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Book-to-market and size as determinants of returns in small illiquid markets: the New Zealand case

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Abstract

The paper highlights the difficulties in adopting investment strategies designed to exploit book-to-market and size effects on the New Zealand share market, which is small and illiquid by world standards. The small number of suitable companies listed on the market, and the high return volatility of individual equities make it difficult to reliably achieve superior returns. Excess returns due to size and book-to-market are highly volatile on a period-by-period basis due to the high volatility of individual shares combined with small portfolio size, which limits diversification. © 2001 Elsevier Science Inc. All rights reserved.

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1. Introduction

The validity of the Capital Asset Pricing Model (CAPM) developed by Sharpe (1964), Lintner (1965) and Black (1972) has been the subject of considerable debate since Fama and French (1992) showed that two variables, size and book-to-market, combine to capture all the cross-sectional variation in equity returns.

More recent evidence concerning the robustness of their results will be discussed in detail shortly. However, it is fair to say that it is now generally accepted that once size and book-to-market effects are eliminated, historical betas, however calculated, have negligible explanatory power with regard to future returns. The size effect is generally accepted, but

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the explanatory power of the book-to-market effect not already encompassed in the size effect is more questionable. Davis, Fama, and French (2000) provide the latest evidence on the robustness of the book-to-market effect, which they claim has survived the attack of critics unscathed. Anecdotal evidence from major equity markets indicates that those following a strategy of investing in high book-to-market or ''value'' stocks have significantly under-performed the market during the period since the mid-1990s. However, this may be an anomaly created by the market excesses of the period.

Bryant and Eleswarapu (1997) and Vos and Pepper (1997) established the presence of the book-to-market effect in New Zealand. Both studies found a positive relationship between book-to-market and returns. The purpose of this study is to examine the phenomena in more detail using more recent data and to determine the problems generated by the size and volatility of this illiquid market.

2. Literature review

Fama and French (1992) was not the first evidence of a book-to-market effect. Banz (1981) was amongst the first to document the size effect when he found that smaller firms had higher risk adjusted returns on the NYSE, providing evidence inconsistent with the CAPM. Keim (1983) showed the size effect was largely attributable to the month of January. Basu (1983) found that as well as the size effect, shares with high earnings to price (E/P) ratios, on average, gave higher risk adjusted returns than those with low E/P ratios. DeBondt and Thaler (1985) used empirical studies to show the size effect as a market overreaction whereby past losers outperform past winners. The pricing anomalies shown by the size effect and E/P ratios did not go unchallenged. Chan and Chen (1988) showed that by altering the way in which beta was calculated, firm size became a proxy for true beta, eliminating the anomaly. In Chan and Chen (1991) they used estimates of risk to show that the size effect was a result of the high risk associated with small firms.

In spite of this earlier evidence, Fama and French (1992) provided evidence that seriously undermined the CAPM. Until their study was published the evidence was contradictory and arguments on size and E/P were largely unresolved. They found that size and book-to-market captured all cross-sectional variation in return associated with beta, size, leverage, book-to-market and E/P ratios, and that after allowing for variation of betas associated with firm size, beta had no explanatory power. That is not to say that the book-to-market effect is totally accepted. The controversy still exists although the evidence is now far more complete.

The high returns to shares with a high book-to-market ratio, or the value premium as it has come to be called, has been explained in various ways. The first of these concludes that the value premium is due to data mining and that the same results are unlikely to be consistently found outside the original sample. This view is favored by Black (1993), Lo and MacKinlay (1990) and MacKinlay (1995). This explanation is now largely rejected as a number of out-of-sample tests have reproduced the earlier results in a variety of markets, and time periods, for example, Chan, Hamoa, and Lakonishok (1991), Capaul, Rowley, and Sharpe (1993), Davis (1994), Fama and French (1998). In addition to suggestions of data mining, it has also

been suggested that survival bias is the cause of the book-to-market effect. However, studies such as Davis (1994) have discounted this.

Another explanation is that the value premium is actually a premium for risk. Certainly there seems to be general agreement that at least part of the premium is due to risk, especially that associated with size. This is the explanation favored by Fama and French (1993, 1996) who argue that the value premium is a compensation for risk in a multifactor model such as proposed in the arbitrage pricing theory of Ross (1976). Fama and French's three factor model states the expected return of a portfolio in excess of the risk-free rate is made up of the excess return on the market portfolio plus factors related to size and book-to-market.

$$E(R_i) - R_f = b_i[E(R_m) - R_f] + s_i E(\text{SMB}) + h_i E(\text{HML}) \quad (1)$$

Fama and French (1995) show that the slope of the SMB (small minus big) and HML (high minus low) lines could be proxies for the relative distress of firms. Firms with a low stock price relative to book value tend to have permanently lower earnings with the opposite applying to low book-to-market stocks. The relationship with between size and distress was less clear. They conclude that they are unable to link the underlying economic variables that produce variability in earnings to the returns related to size and book-to-market ratios. Neither are they able to tell if these economic variables produce variation in consumption and wealth other than that captured by an overall market factor. While Fama and French are able to show that the value premium could be a premium for risk, they still have some way to go in proving that the entire value premium is related to risk and in uncovering the exact linkage between the value premium and risk. Indeed, Daniel and Titman (1997) ascribe the value premium to a behavioral preference for growth stocks and an aversion for value stocks rather than a reflection of risk, although Fama and French (1998) argue that their results are unique to the period from 1973 to 1993 used to demonstrate this characteristic.

A third explanation for the value premium is that it is due to overreaction by investors to a firm's performance. Investors overvalue stocks that have experienced a period of strong growth in earnings, becoming over-optimistic about future growth prospects. They also undervalue stocks that have performed poorly assigning irrationally low values to them. The correction of these overreactions creates the book-to-market effect. This concept is not new, Graham and Dodd (1934) expound the virtues of investing in stocks with low prices relative to dividends, earnings and book value. DeBondt and Thaler (1987), Lakonishok, Shleifer, and Vishny (1994), Haugen (1995), and LaPorta (1996) support the view that the value premium is due to investor overreaction. If their explanation is correct, the market is inefficient and easily exploitable, and the exploitation of this market inefficiency should result in the elimination or reduction of the value premium.

Clearly if one accepts the opinion of Fama and French that the value premium is related directly to risk then the value premium should persist in all markets over extended periods, although periodic deviations would naturally occur. The same would apply if one accepts the view of Daniel and Titman (1997) that the value premium is a result of a behavioral preference. On the other hand, if the book-to-market effect is the result of data mining, or as Haugen (1995) claims the result of investor overreaction, then the effect may disappear when tested on new data. Given the extensive out of sample testing that has been done, the view that the value premium is due to data mining is difficult to uphold. The investor overreaction

theory is however consistent with the evidence, and if this is indeed the cause of the book-to-market effect, then it is possible that investors, once they become convinced that they are overreacting, may change their behavior. Equally if the book-to-market effect is a reflection of risk, but investors believe that is due to their overreaction, they may adjust their behavior to a more risk neutral stance and reduce the value premium accordingly.

This study confines itself to New Zealand data. The results of previous New Zealand studies can be interpreted as showing a reduction in the value premium in New Zealand over recent years. Bryant and Eleswarapu (1997), using data from 1971 to 1993, obtain results consistent with Fama and French (1992). They show that historical annual betas do not predict future returns, and that there is a premium for small firm size and a positive relationship between return and book-to-market ratios. They find that book-to-market explains return variation when the full period is considered but that the relationship turns negative in the period from 1988 to 1993, attributing this to firms with lower ratios being most seriously affected by the 1987 sharemarket crash, which was particularly severe in New Zealand. The New Zealand sharemarket at the time of the 1987 crash was dominated by investment companies whose main assets were shares in other companies and cross shareholdings were common in other companies, making book-to-market ratios an unreliable measure of the true book value of the underlying assets. Vos and Pepper (1997) use data from January 1991 to December 1995, rejecting data from prior years in order to avoid the immediate post sharemarket crash period. They find both the size effect and the book-to-market effect are present during this period. The relationship between small size and high return is strong and this relationship is consistent with risk when standard deviation of return is used as a measure of risk. The also find a return premium for high book-to-market firms and that this has explanatory power over and above the return premium attributable to the size effect. However, they find, ''The BM effect on its own is present but not quite statistically significant''.

A preliminary study by Li and Pinfold (2000) duplicated the Vos and Pepper (1997) study using identical methodology on data from the end of 1995 through June 1999. It found the book-to-market effect was absent and that high book-to-market firms in fact yielded lower returns during the period, although the results were not statistically significant. This study attempts to obtain a more definitive result by using data obtained from a longer period, that is from mid-1993 until March 2001, and uses a methodology that eliminates the survival bias found in the earlier Vos and Pepper (1997) study.

3. Methodology

The methodology used is based on that employed by Fama and French (1992) whereby the stocks being tested are divided into a series of equally weighted portfolios based firstly on size and then on book-to-market ratio. Shares with a market capitalization of less than about N.Z. $20 million (U.S. $8 million) were deemed to have insufficient trading volume and/or market capitalization to allow them to be employed in a meaningful trading strategy and were therefore rejected. Financial institutions, foreign companies, listed property trusts and listed index funds were not included in the sample. This left a total of 80 of the 231 companies currently listed on the New Zealand Stock Exchange. The shares were divided

into 10 equally weighted portfolios of 8 shares each. Commencing October 1, 1993, a new portfolio was formed every 3 months and its returns determined after a period of 6 months. Hence at any time there were two series of portfolios in existence, with a 3-month time overlap between series, giving a total of 30 portfolios formed during the test period. The final returns tested were for the 6-month periods to December 31, 2000 and March 31, 2001. Share prices, market capitalization and data for calculating returns were obtained from Datastream. Book value used was the latest value that would have been available to investors at the time each portfolio was formed. Datastream has insufficient data on New Zealand shares to allow the study to extend to the period prior to October 1993.

Firm beta was also included as a variable in the regression. Beta was estimated over the 6-month period up to the portfolio formation date. This method of estimating beta is somewhat simplistic, and it is acknowledged that more sophisticated methods of calculation provide more accurate predictions of returns. However, this study does not attempt to test the predictive power of beta, and if a combination of book-to-market and size does not outperform this simple beta benchmark their predictive powers must be questioned.

Data was sorted into 10 groups for each period according to size, book-to-market and beta. Returns were calculated for each group and these were used for ordinary least squares regression analysis where the average excess return of each of the 10 portfolios for the 30 periods was regressed against the portfolio number. In addition multiple regression analysis and ordinary least squares regressions were carried out on unranked data using the 6 monthly excess returns of individual firms as the dependent variable, and size, book-to-market and beta as independent variables. This was repeated using the portfolio number as the independent variable.

4. Results

The regression results presented in Tables 1 and 2 show that for shares sorted into book-to-market ranked portfolios, a book-to-market effect similar in magnitude to that found in U.S. studies is present. The slope of the regression line indicates that over the 30 periods portfolios with the highest book-to-market produced a return 5.3% higher than the portfolio with the lowest ratio. The problem is the lack of explanatory power of the result with an adj. R^2 of 0.004. When portfolio number is regressed against portfolio excess return, as shown in Fig. 2, the adj. R^2 rises to 0.11, but this is clearly not high enough to give any confidence in using book-to-market as a portfolio selection tool.

The size effect, which Fama and French (1992) found enhances the predictive power of book-to-market, is present, but small firms only produce a minimal excess return. The regression results show that adding size as a variable does not improve predictive power. It may be noted that all intercepts of the regression lines are negative. This is a reflection of the poor performance of the market during the period whereby it consistently yielded returns less that the risk-free rate.

It is also evident, when portfolios are used, that beta has additional explanatory power over and above that of book-to-market and on its own has at least as much predictive power as the other two factors. As this is an unsophisticated historic beta, its predictive power

Table 1
Cross-sectional regressions of 6 monthly portfolio returns on beta, size and book-to-market

Model	Intercept	Independent variables			
		Beta	B–M	Size	Adj. R^2
1	−0.07593 (−6.689)	0.00837 (4.573)			0.008
2	0.06252 (−5.495)		0.00592 (3.232)		0.004
3	−0.02434 (−2.135)			−0.00101 (−0.552)	0.000
4	−0.11700 (−7.398)	0.00905 (4.935)	0.00683 (3.726)		0.014
5	−0.05289 (−3.734)		0.00630 (3.383)	−0.00213 (−1.142)	0.004
6	−0.07074 (−4.643)	0.00836 (4.567)		−0.00096 (−0.511)	0.008
7	−0.10700 (−6.002)	0.00907 (4.945)	0.00722 (3.878)	0.00220 (−1.189)	0.014

Stocks were assigned to one of 10 equal weighted portfolios according to beta, size and book-to-market and the portfolio returns determined for each period using an equal weighting of shares. The dependent variable in all the regressions is the excess return over the risk-free rate which is regressed against portfolio number for each independent variable. The models consist of all combinations of the independent variables beta, book-to-market and size (market capitalization). Figures in brackets are *t*-statistics.

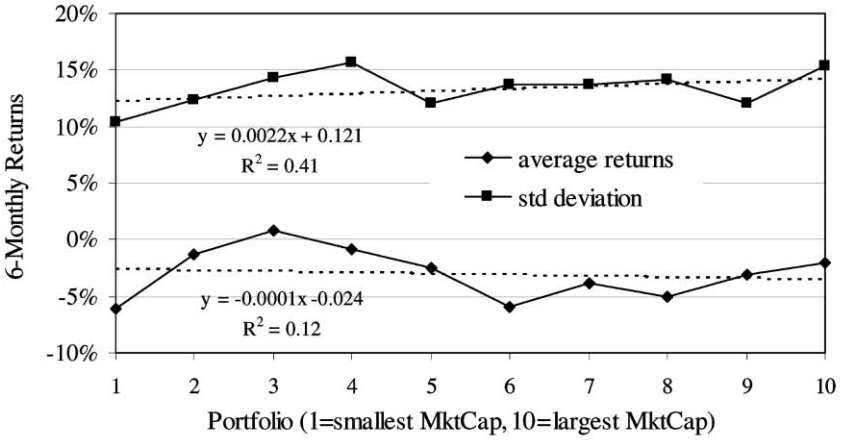
would be expected to be low. The fact that a combination of book-to-market and size has less predictive power is an indictment of the ability of the Fama and French model to predict returns in the New Zealand market.

Figs. 1 and 2 present the regressions of portfolio excess returns against portfolio numbers based on book-to-market and size for the 30 periods. It should be noted that it is not possible to simultaneously rank stocks into portfolios on the basis of both size and book-to-market or any other firm characteristic due to the small number of firms qualifying for analysis. An investor adopting a strategy of selecting portfolios on the basis of book-to-market could earn an excess return, however with an R^2 of only 0.11 the strategy would be extremely risky as

Table 2
Cross-sectional regressions of 6 monthly individual security returns on beta, size and book-to-market

Model	Intercept	Independent variables				
		Beta	B–M	Size	Ln size	Adj. R^2
1	−0.03156 (−5.932)	0.00139 (2.301)				0.002
2	−0.07240 (−8.023)		0.00512 (5.783)			0.013
3	−0.02870 (−5.105)			0.000002 (−0.627)		0.000
4	−0.05232 (−2.658)				0.00433 (1.181)	0.000
5	−0.07551 (−8.310)	0.00161 (2.679)	0.00526 (5.945)			0.016
6	−0.07274 (−7.673)		0.00513 (5.749)	0.0000003 (0.118)		0.013
7	−0.11800 (−5.285)		0.00547 (6.087)		0.00824 (2.230)	0.016
8	−0.03046 (−5.372)	0.00138 (2.283)		0.000001 (−0.560)		0.002
9	−0.05492 (−2.789)	0.00141 (2.327)			0.00452 (1.232)	0.002
10	−0.07616 (−7.972)	0.00162 (2.685)	0.00529 (5.921)	0.0000007 (0.220)		0.017
11	−0.12300 (−5.500)	0.00166 (2.756)	0.00563 (6.6265)		0.00857 (2.322)	0.019

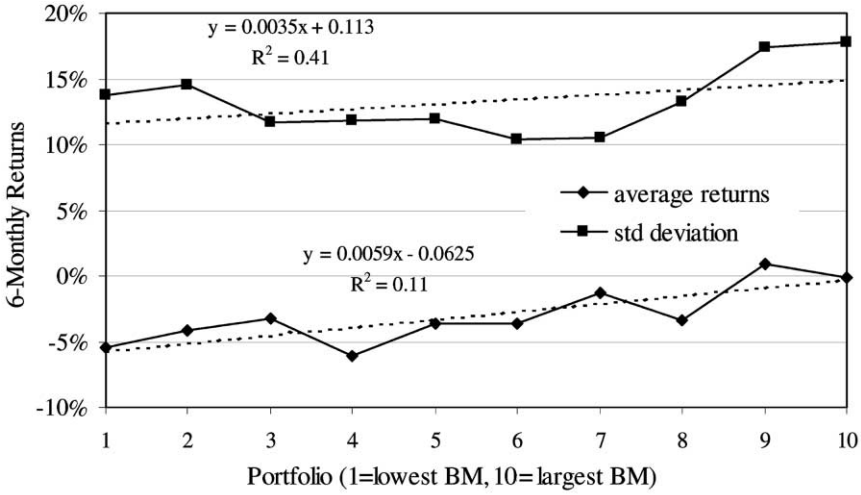
The dependent variable in all the regressions is the excess return over the risk-free rate for individual securities. Regressions are carried out on unranked stocks in each of the 30 portfolio formation periods. The models consist of all combinations of the independent variables beta, book-to-market and size (market capitalization). Figures in brackets are *t*-statistics.



The graph presents the average six monthly returns of portfolios produced by sorting shares into 10 portfolios according to market capitalization for quarterly periods from July 1 1993 to September 30 2000. The regression line is derived by regressing the portfolio number against portfolio returns for the 30 periods of the study. The standard deviation figures are calculated from the portfolio returns and give a measure of the volatility of returns.

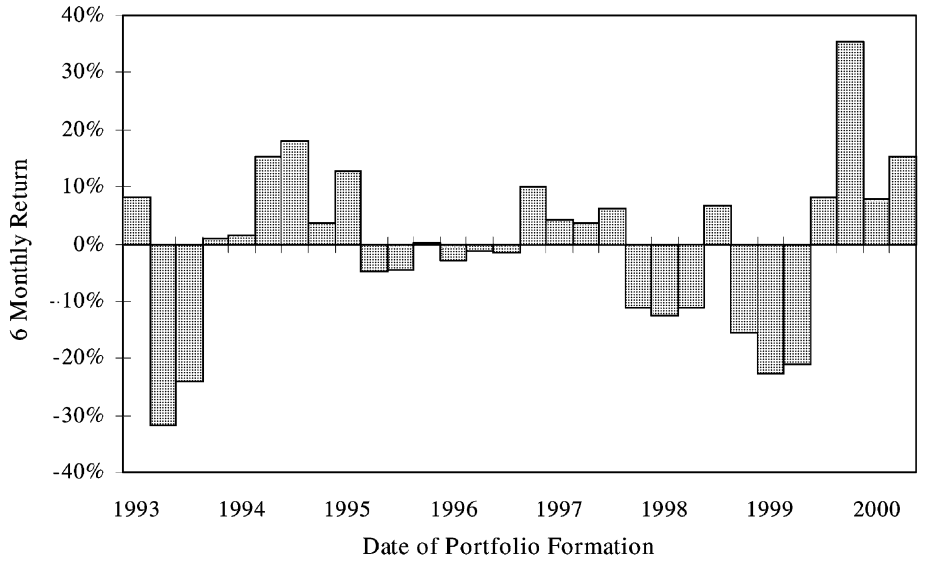
Fig. 1. Average returns of size ranked portfolios and standard deviations of returns.

evidenced by the standard deviation of returns. The size effect is almost absent during the period and has an R^2 of only 0.12, showing that even if the market was large enough to allow portfolios to be constructed simultaneously on size and book-to-market, the addition of selection by size would add little to the return. It is perhaps not surprising that returns are so poorly correlated to size as the standard deviation of portfolio returns shows a limited



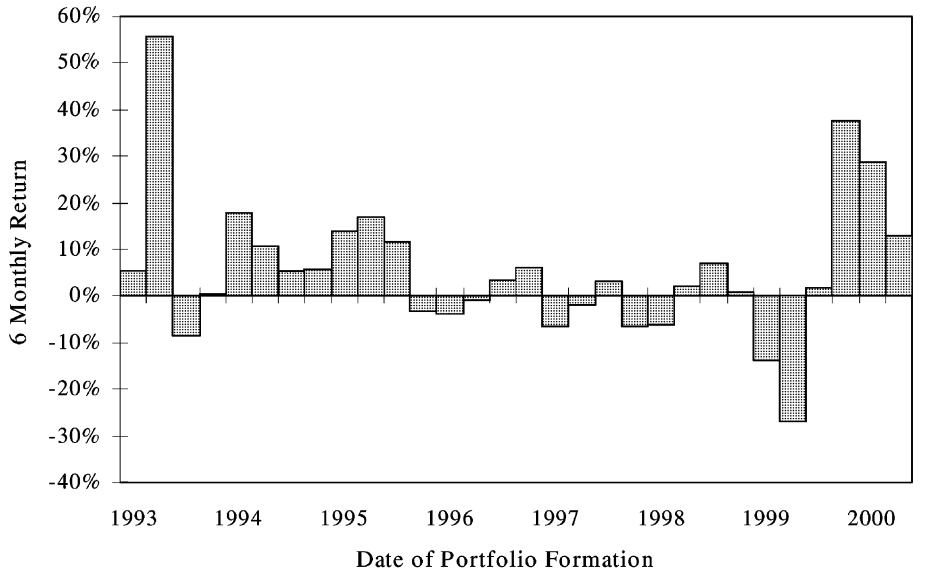
The graph presents the average six monthly returns of portfolios produced by sorting shares into 10 portfolios according to book-to-market ratio for quarterly periods from July 1 1993 to September 30 2000. The regression line is derived by regressing the portfolio number against portfolio returns for the 30 periods of the study. The standard deviation figures are calculated from the portfolio returns and give a measure of the volatility of returns.

Fig. 2. Average returns of book-to-market ranked portfolios and standard deviations of returns.



The graph displays the return premium due to firm size for 30 portfolios formed in the period 1 October 1993 to 30 September 2000. The returns are six monthly returns for portfolios formed each quarter. Each period firms are divided into 10 size ranked portfolios numbered 1 to 10. Return was regressed against portfolio number and the slope of the regression line was used to calculate the difference in return between portfolio 1 and 10, which is presented in the graph.

Fig. 3. Time variance of return premium due to firm size.



The graph displays the return premium due to firm book-to-market for 30 portfolios formed in the period 1 October 1993 to 30 September 2000. The returns are six monthly returns for portfolios formed each quarter. Each period firms are divided into 10 book-to-market ranked portfolios numbered 1 to 10 each period. Return was regressed against portfolio number and the slope of the regression line used to calculate the difference in return between portfolio 1 and 10, which is presented in the graph.

Fig. 4. Time variance of return premium due to book-to-market ratio.

relationship with size. If volatility of returns is a measure of risk, this risk is not being compensated for by higher returns.

The reason for the low statistical significance of book-to-market and size effects is shown in Figs. 3 and 4. There are very large variations over time with almost no consistency from period to period. In addition rather than the size and book-to-market effects acting to reinforce one another they are poorly correlated with a correlation coefficient of only 0.17 even at the portfolio level. It can readily be seen that the outcome of any study of either the size effect or the book-to-market effect will be highly dependent on the time frame selected for the study. Fig. 4 clearly shows why Vos and Pepper (1997), who used a period of 1991–1995, found a positive book-to-market effect and Li and Pinfold (2000) found a negative book-to-market effect in the period 1995–1999. An inspection of the raw data readily reveals the reason for the steep and highly variable slopes of the regression lines. Because the portfolios only contain 8 shares, large movements in the price of individual securities can dramatically affect the results. The standard deviation of returns for the entire sample was 26% with returns varying from −97.9% to +266%. If small capitalization stocks had not been eliminated the variability of individual returns would have been far higher. Small stocks with highly volatile prices also distorted the results, for example, Cue Energy met the size criteria three times. Its best return in a single period was 480%, but on the three occasions that high returns caused it to meet the size criteria, in the following period it suffered losses of between 44% and 60% only to leave the sample. Whenever market capitalization is used as a selection criteria this problem will occur. It may be the reason for the absence of a meaningful size effect. Both Vos and Pepper (1997) and Li and Pinfold (2000), whose selection criteria resulted in each sample firm having returns for the entire period, showed a much more pronounced relationship between size and return. However, for the portfolio investor, it is not possible to use this criteria as there is no way of knowing in advance which stocks will continue to be listed for any selected investment horizon. It must also be borne in mind that eliminating stocks that do not survive the entire period removes the negative returns of failing firms from the sample and, as Chan and Chen (1991) showed, small firms have a higher risk than their larger counterparts and are thus more likely to fail. The resulting survivorship bias could result in small firms appearing to have higher returns than is in fact the case.

In order to allow the reader to place these results within the context of the New Zealand market some statistics are presented. Table 3 shows the size of the market in terms of

Table 3
Size of the New Zealand share market

	Year end							
	1993	1994	1995	1996	1997	1998	1999	2000
Capitalization (N.Z. $m)	29533	30552	36600	51472	52842	48086	49303	45436
Capitalization (U.S. $m)	16222	19255	23667	36209	31746	25069	24884	19127
Turnover (N.Z. $m)	6322	7182	7422	9643	14105	19216	21109	22691
Turnover (U.S. $m)	3433	4291	4849	6654	9239	10060	11036	10147
Listed companies	189	207	205	204	224	229	218	231

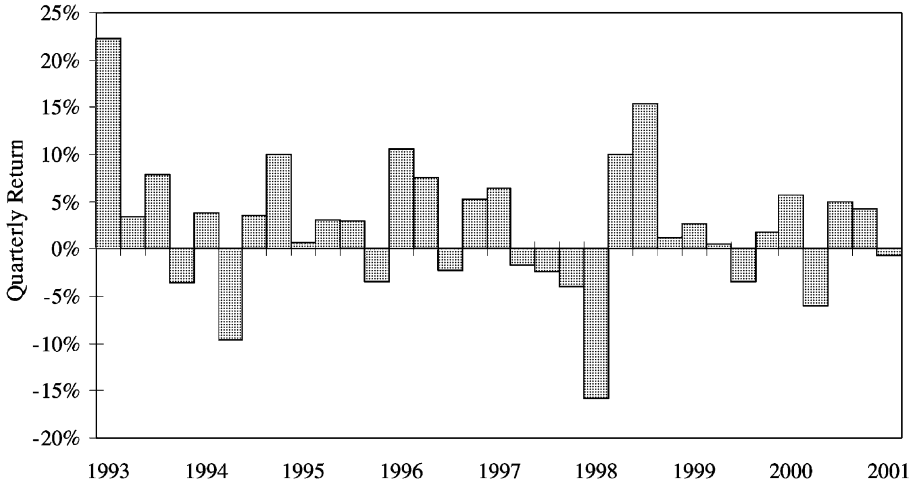


Fig. 5. Returns on the New Zealand all ordinaries gross index.

capitalization and the number of firms listed. Fig. 5 gives the quarterly returns on the NZSE all ordinaries gross index during the period of the study.

5. Discussion

The poor performance of value stocks in the U.S. over recent years is not reflected in the results of this study which showed that a strategy of investing in portfolios of stocks with high book-to-market, and rebalancing those portfolios on a 6-month basis, would have enabled an investor to achieve a return in excess of the market. However, the results would offer little encouragement to anyone contemplating doing so in the New Zealand market in the future. The high variability of returns on a period-by-period basis make it an extremely risky proposition as the lack of diversification necessitated by the small market size makes returns extremely sensitive to portfolio selection. While reducing the number of portfolios used to sort stocks can mitigate this variation in returns, this also reduces the potential benefits of the strategy.

Another problem that limits the ability to use investment strategies based on book-to-market is the size of firms. While the mean size was N.Z. $593 million, the median size of firms in the sample was just N.Z. $135 million. It is obviously difficult to buy and sell large volumes of shares with such low capitalizations without having a significant impact on share price. This leaves such strategies largely in the realm of individual investors, as fund managers would be reluctant to construct portfolios with small stocks that may be difficult to place once they fail to meet the portfolio selection criteria, particularly if the strategy was to be widely adopted.

Arguments that book-to-market and size effects are exploitable violations of market efficiency may apply to larger markets, but they are irrelevant in New Zealand. In small and illiquid markets there is no way such violations of market efficiency can be effectively exploited. Quite apart from the difficulty in constructing portfolios of significant size due to

the illiquidity of small stocks, the small number of companies listed makes it impossible to construct portfolios that provide a satisfactory degree of diversification. The excess returns generated, even over relatively long investment horizons, are not statistically significant because of the extreme variations achieved between periods, and the low contribution that book-to-market or size make to the variation in returns that occur. The timing of when the strategy is started and when it is finally measured also have a large influence on the results, and while time diversification does assist which the reliability of returns, the time horizons required are far too long to attract institutional investors. Their performance is measured over relatively short periods of time and they cannot maintain investor confidence in the face of wild swings of returns relative to the market.

References

Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics*, *9*, 3–18.

Basu, S. (1983). The relationship between earnings' yield, market value and return for NYSE common stocks. *Journal of Financial Economics*, *12*, 129–156.

Black, F. (1972). Capital market equilibrium with restricted borrowing. *Journal of Business*, *45*, 444–455.

Black, F. (1993). Beta and return. *Journal of Portfolio Management*, *20*, 8–18.

Bryant, P. S., & Eleswarapu, V. R. (1997). Cross-sectional determinants of New Zealand share market returns. *Accounting and Finance*, *37*, 181–205.

Capaul, C., Rowley, I., & Sharpe, W. F. (1993). International value and growth stock returns. *Financial Analysts Journal*, 27–36.

Chan, K. C., & Chen, N. (1988). An unconventional asset pricing test and the role of firm size as an instrumental variable for risk. *Journal of Finance*, *43*, 309–325.

Chan, K. C., & Chen, N. (1991). Structural and return characteristics of small and large firms. *Journal of Finance*, *46*, 1467–1484.

Chan, L. K. C., Hamoa, Y., & Lakonishok, J. (1991). Fundamentals and stock returns in Japan. *Journal of Finance*, *46*, 1739–1789.

Daniel, K., & Titman, S. (1997). Evidence on the characteristics of cross-sectional variation of stock returns. *Journal of Finance*, *52*, 1–33.

Davis, J. L. (1994). The cross-section of realised stock returns: The pre COMPUSTAT evidence. *Journal of Finance*, *49*, 1593–1597.

Davis, J. L., Fama, E. F., & French, K. F. (2000). Characteristics, covariances and average returns: 1927–1997. *Journal of Finance*, *55*, 389–406.

DeBondt, W. F. M., & Thaler, R. H. (1985). Does the stock market overreach? *Journal of Finance*, *40*, 793–805.

DeBondt, W. F. M., & Thaler, R. H. (1987). Further evidence on investor overreaction and stock market seasonality. *Journal of Finance*, *42*, 557–581.

Fama, E. F., & French, K. F. (1992). The cross-section of expected stock returns. *Journal of Finance*, *47*, 427–465.

Fama, E. F., & French, K. F. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, *33*, 3–56.

Fama, E. F., & French, K. F. (1995). Size and book-to-market factors in earnings and returns. *Journal of Finance*, *50*, 131–155.

Fama, E. F., & French, K. F. (1996). Multifactor explanations of asset pricing anomalies. *Journal of Finance*, *51*, 55–94.

Fama, E. F., & French, K. F. (1998). Value versus growth: The international evidence. *Journal of Finance*, *53*, 1975–1999.

Graham, B., & Dodd, D. L. (1934). *Security analysis*. New York: McGraw-Hill.

Haugen, R. (1995). *The new finance: the case against efficient markets*. Englewood Cliffs, NJ: Prentice-Hall.

Keim, D. B. (1983). Size-related anomalies and stock return seasonality: Further empirical evidence. *Journal of Financial Economics*, *12*, 13–32.

Lakonishok, J., Shleifer, A., & Vishny, R. W. (1994). Contrarian investment, extrapolation, and risk. *Journal of Finance*, *49*, 1541–1578.

LaPorta, R. (1996). Expectations and the cross-section of stock returns. *Journal of Finance*, *51*, 1715–1741.

Li, Q., & Pinfold, J. F. (2000). *The persistence of the book-to-market effect in New Zealand*. Seattle, USA: Academy of Financial Services Conference.

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.

Lo, A. W., & MacKinlay, A. C. (1990). Data-snooping biases in tests of financial asset pricing models. *Review of Financial Studies*, *3*, 431–467.

MacKinlay, A. C. (1995). Multifactor models do not explain deviations from the CAPM. *Journal of Financial Economics*, *38*, 3–28.

Ross, S. A. (1976). The arbitrage theory of capital asset pricing. *Journal of Economic Theory*, *13*, 341–360.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium and conditions of risk. *Journal of Finance*, *19*, 425–442.

Vos, E., & Pepper, B. (1997). The size and book-to-market effects in New Zealand, *New Zealand Investment Analyst*, 35–45.