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Premium to book value may be a contrary indicator

1. Introduction

In an efficient market, prices reflect all relevant information.

So, in an efficient market, indicators, such as price earnings ratios and book value/price ratios should not be useful in identifying mispriced shares. In fact, no publicly available information should be useful in earning abnormal returns.

This paper uses the usual Sharpe market model to evaluate the average abnormal performance of various portfolios of shares based on their book value/market value ratios[1].

Firms were classified as being "premium" or "discount" firms and placed into separate portfolios. The stock market returns to the portfolio were then compared on a risk adjusted basis.

The objects of this study are to:

(i) Determine whether grouping firms according to the relationship between book value and market value (premium or discount) at a particular point in time is a significant piece of information about how those firms will perform in the future.

(ii) Contribute to the body of research on the market efficiency in the JSE.

(iii) Provide investors with some indication as to the success that this trading rule has had.

2. Research methodology

The link between the premium/discount ratio and the return on equity investment is established in two stages using a research record that has been firmly established in the finance literature[2].

The first stage is the isolation of the firm's performance that is unique to the firm. Performance is now commonly accepted as the increase in owners' wealth attributed to the firm. This is most tangibly measured in the share price, adjusted for payouts made to investors in the form of dividends, according to expression (1).

$$R_{it} = \text{Log}_e \frac{(P_{it} + D_{it})}{P_{it-1}} \quad (1)$$

where:

R_{it} = return on share i over period t
P_{it} = share i closing price at the end of period t
P_{it-1} = share i closing price at the end of period t−1
D_{it} = cash dividend paid out on share i over period t.

This method gives the continually compounded rate of return.

It is also true that each share price has an element of commonality with all other shares. This commonality comes from the effects that the market-wide events have on all shares over which the individual firm has no control, for example, the sharp fall in the R:$ exchange rate. To test the effect of a particular piece of information on share returns, this common effect must be removed and attention must be focused on the firm's specific performance. This focus is achieved using the market model of share return behaviour. The market model is a development of the Sharpe-Lintner two-parameter pricing model. This model takes the form of the equation:

$$\tilde{R}_{it} = \alpha_i + ß_i\tilde{R}_{mt} + \tilde{\varepsilon}_{it}$$

where:

$\tilde{R}_{it}$ = the expected return on share i over period t
$\tilde{R}_{mt}$ = the expected return on the market over period t
$\tilde{\varepsilon}_{it}$ = the deviation of the actual return of share i from the expected return over period t
α_i = intercept term unique to share i
$ß_i = \dfrac{\text{COV}(\tilde{R}_{it}, \tilde{R}_{mt})}{\text{VAR}(\tilde{R}_{mt})}$

This, then, gives a linear relationship between the share return and the return on the market. The magnitude of α and ß are estimated over a long period of time using ordinary least squares regression. By the nature of the least squares regression technique, making some well-documented assumptions, one would expect:

$$E(\tilde{R}_{it}/\tilde{R}_{mt}) = \alpha_i + ß_iR_{mt}$$

where:

$E(\tilde{R}_{it}/\tilde{R}_{mt})$ = the expected return on share i over period t given the expected return of the market over period t
R_{mt} = the actual market return over period t
$\alpha_i, ß_i$ = as defined above.

This means that in an efficient market:

$$E(\tilde{\varepsilon}_{it}/R_{mt}, \phi_{t-1}) = R_{it} - \tilde{R}_{it} = 0$$

where:

$E(\tilde{\varepsilon}_{it}/R_{mt}, \phi_{t-1})$ = the expected value of the deviation of the actual value of share i from the expected value over the period t given the market return over period t and all available information over period t−1.
ϕ_{t-1} = the information set of the public domain.

So, although it is recognised that there will be firm specific returns at any stage, it is expected that these will average over a long period of time to zero.

The second stage of the process is the grouping of these firm specific returns in a way that can be conveniently analysed. There are two parts to this stage.

Firstly, the firms must be defined and grouped as either premium or discount firms. This study used the above definition and considered this relationship at the date of the financial year-end. The calculations were made in the following way.

The market value was taken as the capitalisation of all fully paid-up, ordinary shares on issue at the year-end. The price used was the weekly closing price for that week.

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The net asset value was taken as the reported ordinary shareholders' funds adjusted for the revaluations made by the directors to the balance sheet "investments".

Secondly, the firm specific returns must be collected in such a way as to provide uniformity across all firms. This study uses a technique developed by Ball and Brown in 1968 called the abnormal performance index (API). Starting at the beginning of the financial year, the weekly firm specific return is accumulated to give a geometric return up to end of each week. The weeks are then aligned for all firms in each portfolio and these geometric returns are averaged across all firms for each week and over all years under consideration.

The API is defined as follows:

$$API_w = \frac{1}{N} \sum_{i=1}^{N} \sum_{t=1}^{w} [\Pi (1 + \tilde{\varepsilon}_{it})]$$

where:

w = holding period under consideration
$\tilde{\varepsilon}_{it}$ = deviation of the return on share i in week t
N = total number of firms in each portfolio over all years for the week under consideration.

The API is developed as a metric to detect portfolio performance above or below that which would be expected given the market model. A portfolio which does not perform abnormally will display a pattern of API values that fluctuate around 1.00 through time.

3. The data

Data was collected for 35 industrial firms trading on the JSE between 1973 and 1980. The net asset value data was obtained using the library of annual reports in the GSB Library at the University of Cape Town. The weekly closing prices used to calculate the market value and the returns was taken from a data-base held at the UCT Computer Centre. The RDM 100 index was used as a surrogate for the market return, since only industrial firms were considered in this study.

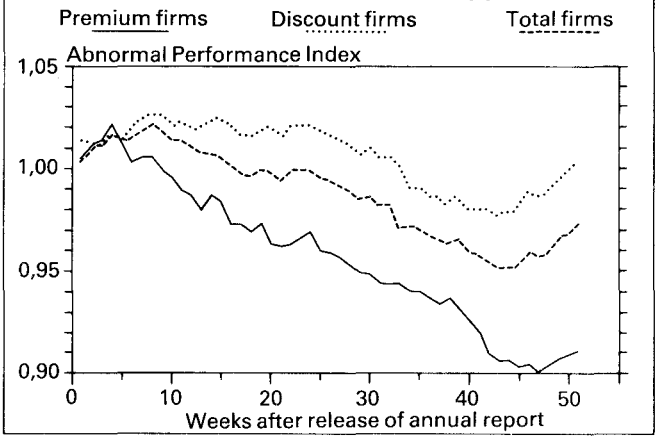
4. The results

Thirty-five firms have been examined in this study, with activities ranging across all industrial sectors. This has led to the pooling of four hundred and four returns for each share. The shares were divided into portfolios for each year and then averaged in the manner described above giving the results shown on Figure 1. The time period examined starts at the date of the financial year-end and includes the next 51 weeks.

If the efficient market hypothesis (EMH) holds for the JSE and the market model is a good predictor of share return behaviour, one would expect no significant difference between the two portfolios. One would also expect the firm specific returns, which have now been averaged across all firms in the portfolio and across a long time period, to fluctuate randomly about 0. This should cause the API to fluctuate randomly about 1 and to end the year not significantly different to 1. This would give a geometric, abnormal (to the market return) return of 0%.

Figure 1 shows three separate portfolio performances. The nature of the premium and discount portfolios has already been dealt with. The "total" portfolio is a curve of the performance of all the firms studied taken together. This can be considered as equivalent to taking a well diversified portfolio and holding it according to a "buy and hold" investment strategy. This is a useful comparative curve because the results of this portfolio are those

Abnormal Performance Index of firms by portfolios



that EMH supporters would regard as typical of the investment strategy that they would use.

In considering the results (see Figure 1), it can be seen that the discount firm portfolio performance starts with a positive API. This increases until week 8 where the portfolio has an API of 1,029, an abnormal geometric return of 2,9%. Little significant change is observed until week 24 after which the API decreases to a value of 0,981, an abnormal return of −1,9% by week 42. Between weeks 42 and the end of the year there is a slight increase in the API and the year is ended with an API not significantly different to 1,00 (an abnormal return of 0,3%). Although the curve shows persistent abnormal positive and negative returns over significant time periods, these returns are not large and are unlikely to provide significant profit opportunities once transaction costs have been accounted for.

The premium firms, on the other hand, provide some very interesting results. This portfolio also starts with a positive API which persists until week 4 reaching 1,022, an abnormal return of 2,2%. At this stage, unlike the discount portfolio, there is a steady downward drift of the API, until week 47, where there is an API of 0,900. This gives an abnormal return of −10,0%. A slight increase in API is seen at the end of the year finishing with an abnormal return of−8,9%. This is significantly different to the expected API of 1,00 – an abnormal return of 0%. All that remains is to establish whether the two portfolios are statistically different.

A Wilcoxon signed-rank test performed on the two portfolios is used to establish this difference. This test gives a "z" value of 3,44 compared to a critical "z" value of 1,65 at the 95% confidence level. This indicates that there is a statistically significant difference between the performance of the premium portfolio compared to that of the discount portfolio. The "total" portfolio has a shape similar to that observed in the discount portfolio. Despite the similarity of the results, both the Wilcoxon signed-rank test and the chi-squared test indicate a significant difference between the performance of this portfolio compared to that of the premium and the discount portfolios.

Several explanations for these results are possible, namely:

(i) there is some inefficiency in the market that allows a trading rule to make abnormal returns;

(ii) the joint distributions of share return and market return are not stationary through time, leading to statistical inconsistencies in the methodology; or

(iii) there is some sort of selection bias introduced by the grouping of the shares.

Each of these explanations is dealt with below:

4.1 Market inefficiencies

In order to make this interpretation correctly, one must first assume that the market model is an accurate predictor of share return behaviour on the JSE. Insufficient work has been done in this field on the JSE to enable a strong case to be made on behalf of the market model's accuracy. However, a number of studies have been performed which point to the existence of at least weak form market efficiency. Hence an interpretation about the efficiency of the South African equity market should be accepted cautiously.

4.2 Non-stationarity of distributions

If this does have a significant impact on the results one would expect the result to be felt equally over all portfolios. This would not be the case if the grouping of firms is related to some other consistent factor which does affect the stationarity of the distributions over time. An example of this might be the magnitude of risk. In any event, this would be a special case of the introduction of a selection bias.

4.3 Neglected variables

The fact that these abnormal returns persist over time is a strong indicator that there is some variable that has not been accounted for by the market model. This variable could, in some way, be linked to the portfolio selection itself. However, it need not be the selection procedure itself. Consider the following:

An important variable in the fixing of share prices may have been unaccounted for in the market model. If this variable bore no relation to the way in which the portfolio was selected, its effect should have been diversified away. This would leave the variable common to all shares, the variation in the market, standing out as the most significant explanation of most share price behaviour.

If, on the other hand, the selection of the portfolios is based in such a way as to introduce, to each portfolio, another variable which strongly explains share price behaviour, then the model indicates its absence by showing a significant abnormal return. This shows up in the model in the form of a persistent residual error associated with that selection criterion.

Only if it can be proved that no variable other than the market returns explains the variation in share returns can one say that the market model is correctly specified. Under these conditions one can turn one's attention to the validity of the EMH.

5. Conclusion

The above results are interesting because they run counter firstly to returns that are predicted by the market model and secondly to those that are predicted according to the EMH. This presents three areas in which conclusions might be drawn. These are, the efficient market hypothesis, the validity of the market model, and the usefulness of the results to equity investors.

Conclusions about the efficiency of the South African equity market and, more generally, the EMH follow from conclusions made about the validity of the market model. This is true because the market model assumes efficiency within the market, at least in the weak sense. This study relies on the fact that a lot of research has been done on the large equity markets of the USA and UK which point out the fact that the market model is reliable. Only if this is shown to be the case under local conditions should one use the market model. This leads us into the second area where conclusions can be drawn.

The results do show a gap between returns actually observed and those predicted by the market model. This could be for one of two reasons or some combination of the two.

Firstly, the assumption that the joint distributions of the share return and the return on the market are stable over time may not be valid. Share returns are not reported continuously but at discreet intervals. Research by Scholes and Williams (1977) indicates that this produces errors in the model. The severity of this error increases with the frequency of reporting. Daily data produces a much larger co-variance of market returns with the residual error than does monthly returns. This study uses weekly returns and the error in the model is likely to be somewhere between the two.

Secondly, it is likely that some significant variable has been left out of the model. This is borne out by the persistence of abnormal returns over time. A defect in the model that could be attributed to market inefficiency would be likely to last a shorter period before market forces acted to normalise the abnormal return about 0%.

The area of conclusion is good news to investors. It provides them with two possibilities. Either the grouping of shares into portfolios is significant in its own right. This would confirm the valid use of this as a trading rule. Or there is some other variable highly correlated with the premium/discount ratio which has been neglected in the model. One such possibility is the ratio of share price earnings per share. This may in turn be linked to the prevailing economic climate. If this is true, the economic climate would be reintroduced into the model via the residual error and this would account for serial correlation.

The real good news to investors is that all is not solved with regard to share price behaviour. There is still scope for research and a number of anomalies in the current financial theory remain unresolved. Whether these anomalies are profitable is questionable, but the market could not be efficient if investors were not trying to beat the market. The results suggest that a condition of premium to book value may be a contrary indicator in the mid-term.

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Footnotes

1 In this discussion, the following is assumed:

Premium firms: $\frac{\text{Net asset value}}{\text{Market value}} < 1$

Discount firms: $\frac{\text{Net asset value}}{\text{Market value}} > 1$

2 This type of research was first used by Fama, Fischer Jensen and Roll in 1969.

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Appendix A

Firms used in the analysis

AECI Limited
African Oxygen Limited
Anglo Alpha Cement Limited
Anglo American Industrial Corporation Limited
Barlow Rand Limited
Beares Limited
Blue Circle Limited
Boumat Limited
Carlton Paper Corporation Limited
Chemical Holdings Limited
Dorman Long Vanderbijl Corporation Limited
Dunlop (SA) Limited
Edgars Stores Limited
Federale Volksbeleggings Beperk
Foschini Limited
Frasers Limited
Gallo (Gallo Africa) Limited
Kaap Kunene Beleggings Beperk
Kohler Brothers Limited
Malcomess-Bakke Limited
Metal Box (SA) Limited
Metkor Investments Limited
Murray and Roberts Holdings Limited
OK Bazaars (1929) Limited
Pep Stores Limited
Pick 'n Pay Stores Limited
Plate Glass and Shatterpruffe Ind Limited
Protea Holdings Limited
Rennies Consolidated Holdings Limited
Reunert and Lenz Limited
Seardel Investment Corporation Limited
Sentrachem Limited
Stewart and Lloyds of SA Limited
Toyota (SA) Limited
Trek Beleggings Beperk
Woolworths Holding Limited