EMH is alive and well

Is being active just a waste of energy?

A study of active managers of Australian equity portfolios for superannuation investors provides no evidence for rejection of the efficient market hypothesis, report MICHAEL DREW and JAMES NOLAND. The market appears to be remarkably efficient, with asset prices reflecting all available information.

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A large body of scholarship in financial economics has investigated the efficiency of capital markets using samples of the investment performance of United States mutual and pension funds, predominantly invested in US stocks. However, little academic attention has been given to the question of whether the investment performance of similar financial intermediaries specialising in the active management of stock portfolios outside the US is explained by Fama's (1970) fair-game model, popularly referred to as the efficient market hypothesis (EMH).

Such an omission is potentially significant because differences in economic, regulatory and legal settings, and differing management philosophies employed by active fund managers around the world, make it far from certain that the same findings would be obtained in other economies. Therefore, it is important to test the robustness of the US findings on a new sample of fund managers.

These ideas are tested using a sample of Australian equity superannuation funds.

Australian and US superannuation arrangements have vastly different histories and institutional frameworks. For most Australians, superannuation is not a consensual system of private arrangements between employers and employees (as is the US pension system), but rather a compulsory savings regime designed to reduce reliance on government-funded age pensions and to increase the retirement income available to individuals. If superannuation contributions are not prudently and effectively managed, the government will face higher age pension commitments than it would otherwise.

Superannuation is now the second most important asset (after the home) for Australians, with an average aggregated superannuation membership balance of $50,000. With the combined effect of continued superannuation contributions and the compounding of these savings, it is not unreasonable to expect that superannuation will be the most important asset for Australians within a generation. Superannuation funds are also an important source of capital for the domestic economy, with total superannuation assets currently

standing at $409 billion, equivalent to 58% of Australia's gross domestic product.

RESEARCH PROBLEM

For almost half a century there has been intense debate about whether markets, particularly the equities market, are efficient. Answers to this question are found on the one hand in the various active fund management styles employed by market practitioners and on the other by the academy's received statement of market efficiency, the EMH.

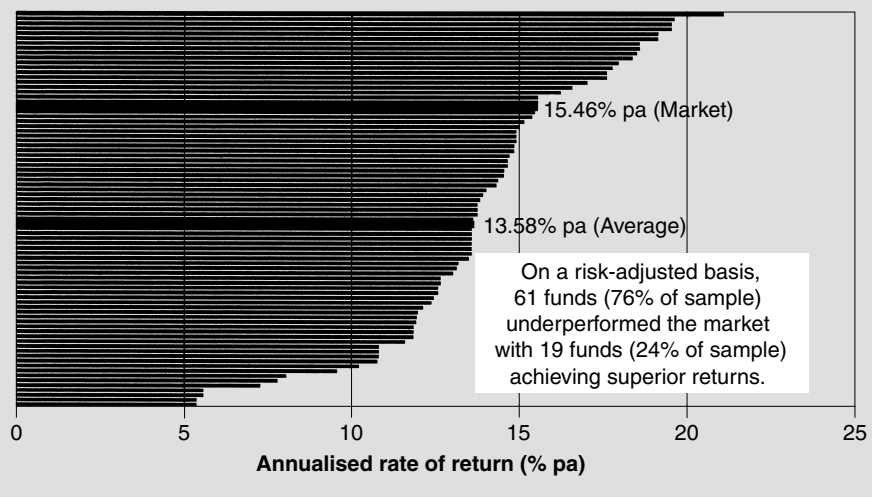
Although there are many different fund management styles, managers engaged in active asset selection all make the same basic assumption: that historical stock information (past price behaviour, annual reports) embodies information concerning future performance. The decision to adopt an active asset selection strategy is based on the premise that, through analysis of historical stock information, the fund manager can earn consistent risk-adjusted returns above an appropriate market benchmark.

In contrast, the EMH suggests that in a liquid market characterised by a large number of rational participants who make unbiased forecasts, stocks will be appropriately priced and reflect all available information. If a market is efficient, no information or analysis can be expected to result in excess risk-adjusted returns above a benchmark. The answer to the problem of asset selection, following the EMH, is indexing. Indexing is a *passive* asset selection strategy, logically deducted from the EMH.

The EMH implies that any excess risk-adjusted performance earned by fund managers is a result of luck, not the skilful application of active asset selection. The past performance of fund managers may help in assessing the riskiness of an active fund manager's strategy but, according to the EMH, would not be useful in ascertaining the skill of the manager.

This study investigates a sample of accumulation superannuation funds specialising in the management of portfolios of domestic equities. It differs from previous research in the field in its use of a data-set free of survivorship bias — a significant methodological flaw resulting in over-estimation of fund-manager performance. The study attempts to provide positive insights into the EMH proposition that the costs associated with active fund management are sunk.

FIGURE 1 **Risk-unadjusted performance analysis**



DATA AND METHODOLOGY

The dependent variable of fund return, commissioned from Morningstar Research Pty Ltd, consists of monthly observations on the returns of every retail open-end superannuation fund classified as "Australian equity fund — general" from January 1991 to April 1999 (100 monthly observations).[1] The sample of 80 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.[2] Interestingly, each of the funds in the sample had an active asset selection mandate. The closest any of the funds came to employing a passive asset selection strategy was in the use of tilting (passive sector-allocation to benchmark, taking active bets within each sector).

In evaluating the performance of these portfolios the study employs the received methodologies of Treynor (1966), Sharpe (1966), Jensen (1968) and, for the first time using Australian data, the measure of Modigliani and Modigliani (1997), popularly referred to as M^2. The motivation for employing the M^2 measure is to identify the premium returned by the sample of funds investigated in this study of the risk-free rate.

The two key independent variables for the study relate to market return and the risk-free rate of return. Following the various trust deeds for the superannuation funds examined in this study, the Australian Stock Exchange All-Ordinaries accumulation index monthly return is employed as the proxy for the market rate of return. The Reserve Bank of Australia 10-Year Commonwealth Bond accumulation index return is used as the risk-free rate of return.

RESULTS

The central motivation behind performance evaluation is to undertake a juxtaposition of the returns achieved by the superannuation fund manager through active asset selection with the returns that could have been obtained through a naive or passive asset-selection strategy.

On a risk-unadjusted basis, Australian fund managers using specialist active asset selection on a general portfolio of domestic equities for retail superannuation investors underperformed the market by 0.1561% per month, or 187 basis points per annum. As illustrated in Figure 1, most funds (76% of the sample) failed to meet benchmark performance.

While the risk-unadjusted analysis provides a starting point, the purpose of this study is

to find whether the active asset-selection techniques employed by the fund managers investigated generate excess *risk-adjusted* returns. The risk-adjusted technologies used permit the performance of fund managers to be quantitatively compared despite different risk policies.

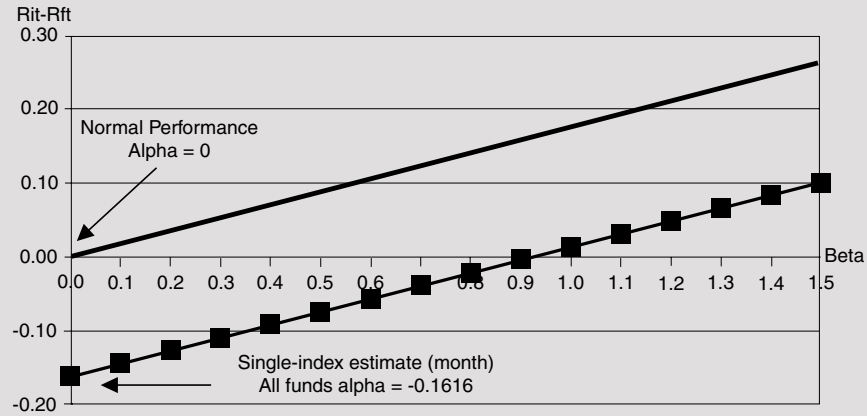
The main finding is that for each of the measures employed, about three-quarters of the funds underperformed the market on a risk-adjusted basis. Further, the market rate of return lies typically between the top and second quartiles in terms of performance. This is particularly controversial in that, following the EMH, the market would be expected to be somewhere between the second and third quartiles in terms of performance, with about half of the sample performing better and the other half worse than the market rate of return.

Using the Treynor or the Sharpe measures, 59 of the 80 funds sampled had performance less than that of the market. This finding is corroborated using the M^2 method, with 60 of the funds sampled having risk-adjusted performance less than the market. Summary estimates of the findings are presented in Table 1.

To give further weight to these findings, Jensen's alpha was estimated for all of the funds in the sample using regression techniques. The Jensen measure indicated that 61 of the 80 funds sampled had negative alpha intercepts (with the market intercept equal to zero). Further, none of funds was found to be statistically significant at the 5% level and R^2 adjusted was recorded at 78%.

The power of the Jensen measure is that it quantifies the level of underperformance of the group against benchmark, unlike the ranking measures of Treynor, Sharpe and M^2. The risk-adjusted average monthly alpha is estimated to be -0.1616 per cent per month. This equates to industry underperformance of 193 basis points per annum. The monthly underperformance against the market is illustrated in Figure 2.

FIGURE 2 **Jensen risk-adjusted performance analysis**



CONCLUSION

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

The average investor would achieve a superior return on superannuation assets and achieve his or her retirement-income objectives more rapidly by either engaging a low-cost fund manager employing a passive asset-selection technique or self-managing the assets using the same passive strategy. This study has provided further evidence that active asset selection fails to generate excess risk-adjusted returns. Indexing, the asset selection technique logically deducted from the EMH, is the most appropriate strategy for a rational, profit-maximising superannuation investor.

The weight of empirical evidence presented by this study and other international studies in support of the EMH is now so great that the counter-arguments of fund managers engaged in active asset selection will be seen as irrelevant if they are not equally supported by scholarly evidence.

The authors wish to thank Dr Jon Stanford FSIA for his insightful comments and suggestions on this paper.

TABLE 1 **Risk-adjusted performance analysis**

	Treynor	Sharpe	M^2
Sample average	-0.623	-0.008	1.147
	(59 funds below)	(59 funds below)	(60 funds below)
	(21 funds above)	(21 funds above)	(20 funds above)
Market	0.147	0.038	1.288

NOTES

1. To be classified as a "retail superannuation fund — Australian equity general", the fund must hold a minimum of 80% of fund assets in domestic equities and a maximum of 20% of fund assets in domestic fixed-interest securities. Therefore, unlike previous studies in the field, this study does not suffer the defects of asset coverage in benchmark selection.

2. The only exclusions from the sample were funds that did not have at least 30 monthly observations. Six funds were excluded on this ground.

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APPENDIX

The Treynor measure uses the *ex-post* security market line as the benchmark for comparison. The calculation of the Treynor measure divides the average excess return on the fund minus the established risk-free rate by the market risk of the fund (identified as the funds' beta):

$$T_i = \frac{R_i - RFR}{\beta_i} \quad \text{and} \quad T_m = \frac{R_m - RFR}{\beta_m}$$

where:

- R_i is the monthly average rate of return for portfolio (fund *i*) during a specified time period;
- R_m is the monthly average rate of return for the market *m* (ASX All-Ordinaries accumulation index) during a specified period;
- RFR is the monthly average rate of return on a risk-free investment (RBA 10-Year Commonwealth Bond accumulation index) during the same period
- β_i is the systematic risk expressed as beta for portfolio on fund *i*
- β_m is the systematic risk of the market (expressed with a numerical value of one)

The Sharpe measure uses the average value of difference in returns (beginning value - ending value) over a given period divided by the standard deviation of those same returns during the same period.

$$S_i = \frac{R_i - RFR}{\sigma_i} \quad \text{and} \quad S_m = \frac{R_m - RFR}{\sigma_m}$$

where:

- S_i is the Sharpe portfolio performance measure for portfolio *i*
- S_m is the Sharpe portfolio performance measure for the market *m*
- σ_i is the standard deviation of the rate of return for portfolio *i* during the time period
- σ_m is the standard deviation of the rate of return for the market *m* during the time period

The Jensen measure is closely linked with the CAPM in that it estimates the portfolio's beta to determine the risk premium which is expressed as the slope of the security market line indicating unit return versus unit risk. The Jensen measure estimates the fund's alpha and is expressed as the Y intercept of return axis:

$$R_i - RFR = \alpha + \beta_i [R_m - RFR]$$

The Modigliani and Modigliani (1997) measure is a variant of the Sharpe measure; it also focuses on total volatility as a measure of risk. The M^2 measure uses the portfolio's average return and determines what it would have been if the portfolio had the same degree of total risk as the market portfolio. The risk-adjusted return M^2_p is the average return that would have been earned if the amount of risk-free investing or lending had resulted in the standard deviation of the portfolio being equal to that of the market portfolio.

$$M^2_p = ar_f + \left[\frac{ar_p - ar_f}{\sigma_p}\right] \sigma_m$$

where:

- ar_f is the monthly average return on the risk-free Rate (10-Year RBA accumulative bonds) over a specified period
- ar_p is the monthly average return for the portfolio (fund) over a specified period. J