RETURNS FROM INVESTING IN AUSTRALIAN EQUITY SUPERANNUATION FUNDS, 1991 TO 1999

by

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Abstract

This study tests the strong-form efficient market hypothesis for Australian equity superannuation fund returns from 1991 to 1999. The efficient market model is not rejected for the sample period, suggesting that passive asset selection is superior to any other strategy that creates greater information and execution expenses, as these costs are largely sunk. Moreover, Australian superannuation investors would achieve their retirement income objectives more rapidly through a passive asset selection strategy.

1. INTRODUCTION

For almost half a century, the following question has been the source of intense debate by both the academy and practitioners: are markets, particularly the market for equities, efficient? Answers to this question have been provided on the one hand by the various active asset selection techniques employed by practitioners, and on the other by the academy's received statement of capital market efficiency, the efficient market hypothesis (EMH).

Fund managers engaged in active asset selection assume that historical information (eg. past price behaviour, publicly available information) embodies information concerning the future performance of equities. The decision to adopt an active asset selection approach is based on the premise that, through a superior analysis of historical information, the fund manager can earn economic rents (superior risk-adjusted returns) for the superannuation investor.

The EMH suggests that, in a liquid market characterised by a large number of rational, expected-utility maximising participants making unbiased forecasts of the future, equities will be appropriately priced and reflect all available information. If the market for equities is, as Fama (1970) describes, efficient in an informational sense, no information or analysis can

be expected to result in the fund manager earning superior risk-adjusted returns or economic rents.

2. INSTITUTIONAL SETTING

The capital market efficiency debate is of particular relevance to Australia's superannuation arrangements. Superannuation is the Commonwealth Government's preferred system for the provision of retirement savings for Australians. The importance of superannuation for the real sector cannot be underestimated. Superannuation is now the second most important asset (after the home) for Australians, with an average aggregated superannuation membership balance of AUD 50,000. With the twin-effects of increasing superannuation contributions (the Superannuation Guarantee Levy is scheduled to increase to 9 per cent over the next three years) and the compounding of these savings with investment returns, it is not unreasonable to suggest that superannuation will be the most important asset for Australian households within a generation.

Superannuation funds are also an important source of capital for the domestic economy. The Australian Prudential Regulation Authority (1999) estimate that total superannuation assets as at 30 June 1999 totalled AUD 409 billion, which is in excess of 58 per cent of Australia's Gross Domestic Product. These institutional features make it timely to investigate the performance of those intermediaries managing Australian superannuation assets.

3. LITERATURE REVIEW

State-of-the-art performance evaluation studies are concerned with two controversial issues. First, a renewed focus on asset pricing models has stemmed from the work of Roll (1977) and Ross (1976) relating to the observability of the market portfolio. Roll (1977) argues that tests of the capital asset pricing model (CAPM) only reject the mean-variance efficiency of the

proxy and that the model might not be rejected if the return on the true market portfolio were used. Moreover, Elton, Gruber, Das and Hlvaka (1993) argue that the use of the CAPM does not capture the impact of fund managers holding a portfolio not completely reflective of the single factor (typically the market factor) selected.

A further limitation of the CAPM is its inability to explain the cross-section of expected returns. From the early work of Basu (1977) to the recent findings of Fama and French (1992, 1993), the CAPM cannot explain a number of persistent anomalies, particularly those relating to value and size. This has led scholars, such as Fama and French (1995, 1996) and Gruber (1996), to advocate the use of multiple-factor asset pricing models (as distinct from the single-factor CAPM) to investigate market efficiency and fund manager performance.

The second controversial issue relates to the methodological flaw of survivorship bias in performance evaluation studies. Elton, Gruber and Blake (1996) argue that fund attrition is the result of two inter-related factors: poor performance; and/or, the assets under management are sufficiently small that the intermediary decides it is no longer viable to continue the fund. A final reason for fund attrition relates to merger and acquisition activity. This is a topical feature of Australia's superannuation fund management industry in light of the recent Commonwealth Bank of Australia Limited/Colonial Limited transaction.

Brown and Goetzmann (1995), Brown, Goetzmann, Ibbotson and Ross (1992) and Elton et al (1996) argue that failure to correct for survivorship bias results in an over-estimation of historical returns. This over-estimation can lead superannuation investors and trustees to be overly optimistic in their expectation of future returns. Moreover, Malkiel (1995) argues that failure to incorporate non-surviving funds into any test of the strong-form EMH render any deductions made from such analysis invalid.

4. METHODOLOGY

The technology employed to evaluate the performance and return persistence of fund managers can be categorised under two broad classifications: risk-unadjusted returns (preliminary model) and risk-adjusted return (single-factor and multiple-factor model).

4.1 Preliminary model

The preliminary model of fund manager evaluation is a rudimentary, risk-unadjusted, measure of return relative to the market. Preliminary estimates of average performance are obtained from:

$$R_{it} - R_{mt} \qquad [1]$$

where:

R_{it} = return on fund i in month t;

R_{mt} = return on the Australian Stock Exchange Top 100 accumulation index in month t.

The limitations of the risk-unadjusted technology are well documented. Tucker, Becker, Isimbabi and Ogden (1994) argue that the most egregious error committed during any assessment of fund manager performance is conducting a comparison of fund returns without consideration of differential fund risk levels. Further, Tucker et al (1994) observe that while the academy has been aware of the need to account for differential risk for more than 30 years, practitioners and retail investors often persist in ignoring this critical issue.

4.2 Single-factor model

Campbell (1996) argues that one of the important problems of modern financial economics is the quantification of the trade-off between risk and return. Although it is generally held that risky investments such as equities will generally yield a higher return than investments free of

risk, it was only with the development of the CAPM that economists were able to quantify risk and the reward for its adoption. The defining feature of the CAPM is that expected returns of an asset must be linearly related to the covariance of its return with the return of the market portfolio. The CAPM provides the theoretical basis for the single-factor measures of performance evaluation developed by Treynor (1965), Sharpe (1966) and Jensen (1968).

The CAPM is a single-period model. Therefore, for econometric analysis of the model, it is necessary to incorporate an assumption of time series behaviour of returns and estimate the model over time. Following Sharpe (1964) and Linter (1965), it is assumed that returns are independently and identically distributed through time and jointly mutlivariate normal. Following the tradition of Elton et al (1996), Ferson and Schadt (1996), Gruber (1996), Ippolito (1989) and Malkiel (1995), this study employs Jensen's (1968) interpretation of the CAPM using the single-factor model to evaluate fund manager performance:

$$R_{it} - R_{ft} = \alpha^{J}_{i} + \beta^{J}_{i}(R_{mt} - R_{ft}) + \varepsilon_{I} \qquad [2]$$

where:

α^{J}_{i} = risk-adjusted excess return measured from the single-index model;

R_{ft} = return on the Reserve Bank of Australia 10-Year Commonwealth Bond accumulation index in month t; and,

β^{J}_{ki} = sensitivity of difference in return on fund i to portfolio z, where z represent the market factor; and,

ε_{i} = random error term in month t.

An important limitation of the single-index model is its inability to explain the cross-section of expected returns. From the preliminary work of Basu (1977) to the recent anomalous findings of Fama and French (1992, 1993, 1995 and 1996) the single-factor model cannot

explain the anomalies such as value and size. To address this problem, a multiple-factor asset pricing model for Australia is developed.

4.3 Multiple-factor model

The challenge for researchers employing multiple-factor models to adjust fund manager returns for risk relates to the controversial issue of selecting the factors to be included in the model that explain the cross section of expected returns in equity markets. Elton et al (1996), Ferson and Schadt (1996) and Gruber (1996) suggest that researchers can resolve this issue through selecting factors for fund manager evaluation that span the major types of securities held by the fund.

Based on the findings of Fama and French (1992, 1993 and 1996), Elton et al (1996), Ferson and Schadt (1996) and Gruber (1996) employ a general four-factor model to investigate non-specialised domestic stock funds. Given that this study examines fund managers with identical mandates as these scholars, a mandate to out-perform a broad domestic equities accumulation index, a four-factor model is developed for the Australian setting. Specifically, the four-factor model employed in this study examines market, size, style and bond factors.

$$R_{it} - R_{ft} = \alpha^4_i + \beta^4_{mt}(R_{mt} - R_{ft}) + \beta_{si}(R_{st} - R_{lt}) + \beta_{gi}(R_{gt} - R_{vt}) + \beta_{di}(R_{dt} - R_{ft}) + \varepsilon_I \qquad [3]$$

where:

α^4_i = risk-adjusted excess return measured from the four-factor model;

R_{it} = return on fund i in month t;

R_{ft} = return on the Reserve Bank of Australia 10-Year Commonwealth Bond accumulation index in month t;

R_{mt} = return on the Australian Stock Exchange Top 100 accumulation index in month t (market factor or single-factor CAPM);

$R_{st} - R_{lt}$ = difference in return between a small capitalisation portfolio and a large capitalisation portfolio based on Australian Stock Exchange-Frank Russell Company indices in month t (size factor[1]);

$R_{gt} - R_{vt}$ = difference in return between a growth portfolio and a value portfolio based on Australian Stock Exchange-Frank Russell Company indices in month t (style factor);

$R_{dt} - R_{ft}$ = difference in return on a bond index that represents Commonwealth, semi-government and corporate bonds across all maturities, based on the Warburg Dillon Reed Composite Bond (All Maturities) accumulation index in month t (domestic fixed interest factor);

β^{A}_{ki} = sensitivity of difference in return on fund i to portfolio k, where k can represent the market, size, style or domestic fixed interest factor; and,

5. DATA COLLECTION

Morningstar Research Pty Ltd (Morningstar), a key independent measurement service in Australia, was commissioned to provide monthly return observations (net of management fees, excluding entry and exit loads) for every retail superannuation fund classified as 'Retail superannuation fund Australian equity – general', from January 1991 to April 1999. The sample of funds is complete in the sense that it contains all of the funds with no missing data and was maintained by the same independent data collection agency throughout the period.

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[1] The size and growth portfolios were constructed from Australian Stock Exchange-Frank Russell Company indices as follows: (a) the small capitalisation portfolio is the average of the return on the Russell Small Value and Russell Small Growth indices; (b) similarly, the large capitalisation portfolio is the average return on the Russell Value 100 and Russell Growth 100 indices; (c) the growth portfolio is the average of the Russell Small Growth and Russell Growth 100 indices; and, (d) the value portfolio is the average of the return on the Russell Small Value and Russell Value 100 indices.

All funds that were in existence in Australia during the sample period are examined in the study with one exception. The exception is that funds that did not have at least 30 months of data available are excluded from the study resulting in 8 funds being excluded. After excluding funds with less $n < 30$, a total of 136 funds remained in the sample.

The sample contains 3 distinct cohorts exist within the retail classification: open-end, closed-end and non-surviving. The retail open-end cohort consists of superannuation funds that are structured to accept investments from individuals. These funds are pooled and invested by a fund manager in a portfolio of general Australian equities. A typical retail fund requires a minimum initial investment of AUD 2,000, with minimum contributions of AUD 100. Retail open-end funds allow investors to buy and sell at a unit price based on the appraised value of total assets. Investors can leave and enter at any time and assets may be continually added to the fund. A total of 68 retail open-end funds are investigated in this study.

Closed end retail funds no longer accept new investors or new investments from existing unitholders. These are usually difficult funds for investors to exit owing to a lack of liquidity in the fund's underlying investments. However, due to the fund being closed-end in nature, this allow the fund manager to be largely unaffected by the impact of large capital inflows from superannuation investors. This provides the fund manager with a degree of certainty regarding the assets under management. Despite the issues relating to exiting such funds, retail superannuation investors are large users of these closed-end products. A total of 56 retail closed-end funds are examined in this study.

The retail non-surviving cohort is comprised of retail funds that were finalised during the sample period. The decision to finalise a fund is typically made by the trustee. An analysis

of the retail non-surviving cohort is key to quantifying the survivorship bias in the sample. A total of 12 retail funds were terminated over the sample period.

A final note of interest regarding the sample relates to the asset selection policy of each of the funds. The trustees of every fund investigated in this study have implemented an active approach to asset selection. This implies that each of the trustees in this study are of the belief that the fund managers employed are superior researchers, having the ability to consistently earn economic rents (in this case, superior risk-adjusted returns on a consistent basis).

As previously discussed, a number of scholars have found that measured US equity mutual fund performance can depend critically on the benchmarks used in analysis. The rigour of the data collection techniques employed have resulted in a sample of Australian superannuation fund managers that permits this study to deal with some of these issues.

The key data advantage of the sample is that the structure of the asset allocation is known. To be classified by Morningstar as a 'Retail superannuation fund Australian equity – general' the fund must hold a minimum of 80 per cent of portfolio assets in general Australian equities, with a maximum of 20 per cent of portfolio assets in domestic fixed interest securities. Therefore, this study can select factors to adjust for risk that do not suffer from the defects of asset coverage.

An important consideration in formulating the research design was the selection of appropriate benchmarks to adjust fund manager performance for risk. The philosophical stance adopted by this study was to select benchmarks that reflect the universe of securities from which fund managers can select from in building a general portfolio of domestic

equities. The typical mandate of the fund managers investigated in this study restrict the majority of investment to large capitalisation equities comprising the Australian Stock Exchange (ASX) Top 100 accumulation index.

Following the parameters set by the typical trust deed of superannuation funds, the ASX Top 100 accumulation index is used as the key proxy for the market portfolio, with the ASX Top 20 accumulation index used as a confirmatory market proxy. Moreover, if fund managers are attempting to undertake strategic behaviour through investing in small capitalisation equities or implementing a strict investment (value or growth) active asset selection style, these effects are captured by the four-factor model.

6. ANALYSIS

6.1 Survivorship bias

Recent US studies by Brown and Goetzmann (1995) and Grinblatt and Titman (1989) differ in their assessment of survivorship bias. At the lower end of the spectrum, Grinblatt and Titman (1989b) estimate this bias to be between -10 and -30 basis points per cent per annum whereas Brown and Goetzmann (1995) estimate a bias of -20 to -70 basis points per year. Table 1 provides summary estimates of survivorship bias for the various techniques used in this study.

Two limitations of the findings of Brown and Goetzmann (1995) and Grinblatt and Titman (1989) are that, first, the estimates presented by these scholars are based on risk-unadjusted technology and, second, only open-end retail funds are considered. Therefore, the only comparable estimate in Table 1 with these previous studies is the estimate of -43 basis points per annum. The preliminary estimate of survivorship is at the mid-point of Brown and Goetzmann's (1995) estimation range.

The results of single-factor and four-factor models to estimate survivorship bias in this study are largely comparable to the recent findings of Blake and Timmermann (1998). For a sample of UK equity-general open-end retail mutual funds, Blake and Timmermann (1998) employ a single-factor and three-factor model to estimate a survivorship bias of -0.019 percent cent per month or -23 basis points per annum. The survivorship bias estimation reported in Blake and Timmermann (1998) reflect the findings of this study with a single-factor model estimate of –21 basis points per annum and a four-factor model estimate of –23 basis points per annum.

***Table 1*: Summary Estimates of Survivorship Bias**

Cohort	$R_{it} - R_{mt}$	α^1	α^4
R_{mt} = ASX Top 100 accumulation index			
Surviving retail funds	-0.1976	-0.1659	-0.0193
All retail funds	-0.2336	-0.1836	-0.0384
Survivorship bias – retail	-0.0359	-0.0177	-0.0191
Basis points (per annum)	**-43**	**-21**	**-23**
R_{mt} = ASX Top 20 accumulation index			
Surviving retail funds	-0.3006	-0.2436	-0.0644
All retail funds	-0.3281	-0.2530	-0.0777
Survivorship bias – retail	-0.0275	-0.0094	-0.0133
Basis points (per annum)	**-33**	**-11**	**-16**

A further application of the estimates provided relates to the formulation of return expectations by superannuation investors. Clearly, superannuation investors are not particularly interested in the performance records of funds that no longer exist. The problem facing investors is to select from a group of currently available superannuation funds. Therefore, the information provided by these intermediaries, financial planners, stockbrokers and other financial advisory firms is biased by survivorship. The estimates presented in this section can be used by superannuation investors as a guide to the impact of survivorship bias on future industry returns due to fund termination. The findings suggest that a rational, profit-

maximising superannuation investor will discount future industry performance expectations (based on a sample of only surviving funds) by between 21 and 45 basis points per annum. The evidence presented on survivorship bias and survivorship premium illustrates that a sampling technique that excludes terminated funds would result in a significant overestimation of fund manager performance. The sample investigated in this study permits the returns from non-surviving funds to be analysed to the exact month of termination – a distinct advantage over previous studies of this kind. The evidence presented supports the finding of Elton et al (1996) that samples that do not correct for fund attrition will overstate the return that fund managers earn for their investors. The estimated survivorship bias range of -21 to -41 basis points per annum suggests the Australian experience is largely reflective of the results from a range of international samples.

***Table 2*: Preliminary performance evaluation estimates**

R_{mt} = ASX Top 100 accumulation index	
Cohort	$R_{it} - R_{mt}$
Retail open-end	-0.1901
Retail closed-end	-0.2053
Retail non-surviving	-0.6066
All retail funds	*-0.2336*
Basis points (per annum)	**-280**
R_{mt} = ASX Top 20 accumulation index	
Retail open-end	-0.3064
Retail closed-end	-0.2946
Retail non-surviving	-0.6142
All retail funds	*-0.3281*
Basis points (per annum)	**-394**

6.2 Performance evaluation

The fund managers investigated in this study engage in active asset selection on behalf of superannuation investors. These fund managers, in undertaking active asset selection,

challenge the EMH proposition that a passive asset selection strategy will be unbeatable by any active asset selection strategy over the long term, as security prices fully reflect available information. The central finding of the performance evaluation study is that active fund managers, whether judged by risk-unadjusted or risk-adjusted technologies, under-perform a passive market benchmarks (ASX Top 100 and Top 20 accumulation indices). The analysis commences with the risk-unadjusted model of fund manager performance described in Equation [1].

***Table 3*: Single-factor performance evaluation estimates**

Cohort	α^1	Stand. Error	β^1_m	Stand. Error	R^2 adj	D-W
	R_{mt} = ASX Top 100 accumulation index					
Retail open-end	-0.1569 (t = -0.95)	0.2388	0.8733 (t = 19.52)	0.0587	0.7965 (df = 62)	2.1795
Retail closed-end	-0.1740 (t = -1.43)	0.1590	0.8197 (t = 23.94)	0.0442	0.7670 (df = 84)	2.2590
Retail non-surviving	-0.3826 (t = -1.17)	0.2881	0.6167 (t = 8.41)	0.0821	0.5352 (df = 56)	2.0641
All retail funds	*-0.1836 (t = -1.19)*	*0.2070*	*0.8272 (t = 20.48)*	*0.0542*	*0.7605 (df = 71)*	*2.2061*
Basis points (per annum)	**-220**					
	R_{mt} = ASX Top 20 accumulation index					
Retail open-end	-0.2534 (t = -1.04)	0.2516	0.8002 (t = 14.64)	0.0655	0.7306 (df = 62)	2.1063
Retail closed-end	-0.2324 (t = -1.42)	0.1878	0.7504 (t = 17.50)	0.0498	0.7100 (df = 84)	2.1179
Retail non-surviving	-0.3590 (t = -1.02)	0.3018	0.5963 (t = 7.37)	0.0820	0.4790 (df = 56)	1.8737
All retail funds	*-0.2530 (t = -1.21)*	*0.2272*	*0.7602 (t = 15.26)*	*0.0598*	*0.6993 (df = 71)*	*2.0933*
Basis points (per annum)	**-304**					

An examination of risk-unadjusted return finds that fund managers under-perform the market by between –280 to -394 basis points per annum. As previously discussed, meaningful deductions cannot be made without adjusting fund manager return for risk, further the

preliminary model ignores that the fund managers in this study can hold up to 20 per cent of fund assets in domestic fixed interest securities. Table 3 presents single-factor or CAPM estimates adjusted for risk as described in Equation [2].

The single-factor estimates in Table 3 provide empirical evidence of the limitations of using the preliminary model. Estimates from the single-factor model illustrate that the average fund in the sample had a β^1_m of less than one (the average β^1 according to single-factor estimates was in the range of 0.76 to 0.82). Therefore, the preliminary estimate understated performance. Using the single-index model, the risk-adjusted return achieved by fund managers over the sample is estimated to be in the range of –220 to -304 basis points per annum.

Although the single-factor model permits greater insight into the performance of fund managers that its preliminary model counterpart, it is argues that the four-factor model captures a greater proportion of the real world influences on fund manager returns. Table 4 presents the findings from a multiple-factor asset pricing technology, specifically, the four-factor model reflecting the Australian experience described in Equation [3].

With R_{mt} equal to the ASX Top 100 accumulation index the four-factor model explains some 84 per cent of the variability of return for the average fund in the sample. This compares favourably with the explanatory power of the single-factor model at 76 per cent.

The four-factor model estimates suggest that fund managers under-perform the market by a range of -46 to –93 basis points per annum. Moreover, the evidence presented on the other three explanatory variables (size, style and domestic fixed interest securities) illuminate some important issues for future research.

Table 4: **Multiple-factor performance evaluation estimates**

Cohort	α^4	β^4_m	β^4_s	β^4_g	β^4_d	R^2 adj	D-W
R_{mt} = ASX Top 100 accumulation index							
Retail open-end	0.0280 (t = 0.12) (se=0.2091)	0.8521 (t = 20.12) (se=0.0580)	0.1797 (t = 2.77) (se=0.0786)	0.1147 (t = 0.92) (se=0.1145)	0.3579 (t = 2.64) (se=0.2026)	0.8377 (df=59)	2.185
Retail closed-end	-0.0663 (t = -0.65) (se=0.1501)	0.8096 (t = 24.75) (se=0.0435)	0.1426 (t = 2.78) (se=0.0566)	-0.0266 (t = -0.04) (se=0.0910)	0.3444 (t = 3.54) (se=0.1117)	0.8213 (df=81)	2.190
Retail non-surviving	-0.2532 (t = -0.83) (se=0.2683)	0.6211 (t = 8.49) (se=0.0830)	0.2483 (t = 2.48) (se=0.1055)	0.0623 (t = 0.41) (se=0.1676)	0.5968 (t = 3.37) (se=0.1973)	0.6620 (df=53)	2.046
All retail funds	*-0.0384* *(t = -0.32)* *(se=0.1876)*	*0.8132* *(t = 21.13)* *(se=0.0536)*	*0.1689* *(t = 2.75)* *(se=0.0710)*	*0.0456* *(t = 0.43)* *(se=0.1085)*	*0.3719* *(t = 3.10)* *(se=0.1612)*	*0.8149* *(df=68)*	*2.176*
Basis points (per annum)	**-46**						
R_{mt} = ASX Top 20 accumulation index							
Retail open-end	-0.0249 (t = -0.11) (se=0.2323)	0.8313 (t = 16.46) (se=0.0655)	0.3345 (t = 4.49) (se=0.0899)	0.0381 (t = 0.41) (se=0.1326)	0.3178 (t = 2.16) (se=0.1889)	0.8071 (df=59)	2.106
Retail closed-end	-0.1034 (t = -0.74) (se=0.1665)	0.7911 (t = 20.02) (se=0.0482)	0.2861 (t = 4.93) (se=0.0657)	-0.0483 (t = 0.1326) (se=0.0995)	0.3224 (t = 2.85) (se=0.1236)	0.7968 (df=81)	2.195
Retail non-surviving	-0.2273 (t = -0.69) (se=0.2772)	0.5968 (t = 8.00) (se=0.0841)	0.3368 (t = 3.16) (se=0.1153)	0.0850 (t = 0.57) (se=0.1723)	0.5834 (t = 3.24) (se=0.2044)	0.6422 (df=53)	2.058
All retail funds	*-0.0777* *(t = -0.46)* *(se=0.2065)*	*0.7931* *(t = 17.28)* *(se=0.0593)*	*0.3130* *(t = 4.57)* *(se=0.0812)*	*0.0021* *(t = 0.08)* *(se=0.1211)*	*0.3424* *(t = 2.56)* *(se=0.1608)*	*0.7879* *(df=68)*	*2.143*
Basis points (per annum)	**-93**						

First, an examination of the regression coefficients in Table IV suggests that the funds investigated during the sample period held equities that were smaller than the combination of equities in the ASX Top 100 and Top 20 accumulation index. This suggests that fund managers are being strategic in their behaviour, investing in small-capitalisation stocks outside popular benchmarks. The existence of a size factor in the sample provides further evidence of the limitations of the single-factor technology.

Second, a statistically significant explanatory variable was, interestingly, the excess return on a portfolio of domestic fixed interest securities above the risk-free rate. This finding

highlights that investors engaging specialist domestic equity fund managers are, typically, investing in a portfolio that has a significant proportion (up to 20 per cent) of return contributed by lower volatile, fixed interest securities. Moreover, this relatively high proportion of domestic fixed interest exposure must be incorporated into the superannuation investor's approach to the asset allocation problem.

Finally, dissimilar to the findings of Elton et al (1996) and Gruber (1996), the specialist Australian fund managers investigated in this study are not characterised by a particular active asset selection style. This is confirmed by the independent variable 'style' not being statistically different from zero at the 5 per cent level. This issue warrants further investigation. Specifically, the active management styles of superannuation fund managers requires a more detailed analysis to provide a statistically significant explanatory variable for the Australian experience. A direction for future research may take the form of qualitative techniques in the form of fund manager surveys to shed light on this issue.

The findings of this study broadly support the use of a multiple-factor conception of the asset pricing model when undertaking performance evaluation studies. The state-of-the-art four-factor model provides a superior explanation and understanding of fund return behaviour compared to its single-factor or CAPM counterpart. The findings support Gruber's (1996) argument that the use of multiple-factor models leads to more accurate performance evaluation. Again, the caveat on this observation is the need to find superior explanatory variable(s), particularly relating to style, for active asset selection in Australia.

The performance evaluation estimates presented in this section could not reject the strong-form EMH. As a group, Australian fund managers appear to have limited active stock selection ability. The economic significance of this finding is that the marginal cost of active

asset selection is far greater than its marginal benefit. Again, this finding is consistent with the strong-form EMH.

7. CONCLUSION

This study of financial intermediaries specialising in the active management of Australian equity portfolios for superannuation investors provides no evidence to reject the received statement of market efficiency, the EMH. The market for equities in Australia appears to be remarkably efficient, with asset prices reflecting all available information.

From a policy perspective, Australian superannuation investors would achieve their retirement income objectives more rapidly by engaging a low cost fund manager employing a passive asset selection technique, or, self-managing the assets using a similar passive strategy. Indexing, the passive asset selection technique logically deducted from the EMH, is the most appropriate asset selection strategy for the rational, profit-maximising superannuation investor.

However, contributors to these types of superannuation fund do not have choice of asset allocation nor do they have the choice of a passive fund although there are such funds with larger minimum entry requirements.

The conclusions further suggest that superannuation fund managers who engage an active trading strategy appropriate excess returns by way of quasi-rents which would be expected to be competed away in a more competitive industry. Such competition would be predicted to follow on availability of performance studies.

This study has provided further evidence that active fund asset selection fails to generate excess risk-unadjusted or risk-adjusted returns. The weight of empirical evidence presented by this study, and other international studies, in support of the EMH is now so voluminous that the counter-arguments of fund managers engaged in active asset selection will be completely irrelevant if they are not equally supported by scholarly evidence.

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