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Book-to-market ratio and returns on the JSE

1. INTRODUCTION

Many firm-specific attributes or characteristics are understood to be proxies for what Fama and French (1992: p428) refer to as "the unnamed sources of risk". Perhaps the most notorious of these is the size of the firm or its market value, first documented by Banz (1981). The relationship between size and average returns has become known as the "size effect".

Ball (1978) argues that the ratio of earnings-to-price, or E/P ratio, is a blanket proxy for unnamed risk factors in expected returns. Other firm attributes such as financial leverage (see Bhandari, 1988), dividend yield (see Litzenberger and Ramaswamy, 1979), and book-to-market ratio (see Rosenberg *et al*., 1985) have also been found to exhibit significant correlations with average returns. Each of these, according to Ho, Strange and Piesse (2000), may be proxies for certain risk factors that are related to asset returns.

The last of these factors, the book-to-market (BTM) ratio, is the ratio of book value of equity (total assets minus total liabilities) as per the balance sheets to market value of equity (stock price times the number of shares outstanding). Fama and French (1992) find a strong positive BTM effect, suggesting that firms with higher BTM ratios have higher expected average returns. Furthermore, in their analysis performed on US data from 1962 to 1989, Fama and French (1992: p428) find that "although the size effect has attracted more attention, book-to-market equity has a consistently stronger role in average returns."

Internationally, literature documenting the explanatory power of the BTM ratio over stock returns is not scarce. Stattman (1980), for example, finds a positive relationship between average return and BTM for U.S. stocks, as do Rosenberg, Reid, and Lanstein (1985). Chan, Hamao, and Lakonishok (1992) find that BTM is useful in explaining Japanese stock returns.

1.1 BTM and risk

The book value of a firm is the difference between total assets (resources expected to result in inflows of economic benefits) and total liabilities (obligations expected to result in outflows of economic benefits), or a measure of net expected inflows of economic benefits, or earnings. However, there is inherent uncertainty surrounding those earnings.

Investments in two firms, each with similar book value to the other, are likely to be valued differently if there is more uncertainty surrounding the returns of one versus the other. The investment with the lesser uncertainty (lower risk) is likely to be preferred to the investment with the greater uncertainty (higher risk), since the marginal utility of risk is assumed to be always negative, as per Markowitz (1959). As a result, the market value of the less risky investment is likely to be higher than the market value of the more risky investment. Since the BTM ratio is the ratio of book value to market value, the less risky investment is therefore likely to have a lower BTM ratio than a more risky investment. Given that higher returns are necessary to induce investors to purchase a riskier investment, a positive relationship between BTM and returns results.

This idea that BTM may be a proxy for risk is documented by Fama and French (1992), Davis, Fama and French (2000), Keim (1988), and Hawawini and Keim in Jarrow, Maksimovic and Ziemba (1995), Daniel and Titman (1997), Strong and Xu (1997), Ho, Strange and Piesse (2000), Drew (2003) and Griffin and Lemmon (2002), to name but a few. Some of the markets tested include those in the U.S., U.K., Hong Kong, Korea, Malaysia, Italy and the Philipines.

Chen and Zhang (1998) suggest BTM may capture three different types of risk: distress of a firm, financial risk, and riskiness of cash flow. Akgun and Gibson (2001), on the other hand, suggest that BTM (as well as size) may subsume useful information regarding both the probability of bankruptcy and recovery rates, as well as distress risk. Vassalou and Xing (2004) posit that the BTM effect is largely a default effect, but exists only in segments of the market with high default risk.

For the purposes of this study, it will suffice to simply recognise that BTM is a proxy for certain elements of risk of the firm, without postulating exactly what those elements are, in the fashion of Fama and French (1992). Attempting to dissect the BTM effect into the various types of risk for which it may proxy remains an intriguing avenue for further research.

Earlier studies on returns on the Johannesburg Stock Exchange (JSE) have largely been performed within the context of the CAPM, with various firm-specific attributes being tested jointly with the CAPM's risk measure, beta, in order to provide evidence for or against the CAPM.

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For instance, Page and Palmer (1991) find evidence for an earnings effect[1], but no size effect. De Villiers, Lowings, Pettit and Affleck-Graves (1986) find no evidence of a size effect, whilst Affleck-Graves, Bradfield and Barr (1988) find that the normal one-parameter CAPM is well-specified, with the exception of gold shares. Specifically, they found that there was no dividend yield, size or liquidity effect. Affleck-Graves, Gilbertson and Money (1982) find a portfolio of low-priced stocks performed better than a portfolio of high-priced stocks.

Due to the scant research on the JSE outside of the context of the CAPM, van Rensburg and Robertson (2003) undertook to identify those attributes which have the ability to explain average monthly returns over a 10-year sample on the JSE, from July 1990 to June 2000, independent of the CAPM's risk measure, beta.[2] This was done by initially regressing returns on each of 24 different attributes[3] separately. These variables included most of the more common attributes typically put forward to explain stock returns, with the exception of the BTM ratio.[4] Afterwards, regressions were performed on all combinations of pairs of attributes to determine how well they jointly explained stock returns. The analysis was extended to groups of three attributes, and the process continued as long as no variables became insignificant at the 5% level in the regression. The resulting optimal model to explain average stock returns was found to be a two-factor model with size and price-to-earnings as explanatory variables.

Fama and French (1992) find that size and BTM combine to capture cross-sectional variation in stock returns, absorbing the influence of leverage and the earnings-to-price ratio. In light of this, it is important to check the robustness of the van Rensburg and Robertson (2003) size-P/E model by including the BTM ratio as a candidate explanatory variable.

[The element of risk related to BTM can be incorporated into a returns model either indirectly through a HML (high-minus-low)-type risk factor, or directly in the form of a "return to styles" approach. The former extracts the signal from the difference of returns on two artificial portfolios, one with high BTM values, and one with low BTM values. The latter simply uses a stock's BTM ratio as an explanatory variable in explaining stock returns. Although the debate as to which is more appropriate continues[5], this study will concentrate on the multi-attribute approach in explaining stock returns, as per Fama and French (1992) and van Rensburg and Robertson (2003) for the sake of comparability.]

The remainder of the paper is divided into the following sections: section two deals with issues relating to data and methodology. Section three presents and discusses results, and the final section concludes.

2. DATA AND METHODOLOGY

The data was generously supplied by Paul van Rensburg and Michael Robertson, and covers the same sample period as their study.

Financial ratios were obtained from the McGregor/Bureau of Financial Analysis (McG/BFA) database of standardised financial accounts, from July 1990 to June 2000. The sample contains stocks in all sectors of the JSE. Returns data were obtained from the BARRA organisation's data set of monthly stock returns, adjusted for all capital events and dividends. A thin trading filter was applied conservatively to ensure that all firms in the sample were traded at least once during each month. Cash shell companies are excluded. The data set shows missing values for de-listed shares only after the de-listings, which helps eliminate the problem of survivorship bias. It also augments the data set. Variables have been cross-

[1] The effect of the price-to-earnings ratio (PE) on returns.

[2] They do perform similar tests within the context of the CAPM too, but find no empirical support for the CAPM at all.

[3] These included: Price-to-earnings, dividend yield, price-to-profit, price-to-NAV, cash flow-to-price, sustainable growth, retention rate, size, return-on-equity, return-on-assets, debt-to-cash flow, debt-to-assets, long term loans-to-assets, debt-to-equity, leverage, financial distress, current ratio, quick ratio, owner's interest, previous one month's return, previous six month's return, previous one year's return, trading volume and shares in issue.

[4] The paper does, however, include a price-to-net asset value per share (P-NAV) ratio. Upon reflection, this turns out to be similar to the inverse of the BTM ratio, though there are a few accounting differences (for example, the treatment of redeemable and irredeemable preference shares). There are however, three more important reasons why the P-NAV will not substitute for BTM. Firstly, the BTM ratio is well documented in the literature, whereas there is less research conducted on the P-NAV ratio. Secondly, regressing returns on BTM and on P-NAV will yield very different results. If a linear regression on one of the variables is correctly specified, then a linear regression on its inverse must be misspecified since the latter will involve a non-linear function. Thirdly, since book value (the numerator in BTM) can be negative, and market value (denominator) is nonnegative, the relationship between book value and BTM (holding market value constant) is continuous. In contrast, the relationship between book value and P-NAV is characterized by a large discontinuity as book value approaches zero from above and below. This means that a minor change in book value from just below zero to just above zero will cause a jump in P-NAV, moving it from the very bottom of the distribution to the very top. Clearly then, using P-NAV is not a good substitute for BTM ratio.

[5] Daniel and Titman (1997) argue that the latter is a better approach in explaining stock returns than the former, in an analysis using both size and BTM attributes. See also Cohen and Polk (1995). Davis, Fama and French (2000), on the other hand, find that the factor approach performs better than the characteristic approach for the book-to-market ratio.

sectionally standardised in each month, resulting in a mean of zero and a standard deviation of unity.[6]

The ratios used were drawn from audited financial year-end reports and interim results were ignored. They have been lagged so that the data from any particular year-end are matched with the returns for May of the following year. Thus there is a minimum lag of 5 months (relating to firms reporting in December) and a maximum lag of 17 months (relating to firms reporting in January). Since the JSE requires all firms to make financial reports available within 90-days of their financial year-end, this conservatively ensures that the financial statement data used was available to investors by the time it is incorporated into the study.

The analysis is performed on the 5 most significant variables reported by van Rensburg and Robertson (2003) on the same data, with the addition of BTM. The independent variables therefore include[7]:

- SIZE – the natural log of market value of the company [ln (number of ordinary shares outstanding times the price per share)]
- PE - price-to-earnings [price per share divided by earnings per share]
- CFTP – cash flow-to-price [((ordinary dividends + non-cash flow items)/ Ordinary shares in issue) / price per share]
- DY – dividend yield [(ordinary dividends / ordinary shares) / price per share]
- PNAV – price-to-net asset value [price / (NAV / ordinary shares)]
- BTM – book-to-market value [book value of equity / market value of equity]

Initially, univariate OLS regressions are employed take the following form:

$$Ret_{i,t+1} = \gamma_{0,t+1} + \gamma_{1,t+1}A_t + \varepsilon_{i,t+1} \quad \text{... (1)}$$

where t is an integer from 1 to 120 corresponding to the particular month from July 1990 to June 2000, $Ret_{i,t+1}$ is the realised return on stock i in period t+1, and A_t is the standardised value of the attribute of the share at the end of month t. $\gamma_{1,t+1}$ and $\gamma_{0,t+1}$ are the estimated intercept- and slope-coefficients, respectively. Significance of the slope-coefficients was evaluated by testing whether the arithmetic mean of the 120 coefficients, one for each month in the time-series from July 1990 to Jun 2000, was significantly different from zero using a Student's t-test.

Following the univariate regression which establishes whether or not there is any explanatory power in particular variables, bivariate regressions of the following form are run:

$$Ret_{i,t+1} = \gamma_{0,t+1} + \gamma_{1,t+1}A_t + \gamma_{2,t+1}B_t + \varepsilon_{i,t+1} \quad \text{... (2)}$$

with the additional attribute at time t (B_t) and it's coefficient, $\gamma_{2,t+1}$. In a similar fashion, other multivariate regressions can be run with up to six explanatory variables, corresponding to the six attributes utilised in this study.

3. RESULTS AND DISCUSSION

The results of the univariate regressions of returns on individual attributes are presented in Table 1. The attributes are ranked in order of significance. The first important finding of this paper is therefore that the BTM variable is clearly able to explain some of the variations in stock returns. The fact that the coefficient on the BTM attribute is significant justifies its inclusion into the set of candidate attributes used in modelling returns. Interestingly, its coefficient is more significant than those of either the SIZE attribute or PE.

Table 1: slope-coefficients of univariate regressions

Attribute	Coefficient	T-stat	P-value
CFTP	0,053811899	3,894746	0,000162
DY	0,017931022	3,398488	0,000920
BTM	0,014863475	2,968554	0,003613
SIZE	-0,005761358	-2,735025	0,007184
PE	-0,005397798	-2,621177	0,009896
PNAV	-0,004927815	-2,125079	0,035631

All coefficients are significantly different from zero at the 5% level.

However, mere statistical significance in univariate regressions is not enough to justify inclusion into a multivariate model, since the aforementioned problem of multicollinearity is likely to pervade. Table 2 shows the pairwise correlations among firm attributes used in this study. Ideally, explanatory variables should not be highly correlated. From this table it becomes clearer why SIZE and PE are chosen by van Rensburg and

[6]Van Rensburg and Robertson (2003) find that this doesn't meaningfully affect the t-statistics, and they point out that it allows for the comparison between the magnitudes of the slopes estimated in the cross-sectional regressions.

[7]Because of the influence of the CAPM, many studies include Beta as an explanatory variable. However, many of them find that it has little or no power to explain stock returns (for example Lam and Spyrou (2003)). On the same sample as this study, van Rensburg and Robertson (2003) find empirical evidence to refute the CAPM. They also exclude beta from their chosen model. Preliminary tests in this study confirm van Rensburg and Robertson (2003)'s findings in that they also show that beta has no significant explanatory power. As a result, it is excluded altogether from the analysis which follows.

Robertson (2003) in their model, because they have relatively low correlation.

Table 2 highlights the correlation problems faced using financial ratios such as those in this study. For example, CFTP and BTM show a pairwise correlation of 0.81, extremely high by any standards. Specifically, the BTM-CFTP, BTM-DY and CFTP-DY correlations are very strong. Interestingly, BTM, CFTP and DY were the three most significant of the attributes used in the univariate regressions. As a result of their high pairwise correlations, however, it is likely that at least one of these three will be redundant.

Table 2: Pairwise correlations among firm attributes

	BTM	CFTP	DY	PNAV	PE	SIZE
BTM	-	0,81	0,69	-0,14	-0,14	-0,33
CFTP	-	-	0,70	-0,11	-0,13	-0,26
DY	-	-	-	-0,08	-0,10	-0,23
PNAV	-	-	-	-	0,61	0,10
PE	-	-	-	-	-	0,14
SIZE	-	-	-	-	-	-

The fact that these three ratios are highly correlated is not surprising when one considers the ratio definitions of each of these three attributes outlined in section 2. Each of the three can be rearranged into a ratio with the denominator equating to the product of the number of shares outstanding and the share price (i.e. the market value). The numerators are then quite comparable. The numerator of the rearranged DY ratio becomes ordinary dividends, while the CFTP ratio simply adds non-cash flow items to the numerator of the DY ratio. Furthermore, to the extent that dividends are typically declared out of remaining assets after deducting all other claims to them (liabilities), the BTM ratio is also likely to tell a similar story.

Having thus considered the individual effects as well as the correlations among the six explanatory variables, the next stage is to begin combining them into bivariate regressions. Table 3 shows the results of regressions of all possible pairs of independent variables. An asterisk below the number of a regression indicates that *both* variables are significant at the 10% level, while double asterisks indicate significance at the 5% level.

The inclusion of the BTM variable into the analysis has generated some interesting results. Firstly, in regressions 4 and 5, where it has been combined with PE and SIZE, respectively, the results seem to indicate that BTM subsumes the roles of PE and SIZE in the bivariate regressions. That is, the inclusion of the BTM variable renders SIZE and PE attributes statistically insignificant, while itself remains significant. This is more clearly illustrated in Table 4, which adds to the van Rensburg and Robertson (2003) SIZE and PE model the BTM attribute in a regression with all three as explanatory variables. The result is that the BTM attribute has again remarkably rendered both variables totally insignificant.

Of all the pairs of variables that were also tested by van Rensburg and Robertson (2003), this study also shows only one pair able to boast significance of both explanatory variables at the 5% level, again the SIZE and PE pair, regression 15 of Table 3. In addition, notwithstanding the displacing role of the BTM attribute when combined with each of the two attributes of the van Rensburg and Robertson (2003) model, none of the new (i.e. containing the BTM attribute) possible pairs of explanatory variables show significance for each component at the 5% level. This presents further validation of the van Rensburg and Robertson (2003) SIZE and PE model. The reason is clearly that even though other variables have greater individual effects than either SIZE or PE, their combined effects are weakened by the high degree of correlation among them.

Some of the regressions in Table 3 warrant a closer look. The BTM and DY, SIZE and CFTP, and SIZE and DY pairs all show significance of both elements at the 10% level in regressions 2,9 and 12, respectively. Regression 1, for example, shows that both the BTM and the CFTP variables are significant at the 10% level. With p-values of 6,27% and 5,37%, they only just missed the 5% cut-off. Further testing with enlarged sample periods would shed light on whether the size-P/E pair performs persistently better than other pairs, especially BTM and CFTP.

To ensure that nothing has been overlooked, Table 5 shows all possible combinations of 3 explanatory variables chosen from the five most significant variables in the univariate regressions, namely BTM, CFTP, DY, PE and SIZE.[8] Not one of the regressions has all three of the variables significant, even at the 10% level. Thus on the chosen criteria, none would feature as candidates for a model of stock returns.

[8]PNAV has been left out, because it is inferior on theoretical grounds to BTM (see note 7), is the poorest performer of all the explanatory variables, and its omission halves the number of regressions to display!

Table 3: Results of bivariate regressions on pairwise combinations of explanatory variables

Regression		Variables	Coefficients	T-stats	P-values
1		BTM	0,011	1,879	6,27%
	*	CFTP	0,033	1,948	5,37%
2		BTM	0,009	1,892	6,09%
	*	DY	0,011	1,745	8,36%
3		BTM	0,015	2,909	0,43%
		PNAV	-0,001	0,493	62,27%
4		BTM	0,015	2,908	0,43%
		PE	-0,002	0,721	47,26%
5		BTM	0,014	2,810	0,58%
		SIZE	-0,002	1,193	23,53%
6		CFTP	0,047	2,260	2,57%
		DY	0,008	1,186	23,79%
7		CFTP	0,053	3,833	0,02%
		CPNAV	-0,002	0,940	34,90%
8		CFTP	0,052	3,813	0,02%
		PE	-0,002	0,714	47,69%
9		CFTP	0,049	3,639	0,04%
	*	SIZE	-0,003	1,739	8,46%
10		DY	0,018	3,306	0,12%
		PNAV	-0,003	1,482	14,11%
11		DY	0,017	3,302	0,13%
		PE	-0,002	1,153	25,11%
12		DY	0,015	3,021	0,31%
	*	SIZE	-0,004	1,790	7,59%
13		PNAV	0,003	0,744	45,84%
		PE	-0,014	1,855	6,60%
14		PNAV	-0,004	1,601	11,20%
		SIZE	-0,006	2,606	1,03%
15		PE	-0,005	2,111	3,68%
	**	SIZE	-0,005	2,482	1,45%

* Significant at the 10% level
** Significant at the 5% level

Table 4: Results of regressing returns on SIZE, PE and BTM

Regression	Variables	Coefficients	T-stats	P-values
1	BTM	0,014	2,788	0,00617
	PE	-0,002	-0,586	0,55900
	SIZE	-0,002	-1,008	0,31548

Table 5: Results of regressions of returns on three-explanatory variable combinations

Regression	Variables	Coefficients	T-stats	P-values
1	BTM	0,007	1,172	24,36%
	CFTP	0,035	1,560	12,15%
	DY	0,007	0,960	33,91%
2	BTM	0,011	1,830	6,98%
	CFTP	0,033	1,947	5,39%
	PE	-0,001	-0,549	58,42%
3	BTM	0,008	1,441	15,21%
	CFTP	0,037	2,212	2,89%
	SIZE	-0,003	-1,291	19,93%
4	BTM	0,009	1,830	6,98%
	DY	0,011	1,743	8,38%
	PE	-0,001	-0,451	65,30%
5	BTM	0,008	1,689	9,38%
	DY	0,012	1,927	5,64%
	SIZE	-0,002	-1,097	27,47%
6	BTM	0,014	2,788	0,62%
	PE	-0,002	-0,586	55,90%
	SIZE	-0,002	-1,008	31,55%
7	CFTP	0,047	2,254	2,60%
	DY	0,008	1,166	24,58%
	PE	-0,001	-0,424	67,26%
8	CFTP	0,044	2,129	3,53%
	DY	0,008	1,199	23,29%
	SIZE	-0,003	-1,413	16,02%
9	CFTP	0,048	3,602	0,05%
	PE	-0,001	-0,540	59,00%
	SIZE	-0,003	-1,535	12,73%
10	DY	0,015	2,985	0,34%
	PE	-0,002	-1,065	28,88%
	SIZE	-0,003	-1,581	11,65%

Lastly, Table 6 shows a regression of returns on all six candidate explanatory variables. This regression is of limited use for the purposes of this study. However, it does clearly illustrate the problem of multicollinearity among the variables, because not one is significant at the 5% level. Further, it points to the usefulness of the CFTP attribute, being the only explanatory variable significant at the 10% level. The implication is that there is some explanatory power in the CFTP attribute that is not captured by any of the other variables. This bears testimony to the well-understood importance of cash flow to a firm, and the inherent danger (increased risk) in firms which generate little cash from operating activities, notwithstanding strong accrued income. This could be a fruitful avenue of investigation in further research.

Table 6: Results of regressions of returns on all six explanatory variables

Variables	Coefficients	T-stats	P-values
BTM	0,004	0,742	45,95%
CFTP	0,040	1,783	7,71%
DY	0,007	1,000	31,94%
PNAV	0,003	0,819	41,45%
PE	-0,007	-1,086	27,98%
SIZE	-0,002	-0,942	34,79%

3.1 The model in perspective

Explaining stock returns is a complicated process. The approach in this analysis has been to use various financial ratios to explain returns under the premise that some of them may be reasonably good proxies for risk.

The practice of lagging financial statement data anywhere between 5 and 17 months from the time of financial year end, though necessary on theoretical grounds, is likely to have biased the results towards insignificance. This is exacerbated by the fact that financial statement elements are held constant across all 12 months between year-ends. These shortcomings are likely to be particularly detrimental if one believes in a high degree of market efficiency, since attributes like BTM are assumed to be *proxies* for underlying risk factors, and not actual sources of risk themselves. It could be argued that investors' perceptions of the risk of an equity position built into the price (and thus returns) at any given time are derived, at least in part, in ways other than by looking at the most recently available balance sheet items.

One should also bear in mind the Johannesburg Stock Exchange has its peculiarities. It is dominated by resource stocks which are subject to their own unique sources of risk. There is also a relatively small amount of stocks that are "investible" from an institutional point of view, due to low liquidity levels. From this perspective, modelling returns on an evenly-weighted sample may be somewhat inappropriate.

As with any empirical study, an extension of the relevant data set would improve results. Although there are roughly 30 000 data entries for each variable, the large amount of noise typical in studies of financial markets makes signals difficult to discern. Studies over longer periods with greater numbers of securities have been criticised for having data sets that are too small.[9]

Lastly, there have been other explanations purported to explain the relationship between the BTM attribute and returns, other than the role of BTM as a proxy for risk. These include the possibility of naïve investors extrapolating strong earnings too far into the future[10], selection biases[11], and unravelling of irrational market impulses[12]. Lev and Sougiannis (1999: p419) make reference to the BTM "black box", or "enigma", illustrating the difficulty of deciphering exactly what causes the full BTM effect. The implication is that even when BTM is found to be significant when explaining stock returns, it may not necessarily be as a result of any underlying risk element. Further research into the BTM effect is needed to conclusively rule out these possibilities.

4. CONCLUSION

The ratio of book-to-market equity can be interpreted as a proxy for some underlying risk relating to a particular stock. As such, it is expected to be related to stock returns according to a risk/return framework. It turns out that this is the case, and a significant positive relationship is found between BTM and stock returns, as predicted.

As per Fama and French (1992), this study on the South African stock exchange also finds that BTM has a strong role in explaining stock returns. Moreover, when BTM is added to the van Rensburg and Robertson (2003) model of PE and SIZE, BTM almost completely subsumes the effect of SIZE and PE, as shown by the regressions on pairs of explanatory variables. BTM also subsumes *both* SIZE and PE in the three-variable regression of returns on SIZE, BTM and PE.

As far as model selection is concerned, the analysis has included a consideration of the usefulness of the BTM attribute in conjunction with the van Rensburg and Robertson (2003) SIZE and PE model. It finds that, although BTM has more explanatory power than either of these two variables, incorporating it into the analysis does not lead to an improvement upon the original SIZE and PE model. This judgement is based on the original criteria for model selection which include the requirement that all explanatory variables be significant at the 5% level.

The failure of the BTM attribute to improve upon the van Rensburg and Robertson (2003) model is largely due to correlation with other attributes which have high explanatory power. This again highlights the success of the SIZE and PE model, which boasts explanatory variables with very low correlation. Finding such a specification is typically difficult since all of the financial variables used in this study are scaled versions of a firm's stock price.

[9] See for example, Kothari, Shanken and Sloan (1994)

[10] See Lakonishok, Shleifer and Vishny (1994)

[11] See Kothari, Shanken and Sloan (1994)

[12] See Fama and French (1992)

Finally, this study opens doors for further research in this area. Contributions yet to be made include the use of a larger data set, using weights to remove the influence of stocks too small for institutional investors, and an investigation in more depth of the nature of the risk for which the BTM ratio is a proxy.

REFERENCES

Affleck-Graves J, Gilbertson R and Money A. 1982. Trading in low priced shares: An empirical investigation 1968-1979. *Investment Analysts Journal*, 19:21-29.

Affleck-Graves J, Bradfield D and Barr D. 1988. Asset pricing in small market - the South African case. *South African Journal of Business*, 19:11-21.

Akgun A and Gibson R. 2001. Equity portfolio management – recovery risk in stock returns. *Journal of Portfolio Management*, 27(2): 22-31.

Anderson T, Black W, Hair J and Tatham R. 1984. *Multivariate Data Analysis, fifth edition.* (Prentice-Hall, Inc.), New Jersey.

Banz R. 1981. The relationship between return and market value of common stock. *Journal of Financial Economics*, 9:3-18.

Ball R. 1978. Anomalies in relationships between securities' yields and yield-surrogates. *Journal of Financial Economics,* 6:103-126.

Beyer A. 1997. The relationship between earnings, returns, size and book-to-market variables on the Johannesburg Stock Exchange. Unpublished Masters Dissertation, University of Stellenbosch.

Bhandari L. 1988. Debt/equity ratio and expected common stock returns: Empirical evidence. *Journal of Finance*, 43:507-28.

Black F. 1972. Capital market equilibrium with restricted borrowing. *Journal of Business*, 45:444-455.

Chan K and Chen N. 1988. An unconditional asset-pricing test and the role of firm size as an instrumental variable for risk. *Journal of Finance,* 43:309-325.

Chan L, Hamao Y and Lakonishok J. 1991. Fundamentals and stock returns in Japan. *Journal of Finance*, 46:1739-1789.

Chen N and Zhang F. 1998. Risk and return of value stocks. *Journal of Business*, 71:501-35.

Cohen R and Polk C. 1995. An investigation of the impact of industry factors in asset-pricing tests. Working Paper, University of Chicago.

Daniel K and Titman S. 1997. Evidence on the characteristics of cross sectional variation in stock returns. *Journal of Finance*, 52(1).

Davis J, Fama E and French K. 2000. Characteristics, covariances, and average returns: 1929 to 1997. *Journal of Finance*, 55:389-406.

De Villiers P, Lowings A, Pettit T and Affleck-Graves J. 1986. An investigation into the small firm effect on the Johannesburg Stock Exchange. *South African Journal of Business Management*, 17(4):191-195.

Drew M. 2003. Beta, firm size, book-to-market equity and stock returns. *Journal of the Asia Pacific Economy*, 8(3):354-379.

Fama E and French K. 1992. The cross-section of expected stock returns. *Journal of Finance*, 47:427-465.

Fama E and French K. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Finance*, 50(1):1-56.

Fama E and Macbeth J. 1973. Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy*, 81(3):607-636.

Faul M and Everingham G. 1998. *Financial Accounting, Fourth Edition* (Butterworth Publishers (Pty) Ltd), Durban

Goldberger A. 1991. *A course in econometrics*, Harvard University Press, Cambridge, Massachusetts.

Griffin J and Lemmon M. 2000. Book-to-market equity, distress risk, and stock returns. *Journal of Finance*, 57(5):2317-2336.

Gujarati D. 1995. *Basic Econometrics, Third Edition* (McGraw-Hill Book Co., Singapore)

Hawawini G and Keim D. 1995. On the predictability of common stock returns: World wide evidence. Chapter 17 in *Handbooks in Operations Research and Management Science: Volume 9, Finance,* Jarrow, R, Maksimovic V. and Ziemba W. Amsterdam: Elsevier Science Publishers.

Ho Y, Strange R and Piesse J. 2000. CAPM anomalies and the pricing of equity: Evidence from the Hong Kong market. *Journal of Applied Economics*, 32:1629-1636.

Keim D. 1988. Stock market regularities: A synthesis of the evidence and explanations, in Elroy Dimson, ed.: *Stock Market Anomalies* (Cambridge University Press), Cambridge.

Kothari S, Shanken A and Sloan R. 1994. Another look at the cross-section of expected stock returns. *Journal of Finance*, 50(1):185-224.

Lakonishok J, Shleifer A and Vishny R. 1994. Contrarion investment, extrapolation, and risk. *Journal of Finance* 50(6):1541-78.

Lam H and Spyrou S. 2003. Fundamental variables and the cross-section of expected stock returns: The case of Hong Kong. *Applied Economics Letters*, 10(5):307-310.

Lev B and Sougiannis T. 1999. Penetrating the book-to-market black box: The R&D Effect. *Journal of Business Finance & Accounting*, 26(3)&(4):419-449.

Lintner J. 1965. The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics*, 47:13-37.

Litzenberger R and Ramaswamy K. 1979. The effects of personal taxes and dividends on capital asset prices: Theory and empirical evidence. *Journal of Financial Economics*, 7:163-95.

Markowitz H. 1959. *Portfolio Selection: Efficient Diversification of Investments.* (Wiley), New York

Page M and Palmer F. 1991. The relationship between excess returns, firm size and earnings on the Johannesburg Stock Exchange. *South African Journal of Business Management*, 22:63-73.

Rosenberg B, Reid K and Lanstein R. 1985. Persuasive evidence of market inefficiency. *Journal of Portfolio Management* 11:9-17.

Sharpe W. 1964. Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19:425-442.

Stattman D. 1980. Book values and stock returns. *The Chicago MBA: A Journal of Selected Papers*, 4:25-45.

Strong N and Xu X. 1997. Explaining the cross-section of UK expected stock returns. *British Accounting Review*, 29(1).

Van Rensburg P and Robertson M. 2003. Style variables and the cross-section of JSE returns. *Investment Analysts Journal,* 57:7-15.

Vassalou M and Xing Y. 2004. Default risk in equity returns. *Journal of Finance*, 59(2):831-868.