6528	0.8691	0.7524

Reviewed empirical findings on the influence of Price to Book ratios on cross sectional returns are uniform: lower price-to-book value stocks tend to outperform higher price-to-book value stocks.

These return results presented above contradict the above statement. It is seen that during the period under study, both the high P/B ratio portfolios (P 1 High and P 1\* High) have on average, higher excess returns (1.20% and 2.22%

respectively) compared to the lower P/B ratio portfolios (0.33%). The intermediate portfolio returns also reveal no linear monotonic relationship between expected excess return as P/B decreases. The returns increase from Portfolio 2 to 3 (0.385 to 2.38%) as the P/B decreases but then returns decrease from Portfolio 3 to 4 (2.38% to -16.19%) as the P/B decreases.

The same is seen for the Sharpe Ratio and the Treynor Measure. Both the High P/B Ratio Portfolios have higher measures compared to the lower P/B Portfolios. This is again in contradiction to empirical findings that suggest better portfolio performance of lower P/B Portfolios.

The beta of the portfolios formed (highest to lowest) does not vary much. The return behaviour and the beta variation of the different portfolios do not reveal a clear relationship between the two. However, from further analysis of the results obtained in this study, it is found that there is a negative correlation of -0.762883411 between the beta of the portfolio and the average excess returns of the P/B Based portfolios of stocks on the NSE. This again contradicts the norm in asset pricing whereby a higher systematic risk measure calls for higher returns rather than lower ones.

On measuring P/B portfolio performance using the Jensen measure, the study forms two hypotheses for testing:

P/B RATIO PORTFOLIOS	P 1 HIGH	P 1* HIGH	P 2	P 3	P 4	P 5 LOW
P-Value	0.3850	0.2380	0.4520	0.4620	0.0300	0.5520

- a) **Hypothesis 1a:** The differential rate of return of LOW P/B portfolios is NOT significantly different from zero

$$H_0: \eta_L = 0$$

$$H_1: \eta_L > 0$$

- b) **Hypothesis 1b:** The differential rate of return of HIGH P/B portfolios is NOT significantly different from zero.

$$H_0: \eta_H = 0$$

$$H_1: \eta_H < 0$$

### **Hypothesis 1a**

Based on the p-value of the Jensen Measure (0.5520), the Jensen measure of the low P/E portfolio is NOT significantly different from zero at all significance levels. (Fail to reject null).

### **Hypothesis 2a**

The Jensen Measure of the high P/E Portfolio 1 is NOT significantly different from zero (p-value 0.3850). That of the high P/E Portfolio 1\* is also NOT significantly greater than zero (p-value 0.2380) at all significance levels.

Based on these results, we can conclude that the P/B ratio has no influence on the differential returns on the Nairobi Stock Exchange either.

Similar to the results seen for the P/E portfolios the Adjusted R-Squared of the regression of the portfolio returns against the excess market (NSE 20 Index) Returns is high. The relation to the excess returns on the market is seen to be a significant risk factor for stocks trading on the exchange. The reverse is seen for the P/B Ratio as a risk factor. The Ratio has a contradictory effect on the cross section of returns of the portfolios formed. The average return, the Sharpe Measure and the Treynor Measure indicate that the High P/B Ratio Stocks take the upper hand.

## CONCLUSION AND RECOMMENDATIONS

The study provides insight into the predictability of the returns of stocks listed on the Nairobi Stock Exchange based on the Stock Multiples, The Price-Earnings Ratio and the Price-to-Book Ratio. The period of study is from January 2005 to December 2013.

We find weak evidence indicating that the Price-Earnings Ratio has any predictability power of the Cross Section of returns of stocks on the NSE. As discussed in the Results and Discussion Section above, the only indication of any relationship is that lowest P/E portfolio earns a higher return compared to the highest P/E portfolios. However, for the intermediate portfolios, the sample reveals no monotonic relationship.

For the Price to Book Ratio, it is seen that during the period under study, both the high P/B ratio portfolios (P 1 High and P 1\* High) have on average, higher excess returns compared to the lower P/B ratio portfolios. This contrasts empirical findings on the multiple's ability to predict cross sectional returns. The inverse of empirical studies holds for the sample examined here in. Similar to the results for the P/E Portfolio returns above, the intermediate portfolio returns reveal no linear monotonic relationship between expected excess return as P/B decreases.

The results, after taking into account other portfolio performance measures; therefore conclude that the P/E may be a proxy for risk to a small degree for the stocks returns in the context of the extreme portfolios (Highest P/E and Lowest P/E Portfolios). However, the risk factor is not well described in a linear fashion as has been evidenced by the intermediate returns. The differential returns of all the P/B Based portfolios are not significantly different from zero.

However, these contradictory findings could be the result of any of a number of things; first, this could be simply a result of a different sample and time-period.

For the Price Earnings Ratio, the main difference between Basu's paper and this study simply concerns the sample, (composition and size), and the length of the period of study. Basu uses a dataset which spans from September 1956 to August of 1971, and contains more than 1400 firms. This is different from this study which takes a sample size of 47 firms and looks at them over a period of years.

For the P/B Ratio, the key difference between this study and that done by Lakonishok, Vishny, & Shleifer, May 1993, is also the sample size and the length of the period of study. The empirical study by Lakonishok, et al used all companies listed on the NYSE and the American Stock Exchange over a 25 year period. The buy and hold strategy is maintained in this study although the Authors assumed the portfolios were held for five years.

Aside from possible sampling issues, numerous other possible explanations could exist for the change in return associated with P/B. For one, the market itself may interpret price-to-book ratios differently compared to developing markets therefore regarding Higher P/B Ratio assets as riskier.

It would be advisable to modernize the CAPM model used by Basu by using the 3-Factor or 5-factor model by Fama and French. A strong argument would be that The Basic CAPM may not adequately explain returns singly; meaning the high adjusted R-Squared denotes a spurious regression.

Another recommendation for this study would be a similar hypothesis testing in an emerging market in Africa over a longer range of years with the inclusion of more firms i.e. using data from an exchange much larger than the Nairobi Stock Exchange and with far more data availability.

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