"Return prediction in small capitalization companies on the Johannesburg Stock Exchange"

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RETURN PREDICTION IN SMALL CAPITALIZATION COMPANIES ON THE JOHANNESBURG STOCK EXCHANGE

Abstract

This report analyzes return prediction in small capitalization companies on the Johannesburg Stock Exchange over the period from 1 January 2010 to 31 December 2015. Well-established fundamental company characteristics and additional small capitalization specific characteristics were regressed against the returns of 104 small capitalization companies. The results show contrary predictability than what is seen in prior studies, which focused on larger companies. The results highlight the difference in the nature of returns earned by small caps and provide insight into unique predictive characteristics that can be used by investors and analysts of small capitalization companies.

Keywords   small capitalization, return, prediction, book-to-market, growth-to-price, momentum, earnings yield, HEPS, EBITDA, ROE

JEL Classification   G11, G14

INTRODUCTION

This paper outlines the predictive nature of fundamental company characteristics on share price returns. In particular, small capitalization companies (small caps) on the Johannesburg Stock Exchange (JSE) in a post-recession recovery period. The characteristics to be tested are partly well-known fundamental characteristics that have been shown to have predictive qualities in previous studies. However, these prior studies focused on larger companies. Furthermore, this paper includes additional characteristics which are unique to this report. These characteristics relate specifically to small caps in an attempt to identify quality small caps in terms of value and business quality (McLachlan, 2016).

The findings of this paper are able to inform investors about small cap companies. It highlights the predictive nature of fundamental company characteristics, as they relate to small caps, providing insight into an under-researched classification of company size. The emphasis on small caps in a post-recession recovery period focuses the report on a specific period and size of company in a combination that is unique and informative. While this report focuses on the JSE, the observations made may also be applicable to small caps in other markets globally given that these fundamental characteristics have shown to have predictive qualities on other exchanges in prior studies.

1. LITERATURE REVIEW

The literature review begins by presenting prior literature relating to return prediction and small caps. Thereafter, each of the characteristics to be tested will be tabulated. The predictive nature of these characteristics, as noted in prior literature, will be discussed. While emphasis is placed on literature, focused on a similar emerging market, global results are also included.

1.1. Return prediction

The efficient market hypothesis states that share prices reflect all relevant information, meaning that it is not possible to outperform the market. Another aspect of the efficient market hypothesis is that share price returns follow a 'random walk', meaning that predicting share returns should not be possible (Malkiel & Fama, 1970). However, previous studies have suggested that returns can be predicted using a variety of methods. In practice, technical analyses predict the movement in a share price using historical share price returns and the patterns these returns can form. Fundamental company characteristics are characteristics such as NAV (net asset value) or cash flow that provide information on the fundamentals of a company. When expressed as a ratio such as cash-flow-to-price or book value to market value, these characteristics can explain share price returns (Fama & French, 2008).

Fama and French (1993) introduced a three factor model consisting of market value, book-to-market ratio, and market risk to predict share price returns. Basiewicz and Auret (2010) applied this three factor model on the JSE from June 1992 to July 2005 and found that it predicted the expected return for companies on the JSE by explaining the size and value effects. The size effect implies that small caps earn greater returns than larger capitalization companies, while the value effect indicates that shares that are undervalued in terms of their fundamentals, such as NAV, will outperform a benchmark over a certain period. More recently, Fama and French (2015) introduced a five-factor model adding profitability and investment patterns to market capitalization and book-to-market ratio.

Holthausen and Larcker (1992) used financial statement information to predict returns from 1978 to 1988 on the New York and American Stock Exchanges using sixty different accounting ratios of companies. Holthausen and Larcker (1992) concluded that by combining financial statement items into one summary measure, they were able better to predict subsequent movements in the share price. Van Rensburg (2001) discovered that earnings yield, past twelve months' (positive) returns, market capitalization, dividend yield, six month's past returns, leverage, cash-flow to debt, turnover and three month's positive past returns were significant in share price return prediction, despite the implications of the efficient market hypothesis. Kruger and Toerien (2014) found that many of the fundamental characteristics tested in prior studies still held firm when tested over the Bull Run of 2002 to 2007 but only cash-flow-to-price remained as a stable predictor of returns during the sub-prime mortgage crisis between 2007 and 2009.

1.2. Small capitalization companies

Small capitalization companies are self-defined as companies with a small market capitalization. The value of a small market capitalization is subjective. Some papers divided companies into quartiles, while others used a specific market capitalization as the limit. Analysts and market commentators have varying definitions that can provide an insight into how to define 'small'. Planting (2013) describes a small cap company on the JSE as a company with a market capitalization of under R2 billion to R5 billion. Morningstar (2015) defines a small cap company as one that falls into the smallest 10% of a domestic exchange by market capitalization.

Consideration can be given to liquidity and research coverage which relate to characteristics that are more common to small caps than larger companies (Planting, 2013). Small caps are sometimes illiquid and, as a result, are excluded from studies (Van Rensburg & Robertson, 2003b). Illiquidity increases the risk of investing in the share, because an investor may not be able to exit the position timeously, thus, the investor may seek a return that includes a premium for investing in

a low liquidity share. This also affects the bid-ask spread, as less liquid shares tend to have a larger spread (Jegadeesh & Subrahmanyam, 1993).

Small caps can provide higher returns than larger capitalisation companies due to the size effect (Van Rensburg & Robertson, 2003a). Because they operate off a smaller asset base, the scope for expansion is greater for small caps than larger companies, and, hence, the returns can be higher. However, this can also be explained by higher volatility and greater risk inherent in small caps (Hammar, 2014).

In terms of small caps, many investors choose small caps when looking for abnormal returns (Hammar, 2014). One theory suggests that real long-term value can be found in buying quality small caps and holding them in anticipation of their growth and subsequent abnormal returns (Van Rensburg, 2001). Small caps have unique characteristics that set them apart from the bigger companies on the JSE. Although riskier, they do offer an opportunity for long-term investment and abnormal capital growth not usually attainable by investing in larger companies.

1.3. Predictors

This sub-section continues by presenting the 12 fundamental characteristics tested in this paper. The first eight are characteristics that have been well-researched in prior literature, which can be drawn from both the global and local market. However, the studies largely focused on larger companies.

The remaining four characteristics are less prevalent in prior literature, but have been selected specifically for their applicability to small caps. Furthermore, the characteristics use a comparison to the JSE average, which is unique for this paper. This is to show evidence of predictive qualities when the predictor is characterized relative to the JSE average.

Further rationale for these four additional characteristics is that small caps can offer good value investing opportunities (Hsieh, 2015). The key factor behind these metrics is providing a measure

of 'value' and 'quality'. While these are open to interpretation, the basic premise is that these characteristics help determine whether quality, cheap small caps can be found, and whether they help predict the returns of these companies.

1.3.1. Cash-flow-to-price

Cash-flow-to-price is calculated as the cash flow per share divided by the share price (Van Heerden, 2014). Cash flow per share is the net cash flow for the period as per the cash flow statement divided by the number of shares outstanding at the end of the year. The larger the ratio, the greater the cash flows generated relative to the share price. This provides an indicator of financial health, as the greater the ratio, the better the cash generation of the business is relative to its size. The predictive power of this ratio has been supported in literature by Kruger and Toerien (2014).

Muller and Ward (2013) established that cash-flow-to-price was one of the most significant characteristics that helped explain significant excess returns in the JSE from 1985 to 2011. Furthermore, it was the only characteristic statistically significant over both the bull and crisis period analyzed by Kruger and Toerien (2014). This was contrary to Van Rensburg (2001) who concluded that cash-flow-to-price was not a significant characteristic in return prediction. It can be deduced that larger cash flows were correlated to share price performance going forward when Chan, Chan, Jegadeesh, and Lakonishok (2001) concluded that accruals are inversely related to share returns, and that larger accruals lead to lower cash flows. Therefore, higher cash flows lead to lower accruals and a greater share price return.

1.3.2. Earnings yield

Earnings yield is the earnings per share (as per International Financial Reporting Standards (IFRS)) as a percentage of the share price. The higher the earnings yield, the greater the earnings relative to the share price. Whether a higher or lower earnings yield is preferred is dependent on whether investors are growth or value investors (Hammar, 2014). Value investors expect undervalued shares to generate excess returns and, there-

fore, prefer lower price multiple shares (i.e., higher earnings yield). Contrastingly, growth investors invest in shares with higher price multiples (i.e., lower earnings yield) in order to capitalize on the company's future growth (Hammar, 2014).

Earnings yield can be used as a measure for the value effect (Strugnell, Gilbert, & Kruger, 2011). The value effect is where 'value shares' outperform a benchmark. A 'value share' is a share that is undervalued, i.e., a share that is trading at a discount to it's fundamental value as indicated by a fundamental characteristic.

Kruger and Toerien (2014) concluded that earnings yield is significantly positively related to share price returns. This is supported by Van Rensburg and Robertson (2003a) who concluded that earnings yield (in this case, price-to-earnings (P/E) was used) is positively correlated with share price returns. Conversely, Hsieh (2015) discovered that an independent value effect as tested through an earnings yield and sales-to-price portfolio, while being present, was weak over the period of 1997 to 2013.

1.3.3. Book-to-market

The book-to-market ratio is the book value of a company (total assets less total liabilities) divided by the market value of the company (i.e., market capitalisation as per the relevant securities exchange). The book-to-market ratio identifies the so-called undervalued companies. A ratio greater than one implies that the book value is greater than the market value, meaning that one could theoretically buy all the shares in that company and sell the company assets and settle its liabilities for an amount greater than what was paid in the market.

Many studies have tested the book-to-market ratio as a return predictor on the JSE, often with differing results due to different methods, inputs or periods. Van Rensburg (2001) used net asset value-to-price and observed that it was not a significant factor in predicting share price returns. Fama and French (2015) found that as the book-to-market ratio of companies listed on the New York Stock Exchange increased, average excess returns increased. This is supported by Auret and Sinclaire

(2006) who observed a statistically significant positive relationship between book-to-market and share price returns.

Book-to-market as a predictive factor has been found to be stable over a financially stable period, but not during unstable periods (such as a market crisis) (Kruger & Toerien, 2014). Basiewicz and Auret (2010) also found that the book-to-market ratio loses its predictive power when the size of a company is included as an explanatory variable.

1.3.4. Twelve-month dividend growth-to-price

The 12-month dividend growth-to-price ratio calculates the 12-month change in the dividend per share (DPS) relative to the current share price. Related to dividend growth and dividends as a share return predictor is the dividend yield. Dividend yield shows the percentage of the share price paid out as a dividend. The higher the yield, the greater the dividend relative to the share price.

Kruger and Toerien (2014) concluded that dividend growth-to-price, not dividend yield, was significant and stable in the 2002 to 2007 bull market on the JSE. This illustrates the long-term predictive capacity of dividends. Similarly, Hodnett, Hsieh, and Van Rensburg (2012b) established that companies with higher dividend growth earn higher returns. Furthermore, Van Heerden (2014) found that dividend yield was more significant for large capitalization companies and Ang and Bekaert (2007) concluded that while dividend yield could predict returns in the short term, it was not a suitable predictor over the long term.

1.3.5. Twelve-month earnings growth-to-price

The 12-month earnings growth-to-price ratio calculates the 12-month change in earnings per share (EPS) relative to the current share price. While earnings yield is a significant predictor of share price returns in the past, earnings growth includes a measure of how well the company is growing its earnings.

Kruger and Toerien (2014) found earnings growth-to-price to be a positively significant predictor of returns during a bull market. Fama (1998) described mean reversion as a basis for share price

prediction highlighting that poor past earnings growth can lead to better future returns, an anomaly that contradicts what Kruger and Toerien (2014) observed. Hodnett et al. (2012b) established that companies with higher earnings growth earn higher returns.

1.3.6. Six-month and twelve-month momentum

Momentum is a measure of the rate of change of a share price. Six-month and 12-month momentum is the rate of change of the share price over the last 6 and 12 months, respectively. The theory is that shares with higher momentum will continue with that momentum and produce higher returns than those with lower momentum.

Gorman (2003) found that momentum can be used as a strategy to predict excess returns when applied to small capitalization mutual funds. Twelve-month 'winners' from the previous year continued to provide excess returns until a reversal in performance occurred from 24 to 36 months onwards. Kruger and Toerien (2014) support the presence of 6- and 12-month momentum when assessing the ALSI. However, this is contrary to Bolton and von Boetticher (2015) who observed no evidence of momentum in the JSE Top 40 companies from 2009 to 2014. This is most likely due to the difference in the periods tested and sample used.

Page, Britten, and Auret (2013) also observed that momentum was evident over the short to medium term. Hoffman (2012) concluded that momentum has a positive relationship with future returns across all categories analyzed, including small and micro capitalization companies. A momentum style based portfolio with a 12 month formation period and a 3 month holding period showed evidence of excess returns compared to the ALSI for a 27 year period ending December 2012 (Muller & Ward, 2013). Hodnett et al. (2012b) also concluded that short term momentum as an investment style was significant. Van Heerden and Van Rensburg (2015) further confirmed many previous studies findings in that the momentum effect was evident and statistically significant in explaining share price returns on the JSE from January 1994 to May 2011.

1.3.7. Log of market value

Market value is a proxy for the size effect, i.e., market value is inversely proportional to share price returns. The size effect implies that smaller capitalization companies earn greater returns than large capitalization companies do. This is because growing companies will have greater share price returns as they grow than larger, established companies (Hammar, 2014).

Kruger and Toerien (2014) found a statistically significant inverse relationship between market value and share price returns, which is consistent with the size effect. This inverse relationship was also evident in Strugnell et al. (2011), but concentrated on the smaller capitalization companies. Over the period of 1985 to 2011, Muller and Ward (2013) only found evidence of the inverse relationship in the smallest capitalization companies, with larger capitalisation companies outperforming smaller capitalization companies. Auret and Cline (2011) also concluded that market value was not a share return predictor. This provides evidence that the inverse relationship between market capitalization and return may only be prevalent during certain time periods and is not a consistent indicator of return prediction. This is supported by Van Heerden and Van Rensburg (2015).

1.3.8. Net debt to equity

Debt to equity is an indicator of the gearing of a company. The lower the ratio, the less debt a company has relative to its net asset value. Lower gearing coupled with higher returns shows that a small company is effectively managing debt while increasing returns year on year (McLachlan, 2016).

As this ratio is assessed in relation to the JSE average, having net debt to equity and lower than the JSE average means that a company has lower gearing and thus potentially lower credit risk than the JSE average and is a 'cheaper' share to buy relative to other shares on the JSE (McLachlan, 2016). This supports the theory of value investing in that these shares will have a greater potential to grow (Hsieh, 2015).

Debt to equity has explanatory power in explaining returns (Fama & French, 2003). Van Rensburg

and Robertson (2003a) found that higher debt levels leads to negative returns with the only exception to this being the returns earned in financial shares. Muller and Ward (2013) observed that over-gearing leads to negative returns and Bhandari (1988) established that share returns are positively related to the debt to equity ratio when beta and company size are controlled for.

1.3.9. Enterprise value to EBITDA

Enterprise value is the market capitalization of the company plus the market value of the company's debt. Enterprise value (EV) to earnings before interest, tax, depreciation and amortization (EBITDA) shows how 'cheap' a share is relative to other shares in its sector. One theory in support of investing in small caps is that they can be 'cheap' or undervalued and thus can generate excess returns (Hammar, 2014).

This ratio is also assessed in relation to the JSE average and can provide insight and comparability of operations, as it eliminates the differences in gearing, as well as how reliant the company is on fixed assets. Other than Minjina (2009) who found EV/EBITDA to not be predictive of returns on the Bucharest Stock Exchange, no other studies on EV/EBITDA as a return prediction variable could be found. This could be because it is mainly used as a valuation multiple and not a predictor (Harvey, 2011).

1.3.10. Two-year average ROE

Return on equity (ROE) is the net profit divided by shareholder's equity. Prior studies have tested ROE as a predictor of returns (Muller & Ward, 2013). However, looking at the two-year average provides continuity and stability to the measure. Comparing this to the JSE average provides an indicator of quality.

Muller and Ward (2013) found that ROE was a significant and persistent factor in excess returns, however, advised that investors avoid companies in the highest and lowest quartiles of ROE. The reasons given were that either those shares were fully priced by investors or the high ROE levels were not sustainable going forward. Studies looking at an average ROE over a certain time-period

could not be found, but the applicability of ROE as a return predictor is apparent from the literature reviewed.

1.3.11. Two-year HEPS growth

JSE listing requirements require that companies listed on the JSE report headline earnings per share. Headline earnings per share is basic earnings per share adjusted for all re-measurements relating to the capital (fixed assets) of the company (South African Institute of Chartered Accountants, 2008). This provides users with earnings that relate mainly to the operations of the business and exclude non-recurring items. Growth in HEPS shows growth mainly due to core operations (South African Institute of Chartered Accountants, 2008).

'Headline' earnings is a figure used in South Africa that is not required to be disclosed in terms of IFRS, but rather in terms of the JSE listing requirements. However, other countries will have a calculation for 'earnings from operations', which is slightly similar. Having a higher two-year HEPS growth than the JSE average means that companies will be more profitable and grow faster than the average JSE company despite the lower gearing, which shows evidence of a good quality company (McLachlan, 2016).

Booth, Broussard, and Loistl (1997) discovered that the change in earnings adjusted for once-off and extraordinary items as per the Deutsche Vereinigung für Finanz analyze und Analgeberatung (DVFA) were significant in predicting share price returns. Furthermore, the change in the difference between published earnings and DVFA earnings was also significant.

The characteristics presented in Table 1 have shown predictive qualities to varying degrees and with varying consistency in previous studies. Cash-flow-to-price and book-to-market value appear to show the strongest evidence of a predictive nature and the applicability to small caps may reinforce it's strong predictive qualities. Of the four additional characteristics selected, net debt to equity has predictive qualities, but little recent literature could be found to investigate the significance of the debt to equity ratio as a return predictor.

Table 1. Predictors

No	Return predictor	Symbol	Calculated as
1	Cash-flow-to-price	CFtoP	Cash flow per share/share price
2	Earnings yield	EY	Earnings per share/share price
3	Book-to-market	BTM	Book value per share/share price
4	Twelve-month dividend growth-to-price	DGtoP	Twelve-month dividend growth/share price
5	Twelve-month earnings growth-to-price	EGtoP	Twelve-month earnings growth/share price
6	Six-month momentum	X6MOM	Share price return over the prior six months
7	Twelve-month momentum	X12MOM	Share price return over the prior twelve months
8	Log of market value	LogMV	Natural logarithm of market value
9	Net debt to equity*	NetDE_Comparison	Net debt/shareholders equity
10	Enterprise value to EBITDA*	EV_Comparison	Enterprise value/earnings before interest, tax, depreciation and amortization
11	Two-year average ROE**	ROE_Comparison	ROE = net profit/shareholders equity. Average ROE over the prior two years
12	Two-year headline earnings per share (HEPS) growth**	2YrHEPSG_Comparison	HEPS growth over the prior two years

Note: *Compared to the JSE average over the tested period as a factor where '0' represents less than the JSE average and '1' represents greater than the JSE average. As mentioned in sub-section 2.3 and Table 1, lower debt and EV/EBITDA means that there is less credit risk and the share is cheaper relative to other companies, which is a characteristic favored in value investing. **Compared to the JSE average over the test period as a factor where '0' represents greater than the JSE average and '1' represents lower than the JSE average. As mentioned in sub-section 2.3 and Table 1, having a higher ROE and HEPS growth shows that the company is of a good quality, in theory.

Notwithstanding this report's findings, none of the 12 characteristics reviewed have been tested against a sample consisting of small caps in isolation. This is possibly due to the nature of small caps and their characteristics. This provides an area for research which this paper investigates.

2. METHODOLOGY

The following research question is posed:

Do fundamental company characteristics predict the returns of small capitalization companies on the JSE?

The period analyzed was 1 January 2010 to 31 December 2015. The constituents of the Mid Cap, Small Cap and Fledgling Indexes of the JSE as at 1 January 2016 were used as the starting point to obtain the sample of companies to be tested. The JSE Small Cap (code: J202) Index's constituents are the next 60 largest companies by market capitalisation after the Mid Cap Index (J201), which is the next 60 largest companies by market capitalisation after the JSE Top 40 (JSE Limited, 2013). The Fledgling Index is all other companies

smaller than the Small Cap Index that qualify to be included in the index. However, it is not subject to the same liquidity requirements as other indexes.

A total of 224 companies constituted the initial sample. A limit of R3 billion for market capitalization as of 1 January 2010 was applied to define a small capitalization company (see sub-section 1.2). If a company subsequently grew above the R3 billion limit, it was retained in the sample, as this would show evidence of improving share price returns that may be explained by the fundamental characteristics of the company. This process removed 80 companies from the initial sample, resulting in 144 remaining companies.

Upon further inspection, 19 companies were noted to have listed or delisted during the period and were, therefore, removed from the sample, because the nature of this analysis was to explain the returns as opposed to comparing excess returns. Therefore, only companies that were listed from 1 January 2008 to 1 January 2016 were used (a company had to be listed from 2008, because some of the characteristics use a two-year average).

Furthermore, a liquidity filter was applied to eliminate the most illiquid shares (Kruger & Toerien, 2014). Shares that had a turnover ratio of less than 0.03% were eliminated. This equated to 21 companies. The turnover ratio was calculated as the volume for the month divided by the number of shares outstanding. This approach is supported by Page et al. (2013). As a result, the final sample of companies available for testing was 104.

The Total Return Index was used for returns, as it eliminates the need to calculate the monthly returns and includes dividends paid. Thus, the effect of dividends is taken into account along with share price changes.

2.1. Data

The same 12 characteristics discussed in section 1.3 are presented in Table 1 to allocate symbols and set out the means of calculation:

The relevant data were obtained from Thomson Reuters DataStream and relevant averages were calculated to be used in the comparison. For data pertaining to HEPS and the JSE averages, INet BFA was used. The averages were filtered for outliers at the 97.5% level due to the riskier nature of small caps compared to larger companies (Hammar, 2014). Where averages were greater than the 97.5% level, the value of the 97.5% average was assigned (Kruger & Toerien, 2014). This provides a more comparable and realistic average comparison, because without the filtering, the impact of the outliers would have been substantial and distorted the results.

Except for the data to be used in the comparisons, each characteristic was standardized to ensure that the slopes given by the regression are comparable. The company data used for the comparison characteristics were not standardized, as the comparison is tested as a 0 or 1 factor variable.

2.2. Statistical approach

A cross-sectional regression analysis of the monthly returns against each company characteristic was performed over the test period of 1 January 2010 to 31 December 2015 as represented in equation (1):

$$R_{i,t+1} = B_{0,t+1} + B_{1,t+1}S_{i,t} + E_{t+1}, \qquad (1)$$

where $R_{i,t+1}$ is the monthly return for share i for the month $t+1$, $B_{0,t+1}$ is the constant, $B_{1,t+1}$ is the slope coefficient in month $t+1$, $S_{i,t}$ is the standardized value of the characteristic being tested or the factor variable relating to the comparison, and E_{t+1} is the residual.

Headline earnings per share (HEPS) growth was separately correlated against yearly returns to determine the Pearson product-moment correlation coefficient because monthly HEPS data were not available.

Due to the large number of data points in the regression analysis, the central limit theorem applies in that the arithmetic mean of a sufficiently large sample of independent random variables will be approximately normally distributed (Weisstein, 2016). Thus, a t-test is appropriate.

Small cap shares are inherently riskier due to their characteristics. Therefore, the returns were risk-adjusted using the Capital Asset Pricing Model (CAPM). This is also done to ensure that the characteristics being tested are not representative of systematic risk. The beta was attained for each share for the relevant period. The 10 year SA government bond (R186) was used as the risk-free rate and the market premium attained. The CAPM return was calculated per company and subtracted from the actual return to obtain the excess return. A regression was conducted over the excess returns of each share per month against each standardized company characteristics. CAPM is represented by equation (2):

$$R_i = R_f + \beta_i \cdot \left(R_M - R_f\right) + \varepsilon_i, \qquad (2)$$

where R_i is the return for share i, R_f is the risk free rate, β_i is the beta of share i, R_M is the return on the market and ε_i is the return unexplained by the market, i.e., a residual. $\beta_i\left(R_M - R_f\right)$ is the systematic part of the return, thereby leaving $R_f + \varepsilon_i$ as the unsystematic part of the return of share i. We calculate the excess return $\left(\alpha\right)$ by rearranging equation (2) as follows to get equation (3):

$$R_i - R_f = \alpha + \beta_i \cdot \left(R_M - R_f \right) + \varepsilon_i. \qquad (3)$$

Therefore, the abnormal return can be modelled as follows in equation (4):

$$\alpha_i + \varepsilon_i = R_i - R_f - \beta_i \cdot \left(R_M - R_f \right), \qquad (4)$$

where $\alpha_i + \varepsilon_i$ is the abnormal return. The abnormal returns are calculated and regressed against the standardised characteristics per equation (5):

$$\alpha_{i,t+1} + \varepsilon_{i,t+1} = B_{0,t+1} + B_{1,t+1} \cdot S_{i,t} + E_{t+1}. \quad (5)$$

2.3. Limitations and risks

Survivorship bias can result in focus being placed only on companies that are still listed, thus ignoring the impact of those that have delisted. There were five small cap companies that delisted during the period tested. Complete data could not be attained and thus they were excluded. Given that there were 104 companies tested, the omission of five companies should not have a material impact. Furthermore, a test of this nature would be less impacted by survivorship bias, as we look at the explanatory relationship between return and fundamental characteristics as opposed to comparing the returns of a certain style portfolio to a benchmark.

3. RESULTS

The results of the monthly characteristics (i.e., excluding HEPS growth) are presented in Table 2 for the ordinary least squares (OLS) regression over the period from 1 January 2010 to 31 December 2015. Standard errors are shown in parenthesis.

In terms of the regression results as presented in Table 2, five characteristics were found to be statistically significant at the 5% level; namely 1) book-to-market, 2) twelve-month momentum, 3) enterprise value to EBITDA comparison, 4) net debt to equity comparison and 5) return on equity comparison.

Book-to-market is significantly inversely related to returns, which contradicts the findings of prior studies. Auret and Sinclaire (2006), Hodnett et al. (2012), Fama and French (2015) and Kruger and Toerien (2014) all found significant positive relationships between book-to-market and returns.

Table 2. Regression output

Characteristic	Unadjusted	t-stat	CAPM risk-adjusted	t-stat
LogMV	637.353 (599.649)	1.063	299.967 (602.113)	0.498
BTM	−2 296*** (625.345)	−3.672***	−2 410*** (627.915)	−3.838***
EY	−10.969 (554.306)	−0.020	120.332 (556.584)	0.216
CFtoP	−418.844 (511.877)	−0.818	−464.185 (513.981)	−0.903
X6MOM	−137.399 (688.325)	−0.200	−118.004 (691.153)	−0.171
X12MOM	−1 527* (693.198)	−2.203*	−1 587* (696.047)	−2.280*
EGtoP	−395.981 (546.552)	−0.725	−439.174 (548.799)	−0.800
DGtoP	−65.142 (514.614)	−0.127	−109.578 (516.729)	−0.212
EV_Comparison	−4 525** (1 555)	−2.911**	−4 385** (1 561)	−2.809**
NetDE_Comparison	−6 281*** (599.649)	−6.020***	−6 716*** (1 048)	−6.412***
ROE_Comparison	−3 417** (1 067)	−3.204**	−3 457*** (1 071)	−3.228***
N	7592		7592	
R-squared	0.012		0.014	

Note: significance level: *** < = 0.001; ** < = .01; * < = 0.05.

However, this inverse result is consistent with Hoffman (2012) who observed that small caps had an inverse relationship with returns when grouping the sample by company size. Therefore, when focussing on small caps, book-to-market appears to have an inverse relationship to returns. This means that the smaller the book value of the company is relative to the market value, the greater the returns. This observation indirectly indicates an inverse 'size effect' in that the greater the market capitalization within the small cap classification (thus, the smaller the book-to-market ratio), the greater the return.

Twelve-month momentum also has a significant inverse relationship to returns when focusing on small caps only. This is again contradictory to prior studies such as Gorman (2003) and Hoffman (2012). Table 2 shows that the slower the share price changes, the greater the return. This may be due to a type of earnings announcements effect being more prevalent in small caps. Due to the lack of coverage, some small cap shares may not trade often, thus, having a slow momentum. However, when there are earnings announcements, these shares gain traction if their earnings are high, and the subsequent moves in price are large. Thus, these slow trading, low momentum shares show a higher return.

Enterprise value to EBITDA (EV/EBITDA) as compared to the JSE average shows that EV/EBITDA has predictive qualities when compared to the JSE average. Where the EV/EBITDA ratio is lower than the JSE average, returns are greater. This is consistent with the value investing school of thought as evidenced by Hsieh (2015) and McLachlan (2016) where 'cheaper' shares offer value investing opportunities and thus greater returns.

Table 2 also shows that when net debt to equity in small caps is lower than the JSE average, the returns are greater. Debt to equity as a predictor thus supports the findings of Fama and French (2003) and Muller and Ward (2013), with the latter showing that lower debt results in greater returns. The t-stat shows a high significance level not usually evident when using debt to equity as a predictor.

Lastly, two-year average ROE as compared to the JSE average demonstrates a significant positive relationship to returns. Where the two-year average ROE was higher than the JSE average, a zero (0) was assigned. Thus, the t-stat is negative as a result of the allocation of a zero (0). Therefore, where the ROE is greater than the JSE average, the returns are greater. This is contrary to Van Heerden and Van Rensburg (2015) and Van Rensburg (2001) who found that ROE was not significant over their respective test periods. However, this might be due to differences in the samples used. ROE, when isolated in small caps, may be significant, as earning profits as a smaller company may have a high significance to the market.

The results for two-year HEPS growth is presented in Table 3 for the correlation test over the period from 1 January 2010 to 31 December 2015.

Table 3. Correlation test

Characteristic	2 Year HEPS growth
Correlation coefficient	0.0077
P-value	0.847

The p-value is not significant at the 5% level. There is thus no significant correlation between the HEPS growth and the returns of small caps.

CONCLUSION

Research into small caps is often excluded from research papers owing to a number of characteristics inherent in this classification of companies. Therefore, research on this subset is limited. The findings of this paper provide much needed insight into this under-researched area.

This report informs investors of the benefits of investing in quality, undervalued small cap shares. The predictive nature of the fundamental characteristics show contrary results to what is more commonly seen with larger companies. Therefore, both smaller, individual investors and large institutions alike can benefit from this research. The findings are applicable to both the local South African economy and the global market.

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