Dividend Yield Investment Strategies in the South African Stock Market

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DECLARATION

I, Nelmarie Erasmus, declare that the research work reported in this dissertation is my own, except where otherwise indicated and acknowledged. It is submitted to fulfil the partial requirements for the Masters of Management in Finance and Investment degree at the University of the Witwatersrand, Johannesburg. This thesis has not, either in whole or in part, been submitted for a degree or diploma to any other institution or university for a similar qualification. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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ABSTRACT

The subject of this study posits the profitability of an investment strategy focused on high-dividend yielding securities from the South African stock market over the period of 10 years from 2002 to 2012. The study follows an expected dividend yield model, similar to the model proposed by Hsu and Lin (2010), for the construction of a high-dividend yielding portfolio. Financial data of listed companies' dividends and other financial information is used to estimate these expected current dividend yields by employing multiple regression analysis. It is suggested that these expected yields better reflect companies' future profitability than traditional current dividend yields. The results of the study show that the performance differences between the portfolios based on the expected dividend yield model and the benchmark portfolios are significant; however the tests of the model suggest that the model is not a good fit for the data.

GLOSSARY

FTSE/JSE Africa All Share Index

The FTSE/JSE Africa All Share Index is a market capitalization weighted index. Companies included in this index make up the top 99% of the total pre-free float market capitalization of all listed companies on the Johannesburg Stock Exchange. Hereafter only referred to as the All Share Index.

FTSE/JSE Africa Top 40 Index

The FTSE/JSE Africa Top 40 Index is a market capitalization weighted index. Companies included in this index are the 40 largest companies which are constituents of the FTSE/JSE Africa All Share Index ranked by market capitalization. Hereafter only referred to as the Top 40 Index.

FTSE/JSE Africa Mid Cap Index

The FTSE/JSE Africa Mid Cap Index is a market capitalization weighted index. Companies included in this index are the 60 largest companies which are constituents of the FTSE/JSE Africa All Share Index, not included in the FTSE/JSE Africa Top 40 Index, ranked by market capitalization. Hereafter only referred to as the Mid Cap Index.

FTSE/JSE Africa Dividend Plus Index

The FTSE/JSE Africa Dividend Plus Index is a yield weighted index designed to measure the performance of higher yielding securities. Companies included in this index are the 30 largest companies which are constituents of both the FTSE/JSE Africa Top 40 Index and the FTSE/JSE Africa Mid Cap Index, excluding real estate companies, ranked by their one-year forecast dividend yield. This index is reviewed semi-annually in June and December, of which the dividend yield data is based on the one-year dividends per share forecasts as sourced from McGregor BFA, divided by the price of the underlying security. Hereafter only referred to as the Dividend Plus Index.

BLOOMBERG FIELD DESCRIPTIONS

NET_INCOME

Net income (losses) is the profit after all expenses have been deducted. These expenses include non-recurring and extraordinary gains and losses.

CF_CASH_FROM_OPER

Total cash generated from a company's operational activities.

BS_TOT_ASSET

The total of a company's short- and long-term assets as reported on the Balance Sheet.

SALES_REV_TURN

Sales/Revenue/Turnover amounts to the total operating revenues less adjustments to Gross Sales. Adjustments to Gross Sales consist of returns, discounts, allowances, excise taxes, insurance charges, sales taxes, and value added taxes (VAT).

BS_ACCT_NOTE_RCV

Accounts and Notes Receivable includes trade receivables directly related with operating activities, net of the provision for bad debt.

BS_NET_FIX_ASSET

Net Fixed Assets includes depreciable and non-depreciable fixed assets held for own use, capitalized fixed assets, and rental properties, net of accumulated depreciation expenses. For mining companies capitalized exploration and development costs are included.

DIVIDEND_YIELD

The dividend yield is calculated by dividing the trailing 12month dividend per share by the last available price. The 12month dividend per share is disclosed in the income statement.

DVD_PAYOUT_RATIO

The Dividend Payout Ratio (%) is calculated as follows:

$$\left(\frac{Cash\ Common\ Dividends}{Income\ Before\ Extraordinary\ Items - Minority\ Interest - Cash\ Pref\ Dividends}\right) \times 100$$

* Note: The Dividend Payout Ratio is not computed if the denominator is negative.

IS_EPS

Earnings Per Share amounts to the bottom-line Earnings Per Share, which includes the effects of non-recurring and extraordinary gains (losses). It is calculated by dividing the Net Income Available to common shareholders by the Basic Weighted Average Outstanding Shares.

CUR_MKT_CAP

Current market capitalization accounts for the total current market value of all outstanding shares of a company, stated in the pricing currency. Market Capitalization is a measure of corporate size.

CF_FREE_CASH_FLOW

Free Cash Flow is calculated as the cash flow from operating activities less total capital expenditure, where capital expenditure is the amount spent on purchases of tangible fixed assets.

CAPITAL_EXPEND

The capital expenditure of a company is the amount spent on purchases of fixed (tangible) assets. The value is always negative. The amount may include intangible assets when not disclosed separately.

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1. INTRODUCTION

Within the field of finance, a substantial amount of work has been dedicated to the forecasting of future stock returns. In particular, the correlation between dividend yields and future stock returns have been of interest and importance in this regard.

1.1 Problem Statement

An investment strategy, in financial literature, is described as a methodical plan followed by investors in the financial markets in an attempt to accomplish superior returns through the buying and selling of financial assets (Pardo, 2008). These financial assets are constituents of the four main asset classes namely fixed income (cash and bonds), property, equities and derivatives.

Investors in equity markets are greatly concerned with the performance of companies listed on the stock exchange in their attempt to achieve higher than average returns on their portfolios. In recent years a number of studies have been dedicated to investment strategies based on dividend yields in order to improve returns on a portfolio, of which one of the most disputed topics relates to whether high dividend yields relate to high rates of return. High dividend yields, low price-to-book ratios, low price-to-earnings ratios and low expected growth rates are typical characteristics attributed to so called value securities, as enumerated by Visscher and Filbeck (2003). Therefore, investment strategies based on high dividend paying securities can be classified under the broader investment strategy known as value investing. Value investing is a strategy followed by investors in pursuit of identifying securities deemed as undervalued in the stock market, in order to profit from these securities which were bought at a discount.

Studies conducted on investment strategies based on dividend yields have however produced diverse outcomes in different countries. The Dow-10 investment strategy, or better known as the *Dogs of the Dow* strategy, is one of the seemingly more popular dividend yield investment strategies found to be followed by investors in the United States. This strategy entails the purchasing of the 10 highest dividend yielding securities from the 30 blue chip companies in the Dow Jones Industrial Average (DJIA). At closer investigation, McQueen et al. (1997) found that a portfolio following the *Dogs of the Dow* strategy yielded statistically superior returns in comparison to the market benchmark, which consists of all 30 shares, throughout the period under analysis. Similar studies based on the *Dogs of the Dow* strategy have been replicated in the Canadian stock market (Visscher & Filbeck, 2003) as well as the Polish stock market (Brzeszczynski & Gajdka, 2008), where the portfolios composed of the 10 highest dividend yielding securities were found to achieve superior risk-adjusted returns

in comparison to returns achieved by the market. The return of a portfolio is adjusted for risk in order to be compared meaningfully against its chosen benchmark. Possible risk-adjusted performance measures that can be incorporated include Sharpe's Ratio and Treynor's Measure amongst others.

However, the replication of the *Dogs of the Dow* strategy in the British stock market have lead to less desirable results, and returns - both unadjusted and risk-adjusted - have been found ineffective in the attempt to outperform the market (Filbeck & Visscher, 1997). Another study conducted on the British stock market by Gwilym et al. (2005) pertaining to dividend yield investing strategies demonstrated similar results, as Gwilym et al. (2005) maintained that excess returns tend to disappear after appropriate adjustment for risk has been taken into account. It is clear from these findings that dividend trading strategies have contributed mixed results, depending on the market under investigation.

1.2 Purpose of the Study

The purpose of this study is to investigate whether the strategy of investing in securities based on estimated high dividend yields, conducted on data from the Johannesburg Securities Exchange (JSE), will yield superior returns in comparison to the market. The study will be based on a model similar to the one proposed by Hsu and Lin (2010) in determining 30 companies to be included in the portfolio. The data used in the study will include the constituents of both the Top 40 Index and the Mid Cap Index, in order to closely resemble the Dividend Plus Index. The benchmarks employed in this study include both the All Share Index as well as the Dividend Plus Index.

1.3 Background Literature

It is evident from past studies that researchers tend to construct portfolios following a dividend yield strategy based on the rankings of current dividend yields, as seen with the *Dogs of the Dow* strategy. One explanation of this approach, applied by researchers, is the dividend information signalling theory, where dividend announcements are interpreted as information signals communicated by managers to the market – since management is believed to have better insights into the future prospects of their company. The dividend information signalling theory suggests that management uses the increase in the level of dividends announced as a communication tool to convey a message of a company's strong future prospects. Even more importantly, the dividend information signalling theory suggests that companies with higher dividend yields are generally regarded as having greater information content than companies with lower dividend yields (Bhattacharya, 1979; Miller & Rock, 1985).

According to a study done by Hsu and Lin (2010), investors are likely to face a myriad of problems when constructing their portfolios based solely on the ranking of current dividend yields. One of the possible problems investors might face involves circumstances where managers with free cash flow at their disposal, such that cash flow levels are above the levels required to finance all projects with a positive net present value, may choose to increase dividend levels in order to reimburse shareholders for capital losses incurred in previous years, or choose to reduce predacious acquisition intent. Jensen (1986) confirms this statement in his theoretical study by arguing that excess cash will not go to waste. Another possible problem investors might face relates to high dividend yield levels simply being a result of a decrease in security prices, which has the effect of higher dividend yields even though the dividend levels remained unchanged, and therefore conveys no real information content (Van Zyl et al., 2006).

It is of utmost importance for both researchers and investors to pay attention to these problems when constructing a portfolio based on dividend yield rankings, in order for them to select the correct potentially profitable (winning) securities in their quest to accomplish superior returns. Harada and Nguyen (2005) found that investors can expect companies with positive earnings trends and promising financial information and ratios to increase their dividend levels, which supports the idea that they should take heed of the abovementioned problems. However, they argue that unexpected increases in dividend levels merely arise from overly confident managers creating ‘noise’ in the market as opposed to conveying valid information to their investors.

It can therefore be deduced that researchers and investors that construct their portfolios based solely on current dividend yields of companies, considering all of the potential problems faced, may result in the inclusion of potentially profitable securities when they are actually not. This may lead to investors being unsuccessful in their pursuit of outperforming the relevant market.

In an attempt to improve this situation, Hsu and Lin (2010) constructed a model based on a re-estimated dividend yield, attempting to construct a high dividend yield portfolio capable of risk-adjusted returns superior to that of the relevant market, while attempting to exclude the ‘noise’ made by the overly confident managers. They refer to this re-estimated dividend yield as the ‘expected current dividend yield’.

1.4 Objectives of the Study

The main objective of the study is to investigate the returns of a portfolio constructed based on an expected dividend yield model similar to that of Hsu and Lin (2010), compared to:

(a) The returns from the Dividend Plus Index
(b) The returns from the All Share Index

These comparisons will conclude whether a portfolio based on a model similar to that of Hsu and Lin (2010) can yield superior results in the South African stock market.

This study aims to identify whether the expected dividend yield model can be applied successfully to South African equity data, in an attempt to make an empirical contribution to the discussion of whether high dividend yield portfolios can lead to the outperformance of the market in South Africa.

The limitations of the study arise due to the fact that only dividend declaring large- and midcap companies listed on the JSE are included. Property companies will be included in the study, unlike the methodology followed in the construction of the Dividend Plus Index. It is unclear from research done on the Dividend Plus Index as to why property companies are excluded. Dividends of preference shares and special dividends are not included in this study, since the dividend yield considered only takes into account dividends paid on ordinary shares. Only dividends declared during the period of 2001-2011 will be considered. Since companies declare dividends at different times during the year, data sourced for this study will have to be adapted in such a way that all input information on companies are uniform with regard to the time periods used in the application of the model.

1.5 Methodology

The measurement of a high dividend yield portfolio yielding excess returns in comparison to a market related benchmark will be based on a model similar to the one constructed by Hsu and Lin (2010):

$$DivYield_t = \beta_0 + \beta_1 DPR_t + \beta_2 EPS_t + \beta_3 {}^{M_t}/_{A_t} + \beta_4 Size_t + \beta_5 DivYield_{t-2} + \beta_6 {}^{FreeCashFlow_t}/_{Equity_t} + \beta_7 DA_t + \varepsilon_t$$

Where:

t denotes half-yearly time periods;

$DivYield_t$ is the dividend yield for period *t*;

DPR_t is the dividend payout ratio for period *t*;

EPS_t is the attributable earnings per share for period *t*;

M_t/A_t is a proxy variable referring to the opportunities for investment growth in period *t* where M_t refers to the market value of the company and A_t to the total assets of the company at the end of period *t*;

$Size_t$ refers to the company's size at the end of period *t*;

$DivYield_{t-2}$ is the dividend yield for period *t-2*;

$FreeCashFlow_t/Equity_t$ refers to the amount of cash available to be paid to the shareholders at the end of period *t*;

DA_t is the discretionary accruals for the period *t,* and serves as a measure for earnings manipulation;

ε_t is the error term;

$\beta_0, \beta_1, \ldots, \beta_7$ are coefficients of the model.

The portfolios constructed based on the expected dividend yield will be done by using the following approach:

(a) The expected dividend yield model will be used to test the financial data with a sample period of 11 years (2001 – 2012).
(b) The coefficients, as estimated by the model, will be used in conjunction with the periodic data collected to calculate the expected dividend yields.
(c) These expected dividend yields will be sorted and ranked in descending order from which a portfolio, consisting of the top 30 companies, will be constructed. This is in line with the number of companies included in one of the benchmark indices employed in this study, namely the Dividend Plus Index.
(d) The anticipated portfolio will be invested in the imminent period.
(e) The process will be repeated for all future rolling periods.

A detailed description of the approach utilized is discussed in Section 3.3.

1.6 Outline of the Study

This thesis is structured in the following way. Section 2 presents the literature review of the study relating to the effect of dividend yields on a security's return. Section 3 consists of the data implemented for this study and the research methodology applied consisting of the quantitative model and its associated variables. Section 4 presents the empirical results of the investigation in order to address the objective of the study as to whether it is possible for such a portfolio to outperform the market benchmarks. Lastly, Section 5 contains conclusions and recommendations drawn from this study.

The forecasting of future stock returns have long been of interest to both practitioners and financial researchers in an attempt to create portfolios that outperforms the relevant benchmarks involved. A substantial amount of work has been dedicated in particular to the effect of dividend yields on stock returns which provides a strong foundation for the logic behind dividend yield investment strategies and will be discussed in the consequent chapter.

2. LITERATURE REVIEW

Over the years an overabundance of theories and studies relating to dividends and companies' dividend policies have been formulated and tested, which led to a well-founded basis as to the reasoning behind dividend yield investment strategies.

2.1 Investment Approaches and Trading Strategies

In academic literature, investment is generally defined as the current commitment of money, based on fundamental research, to real and/or financial assets in the expectation of accumulating wealth over time. It is important to note that the accumulation of wealth not only consists of an increase in the value of the assets invested in, but also from the cash flows generated by these assets (Bodie et al. 2005). By investing in the equity of a company, investors receive a share of ownership which entitles them to receive any dividends the company may decide to pay, even though no particular payments are promised. The accumulation of wealth, when considering investment in equities, therefore consists of an increase in the value of the security as well as dividends received.

The primary goal of investment management is to maximize the return and minimize the associated risk for their investor, in order to outperform the market in question over a certain period of time. The return achieved should compensate the investor for consumption deferred over this period, inflation (the reduction of purchasing power due to an increase in prices of goods and services) as well as the risk associated with the investment. Due to the uncertainty of expected future financial benefits, it is important for investment managers to limit their exposure to any particular asset by means of diversification. In a portfolio compiled of high-dividend yielding securities, diversification is achieved by investing in various companies across various industries on the stock exchange.

Investment managers have to choose between following a passive- or active investment management strategy, which is associated with the Efficient Market Hypothesis. It is helpful to briefly mention the Efficient Market Hypothesis (EMH) as well as the Random Walk Hypothesis (RWH) as developed by Eugene F. Fama (Fama, 1965; Fama 1970). The premise of the EMH is that information is equally available to all market participants and is therefore almost instantaneously reflected in the current market prices of securities. The EMH depicts that because of market efficiency, profitable opportunities based on technical analysis and information based trading are eliminated, which leads to a random walk of security prices. It can be deduced that the more efficient the market, the more random the security price series (Liu & Maddala, 1992), which in turn implies that in effect, all efforts to pick securities for an investment strategy attempting to yield superior returns are indeed

futile. It should be emphasized that a random walk of security prices however does not imply market efficiency, since a random walk is defined by the independence of security price changes.

That being said, Bodie et al. (2005) mention the following in their book with regard to efficient markets concerning the choice between investment management strategies:

> Passive management calls for holding highly diversified portfolios without spending effort or other resources attempting to improve investment performance through security analysis. Active management is the attempt to improve performance either by identifying mispriced securities or by timing the performance of broad asset classes… If the efficient market hypothesis were taken to the extreme, there would be no point in active security analysis (p.38).

The question then remains: why follow an active investment-management approach if markets are efficient and all relevant information is reflected in the prices of securities? The answer is quite simple: even though the market is efficient, the market is not perfectly efficient. It is these near-efficient conditions that create profitable opportunities for diligent investment managers to exploit even minor mispricing of securities in the market, when compiling their investment portfolios. It is clear why there is value in opting for an active investment-management approach.

Dividend yield investment strategies fall under the broad class of value investing. As mentioned earlier, Visscher and Filbeck (2003) regards securities with high dividend yields, low price-to-book ratios, low price-to-earnings ratios and/or low expected growth rates as typical characteristics of value securities, whereas growth securities demonstrate the opposite of these characteristics. Fama (1998) argues that investors initially overreact negatively (positively) to undesirable (desirable) financial news about a company, which leads to the creation of value (growth) securities. Once the market has adjusted fully to these overreactions, it is to be expected that value securities will outperform the growth stocks.

This paper considers a dividend yield investment strategy, which belongs to the value investing class by following an active invest-management approach, aiming to yield superior results in our quest to outperform the market.

2.2 Theory of Dividends and the Dividend Policy

Investors' compensation for holding securities of a company consists of regularly scheduled dividends and probabilistic capital gains or losses, due to an increase or decrease in the value of the security. The dividends paid to shareholders represent a distribution of the after-tax profits of a company and are paid out of current or past-retained earnings.

When considering constructing an investment portfolio based on the information of dividends paid out by publicly traded companies, it is important to briefly take note of corporate dividend policy and the effect it has on current security prices. Dividend policy is of importance to the management of a company, since they have to decide not only whether to pay dividends or not, but also on how much they should pay.

The prominent irrelevance theory of dividend policy proposed by Miller and Modigliani (1961) contend that dividend policies, under a strong setting of ideal market conditions, do not have an effect on security valuations of companies. These ideal market conditions necessitate perfect markets, where investors' behaviour is rational, as well as perfect certainty in terms future profits for every company. This theory suggests that the dividend payout policy a company chooses to follow will neither affect its security price, nor would it affect the total returns to its shareholders - given the investment policy they choose to follow in order to enhance their market value. From these suggestions it can be deduced that dividend signals will not arise and that companies' future returns can therefore not be associated with dividends declared or any other dividend indicator, including dividend yields. In line with this theory is the study conducted by Black and Scholes (1974) in which their findings were inconclusive as to whether the dividend policy of a company affected its security price, since they were unable to prove that different dividend yields lead to different security returns.

To serve as evidence, Black and Scholes (1974) stated:

> … if a corporation could increase its share price by increasing (or decreasing) its payout ratio, then many corporations would do so, which would saturate the demand for higher (or lower) dividend yields, and would bring about an equilibrium in which marginal changes in a corporation's dividend policy would have no effect on the price of its stock (p.2).

Based on the findings by Miller and Modigliani (1961) and Black and Scholes (1974), the expectations of superior performance of a dividend yield portfolio in relation to the market seems to be impossible both in theory and market efficiency.

In an attempt to relax the assumption of market efficiency as proposed in the dividend irrelevance theorem by Miller and Modigliani (1961), a catering theory of dividends was developed and tested by Baker and Wurgler (2004). The catering theory suggests that the company caters for their investors' needs. They're focus was on the dividend premium, defined as the difference between the average market-to-book ratio of dividend payers and non-dividend payers, as the driving force behind the decision to pay dividends. In their findings, Baker and Wurgler (2004) suggested that dividends are highly relevant to prices of securities, as management recognizes and caters for investors' demands by paying dividends when investors put a premium on dividend payers and not paying when investors prefer non-dividend payers. The source of this demand for dividends appears to be sentiment-driven.

It is important to note however, that these findings are based on the sole purpose of whether to pay dividends or not and not as to how much to pay. Li and Lie (2006) extended the catering theory developed by Baker and Wurgler (2004) to address the shortcoming as to why companies change their level of dividends. This drawback in the study of Baker and Wurgler (2004) is quite significant, since empirical evidence suggests that management are more likely to face decisions relating to the change of current dividend levels, as opposed to whether to introduce maiden dividends or to eliminate existing dividends.

According to Li and Lie (2006) companies are more likely to increase dividends and by greater levels if the dividend premium is high, which tends to lead to inflated stock prices and vice versa. Thus, both Baker and Wurgler (2004) and Li and Lie (2006)'s studies contended that the capital market rewards managers for making dividend decisions bearing in mind investors' demand.

Prior to the seminal theory formulated by Miller and Modigliani (1961), a different approach of dividend theory by Lintner (1956) suggested that dividend payment was indeed relevant to rates of returns of companies. Lintner (1956) found that managers of companies believe that the market puts a premium on security prices of companies maintaining stable dividend policies and therefore have the desire for keeping a reasonably stable dividend rate.

The importance of the dividend policy of a company is clearly a major problem for management since the main concern still remains the stability of the payout ratio, unless an increased (or decreased) level of future earnings is apparent.

The use of dividend payments by management to convey information with regard to their belief about future prospects of the company, since it depends on the belief that a

company's management often possesses privileged information about its future expectations regarding earnings, is known as the dividend signalling hypothesis of Miller and Modigliani (1961). It can be interpreted that firms increase (or decrease) dividends to convey management's optimistic (or pessimistic) outlook for future earnings prospects, as mentioned in a paper by Bhana (1998).

The asymmetry of information, meaning that managers possess more information regarding the future prospects of a firm than its investors do, has been extensively debated in the corporate finance literature. Bhattacharya (1979), Miller and Rock (1985) and John and Williams (1985) attempted to elucidate these asymmetries by developing theoretical models in which companies signal private information by means of changes in dividends, revealing security prices adjusting to new equilibrium levels in response to these dividend decisions. It has been thought that therefore management conveys information regarding future profitability and cash flow through its dividend policy, thus enabling investors to assess the real market value of the firm. Management may also try to keep consistent levels of dividends, as opposed to decreasing dividend levels, in an attempt not to mistakenly convey a message of bad news to investors.

2.3 Dividend Yield and Dividend Yield Investment Strategies

As an introduction, an important yield associated with securities is the dividend yield. The dividend yield is a reflection of the interrelationship between dividends paid and the market price of the security and expresses the dividend as a percentage of the security price. According to Van Zyl et al. (2006):

> From this the dividend rate is calculated as the dividend in cents per share divided by the par value of the ordinary shares (the price at which the shares were originally issued and sold to the public). The dividend yield or cash yield can be calculated in one of two ways. The calculation can either be the dividend in cash per share over the last 12 months expressed as a percentage of the company's current market price of the share, or the dividend yield calculated as the nominal value of the company's shares divided by the market price of the share multiplied by the dividend rate (p. 335-336).

High-dividend yield investment strategies have been in existence for numerous years. The outstanding returns generated by these investment strategies have won support from both the academic community (Filbeck & Visscher, 1998; Gwilym et al,, 2005; Brzeszczyński & Gajdka, 2007) as well as practitioners. Even though it is evident from earlier studies

performed on dividend yield investment strategies that mixed results were observed depending on the market under investigation, there is still scope of testing these strategies in the South African stock markets.

In practice we find that investors prefer cash dividends due to their informational content, since a change in dividend is often followed by a change in the market price of the security. There are several other potential motivations for the preference of dividend-paying securities being held by investors in their portfolios. First, retirees and investment funds such as pension funds need to invest in assets that provide a reasonably stable income stream, in order to meet liabilities such as expenditure incurred and benefits to be provided to their members at some time in the future. It is deemed to be cheaper and easier to receive dividends, as opposed to selling or borrowing against stocks (Black & Scholes 1974). Second, dividend paying firms are predominantly mature firms and are therefore commonly perceived as less risky by investors. Third, firms declaring high dividends not only present their prosperous cash flow, but also reflect the financial ability of management to exercise restraint. These needs of investors collectively taken into account can result in a portfolio consisting of high dividend yielding firms outperforming other market performance indicators.

Arnott et al. (2005) was successful in constructing such a portfolio – a dividend-weighted index constituent of mature firms characterized by lower return volatility and lower perceived growth prospects - that proved to outperform other higher risk conventional market performance indices. One of the articles on the subject matter found, based on the South African stock market, investigates as to whether “dividend investing” have added benefits for the South African investor (Wolmarans, 2000). The study concluded that the dividend yield is less successful in determining a portfolio likely to outperform another portfolio than that of a portfolio determined by the earnings yield of a firm. Wolmarans (2000) assigns this to the unstable dividend policies of large companies in South Africa compared to other countries. A study done by Bhana (1998) on the effect of firms’ dividend policy on South African security prices, has found evidence that policies do not appear to influence returns realized on their securities.

The question remains: how does the much debated topic of dividend yield investment strategies relate to the South African stock market? And more so, is there any merit in the findings of Bhana (1998) and in particular Wolmarans (2000)’s study?

To justify the concerns raised with regards to the findings of studies done concerning dividends and dividend yields on South Africa data, 3 simple graphs depict the probable existence of a relationship between dividend yields and security prices. These graphs are

normalized by scaling to 100 in order to identify the relative variation between the two indices plotted against each other.

Figure 1 plots the Dividend Plus Index against the All Share Index. It is clear that the Dividend Plus Index has outperformed the All Share Index and has consistently done so over the period of 2009 to 2012.

Figure 1: Comparison between the Dividend Plus Index and the All Share Index

Figure 2 plots the Dividend Plus Index against the Top 40 Index. The Dividend Plus Index has visibly outperformed the Top 40 Index and has consistently done so over the period of 2009 to 2012.

Figure 2: Comparison between the Dividend Plus Index and the Top 40 Index

Figure 3 plots the Dividend Plus Index against the Mid Cap Index. It is evident that the Dividend Plus Index seems to track the Mid Cap Index and offers potential periods of outperformance.

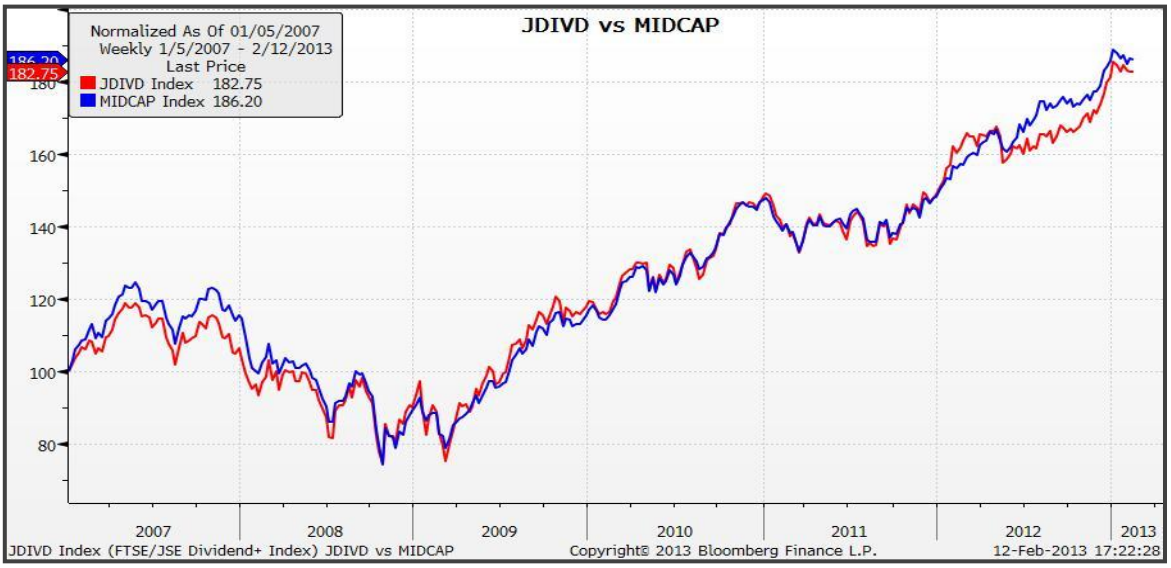

Figure 3: Comparison between the Dividend Plus Index and the Mid Cap Index

It is beneficial to not only consider the figures plotting the All Share, Top 40 and Mid Cap Indices against the Dividend Plus Index, but also to analyse the correlation between these indices. The correlation between two variables measures the degree of linear relationship between the variables. It is evident that the Dividend Plus Index is less correlated with the Top 40 and the All Share Indices than the Mid Cap Index. This can be ascribed to the fact that the Top 40 Index is characterized by mature companies offering growth opportunities as opposed to the Mid Cap companies offering value opportunities. These value opportunities are signalled by high dividend yields amongst others, providing sufficient explanation for the above assumption.

	All Share Index	*Top 40 Index*	*Mid Cap Index*	*Dividend Plus Index*
All Share Index	1			
Top 40 Index	0.994355130	1		
Mid Cap Index	0.925384495	0.879997723	1	
Dividend Plus Index	0.915157198	0.875772349	0.970026571	1

Table 1: Correlation Matrix of the Indices

Taking into account the inferences drawn from both the graphical and numerical information conveyed above, it is evident that there is room for improvement regarding studies done on the role of dividends in the South African market, as well as the potential value high dividend yielding securities can add to an investment portfolio.

3. DATA AND METHODOLOGY

This study employs a model similar to the more robust model proposed by Hsu and Lin (2010) in the examination of dividend yield investment portfolios constructed from high-dividend yielding South African securities, in order to attempt to address the weaknesses of portfolio construction based on ranking of current dividend yields as mentioned in section 1.2.

3.1 The Regression Model

The measurement of a high dividend yield portfolio yielding excess returns in comparison to the market related benchmark, the Dividend Plus Index and consequently the All Share Index, is based on the expected dividend yield model, similar to the model constructed by Hsu and Lin (2010).

The model is employed by applying regression analysis, such that explicit information from a company is regressed in order to calculate an implicit dividend yield. One disadvantage of however, is that there may not be enough observations in the estimation period to obtain reliable parameter estimations for multiple linear regression.

The expected dividend yield model is represented as follows:

$$DivYield_t = \beta_0 + \beta_1 DPR_t + \beta_2 EPS_t + \beta_3 {}^{M_t}/_{A_t} + \beta_4 Size_t + \beta_5 DivYield_{t-2} + \beta_6 {}^{FreeCashFlow_t}/_{Equity_t} + \beta_7 DA_t + \varepsilon_t$$

Where:

t denotes half-yearly time periods;

$DivYield_t$ is the dividend yield for period *t,* calculated by dividing the dividend per share for period *t* by the price of the security at the end of period *t*;

DPR_t is the dividend payout ratio for period *t,* calculated by dividing the dividends paid for period *t* by the company's equity at the end of period *t*;

EPS_t is the attributable earnings per share for period *t* as published on Bloomberg, calculated by dividing the difference between the net profit for period *t* and the preference dividend for period *t* by the average number of shares for the period;

M_t/A_t is a proxy variable referring to the opportunities for investment growth in period *t,* calculated by dividing the market capitalization (M_t) by the total assets (A_t) as at the end of period *t*;

$Size_t$ refers to the size of the company at the end of period *t,* calculated by taking the natural logarithm of total assets at the end of period *t*;

$DivYield_{t-2}$ is the dividend yield for period *t-2,* calculated by dividing the dividend per share for period *t-2* by the price of the security at the end of period *t-2*;

$FreeCashFlow_t/Equity_t$ refers to the amount of cash available to be paid to the shareholders at the end of period *t,* calculated by dividing the free cash flow for period *t* by the equity at the end of period *t*. Free cash flow for period *t* is calculated by subtracting cash invested to maintain capacity (capital expenditure) in period *t* from cash generated from operating activities in period *t* (King et al., 1997);

DA_t denotes the discretionary accruals which refers to the earnings manipulation variables for quarter *t,* calculated by employing the modified Jones Model (Dechow et al., 1995) as explained in a tutorial by Keefe (n.d.);

ε_t is the error term representing the composite effect of the independent variables not explicitly stated in the model

$\beta_0, \beta_1, \ldots, \beta_7$ are parameters of the model, representing the estimated relationships of the independent variables to the dependent variable

The portfolios are constructed using the following approach:

(a) The expected dividend yield model is used to test panel data consisting of 10 retrospective periods

(b) The estimated coefficients are then used in conjunction with the periodic data collected to calculate the expected dividend yields

(c) These expected dividend yields are ranked in descending order and a portfolio is compiled consisting of the top 30 ordered securities

(d) The anticipated portfolio is invested in the imminent period

(e) The process is iterated for all future rolling periods

3.2 Model Variables

Regression analysis is a statistical methodology that uses the relationship between two or more quantitative variables in order to predict a response from the other variables.

3.2.1 Measuring the Dependent Variable

The current dividend yield is used as the dependent (response) variable in this study. Recall from above that $DivYield_t$ is calculated by dividing the current dividend per share for period *t* by the price of the security at the end of period *t.*

3.2.2 Choosing Independent Variables

The independent variables are data items chosen in such a way that it should convey some relationship to the dividend yield.

The independent variables used in the model are defined as follows:

Current Dividend Payout Ratio (DPR): The expectation in the application of the expected dividend yield model is that the dividend payout ratio will relate positively with the current expected dividend yield. This implies that an increase (or decrease) in the payout ratio will lead to an increase (or decrease) in the current expected dividend yield. This links up with the study done by Lintner (1956) in which he suggested that the stability of dividend payments were relevant when uncertainty revolves around the future prospects of a company. In the paper by Miller and Modigliani (1961) it is also stated that management will stick to the company's targeted dividend payout ratio set.

Attributable Earnings per Share (EPS): In a paper by Nissim and Ziv (2001) the relation between the changes in dividend levels and future profitability was measured in support of the information signalling hypothesis. The study conveyed a positive relationship between dividend changes and the future profitability of firms, hence supporting the hypothesis regarding the informational content. Also supporting the signalling theory is the study conducted by Firer et al. (2008), in accordance with the paper by Brav et al. (2003), on the dividend policy in South Africa in which they have found that South African managers target a payout ratio in order to avoid dividend decreases in future should profits be less than desirable. The expectation with regards to the earnings per share variable is positively related with the current expected divided yield in the application of the model.

Investment Growth Opportunities $({}^{M}/_{A})$: The opportunities for investment growth are expected to be negatively related with the current expected dividend yield. In an attempt to solve the capital structure puzzle, Myers (1984) proposed a modified pecking theory when it

comes to companies needing to finance investment opportunities. This theory shows that companies prefer to finance investment opportunities with internally generated cash and will gradually adapt their target dividend payout ratio, due to the stickiness of dividend policies, accordingly.

Size of the Company ($Size$): With regards to the distribution of cash dividends, a study by DeAngelo et al. (2004) shows that a relationship exists between companies' size and their dividend payouts, such that the larger the company the greater the amount of dividends distributed to their shareholders. The effect with regards to the dividend yields of these larger companies will however be relatively small, since capital available to large companies are much greater as opposed to capital availability to the smaller companies. The size of the company is therefore expected to be negatively related to the expected current dividend yield.

Previous Dividend Yield ($DivYield$): The previous dividend yield is expected to be positively related to the expected current dividend yield. This implies that an increase (decrease) in the previous dividend yield will lead to an increase (decrease) in the current expected dividend yield. Again, linking up with the study done by Lintner (1956) in which he suggested that the stability of dividend payments were relevant when uncertainty revolves around the future prospects of a company.

Free Cash Flow to Equity ($FreeCashFlow/_{Equity}$): The change in free cash flow is expected to be positively related to the expected current dividend yield. The free cash flow is self explanatory, seeing that a rise in the profits of a firm will lead to an increase in its cash flow. These increased cash flows will lead to management possibly revising the current dividend payout policy, in order to keep the shareholders' best interest at heart (Lintner 1956).

Discretionary Accruals (DA): The discretionary accruals variable serves as a proxy for the quality of a company's earnings reflecting management's choices. The influence management has with regards to the company's dividend payout policy may lead to creative accounting practices in order to manipulate earnings. To make the measurement of the model more stringent, the discretionary accruals variable is added as a proxy for possible manipulation of earnings. A high amount of discretionary accruals indicates lower-quality earnings and can be seen as a warning that management may be overstating earnings by making use of these mentioned creative accounting tactics. The direction of earnings manipulation is uncertain and we have no expectation with regards to the relation it has with

the expected current dividend yield. In calculating discretionary accruals, the modified Jones Model (Dechow et al., 1995) as explained in a tutorial by Keefe on Investopedia, will be employed.

The model is represented as follows:

$$NOA_t/_{ASSETS_{t-1}} = \delta_0 + \frac{\delta_1}{ASSETS_{t-1}} + \delta_2 \left(\Delta SALES_t - \Delta REC_t/_{ASSETS_{t-1}}\right) + \delta_3 \, PPE_t/_{ASSETS_{t-1}} + \vartheta_t$$

Where:

NOA_t is net operating accruals for the period *t,* calculated as net income for the period *t* minus cash flow from operations for period *t*;

$ASSETS_{t-1}$ is the lagged total assets for the period such that is the total assets for period *t-1*;

$\Delta SALES_t$ denotes the change in sales calculated as the sales at the end of the period minus the sales at the beginning of period;

ΔREC_t denotes the change in accounts receivable calculated as the receivable accounts at the end of the period minus the receivable accounts at the beginning of the period;

PPE_t denotes the net property, plant and equipment for the period *t*;

ϑ_t denotes the error term.

Note: The error term ϑ_t is the estimate of discretionary accruals. The residuals obtained from this analysis are utilized in the expected dividend yield model as an independent variable. A high level of discretionary accruals relative to other companies included in the universe would indicate relatively poor earnings quality, whereas a low level would indicate the opposite.

3.3 Study Approach

To clarify any uncertainties in the methodology followed in constructing the portfolios based on the proposed model, a detailed approach is outlined below.

3.3.1 Regression Analysis

In the estimation of the expected dividend yield, company-specific data for each independent variable are used across several periods in time. In essence, data sets (consisting of both the dependent and independent variables) are sourced from each company over a number of consecutive periods.

The scope of the model is specific to companies listed on the JSE with the tendency of regular dividend payments to shareholders. The returns of the proposed portfolio are calculated through the use of semi-annual data.

The table below outlines the sample periods used to estimate the dividend yields in determining the proposed investment portfolios. Half yearly periods are denoted by H1 and H2:

Sample Period	Estimated Dividend Yield	Proposed Investment Date
H1 2001 - H2 2005	H1 2006	H1 2007
H2 2001 - H1 2006	H2 2006	H2 2007
H1 2002 - H2 2006	H1 2007	H1 2008
...	...	...
H1 2006 - H2 2010	H1 2011	H1 2012
H2 2006 - H1 2011	H2 2011	H2 2012

Table 2: Half-yearly Sample Periods

3.3.2 The Portfolio

The portfolio is constructed based on the expected dividend yield model proposed by the study. The proposed portfolio will be constructed of 30 securities selected from the constituents of the Top 40 and Mid Cap Indices. The initial investment in H1 2007 for each company is based on the dividend yield as estimated for H1 2006. The first step in determining an estimation of the dividend yield for this period will be to estimate the coefficients ($\beta_0, \beta_1, \ldots, \beta_7$) in the model, through the use of data sets over 10 retrospective periods, H1 2001 to H2 2005. Actual data sourced for H1 2006 together with these estimated coefficients are then used in the calculation of the estimated dividend yield.

The reason for the use of expected dividend yields estimated for H1 2006 as opposed to H2 2006 is due to the fact that actual data on financials and dividends for H2 2006 will not yet

be available at date of investment, H1 2007. The estimated expected dividend yields, to some extent already portray the most recent information available as communicated by financial statements and dividends paid, since the data for H2 2006 is only available to the market in H1 2007 as stated earlier – not in time for investments to be made in the selected securities for inclusion in the portfolio for H1 2007. Similarly, for the investment period of H2 2007, the expected dividend yields are estimated for H2 2006 by using data obtained over the sample period of H2 2001 to H1 2006. These 10 consecutive semi-annual periods are effectively just rolling forward for each of the subsequent periods the expected dividend yields are to be estimated for, in order to invest in the proposed portfolios.

The portfolios constructed and invested in over the period of H1 2007 to H2 2012 are estimated by making use of sample periods stretching over the period of H1 2001 to H1 2011 and are benchmarked against the Dividend Plus Index.

3.5 Data Description

The FTSE Group and the JSE Limited have joined forces in the designing of indices measuring the performance of the major capital and industry segments of the South African market. These indices, which forms part of the FTSE/JSE Africa Index series, enable investors to track market performance by market capitalization, the different sectors as well as investment strategies. An important factor companies need to adhere to is sufficient liquidity, which reflects an accurate and reliable price for determining the market value of the company. The sufficient liquidity is reflected in the methodology followed in calculating the FTSE/JSE Africa Index series.

The benchmark index used in the study, the Dividend Plus Index, was launched in August 2006. For this reason the sample period for this study runs from January 2007 to December 2012 – a total of 6 years. However, since this study makes use of backwards sampling in the estimation of dividend yields for the various securities in question, a sampling period of 10 retrospective time periods is utilized such that the actual data used in this study runs from January 2001 to December 2012. When the lagged variables included in the study are also taken into consideration, the actual data used in this study runs from January 2000 to December 2012.

Securities of companies meeting the following selection criteria are included in the sample:

(a) All ordinary shares in issue that are listed on the JSE.
(b) Securities of dividend paying companies.

(c) Securities of property companies are included in the sample to more substantially reflect the composition of the principle benchmark, unlike with the Dividend Plus Index where property companies are excluded.

The constituents of the Top40 Index and the Mid Cap Index for the time periods in consideration were obtained from Bloomberg to determine the securities to be used in the model. All fields (data items) associated with the selected securities were also obtained from Bloomberg and data items were imported into Excel by using the Bloomberg data history function stipulating a half yearly period. The expectation of using half yearly data was to obtain actual half yearly periods, June and December (Jun/Dec). The only data items reflecting actual half yearly periods were CUR_MKT_CAP, DIVIDEND_YIELD and EQY_DVD_YLD_IND_NET. The rest of the data items reflected the half yearly reporting periods of each associated company.

3.5.1 Remedial Data Measures

To get a better insight into the data at hand, the data set, Data Set A, had to reflect the following properties:

(a) Records from the year 2000 and onwards were included in the sample.
(b) All non-dividend paying companies were excluded from the data set.
(c) Half yearly periods were derived from the given dates, such that data from January to June were grouped together under the period H1 and data from July to December under the period H2. These fictitious periods were created in order to determine which companies presented multiple half yearly periods. The following companies contained multiple half yearly periods:
    - MVL

      For 2002-2003 half-yearly reporting periods consisted of Mar/Sep.

      For 2004-2011 half-yearly reporting periods consisted of Jun/Dec.

      It can be assumed that the company's financial year-end reporting dates were amended and the company is therefore removed from the sample data.
    - PSG

      For 2003-2012 half-yearly reporting periods consisted of Feb/Aug.

      The date 2006/06/30 consistently appeared across all data items reflecting the reporting period.

      This discrepancy caused the company to be removed from the sample data.
    - PTG

      For 2004-2011 half-yearly reporting periods consisted of Jun/Dec.

The date 2011/03/30 appeared in the data item reflecting the revenue component of the company (SALES_REV_TURN).

This discrepancy led to the deletion of the company from the sample data.

- TSH

  For 2000-2009 half-yearly reporting periods consisted of Jun/Dec.

  In 2010 reporting periods reflected Jun/Sep/Dec values.

  For 2011-2012 half-yearly reporting periods consisted of Mar/Sep.

  It can be assumed that the company's financial year-end reporting dates were amended and the company is therefore removed from the sample data.

(d) An extraction of all the companies with a reporting period of Jun/Dec was done in order to determine whether sufficient data would be available without amending the original data set. 89 of the possible 149 companies satisfied the criteria.

(e) Missing values for CF_FREE_CASH_FLOW was calculated by subtracting the associated CAPITAL_EXPEND from the CF_CASH_FROM_OPER (as described in field description).

(f) Where missing values were observed in the data items CAPITAL_EXPEND, BS_ACCT_NOTE_RCV and CF_PRPTY_IMPRV, it was assumed to be zero.

(g) Where no financial statement information was available, such that only information on CUR_MKT_CAP, DIVIDEND_YIELD and EQY_DVD_YLD_IND_NET was available, the records were deleted.

(h) Missing values in DVD_PAYOUT_RATIO were replaced with zero if the associated values of IS_TOT_CASH_COM_DVD were zero.

(i) Missing values elsewhere were averaged out, such that the last available value was added to the next available value and divided by 2.

(j) Since DVD_PAYOUT_RATIO is calculated as a percentage by Bloomberg (see Bloomberg Field Descriptions), these values needed to be divided by 100 to attain values reflecting the ratio.

(k) Companies with no records for DIVIDEND_YIELD and IS_EPS were dropped from the sample.

(l) All salient variables utilized in the study were standardized to permit the comparisons of the estimated regression coefficients in common units. A variable X is standardized using

$$\tilde{X} = \frac{X - \bar{X}}{\sigma_X}$$

where $\tilde{X}$ denotes the standardized variable X, $\bar{X}$ denotes the mean of variable X and σ_X denotes the standard deviation of variable X.

A short explanation regarding these remedial measures can be seen in Appendix A.

Due to the fact that only 89 of the possible 149 companies are reflected in the above data set, a second data set, Data B, was created following the exact steps as above except for step 4 which was replaced by the following remedial action:

To enable comparison of model variables across all companies originally sourced for this study, the reporting dates for companies which differed from the actual half yearly periods, consisting of Jun/Dec, had to be transformed to reflect these periods. This was accomplished by assigning a 6th of the value of the associated reporting half yearly date to the date and each of the preceding 5 months as shown in the figure below:

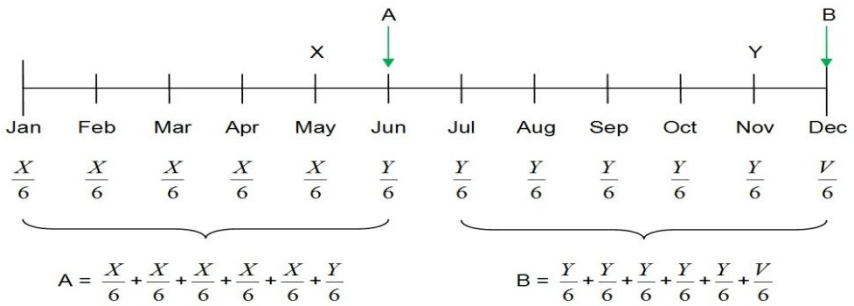

Figure 4: Deriving Values for Actual Half Year Periods

If a company reports on their financial position on half yearly periods May/Nov 2000:

Let the value reported on May 2000 be equal to X.

Let the value reported on November 2000 be equal to Y.

And let the value reported on May 2001 be equal to V.

The derived value for the company as used in Dataset B on June 2000 is equal to A.

The derived value for the company as used in Dataset B on November 2000 is equal to B.

This process seems to be a fair treatment to the variables of the companies in question, since the values are averaged out over a period and no new information is added to the data set in question, Data Set B.

Tables 3 and 4 exemplify the summary statistics of the salient variables for Datasets A and B respectively:

Label	N	Lower Quartile	Mean	Median	Upper Quartile	Std Dev
DivYieldt	728	2.0824500	3.7376274	3.3746000	4.6560500	3.4345592
DPRt	728	0	0.0784505	0.0344730	0.0604946	0.6893161
EPSt	728	0.4560000	2.5723683	1.[illegible]194000	3.1800000	5.2665462
Mt/At	728	0.6907439	2.6466755	1.07981[illegible]0	1.9979745	4.9418212
Sizet	728	3.7347039	4.1289518	4.0162831	4.5031974	0.5936069
DivYieldt-2	728	2.1548000	3.854629[illegible]	3.3990000	4.7320500	3.4837309
FCFt/At	728	-0.0088035	0.0248400	0.0162602	0.0557427	0.0565869
DAt	728	-0.0382750	-0.0064087	-0.0046582	0.0262200	0.0629678

Table 3: Summary Statistics for Dataset A

Label	N	Lower Quartile	Mean	Median	Upper Quartile	Std Dev
DivYieldt	2097	1.8750000	4.2282369	3.5895000	5.2857000	4.9842789
DPRt	2097	0.0045291	0.0578297	0.0295853	0.0574339	0.4114152
EPSt	2097	0.2800000	1.8437137	0.8210000	2.1923333	3.9352381
Mt/At	2097	0.6024238	2.0224460	0.9835110	1.7510899	3.7014381
Sizet	2097	3.5249151	3.9479453	3.8792909	4.3282980	0.6350869
DivYieldt-2	2097	1.8550000	4.2937879	3.6560000	5.4054000	5.0280148
FCFt/At	2097	-0.0045706	0.0215868	0.0137285	0.0458156	0.1180736
DAt	2097	-0.0303778	-0.000159948	0.000402569	0.0288569	0.0769341

Table 4: Summary Statistics for Dataset B

From the above two tables it is evident that the standard deviation of some of the variables are quite substantial. This can be ascribed due to questionable data obtained, since all the variables have been standardized.

In order to avoid potential collinearity problems between the variables utilized in the model, a correlation matrix is drawn up for both Dataset A and Dataset B to determine whether any abnormalities between the correlation coefficients may be present. Correlation matrices of the variables for Dataset A and B are illustrated in Tables 5 and 6:

Pearson Correlation Coefficients, N = 728								
	clc_Div_Yield	clc_Dvd_Pay_Ratio	IS_EPS	clc_mCap_Assets	clc_Size	div_ind_yield_lag2	clc_Fcf_Assets	_DA
clc_Div_Yield DivYieldt	1.00000	0.03217	0.11128	0.01281	-0.13612	0.43197	0.18225	-0.00186
clc_Dvd_Pay_Ratio DPRt	0.03217	1.00000	0.01433	0.00897	-0.01948	0.00869	-0.01086	-0.06013
IS_EPS EPSt	0.11128	0.01433	1.00000	-0.04484	0.22863	0.01130	0.15745	0.20395
clc_mCap_Assets Mt/At	0.01281	0.00897	-0.04484	1.00000	0.12134	0.01658	0.15519	0.01263
clc_Size Sizet	-0.13612	-0.01948	0.22863	0.12134	1.00000	-0.14728	-0.13467	0.07223
div_ind_yield_lag2 DivYieldt-2	0.43197	0.00869	0.01130	0.01658	-0.14728	1.00000	0.10842	0.04556
clc_Fcf_Assets FCFt/At	0.18225	-0.01086	0.15745	0.15519	-0.13467	0.10842	1.00000	-0.25147
_DA DAt	-0.00186	-0.06013	0.20395	0.01263	0.07223	0.04556	-0.25147	1.00000

Table 5: Correlation Matrix for Dataset A

Pearson Correlation Coefficients, N = 2097								
	clc_Div_Yield	clc_Dvd_Pay_Ratio	IS_EPS	clc_mCap_Assets	clc_Size	div_ind_yield_lag2	clc_Fcf_Assets	_DA
clc_Div_Yield DivYieldt	1.00000	0.04222	0.04916	-0.06473	-0.04563	0.61990	0.10168	0.05353
clc_Dvd_Pay_Ratio DPRt	0.04222	1.00000	0.01703	0.02262	-0.00488	0.02486	0.01863	-0.03288
IS_EPS EPSt	0.04916	0.01703	1.00000	-0.03503	0.27324	0.03092	0.05006	0.22247
clc_mCap_Assets Mt/At	-0.06473	0.02262	-0.03503	1.00000	0.01216	-0.05765	0.06755	-0.01989
clc_Size Sizet	-0.04563	-0.00488	0.27324	0.01216	1.00000	-0.04485	0.06932	0.03828
div_ind_yield_lag2 DivYieldt-2	0.61990	0.02486	0.03092	-0.05765	-0.04485	1.00000	0.09936	0.06570
clc_Fcf_Assets FCFt/At	0.10168	0.01863	0.05006	0.06755	0.06932	0.09936	1.00000	-0.21197
_DA DAt	0.05353	-0.03288	0.22247	-0.01989	0.03828	0.06570	-0.21197	1.00000

Table 6: Correlation Matrix for Dataset B

From Tables 6 and 7, with the exceptions of the correlation coefficients between the lagged dividend yield and the current dividend yield of 0.43197 and 0.61990 respectively, the rest of the correlation coefficients are below 0.25. The above observations lead to the reasonable assumption that the problem of collinearity is not present in the model. An even bigger problem faced when utilizing multiple regression is the occurrence of multicollinearity, due to the independent variables in a model being highly correlated with one another. This issue will be addressed in section 4.

4. EMPIRICAL RESULTS AND ANALYSIS

The expected dividend yield model proposed in this study was regressed on financial datasets by utilizing multiple regression analysis.

The sample period for the estimation of expected dividend yields stretched over a 10 year period, from H1 2001 to H2 2011. As mentioned, backward sampling of 10 consecutive half-yearly periods were used as sub-samples for each dataset in the estimation process. By rolling the sub-sample forward for each imminent period, a total of 12 sub-samples were produced in the estimation process.

Since regression analysis is applied, emphasis needs to be placed on the importance of examining the appropriateness of the multiple regression model considered for the sample data at hand. Statistical Analysis Software (SAS) is used to generate the coefficients and statistics necessary to evaluate how well the model fits the data.

These inferential methods are subject to the following required conditions involving the error term (ε):

(i) The probability distribution of ε is normal;
(ii) The mean of the distribution of ε is 0;
(iii) The standard deviation of ε is constant;
(iv) The errors are independent.

It can be written as

$$\varepsilon \sim N(0, \sigma^2)$$

Another condition that needs to be met is that the independent variables should be uncorrelated with one another. This is known as multicollinearity and has been mentioned earlier.

These required conditions are diagnosed and any problems incurred are to be taken note of, since these assumptions must be satisfied in order for inference to be possible.

Table 7 gives a representation of the empirical results obtained from regression ran on Dataset A. The results in table 7 shows mixed results, which is difficult to interpret to say the least. This may be a result of applying multiple regression analysis on panel data.

Further investigation into the above assumptions in this model gives some clarification.

Firstly, it is necessary to investigate if any multicollinearity is present in this model. Variance Inflation Factors (VIF) measure by how much the standard error of the parameter estimate increases in the presence of multicollinearity. In the absence of multicollinearity $VIF = 1$ (Santana, 2009). These factors are all close to 1 and multicollinearity does not seem to pose a problem.

Next, the assumption of homoscedasticity (constant variance) needs to be tested for by making use of White's Moment's Specification test. It is found that these moment's specification tests, which is utilized to test the null hypothesis of constant standard deviation of the error term, reflects a p-value less than alpha. The null hypothesis is therefore rejected and states that there is not enough evidence to assume that homoscedasticity is present. See Appendix B.2 to serve as an example of the output interpreted.

Expected Dividend Yield Model based on Dataset A	Backwards Sampling Estimation Periods											
	H1 2001 - H2 2005	H2 2001 - H1 2006	H1 2002 - H2 2006	H2 2002 - H1 2007	H1 2003 - H2 2007	H2 2003 - H1 2008	H1 2004 - H2 2008	H2 2004 - H1 2009	H1 2005 - H2 2009	H2 2005 - H1 2010	H1 2006 - H2 2010	H2 2006 - H1 2011
Intercept	7.60E-16 (1.0000)	3.79E-16 (1.0000)	3.13E-16 (1.0000)	2.36E-16 (1.0000)	1.30E-17 (1.0000)	5.52E-17 (1.0000)	6.93E-17 (1.0000)	-3.47E-16 (1.0000)	-2.27E-17 (1.0000)	8.34E-17 (1.0000)	1.32E-16 (1.0000)	4.96E-16 (1.0000)
DPRt	0.28952 (<0.0001)	0.30795 (<0.0001)	0.40172 (<0.0001)	0.41858 (<0.0001)	0.03826 (0.4349)	0.044811 (0.3582)	0.005283 (0.9213)	0.002697 (0.9601)	0.012233 (0.8312)	1.68E-05 (0.9998)	-0.00733 (0.9028)	0.017394 (0.7562)
EPSt	0.016101 (0.6816)	0.014431 (0.7328)	-0.01762 (0.6820)	-0.03954 (0.3797)	0.070558 (0.1750)	0.035956 (0.5103)	0.14261 (0.0168)	0.1325 (0.0269)	0.13973 (0.0225)	0.13094 (0.0338)	0.10801 (0.0905)	0.046169 (0.4409)
Mt/At	-0.06369 (0.0701)	-0.07147 (0.0642)	-0.08528 (0.0319)	-0.08739 (0.0346)	-0.06243 (0.2105)	-0.05681 (.2534)	-0.05004 (0.3608)	-0.04141 (0.4516)	-0.04879 (0.4049)	-0.04481 (0.4536)	-0.0574 (0.3535)	-0.09823 (0.0915)
Sizet	-0.05486 (0.1524)	-0.0661 (0.1164)	-0.02189 (0.6085)	-0.00873 (0.8435)	-0.06186 (0.2336)	-0.02241 (.6641)	-0.06175 (0.2741)	-0.08145 (0.1486)	-0.10289 (0.0854)	-0.10179 (0.0943)	-0.08699 (0.1634)	-0.02395 (0.6795)
DivYieldt-2	0.61917 (<0.0001)	0.56869 (<0.0001)	0.48446 (<0.0001)	0.45114 (<0.0001)	0.53008 (<0.0001)	0.52622 (<0.0001)	0.41224 (<0.0001)	0.40691 (<0.0001)	0.22566 (0.0001)	0.18264 (0.0020)	0.14877 (0.0149)	0.37587 (<0.0001)
FCFt/At	0.063452 (0.0965)	0.071264 (0.0848)	0.094882 (0.0284)	0.14391 (0.0013)	0.13666 (0.0087)	0.13475 (0.0131)	0.026829 (0.6488)	0.002304 (0.9689)	0.050154 (0.4205)	0.008791 (0.8909)	0.040504 (0.5419)	0.19721 (0.0018)
DAt	0.063793 (0.0781)	0.065605 (0.0952)	0.10037 (0.0156)	0.12324 (0.0046)	0.092105 (0.0711)	0.10571 (0.0471)	-0.06528 (0.2573)	-0.06507 (0.2704)	-0.01669 (0.7868)	-0.09065 (0.1502)	-0.04503 (0.4880)	0.061115 (0.3174)
No of observations	302	301	310	297	279	290	290	290	290	290	278	278
Rsquared	0.6496	0.5805	0.5449	0.5322	0.3614	0.3454	0.2098	0.3454	0.0902	0.0647	0.0624	0.0481

[1]

Table 7: Dividend Yield Estimation Results for Dataset A

When multiple regressions are run on panel data, the underlying assumptions may fall flat. In this scenario the variance of the error term shows heteroscedastic properties instead of the assumed constant variance (homoscedasticity). The error terms and data applied may also show some type of dependence. Even though the correlation matrices earlier did not pick up

[1] Table 7 is an illustration of each variables estimated coefficient and in brackets below states the associated p-value.

any correlation problems, it is important to take note that correlation matrices only test for linear dependence.

These unimpressive results may also, in part, be a reflection of the small amount of data available, since Dataset A only represents companies with financial half-year periods of June and December respectively. In each period less than 30 companies were part of the sub-samples. This amounts to only 30% of the possible 100 that is supposed to be included in the sample.

The results for Dataset B in Table 8, shows similar mixed results, even for a larger sample. It can be of interest to look at the coefficient of determination (R^2), known as a fit statistic. This statistic determines how well the model fits the data. The closer this value is to 1, the better the fit. Both Dataset A and Dataset B's results shows relatively reasonableR^2's (especially in the beginning stages of the study), which should indicate that the model has some explanatory power. It is interesting that this statistic seems to decline over time, which may also be due to the panel data effects. In order to test whether there is some truth to this statement, the estimated coefficients are applied to the data in order to estimate expected dividend yields in an attempt to compile a portfolio in pursuit of outperforming the benchmarks.

Expected Dividend Yield Model based on Dataset B	Backwards Sampling Estimation Periods											
	H1 2001 - H2 2005	H2 2001 - H1 2006	H1 2002 - H2 2006	H2 2002 - H1 2007	H1 2003 - H2 2007	H2 2003 - H1 2008	H1 2004 - H2 2008	H2 2004 - H1 2009	H1 2005 - H2 2009	H2 2005 - H1 2010	H1 2006 - H2 2010	H2 2006 - H1 2011
Intercept	9.05E-16 (1.0000)	1.54E-15 (1.0000)	2.25E-15 (1.0000)	1.33E-15 (1.0000)	2.91E-16 (1.0000)	-5.76E-16 (1.0000)	-1.78E-16 (1.0000)	6.61E-16 (1.0000)	4.39E-16 (1.0000)	3.66E-16 (1.0000)	4.17E-16 (1.0000)	-2.44E-16 (1.0000)
DPRt	0.23337 (<0.0001)	0.23667 (<0.0001)	0.27783 (<0.0001)	0.14093 (<0.0001)	0.013552 (0.5781	0.00847462 (0.7271)	0.003784022 (0.8842)	0.00808638 (0.7887)	0.00939914 (0.7636)	0.00796902 (0.7997)	0.013075 (0.7092)	0.025566 (0.4300)
EPSt	0.005943 (0.6966)	0.013072 (0.5658)	0.015294 (0.6820)	0.002518 (0.9242)	0.00749 (0.7736)	-0.00031546 (0.9903)	0.037099 (0.1855)	0.034635 (0.2960)	0.033737 (0.3161)	0.025137 (0.4552)	0.02603 (0.4891)	-0.03964 (0.2636)
Mt/At	-0.07235 (<0.0001)	-0.087789 (<0.0001)	-0.09373 (0.0319)	-0.07353 (0.0028)	-0.045135 (0.0689)	-0.028509 (0.2480)	-0.042669 (0.1066)	-0.062685 (0.0418)	-0.07428 (0.0201)	-0.073895 (0.0216)	-0.12948 (0.0003)	-0.13111 (0.0001)
Sizet	-0.03891 (0.0791)	-0.038669 (0.0863)	-0.03384 (0.6085)	-0.02877 (0.2605)	-0.011951 (0.6417)	0.01324 (0.6040)	-0.019612 (0.4766)	-0.045339 (0.1534)	-0.067011 (0.0425)	-0.057721 (0.0818)	-0.08087 (0.0286)	-0.03803 (0.2610)
DivYieldt-2	0.71252 (<0.0001)	0.68678 (<0.0001)	0.62915 (<0.0001)	0.69551 (<0.0001)	0.74178 (<0.0001)	0.76182 (<0.0001)	0.72542 (<0.0001)	0.58062 (<0.0001)	0.52303 (<0.0001)	0.52852 (<0.0001)	0.35153 (<0.0001)	0.48257 (<0.0001)
FCFt/At	0.030433 (0.2845)	0.00654168 (.7679)	0.02766 (0.0284)	0.023067 (0.3632)	0.017917 (0.4694)	0.00421863 (0.8648)	0.006727174 (0.8009)	0.017584 (0.5689)	0.027411 (0.3919)	0.031825 (0.3232)	0.076692 (0.0334)	0.16747 (<0.0001)
DAt	0.039579 (0.0004)	0.045016 (0.0394)	0.07402 (0.0156)	0.017359 (0.5067)	0.00478 (0.8496)	-0.024123 (0.3373)	-0.057609 (0.0352)	-0.026244 (0.4112)	-0.012936 (0.6960)	-0.020531 (0.5368)	0.040791 (0.2776)	0.09272 (0.0096)
No of observations	750	750	750	740	740	720	700	720	720	720	680	650
Rsquared	0.7088	0.6717	0.633	0.5777	0.5673	0.5828	0.5357	0.5357	0.3537	0.3036	0.1809	0.3339

[2]

Table 8: Dividend Yield Estimation Results for Dataset B

[2] Table 8 is an illustration of each variables estimated coefficient and in brackets below states the associated p-value.

4.1 Comparison of Portfolio Performance

From the list of current constituents, all companies with consecutive data periods, say H1 2001 to H2 2005, are included in the sample. The variables for the expected dividend yield model are computed for these companies over time as well as standardized before used in the regression model, to take into account for different unit measurements. The estimates of these parameters are used in conjunction with actual data for, say H1 2006, in order to estimate the dividend yield for each company. These estimated expected dividend yields are ranked in descending order and the top 30 companies are chosen to form part of the investment portfolio for the investment period due. In this example, dividend yields for H1 2006 are estimated in order to rank the companies. The investment into this portfolio will only be due in H1 2007. The investment portfolio is weighted according to the expected dividend yield.

This study utilizes a 'buy and hold' strategy, in order to minimize transaction fees. The investment results for the 12 periods reveal portfolio results in excess of that of the benchmarks in the study as seen in table 9.

Commenting just on the results reported on the portfolio based on Dataset B, the expected dividend yield model does indeed seem to have some explanatory power. Looking at the returns of the portfolio for H1 2008 and H1 2011 respectively in comparison to the returns of the Dividend Plus Index, since these two portfolios share the methodology of investing in value companies by making use of dividend yields, it can be seen that they follow the same trend in the market. Both portfolios reported significant losses in comparison to the market in both of these periods. The losses in 2008 can be explained due to the adverse economic conditions spread widely across the world when the credit crisis hit America. Since growth companies are seen as more mature companies, these value shares are not and were obviously much more susceptible and easily affected by the negative conditions.

The expected dividend yield portfolio, compiled from using the expected dividend yield model, outperformed the Dividend Plus Index by about 6.081% and outperformed the All share Index by a whopping 20.567%.

Portfolios Return based on Dataset A	Holding Period												
	H1 2007	H2 2007	H1 2008	H2 2008	H1 2009	H2 2009	H1 2010	H2 2010	H1 2011	H2 2011	H1 2012	H2 2012	Total
All Share Index	0.12643	0.00888	0.03835	-0.28312	0.01307	0.21824	-0.05866	0.23489	-0.01373	0.00189	0.00189	0.16633	0.45446
Dividend Plus Index	0.09974	-0.06281	-0.17808	0.08823	0.04579	0.19243	0.04572	0.1977	-0.0569	0.05087	0.05087	0.12576	0.59932
Expected Dividend Portfolio	0.20767	0.06186	0.04088	-0.0876	0.07	0.26372	0.01884	0.18651	-0.10342	0.06064	0.04547	0.09899	0.86356

Portfolios Return based on Dataset B	Holding Period												
	H1 2007	H2 2007	H1 2008	H2 2008	H1 2009	H2 2009	H1 2010	H2 2010	H1 2011	H2 2011	H1 2012	H2 2012	Total
All Share Index	0.12643	0.00888	0.03835	-0.28312	0.01307	0.21824	-0.05866	0.23489	-0.01373	0.00189	0.00189	0.16633	0.45446
Dividend Plus Index	0.09974	-0.06281	-0.17808	0.08823	0.04579	0.19243	0.04572	0.1977	-0.0569	0.05087	0.05087	0.12576	0.59932
Expected Dividend Portfolio	0.18924	0.03094	-0.13411	0.01313	0.00163	0.20618	0.01224	0.154	-0.05776	0.06826	0.07656	0.09982	0.66013

Table 9 : The Accumulated Returns for Single Holding Periods

5. DISCUSSION AND CONCLUSION

Previous studies relating to the predictive power dividends have in the forecasting of future stock returns have continually raised issues of interest within academia. The correlation between dividend yields and stock returns have been of particular interest, which have led to the examination of a number of strategic investment strategies based on dividend yields. One of the seemingly more popular dividend yield investment strategies is the *Dogs of the Dow* strategy, as mentioned earlier in the paper. This strategy involves the ranking of the current dividend yields of stocks in a particular market and investing in a number of shares possessing the highest dividend yield. Studies that have followed a similar approach includes McQueen et al. (1997), Visscher and Filbeck (2003) and Brzeszczynski and Gajdka (2008) to name but a few. A similar study was attempted by Wolmarans (2000) on South African securities, but the result left much to be desired.

The study conducted by Hsu and Lin (2010) attempts to estimate a dividend yield which better reflect the prospective profits of a firm, by taking into account that high dividends may merely be a result of lower stock prices or may be attributable to creative accounting by managers in an attempt to reflect better earnings. The current dividend yield is replaced by the expected dividend yield and stocks are ranked accordingly.

In an attempt to replicate a similar model based on South African equities, a number of issues emerged which should be addressed for further investigations.

The first major issue relates to data mining. The data on South African companies obtained from Bloomberg was not sufficient for the requirements of this study. The data not only displayed countless missing data points, but also numerous records where the integrity of the data was questionable. Either alternative data providers should be explored in attempting to find more accurate periodical data pertaining to South African listed companies or new data sets should be examined altogether.

The empirical results of the study exhibit superior performance by the portfolio based on the expected dividend, on both datasets utilized, in comparison to the returns on the benchmark indices, namely the All Share Index and the Dividend Plus Index. The returns reflected by the portfolio based on information from Dataset A is ascribed to mere coincidence, since only a maximum of 30 companies per period was available for regression analysis per period. Most of the times the number of companies observed were less than 30. The returns on Dataset B may be ascribed to the estimation power of the expected dividend yield model, but since the assumptions underlying the multiple regression model is violated it cannot be confidently assumed.

The investigation of trading strategies based on high dividend yielding securities is most certainly an interesting topic in the financial industry and has a lot of scope in the South African market. It is worth pursuing a similar study on South African data, by applying an appropriate regression model considering the problems we have come across in this study. These models may include mixed regression models for repeated-measure data as explained in a paper by Blackwell et al. (2006) as an alternative for future studies. It will also be of interest to compare portfolios created by an implicit calculation of dividends, such as was attempted in this study, by portfolios based on explicit dividend information. These returns can make use of Sharpe's Ratio and the Treynor Index as additional measures of risk-adjusted returns in order to see whether high-dividend yield trading strategies are indeed statistically significant.

While the paper has demonstrated the merits of a framework to construct a portfolio based on expected dividend yields, we concede that further investigations are warranted. Financial data as one used in this research is known to exhibit so-called repeated-measures as such one has to apply regression models better suited for this sort of data. Further research will focus on applying mixed regression models that are a class of statistical models that can be applied for such data sets as the one discussed in this research.

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APPENDIX A

A.1 List of Tickers and Company Names

Ticker	Name	Ticker	Name	Ticker	Name	Ticker	Name
ABL SJ Equity	AFRICAN BANK INVESTMENTS LTD	CSO SJ Equity	CAPITAL SHOPPING CENTRES GRO	MDC SJ Equity	MEDICLINIC INTERNATIONAL LTD	REM SJ Equity	REMGRO LTD
ACL SJ Equity	ARCELORMITTAL SOUTH AFRICA	DDT SJ Equity	DIMENSION DATA HOLDINGS PLC	MKL SJ Equity	MAKALANI HOLDINGS LTD	RES SJ Equity	RESILIENT PROPERTY INCOME
ACP SJ Equity	ACUCAP PROPERTIES LTD	DRD SJ Equity	DRDGOLD LTD	MMI SJ Equity	MMI HOLDINGS LTD	RLO SJ Equity	REUNERT LTD
AEG SJ Equity	AVENG LTD	DSY SJ Equity	DISCOVERY HOLDINGS LTD	MND SJ Equity	MONDI LTD	RMH SJ Equity	RMB HOLDINGS LTD
AFB SJ Equity	ALEXANDER FORBES LTD	DTC SJ Equity	DATATEC LTD	MNP SJ Equity	MONDI PLC	RMI SJ Equity	RMI HOLDINGS
AFE SJ Equity	AECI LTD	ECO SJ Equity	EDGARS CONSOLIDATED STORES	MPC SJ Equity	MR PRICE GROUP LTD	SAB SJ Equity	SABMILLER PLC
AFR SJ Equity	AFGRI LTD	EHS SJ Equity	EVRAZ HIGHVELD STEEL AND VAN	MRF SJ Equity	MERAFE RESOURCES LTD	SAC SJ Equity	SA CORPORATE REAL ESTATE FUN
AFX SJ Equity	AFRICAN OXYGEN LTD	ELD SJ Equity	ELAND PLATINUM HOLDINGS LTD	MSM SJ Equity	MASSMART HOLDINGS LTD	SAP SJ Equity	SAPPI LIMITED
AGL SJ Equity	ANGLO AMERICAN PLC	ELE SJ Equity	ELEMENTONE LTD	MTN SJ Equity	MTN GROUP LTD	SBK SJ Equity	STANDARD BANK GROUP LTD
AIP SJ Equity	ADCOCK INGRAM HOLDINGS LTD	ELH SJ Equity	ELLERINE HOLDINGS LTD	MTX SJ Equity	METOREX LTD	SHF SJ Equity	STEINHOFF INTL HOLDINGS LTD
ALT SJ Equity	ALLIED TECHNOLOGIES LTD	EMI SJ Equity	EMIRA PROPERTY FUND	MUR SJ Equity	MURRAY & ROBERTS HOLDINGS	SHP SJ Equity	SHOPRITE HOLDINGS LTD
AMS SJ Equity	ANGLO AMERICAN PLATINUM LTD	EQS SJ Equity	EQSTRA HOLDINGS LTD	MVL SJ Equity	MVELAPHANDA RESOURCES LTD	SIM SJ Equity	SIMMER & JACK MINES LTD
ANG SJ Equity	ANGLOGOLD ASHANTI LTD	EXX SJ Equity	EXXARO RESOURCES LTD	NBC SJ Equity	NEW BOND CAPITAL LTD	SLM SJ Equity	SANLAM LTD
APA SJ Equity	APEXHI PROPERTIES-UNIT CL A	FPT SJ Equity	FOUNTAINHEAD PROPERTY TRUST	NED SJ Equity	NEDBANK GROUP LTD	SNT SJ Equity	SANTAM LTD
APB SJ Equity	APEXHI PROPERTIES-UNIT CL B	FSR SJ Equity	FIRSTRAND LTD	NHM SJ Equity	NORTHAM PLATINUM LTD	SNU SJ Equity	SENTULA MINING LTD
APN SJ Equity	ASPEN PHARMACARE HOLDINGS LT	GFI SJ Equity	GOLD FIELDS LTD	NPK SJ Equity	NAMPAK LTD	SOL SJ Equity	SASOL LTD
ARI SJ Equity	AFRICAN RAINBOW MINERALS LTD	GND SJ Equity	GRINDROD LTD	NPN SJ Equity	NASPERS LTD-N SHS	SPG SJ Equity	SUPER GROUP LTD
ARL SJ Equity	ASTRAL FOODS LTD	GRF SJ Equity	GROUP FIVE LTD	NTC SJ Equity	NETCARE LTD	SPP SJ Equity	SPAR GROUP LIMITED/THE
ASA SJ Equity	ABSA GROUP LTD	GRT SJ Equity	GROWTHPOINT PROPERTIES LTD	OCE SJ Equity	OCEANA GROUP LTD	SUI SJ Equity	SUN INTERNATIONAL LTD
ASR SJ Equity	ASSORE LTD	HAR SJ Equity	HARMONY GOLD MINING CO LTD	OML SJ Equity	OLD MUTUAL PLC	SYC SJ Equity	SYCOM PROPERTY FUND
ATN SJ Equity	ALLIED ELECTRONICS CORP LTD	HCI SJ Equity	HOSKEN CONS INVESTMENTS LTD	OPT SJ Equity	OPTIMUM COAL HOLDINGS	TBS SJ Equity	TIGER BRANDS LTD
ATNP SJ Equity	ALLIED ELECTRONICS CORP-PRF	HLM SJ Equity	HULAMIN LTD	PAM SJ Equity	PALABORA MINING CO LTD	TFG SJ Equity	THE FOSCHINI GROUP LTD
AVI SJ Equity	AVI LTD	HYP SJ Equity	HYPROP INVESTMENTS LTD-UTS	PAP SJ Equity	PANGBOURNE PROPERTIES LTD	TKG SJ Equity	TELKOM SA SOC LTD
AXC SJ Equity	APEXHI PROPERTIES-UNIT CL C	ILV SJ Equity	ILLOVO SUGAR LTD	PFG SJ Equity	PIONEER FOODS LTD	TON SJ Equity	TONGAAT HULETT LTD
BAT SJ Equity	BRAIT SE	IMP SJ Equity	IMPALA PLATINUM HOLDINGS LTD	PGR SJ Equity	PEREGRINE HOLDINGS LTD	TRE SJ Equity	TRENCOR LTD
BAW SJ Equity	BARLOWORLD LTD	INL SJ Equity	INVESTEC LTD	PIK SJ Equity	PICK N PAY STORES LTD	TRU SJ Equity	TRUWORTHS INTERNATIONAL LTD
BIL SJ Equity	BHP BILLITON PLC	INP SJ Equity	INVESTEC PLC	PMA SJ Equity	PRIMEDIA LTD/SOUTH AFRICA	TSH SJ Equity	TSOGO SUN HOLDINGS LTD
BLU SJ Equity	BLUE LABEL TELECOMS LTD	IPL SJ Equity	IMPERIAL HOLDINGS LTD	PMN SJ Equity	PRIMEDIA LTD-'N' SHRS	UTR SJ Equity	UNITRANS LTD
BVT SJ Equity	BIDVEST GROUP LTD	JDG SJ Equity	JD GROUP LTD	PPC SJ Equity	PPC LTD	UUU SJ Equity	URANIUM ONE INC
CAT SJ Equity	CAXTON AND CTP PUBLISHERS AN	JSE SJ Equity	JSE LTD	PSG SJ Equity	PSG GROUP LTD	VNF SJ Equity	VENFIN LTD
CFR SJ Equity	FINANCIERE RICHEMONT-DEP REC	KIO SJ Equity	KUMBA IRON ORE LTD	PTG SJ Equity	PEERMONT GLOBAL PTY LIMITED	VOD SJ Equity	VODACOM GROUP LTD
CLS SJ Equity	CLICKS GROUP LTD	LBH SJ Equity	LIBERTY HOLDINGS LTD	RBP SJ Equity	ROYAL BAFOKENG PLATINUM LTD	WAR SJ Equity	GOLD FIELDS OPERATIONS LTD
CML SJ Equity	CORONATION FUND MANAGERS LTD	LEW SJ Equity	LEWIS GROUP LTD	RBW SJ Equity	RAINBOW CHICKEN LTD	WBO SJ Equity	WILSON BAYLY HOLMES-OVCON
CPI SJ Equity	CAPITEC BANK HOLDINGS LTD	LGL SJ Equity	LIBERTY GROUP LTD	RBX SJ Equity	RAUBEX GROUP LTD	WES SJ Equity	WESCO INVESTMENTS LTD
CPL SJ Equity	CAPITAL PROPERTY FUND	LHC SJ Equity	LIFE HEALTHCARE GROUP HOLDIN	RDF SJ Equity	REDEFINE PROPERTIES LTD	WEZ SJ Equity	WESIZWE PLATINUM LTD
CSL SJ Equity	CONSOL LTD	LON SJ Equity	LONMIN PLC	REI SJ Equity	REINET INVESTMENTS SA-DR	WHL SJ Equity	WOOLWORTHS HOLDINGS LTD

A.2 Remedial Measures for Data

Where CF_PRPTY_IMPRV, BS_ACCT_NOTE_RCV and CAPITAL_EXPEND is missing it is assumed to be zero.
Where missing value, the value is calculated by adding the last and next value and dividing it by 2.
Companies deleted from sample where observations are questionable
Where DVD_PAYOUT_RATIO, IS_TOT_COM_DVD is zero, dividend yield assumed to be zero
Where CF_CASH_FROM_OPER was empty, it was calculated by subtrating CAPIT_EXPEND from CF_CASH_FROM_OPER
Where no financial data was available for H2 2012 yet, the previous values were used

ticker	year	freq	CUR_MKT_CAP	BS_NET_FIX_ASSET	BS_TOT_ASSET	CAPITAL_EXPEND	CF_CASH_FROM_OPER	CF_FREE_CASH_FLOW	DVD_PAYOUT_RATIO	IS_EPS	IS_TOT_CASH_COM_DVD	NET_INCOME	SALES_REV_TURN	TOT_COMMON_EQY	BS_ACCT_NOTE_RCV	DIVIDEND_YIELD	CF_PRPTY_IMPRV
ACL SJ EQUITY	2000	H1	2993.62	8690	15401	-790	646	-144	0	1.0137	0	266	7058	7966	1295	0	0
ACL SJ EQUITY	2000	H2	3574.28	9206	16240	-944	856	-88	0	0.7895	0	209	7219	8184	0	0	0
ACL SJ EQUITY	2001	H1	7889.63	9668	16728	-1254	738	-516	.	-3.4213	0	-934	7896	7140	1656	0	0
ACL SJ EQUITY	2001	H2	3096.53	10782	19040	0	2153	2153	0	1.1858	0	382	6446	8085	0	0	0
ACL SJ EQUITY	2002	H1	9806.55	11993	18114	0	354	354	15.19	11.9804	178.3	3759	7742	11104	0	1.818	0
ACL SJ EQUITY	2002	H2	9472.23	11937	18237	-396	1588	1192	32.58	3.4109	446	1369	9770	12199	0	6.588	0
ACL SJ EQUITY	2003	H1	7132.03	12077.5	18405.5	0	774	326.5	52.415	2.2832	390.25	916	9472.5	12585	0	8.75	0
ACL SJ EQUITY	2003	H2	12837.66	12218	18574	-499	-40	-539	72.25	1.1555	334.5	463	9175	12971	1239	6.076	0
ACL SJ EQUITY	2004	H1	17206.03	12124	20211	-405	2089	1684	0	3.8331	0	1540	10544	14131	2625	1.943	0
ACL SJ EQUITY	2004	H2	29196.76	12930	23729	-849	3489	2640	48.68	8.3106	1784	3644	12509	16040	2207	4.58	0
ACL SJ EQUITY	2005	H1	20950.35	12826	25135	-493	2573	2080	33.35	7.9996	1070.4	3210	12264	18918	0	11.489	0
ACL SJ EQUITY	2005	H2	27302.32	13133	25753	-1089	3034	1945	33.61	4.6331	624.4	1858	11768	19507	1613	6.204	0
ACL SJ EQUITY	2006	H1	33319.97	13976	27831	-606	2058	1452	0	4.7664	0	1912	12132	20876	2919	1.873	0
ACL SJ EQUITY	2006	H2	43795.15	14526	30601	-840	2666	1826	56.55	6.8107	1546	2734	13231	22943	1908	3.532	0
ACL SJ EQUITY	2007	H1	56788.82	15056	33106	-760	2770	2010	33.07	7.8329	1038.6	3141	14575	25451	2968	4.553	0
ACL SJ EQUITY	2007	H2	60845.16	15525	28205	-1092	3799	2707	34.99	6.4774	909.4	2599	14779	20583	2039	3.143	0
ACL SJ EQUITY	2008	H1	99402.72	15724	33418	-857	2222	1365	33.35	11.3883	1524.47	4571	18403	24402	4537	2.413	0
ACL SJ EQUITY	2008	H2	39426.77	15917	37435	-975	5687	4712	34.48	11.9993	1658.51	4810	21511	27995	1770	7.993	0
ACL SJ EQUITY	2009	H1	42569.32	15981	29979	-339	1508	1169	.	-1.9	0	-848	11960	21360	2625	4.246	0
ACL SJ EQUITY	2009	H2	45912.47	15862	30784	-575	1812	1237	0	0.923	0	370	13638	21925	1705	0	0
ACL SJ EQUITY	2010	H1	33828.13	15573	34228	-356	1310	954	33.87	4.43	601.8	1777	16165	23860	3380	1.977	0
ACL SJ EQUITY	2010	H2	35312.49	16432	31718	-1358	757	-601	.	-1.08	0	-432	14059	22556	1550	1.894	0
ACL SJ EQUITY	2011	H1	35209.96	16159	32439	-336	-406	-742	33.74	1.63	220.66	654	16576	23101	3065	0.696	0
ACL SJ EQUITY	2011	H2	30569.68	16618	32422	-854	-733	-1587	.	-1.61	0	-646	14877	22669	1904	0.802	0
ACL SJ EQUITY	2012	H1	23357.41	16126	31995	-227	627	400	0	0.25	0	102	17792	22782	3327	0	0
ACL SJ EQUITY	2012	H2	16047.08	16068	30898	-648	1257	609	.	-1.52	0	-610	14499	22242	1669	0	0
NBC SJ EQUITY	2000	H1	2835.89	274.94	1831.56	0	.	.	0	0.672	0	129.51	.	335.66	373.08	0	0
NBC SJ EQUITY	2000	H2	2376.37	353.47	2190.02	0	.	.	0	0.6804	0	136.33	1076.2	511.44	0	0	0
NBC SJ EQUITY	2001	H1	1850.12	305.25	2172.32	0	.	.	.	1.0267	.	212.47	1302.91	706.62	381.89	.	0
NBC SJ EQUITY	2001	H2	1511.09	535.63	1750.94	0	71.57	71.57	0	0.4881	0	100.43	1426.41	711.12	0	.	0
NBC SJ EQUITY	2002	H1	1297.99	325.06	1994.94	0	136.67	136.67	.	0.4667	.	94.21	1484.7	792.41	502.75	.	0
NBC SJ EQUITY	2002	H2	1489.78	567.34	1831.76	0	93.02	93.02	0	0.5469	0	107.02	1569.58	792.02	0	.	0
NBC SJ EQUITY	2003	H1	1297.99	328.68	1813.18	0	135.16	135.16	72.52	0.4592	62.86	86.68	1619.99	875.77	566.98	45.539	0
NBC SJ EQUITY	2003	H2	1288.3	636.07	1792.78	0	158.38	158.38	0	0.4891	0	93.03	1743.47	916.73	0	45.881	0
NBC SJ EQUITY	2004	H1	1452.97	345.66	1802.06	0	172.5	172.5	252.18	0.4639	221.56	87.86	1743.66	1003.46	608	145.29	0
NBC SJ EQUITY	2004	H2	2863.72	345.59	3401.37	0	49.98	49.98	0	0.408	0	86.47	1714.3	2392.77	0	151.796	0
NBC SJ EQUITY	2005	H1	2618.26	333.14	3554.59	0	303.05	303.05	0	0.94	0	288.24	1507.01	2609.11	450.28	0	0
NBC SJ EQUITY	2005	H2	3588.3	327.6	5632.1	0	-48.68	-48.68	0	1.858	0	754.76	1512.37	4192.07	0	0	0
NBC SJ EQUITY	2006	H1	3366.8	349.47	6309.65	0	298.44	298.44	0	0.8857	0	390.18	1590.06	4576.27	514.95	0	0
NBC SJ EQUITY	2006	H2	4549.61	393.85	7267.19	0	51.86	51.86	0	1.668	0	737.85	1688.46	5259.59	0	0	0
NBC SJ EQUITY	2007	H1	4983.75	389.62	7999.29	-253.25	287.95	34.71	6.21	1.134	31.01	499.25	1773.13	5689.39	589.84	10.073	0
NBC SJ EQUITY	2007	H2	4540.75	437.32	6964.23	0	-24.35	-24.35	0	-0.952	0	-387.34	1699.93	5050.76	0	29.427	0
NBC SJ EQUITY	2008	H1	2658	268.15	7347.57	0	233.15	233.15	0	-2.728	0	-1145.45	1838.99	3820.26	604.9	52.004	0
NBC SJ EQUITY	2008	H2	2192.85	298.74	6941.15	0	111.74	111.74	0	0.019	0	7.68	1889.66	3750.51	0	0	0
NBC SJ EQUITY	2009	H1	2098.22	322.61	7065.14	0	88.85	88.85	0	0.1999	0	81.29	1856	3839.89	470.05	53.273	0
NBC SJ EQUITY	2009	H2	3287.21	330.21	7572.62	0	344.44	344.44	0	1.173	0	477.32	.	4324.1	0	0	0
NBC SJ EQUITY	2010	H1	3613.6	389.49	7355.06	0	112.36	112.36	0	0.81	0	388.47	.	4725.02	533.61	0	0
NBC SJ EQUITY	2010	H2	1744.04	1.37	3214.5	0	11.4	11.4	0	-0.536	0	-245.93	.	2031.03	0	0	0
NBC SJ EQUITY	2011	H1	1857.29	1.25	2766.15	0	-45.12	-45.12	0	0.204	0	121.46	.	2160.24	0	0	0
NBC SJ EQUITY	2011	H2	1979.16	1.1	2823.28	0	15	15	0	0.167	0	88.22	.	2245.81	0	0	0
NBC SJ EQUITY	2012	H1	1892.01	0.44	2416.14	0	-42.53	-42.53	.	-0.557	0	-292.19	.	1922.24	0	0	0
NBC SJ EQUITY	2012	H2	1140.35	0.44	2416.14	0	-42.53	-42.53	.	-0.557	0	-292.19	.	1922.24	0	0	0

APPENDIX B

B.1 Regression Output on the Jones Model on Dataset B

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.48860	0.16287	27.49	<.0001
Error	2093	12.39903	0.00592		
Corrected Total	2096	12.88763			

Root MSE	0.07697	R-Square	0.0379
Dependent Mean	-0.01046	Adj R-Sq	0.0365
Coeff Var	-736.03261		

Parameter Estimates							
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	Intercept	1	-0.02598	0.00242	-10.76	<.0001	0
clc_1_asset_lag	1/AssetLag	1	-0.91817	0.94989	-0.97	0.3339	1.02629
clc_d_sales_rec_assets	ChSales-ChReceive/AssetLag	1	0.00019214	0.00917	0.02	0.9833	1.01264
clc_ppe_assets	PPE/AssetLag	1	0.04159	0.00461	9.02	<.0001	1.03606

Test of First and Second Moment Specification		
DF	Chi-Square	Pr > ChiSq
9	17.30	0.0443

B.2 Regression for H1 2006 explained for Dataset B

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	530.89987	75.84284	258.03	<.0001
Error	742	218.10013	0.29394		
Corrected Total	749	749.00000			

Root MSE	0.54216	R-Square	0.7088
Dependent Mean	2.02828E-15	Adj R-Sq	0.7061
Coeff Var	2.672988E16		

Test of First and Second Moment Specification		
DF	Chi-Square	Pr > ChiSq
35	63.26	0.0024

Parameter Estimates							
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	Intercept	1	9.0453E-16	0.01980	0.00	1.0000	0
clc_Dvd_Pay_Ratio	DPRt	1	0.23337	0.02127	10.97	<.0001	1.15243
IS_EPS	EPSt	1	0.00594	0.02158	0.28	0.7830	1.18623
clc_mCap_Assets	Mt/At	1	-0.07235	0.02021	-3.58	0.0004	1.04072
clc_Size	Sizet	1	-0.03891	0.02102	-1.85	0.0646	1.12623
div_ind_yield_lag2	DivYieldt-2	1	0.71252	0.02201	32.37	<.0001	1.23499
clc_Fcf_Assets	FCFt/At	1	0.03043	0.02106	1.45	0.1489	1.13011
_DA	DAt	1	0.03958	0.02093	1.89	0.0590	1.11598

B.3 Weighted Return For H1 2007

Ticker	PX_Begin	PX_Last	DPS	Weighted_Return
ABL SJ EQUITY	2880	2990	0	0.03819
AEG SJ EQUITY	3807.3	5695.55	0	0.49596
ALT SJ EQUITY	6099	6480	309	0.11313
AMS SJ EQUITY	83305.2	113148.3	2819	0.39208
ASA SJ EQUITY	12700	13150	240	0.05433
ATN SJ EQUITY	3530	4970	0	0.40793
ATNP SJ EQUITY	3231	4875	78	0.53296
AVI SJ EQUITY	1981	1971	73	0.0318
BVT SJ EQUITY	13634.28	14521.72	450.17	0.09811
FPT SJ EQUITY	596.64	645.28	0	0.08152
FSR SJ EQUITY	1790.64	1823.72	43	0.04249
GRF SJ EQUITY	4550	5440	72	0.21143
HYP SJ EQUITY	3850	4385	129.9	0.1727
INL SJ EQUITY	8865	9130	13	0.03136
INP SJ EQUITY	9165	9186	13	0.00371
JDG SJ EQUITY	8052	7099	246	-0.0878
MPC SJ EQUITY	2500	2721	0	0.0884
NHM SJ EQUITY	5250	5600	410	0.14476
PAP SJ EQUITY	1425	1480	62	0.08211
PPC SJ EQUITY	4165.85	5288.26	0	0.26943
RBW SJ EQUITY	1327.41	1523.96	64.57	0.19671
REM SJ EQUITY	5858.77	6252.67	281	0.11519
RLO SJ EQUITY	8189	7590	73	-0.06423
SAC SJ EQUITY	340	390	0	0.14706
SLM SJ EQUITY	1900	2249	0	0.18368
SNT SJ EQUITY	8750	11375	166	0.31897
TFG SJ EQUITY	5785	6101	170	0.08401
TON SJ EQUITY	8556.98	9237.09	147.4	0.09671
TRU SJ EQUITY	3210	3650	60	0.15576
WHL SJ EQUITY	1793	2140	76	0.23592