TESTING THE INCOMPLETE ARBITRATE HYPOTHESIS: EVIDENCE FROM AUSTRALIAN WHOLESALE SUPERANNUATION FUNDS

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Abstract

This paper tests the efficiency of capital markets when information is costly to obtain by analysing the performance of Australian wholesale superannuation funds specialising in the management of domestic equity portfolios from 1991 through 1999. Using a fund regression approach, the paper finds evidence that is consistent with an incomplete arbitrage function, with investment managers generating returns sufficiently high to compensate them for the increased costs of active asset selection. Risk-adjusted returns in the Australian superannuation fund industry, net of management fees and expenses, are comparable to the returns from a passive asset selection policy.

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Introduction

For the past two decades the following question has been a source of continuing controversy for financial economists: Can the trades of informed investors occur at prices sufficiently different from full information prices to compensate them for the cost of becoming informed? Answers to this question have been provided on the one hand by the received statement of market efficiency, the efficient market hypothesis (EMH), and on the other hand by the incomplete arbitrage hypothesis (IAH).

The purpose of this paper is to discuss in more detail the IAH in light of the EMH, with a view to testing the empirical validity of the IAH. Specifically, the paper considers the IAH notion that, in an efficient market where information is costly to obtain, investment managers should make trades and hold portfolios that earn risk-adjusted returns

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sufficiently higher than index funds to compensate them for higher expenses. Using a four-factor model developed for the Australian setting, estimated risk-adjusted returns for a sample of Australian wholesale superannuation funds for the period 1991 through 1999, are greater than zero. The results are consistent with the IAH model of equilibrium that incorporates the expenses of research and trading in the investment management process.

The paper is organised as follows. Section I presents a theoretical conception of efficient capital markets under costless and costly information, with a review of the implications of the empirical evidence to date for the competing hypotheses. Section II explores the applicability of the debate for Australia's national system of mandated retirement funding through the employment sector, termed superannuation. Section III presents the methodology to examine the efficiency with which investment managers convert retirement savings into retirement income in Australia through portfolios of domestic equities, with Section IV describing the sample. The empirical results are set forth in Section V. Section VI concludes the paper.

I. Literature Review

Under the assumption of costless information and trading in frictionless markets, Fama (1970) suggests that the arbitrage function in capital markets is complete, with security prices reflecting all available information. In such a market, any expenditure additional to the implementation of a passive asset selection policy is sunk. The EMH resolves the question of whether the trades of informed investors occur at prices sufficiently different from full information in the negative. The unpredictable nature of security prices removes the opportunity for managers to earn economic rents (including sufficient rents to compensate them for their information gathering costs) over the long run.

The rudiments of the competing hypothesis, the IAH, are attributed to Grossman (1976). Grossman (1976) shows that in a market where the price system is noisy, markets do not aggregate information perfectly. Moreover, an efficient price system, chararcterised by perfect aggregation of information, eliminates the private incentive for collecting information. The central breakthrough in the development of the IAH was achieved when the assumption of costless information was relaxed. In a market characterised by costly information, Grossman and Stiglitz (1980) argue that the EMH notion that all markets, including the market for information, are always in equilibrium and always perfectly arbitraged are inconsistent when the arbitrage function is costly.

The IAH answers the question of whether the trades of informed investors occur at prices sufficiently different from full information in the affirmative. In a market characterised by costly information, prices cannot perfectly reflect all available information. Grossman and Stiglitz (1980) deduct that there is a fundamental conflict between the efficiency with which markets spread information and the incentive to acquire information. The IAH is controversial as it proposes an equilibrium in which there is a degree of disequilibrium. Under the IAH framework, prices reflect the information of informed investors, or arbitragers, but only partially, such that those agents who expend resources to obtain information receive compensation. Alternatively, Lo (1997) suggests that it is the degree

of market inefficiency that determines the effort investors are willing to expend to gather and trade on information. Therefore, a non-degenerative market equilibrium will only arise when there are sufficient profit opportunities to compensate for the cost of trading and information gathering.

In formulating a model of the IAH for empirical refutation, Ippolito (1989) conceptualises a market in which passive asset selectors essentially pay informed active asset selector (through trades favouring informed investors) a sufficient amount to pay for the information-gathering activity. Informed investors out-perform the market before expenses, but make no excess returns after netting out the expense of gathering information. Thus, in equilibrium, the IAH suggests that there is no incentive to favour investment managers with either a passive or active asset selection mandate.

In examining the performance of 143 US mutual funds over the twenty year period 1965 through 1984, Ippolito (1989) reports that the estimated single-index risk-adjusted return (α) of the mutual fund industry exceeded zero after deducting transaction costs and expenses. The conclusions of Ippolito (1989) were in contrast to those reached by the previous contributions of Jensen (1968), Sharpe (1964) and Treynor (1965). The results were particularly contentious in light of Jensen's (1968) contribution. Investigating a similar sample and methodology to Ippolito (1989) over the twenty year period previous, 1945 through 1964, Jensen (1968) estimates a negative α for the mutual fund industry. This led Jensen (1968) to deduct that, on average, investment managers could not earn rates of return that justified the expenses of operating the fund, a finding consistent with the EMH. Ippolito's (1989) contribution was controversial as it demonstrated that sufficient profit opportunities existed in capital markets to compensate informed investors for the cost of trading and information gathering. Moreover, Ippolito (1989) provided, for the first time, empirical evidence that mutual funds with higher turnover, fees and expenses earned rates of return sufficiently high to offset the higher charges of active management, lending support to the IAH.

The work of Ippolito (1989) ignited a number of responses from the academy. The leading advance on Ippolito's (1989) research was made by Elton, Gruber, Das and Hlavka (1993). Using an identical data set, Elton et al (1993) show that Ippolito's (1989) results were primarily due to the difference in the performance of equities outside the single-index (S&P 500) in the period 1965 through 1984, compared to the performance of these assets in Jensen's period 1945 through 1964. Furthermore, after accounting for mutual funds holding assets outside the single-index (non-S&P 500 equities), Elton et al (1993) find that the Ippolito's (1989) results change and are identical to those found in earlier studies.

The empirical evidence following the contribution of Elton et al (1996) has overwhelmingly corroborated the EMH notion that the trades of informed investors do not occur at prices sufficiently different from full information prices due to the completeness of the arbitrage function. Specifically, Cai, Chen and Yamada (1997), Coggin, Fabozzi and Rahman (1993), Edelen (1999), Gruber (1996), Malkiel (1995) and Zheng (1999) report that investment managers, on average, deliver inferior risk-adjusted

results to a passive asset selection strategy. Brown and Goetzmann (1995), Carhart (1997) and Wermers (2000) provide only limited support for the IAH, finding that a value-weighted index of funds has a small positive risk-adjusted return compared to benchmark.

Recent research considering this issue by Drew and Noland (2000), Drew and Stanford (2001a, 2001b, 2003), Sawicki (2000) and Sawicki and Ong (2000) for the Australian setting provides corroborating evidence of the experience in the United States. Using techniques comparable to Gruber (1996), Drew and Stanford (2003) find that the average domestic equity superannuation retail fund under-performs benchmark returns by a range of 46 to 93 basis points per annum for the period 1991 through 1999. Drew and Stanford (2003) find that as an industry, investment managers destroy value for retail superannuation members, with the costs of research and trading associated with active management being largely sunk[1].

II. Institutional setting

The debate surrounding the completeness, or otherwise of the arbitrage function in capital markets is of particular relevance to Australia, in particular, financial intermediaries managing Australia's burgeoning pool of superannuation assets. Superannuation is the Commonwealth Government of Australia's preferred system for the provision of retirement income. The key characteristic that differentiates the evolution of superannuation funds from, say, US pension funding, is that the Australian systems is characterised by uniformity, with involuntary participation by employees, employers and government.

In the 1991 Commonwealth budget, the Government announced its intention to introduce a Superannuation Guarantee Levy (SGL) that required all employers to provide a prescribed level of superannuation support to virtually all of their employees. On 1 July 1992, the SGL commenced at 4 per cent of annual national payroll for companies, scaling up to the 8 per cent of annual national payroll as at 1 July 2000.

The introduction of the SGL on 1 July 1992 has seen Australia's superannuation assets more than double over the ensuing seven years. The Australian Prudential Regulatory Authority (APRA) (1999) reports that superannuation assets at the end of June 1999 totalled AUD 409 billion or 58 per cent of Australia's Gross Domestic Product. The mandated funding of retirement income through the employment sector has resulted in coverage for Australians. APRA (1999) find that 81 per cent of all employees in Australia are covered by superannuation, with coverage for full-time employees higher at 97 per cent.

The institutional setting for retirement funding arrangements in Australia provides a unique sample to test the international findings regarding the completeness, or otherwise,

[1] Retail funds are superannuation products that typically have a minimum initial investment amount of AUD 2,000 and subsequent minimum contributions of AUD 100. Individual-investors commonly use retail funds with superannuation assets of less than AUD 100,000 to be invested per fund.

of the arbitrage function in capital markets. Moreover, it is timely to undertake an empirical evaluation of the performance of investment managers specialising in wholesale superannuation assets since the introduction of the SGL, to provide positive insights into the efficiency with which such managers are transforming retirement savings into retirement income.

III. Research methodology

The method used to estimate risk-adjusted returns for the wholesale portfolios is comparable to Gruber (1996) and Zheng (1999), which select factors for the multifactor model that span the major types of securities held by non-specialised equity portfolios. Specifically, this study uses the Fama and French (1992, 1993, 1996) three-factor time series regression with an additional explanatory variable to account for holding in domestic fixed interest securities. Under this approach, OLS regressions are performed to estimate portfolio factor loadings and conditional (weighted average) and unconditional (arithmetic average) α measures from the following regression:

$$R_{it} - R_{ft} = \alpha_i + \beta_{mt}(R_{mt} - R_{ft}) + \beta_{si}(R_{st} - R_{lt}) + \beta_{gi}(R_{gt} - R_{vt}) + \beta_{di}(R_{dt} - R_{ft}) + \varepsilon_I \qquad (1)$$

where:

α	=	risk-adjusted excess return on fund *i* measured from (1);
R_{ft}	=	yield on the Reserve Bank of Australia 13-week treasury note in month *t*;
R_{mt}	=	return on the Australian Stock Exchange Top 100 accumulation index in month *t* (market);
$R_{st} - R_{lt}$	=	difference in return between a small capitalisation portfolio and a large capitalisation portfolio based on Australian Stock Exchange-Russell Company indices in month *t* (size);
$R_{gt} - R_{vt}$	=	difference in return between a growth and a value portfolio based on Australian Stock Exchange-Russell Company indices in month *t* (style);
$R_{dt} - R_{ft}$	=	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_{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,
ε_i	=	random error term in month *t*.

The size and growth portfolios were constructed from Australian Stock Exchange-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) 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.

IV. 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 wholesale superannuation fund classified as 'Wholesale Pooled Superannuation Trust Australian Equity – General', from January 1991 through 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.

All funds that were in existence in Australia during the sample period are examined in the study with one exception. As a minimum of 30 months of return data was required to perform OLS estimation for each investment manager, those funds that did not have at least 30 months of data available were excluded from the sample. This resulted in a total of study resulting in 2 funds being excluded. After excluding funds with less $n < 30$, a total of 30 funds remained in the sample.

The advantage of the sample investigated in this study is that the structure of the asset allocation is known. To be classified by Morningstar as a 'Wholesale Pooled Superannuation Trust 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.

Wholesale funds provide structured investment management services for the trustees of corporate or employer superannuation funds on behalf of employee members. This study considers a sector specific investment policy, Australian Equity – General, as distinct from multi-sector or balanced policies. The funds investigated in this study typically require a minimum investment of AUD 250,000, with minimum monthly contributions of AUD 20,000.

The sample contains 3 distinct cohorts exist within the classification: open-end, closed-end and non-surviving. The wholesale open-end cohort consists of superannuation funds that are structured to accept investments from trustees. These funds are pooled and invested by a fund manager in a portfolio of general Australian equities. Wholesale funds permit superannuation trustees 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 26 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 and outflows from superannuation trustees. This provides the investment manager with a degree of certainty regarding the assets under management. The liquidity issues relating to exiting such funds have resulted in superannuation trustees being minimal users of these closed-end products. A total of 2 wholesale closed-end funds are examined in this study. The wholesale non-surviving cohort is comprised of funds that were terminated during the sample period. The decision to finalise a fund is typically made by the investment manager. The inclusion of the retail non-surviving cohort is key to mitigating the methodological flaw of survivorship bias (Malkiel 1995). The Australian wholesale market is characterised by a low mortality rate, with only 2 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 investment managers evaluated. All of the funds investigated have undertaken an active approach to asset selection. This implies that each of the investment managers are of the belief that, as a minimum, the arbitrage function in the Australian equities market is incomplete, providing sufficient opportunities for wholesale managers to earn sufficient risk-adjusted returns to cover the costs associated with active asset selection. If this IAH holds, the decision to engage an investment manager to undertake active asset selection is a rational, profit maximising strategy for the superannuation fund trustee.

V. Empirical results

A. Risk-unadjusted results

Table I illustrates that the average returns of all 'Wholesale Pooled Superannuation Trust Australian Equity – General' funds during the observation period were 1.1778 per cent per month or 14.13 per cent per annum on an unconditional basis. The unconditional results are comparable to a buy-and-hold return on the ASX Top 100 accumulation index of 1.3156 per cent per month or 15.78 per cent per annum.

Table I

Risk-UnAdjusted Returns of 'Wholesale Pooled Superannuation Trust Australian Equity – General' Funds: January 1991 to April 1999

The returns in the table are reported on a monthly basis. Unconditional returns are denoted as EW (equally weighted) being the simple arithmetic average of returns. Conditional returns are denoted as CW (conditionally weighted) with individual fund returns weighted by their respective assets under management to derive an average of returns. The buy-and-hold 100 (20) index is the monthly return recorded on the ASX Top 100 (20) accumulation index over the sample period.

Cohort	EW Mean return	CW Mean return
Open-end	1.1969	0.0475
Closed-end	0.9128	0.0002
Finalised	0.9623	0.0028
All funds	**1.1778**	**0.0420**
Buy-and-hold 100	1.3156	
Buy-and-hold 20	1.3878	

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. To adjust for risk, this study employs a fund regression approach using a multifactor model.

B. Risk-adjusted results

Table II reports the estimated α on a conditional and unconditional basis using the fund regression approach.

Table II

Risk-Adjusted Returns using the Fund Regression Approach: January 1991 to April 1999

Alpha (α) is estimated from the time series regression of the excess fund returns on the excess market return and the mimicking returns for the size (R_{st} -R_{lt}), style (R_{gt} -R_{vt}) and bond (R_{dt} -R_{ft}) factors: R_{it} - R_{ft} = α_i + $\beta_{mt}(R_{mt}$ -$R_{ft})$ + $\beta_{si}(R_{st}$ -$R_{lt})$ + $\beta_{gi}(R_{gt}$ -$R_{vt})$ + $\beta_{di}(R_{dt}$ -$R_{ft})$ + ε_i. The excess market return, R_{mt} -R_{ft}, is the difference between the return on the Australian Stock Exchange (ASX) Top 100 Accumulation Index (with the ASX Top 20 Accumulation index used as a confirmatory proxy) and the yield on the Reserve Bank of Australia 13-week treasury note in month *t*. The size factor is the return on the mimicking portfolio for the common size anomaly in stock returns. The style factor is the return on the mimicking portfolio for the common book-to-market equity anomaly in stock returns. Finally, the bond factor is the return on the mimicking portfolio of domestic fixed interest securities to remove the defects of asset coverage. The market, size, style and bond factors are constructed following the descriptions of Fama and French (1993), Gruber (1996) and Drew and Stanford (2003). β_k is the factor loading on the corresponding independent variable. All *t*-statistics are provided in the brackets and are adjusted for autocorrelation using the Newey-West covariance matrix. Performance measures are in percentage return per month. The R^2 for all funds on an EW (CW) basis was 0.8251 (0.8474) with a Durbin-Watson statistic of 2.023 (2.006). Given no evidence of serial correlation, we do not pursue further into the first-order autoregressive AR1 and Augmented Dickey-Fuller (ADF) test.

Cohort	EW Alpha (α^4)	CW Alpha (α^4)
R_{mt} = ASX Top 100 Accumulation Index		
Open-end	0.0998 (0.0051)	0.0051 (0.0249)
Closed-end	0.0545 (0.0005)	0.0013 (0.0062)
Finalised	-0.0530 (0.0013)	-0.0005 (0.0051)
All funds	**0.0866** (0.0045)	**0.0045** (0.0233)
R_{mt} = ASX Top 20 Accumulation Index		
Open-end	0.0672 (0.0051)	0.0041 (0.0051)
Closed-end	0.0353 (0.0005)	-0.0007 (0.0005)
Finalised	-0.0490 (0.0013)	0.0011 (0.0013)
All funds	**0.0573** (0.0036)	**0.0036** (0.0045)

The equation in (1) was estimated for the 30 'Wholesale Pooled Superannuation Trust Australian Equity – General' funds, from January 1991 through April 1999. Following the contribution of Ippolito (1989), the central question asked of the sample is whether there is any evidence that investment managers either failed to earn rates of return available through passive asset selection (index fund) or earned returns that were superior to the market.

Using the four-index model with R_{mt} equal to the ASX Top 100 accumulation index, the unconditional alpha for the industry was estimated at 0.0866 per cent per month, or 103 basis points per annum. The more appropriate measure of industry performance, the conditional alpha, is weighted by mean asset size and was estimated at 0.0233 per cent per month, or 27 basis points per annum. The positive alpha is consistent across the open and closed-end cohort and corroborated using a different market proxy (with R_{mt} equal to the ASX Top 20 accumulation index, the unconditional alpha for the industry was 69 basis points per annum and the unconditional alpha at 21 basis points per annum).

The results presented in Table II are consistent with the Grossman and Stiglitz (1980) notion that if investment managers are essentially informed investors, then their returns, adjusted for risk and expenses will be comparable to the returns achieved in an index fund due costly information. The evidence presented using a sample of Australian superannuation investment managers cannot reject the IAH model of equilibrium. With similar results, Ippolito (1989) deducts that the evidence is consistent with the notion that that expenses and charges affiliated with investment management are offset by superior results, a condition which characterises efficient markets in the presence of costly information. Following the critique of Elton et al (1993), this study has addressed the

major methodological flaws in previous studies, specifically relating to survivorship bias and the use of a multifactor conception of the CAPM.

The empirical analysis undertaken in Table II provides partial answers to the question of whether investment managers generate sufficient returns to offset expenses. There is no evidence over the observation period that, net of management fees, investment managers underperformed a passive asset selection strategy on a risk-adjusted basis. A further issue that requires analysis relates to the role of fees. An important issue to consider is whether a direct relationship exists between the management fee charged by investment managers and the resultant performance. Specifically, the question asked of the sample is whether funds that charge higher management fees earn sufficiently higher rates of return to cover such costs.

C. Management fees

The ongoing management fees of the funds investigated in this study are charged based on the value of fund units. Typically, the management fee is accrued daily and is payable quarterly in arrears (or upon the full withdrawal of the fund) by the redemption of units. The unconditional management fee of the sample is 0.74 per cent per annum and 0.76 per cent per annum on a conditional basis. A further defining feature of the sample of wholesale funds is that no entry or exit loads are levied by any of the managers. To test for a relationship between the management fee and fund returns, Table III sorts fund alphas into management expense ratio (MER) bands on an equal- and conditional-weighted basis.

Table III

Investment Manager Alphas, Sorted by Management Fee: January 1991 to April 1999

The monthly fund alphas are sorted into annual management fee bands and reported on a equal and conditional weighted basis. In a typical fund, ongoing management fees are charged on a sliding scale based on the value of units. Fees are accrued daily and are payable quarterly in arrears (or upon full withdrawal from the fund) by the redemption of units. All costs incurred in managing the assets of the fund are charged to the fund and are taken into account when calculating unit values. These costs include stamp duty and other statutory charges, brokerage, commission, taxes, costs associated with valuations and costs on the acquisition and disposal of assets, fees associated with the management and maintenance of assets and custodial fees.

Management Expense Ratio	EW Mean return	CW Mean return
MER < 0.6%	0.4957	0.2614
0.6% > MER < 0.7%	0.3645	0.2187
0.7% > MER < 0.8%	**-0.0619**	**-0.0467**
0.8% > MER < 0.9%	0.1283	0.1182
0.9% > MER	0.1155	0.1032

Table III provides evidence that suggests an inverse relationship exists between management fees and investment manager returns. Excluding the most populated band,

0.7% > MER < 0.8%, as it includes all the funds from the finalised cohort, estimated investment manager returns decline with higher expenses. This finding is inconsistent with the IAH suggestion of a positive relationship between manager returns and fees. Moreover, this finding aligns much more closely with the EMH notion that costs associated with research and trading are sunk.

D. Policy implications

The evidence presented in the analysis section raises a number of important normative issues for the trustees of superannuation funds. First, contrary to recent empirical studies, evidence is presented that the arbitrage function is incomplete, with the investment management industry covering expenses through active asset selection. This provides some support for trustees to engage wholesale managers with an active stock selection mandate on behalf of superannuation fund members.

Second, again contrary to recent studies, the Australian 'Wholesale Pooled Superannuation Trust Australian Equity – General' fund segment has a remarkably low attrition rate. Low fund mortality minimises the risk that trustees will formulate overly optimistic future return expectations. A question that needs to be addressed in future research is why the mortality rate in the wholesale segment is so low. One possible answer to this question is that, given the nature of Australian's superannuation arrangements, wholesale investment managers face a highly inelastic demand curve for their services.

Finally, on the issue of manager remuneration, trustees must be cognisant of the inverse relationship between management fees and returns presented in this paper. This study finds that active investment managers that have higher expense ratios, higher fees and higher turnover do not earn sufficiently higher rates of return to pay for these additional costs. The evidence presented in Table III raises a number of interesting (and potentially profitable) issues for future research relating to the quantification of an equilibrium point between the marginal cost and marginal benefit of active asset selection. The identification of such a point would assist trustees in striking a remuneration level for investment managers that maximises the efficiency in which retirement savings are converted into retirement incomes.

VI. Conclusion

This paper investigates the performance of Australian 'Wholesale Pooled Superannuation Trust Australian Equity – General' funds for the period January 1991 through April 1999. Evidence is provided that informed investors, in an efficient capital market with costly information, earn sufficient economic rents to compensate them for the cost of obtaining the information. Using a multifactor model on a sample free of survivorship bias, the study finds that the investment management industry earned a positive alpha using alternate market benchmarks, a finding consistent with the IAH.

To further investigate the controversial findings, the hypothesis was tested that investment managers that followed more active asset selection policies (as evinced by higher management expense ratios) generated sufficient economic rents to cover the higher expenses. Unlike the findings of Ippolito (1989), the results showed that an inverse relationship exists between management expenses and fund return, a finding consistent with the EMH.

The results reported in this paper have raised two interesting directions for future research in investment manager evaluation. First, further investigation is required into the reasons behind the low fund attrition rate in Australian wholesale funds. Second, an extension of these results to attempt to quantify the relationship between the marginal benefit and marginal cost of active asset selection is an immediate priority to assist the trustees of superannuation funds in the remuneration decision of investment managers.

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