INVESTMENT MANAGER CHARACTERISTICS, STRATEGY AND FUND PERFORMANCE

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DEDICATION

This dissertation is dedicated to my late mother, Kerry, and to my father Peter, in recognition of their generous love, support and encouragement throughout my life.

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SYNOPSIS

This dissertation presents five research essays evaluating the performance of managed funds in light of the investment strategy and manager characteristics exhibited by institutional investment companies. An analysis of investment performance with respect to a fund manager's strategy provides important information in determining whether performance objectives have been achieved. There are a number of different types of investment strategies managed funds may adopt. However, the primary dichotomy is on the basis of whether the portfolio manager implements either an active or index approach. Active managers attempt to outperform the market through the use of price-sensitive information, whereas a passive manager's objective is to replicate the returns and risk of a target benchmark index. The evaluation of investment manager characteristics is also evaluated. This is motivated on the basis that asset management entities place significant emphasis on both the articulation and differentiation of their investment style relative to competitors, and selling the strengths of their portfolio management skills (in terms of past performance) as well identifying the key individuals comprising their investment team and their unique attributes.

For active equity managers, the methods used in constructing portfolios and implementing the investment strategy include security selection, in terms of 'top-down' or 'bottom-up' strategies, value-biased, growth-biased or style-neutral strategies, and portfolios exhibiting market capitalisation biases (i.e. preferences to large or small-cap securities). In terms of active bond portfolio management, the most common strategies include duration management and yield curve positioning. Active managers' strategies are likely to extend beyond stock selection, in particular, where the fund manager adjusts the portfolio's composition in anticipation of favourably capitalising on future movements in the market. For index managers, replication of both the returns and risk of the underlying index may be achieved through either full-replication of constituent stocks comprising the index, or through non-replication techniques (stratified sampling and/or optimisation). Each essay provides a unique contribution to the literature with respect to the performance of active and index funds, as well as an analysis of funds that invest specifically in domestic equities, domestic fixed interest, and diversified funds that invest across the broad spectrum of asset classes.

The origins of the performance evaluation literature are ascribed to Cowles' (1933) pioneering work, and the literature has given increasing attention to the topic. However the most fundamental issue considered in almost all previous studies of managed fund performance is the extent to which actively managed portfolios have earned superior risk-adjusted excess returns for investors. The literature has overwhelmingly documented (with a small number of exceptions) that active funds have been unable to earn superior returns, either before or after expenses (e.g. Jensen (1968), Elton *et al.* (1993), Malkiel (1995), Gruber (1996)). While the international evidence is supported by the few Australian managed fund studies available, Australian research remains surprisingly scarce. This is perplexing considering the sheer size of the investment industry in Australia (around $A717 billion as at 30 June 2001) and the importance placed on the sector with respect to successive Federal Governments' retirement income policies. The objectives of this dissertation therefore involve an analysis of managed fund performance with respect to differences in investment strategies (i.e. active and index), as well as providing an analysis of funds invested in equities, bonds and diversified asset classes (or multi-sector portfolios).

The first essay evaluates the market timing and security selection capabilities of Australian pooled superannuation funds. These funds provide institutional investors with exposure to securities across many different asset classes, including domestic and international equities, domestic and international fixed interest, property and cash. Surprisingly, the specific analysis of multi-sector funds is scarce in the literature and limited to Brinson *et al.* (1986, 1991), Sinclair (1990), and Blake *et al.* (1999). This essay also evaluates performance for the three largest asset classes within diversified superannuation funds and their contribution to overall portfolio return. The importance of an accurately specified market portfolio proxy in the measurement of investment performance is demonstrated, where the essay employs performance benchmarks that account for the multi-sector investment decisions of active investment managers in a manner that is consistent with their unique investment strategy. This approach rectifies Sinclair's (1990) analysis resulting from benchmark misspecification. Consistent with the literature, the empirical results indicate that Australian pooled superannuation funds do not exhibit significantly positive security selection or market timing skill.

Given the evidence in the literature surrounding the inability of active funds to deliver superior returns to investors, lower cost index funds have become increasingly popular as an alternative investment strategy. Despite the significant growth in index funds since 1976, when the first index mutual fund was launched in the U.S., research on their performance is sparse in the U.S. and non-existent in Australia. The second essay provides an original analysis of the Australian index fund market, with specific analysis applicable to institutional Australian equity index funds offered by fund managers. While indexing is theoretically straightforward, in practice there exist potential difficulties in exactly matching the return of the underlying index. Therefore the magnitude of tracking error is likely to be of concern to investors. This essay documents the existence of significant tracking error for Australian index funds, where the magnitude of the difference between index fund returns and index returns averages between 7.4 and 22.3 basis points per month for funds operating at least five years. However, there is little evidence of bias in tracking error, implying that these funds neither systematically outperform or underperform their benchmark on a before cost basis. Further analysis documents that the magnitude of tracking error is related to fund cash flows, market volatility, transaction costs and index replication strategies used by passive investment managers.

The third essay presents evidence of the performance of U.S. mutual funds, where attention is given to both active and index mutual funds for which the applicable benchmark index is the S&P 500. This essay examines both the magnitude and variation of tracking error over time for S&P 500 index mutual funds. The essay documents seasonality in S&P 500 index mutual fund tracking error, where tracking error is significantly higher in the months of January and May, together with a seasonal trough in the quarters ending March-June-September-December. Statistical evidence indicates tracking error is both positively and significantly correlated with the dividend payments arising from constituent S&P 500 securities. In terms of a performance comparison between actively managed and index funds, active funds on average are found to significantly underperform passive benchmarks. On the other hand, S&P 500 index mutual funds earned higher risk-adjusted excess returns after expenses than large capitalisation-oriented active mutual funds in the period examined. These results suggest the S&P 500 is consistent with capital market efficiency, implying an absence of economic benefit accruing to the average investor utilising actively managed U.S. equity mutual funds.

The fourth essay presented in the dissertation examines the performance of Australian investment management organisations with direct reference to their specific characteristics and strategies employed. Using a unique information source, performance is evaluated for actively managed institutional balanced funds (or diversified asset class funds), Australian share funds and Australian bond funds. Performance is evaluated with respect to the investment strategy adopted, the experience and qualifications held by investment professionals, and the tenure of the key investment professionals. This essay also evaluates the performance of senior sector heads to determine the skills of individuals driving the investment process, even though these individuals may migrate to competitor organisations. The essay finds evidence that a significant number of active Australian equity managers earned superior risk-adjusted returns in the period, however active managers perform in line with market indices for balanced funds and Australian bond funds.

A number of manager characteristics are also found to predict risk-adjusted excess returns, systematic risk and investment expenses. Of particular note, performance of balanced funds is negatively related to the institution's age and the loyalty of non-senior investment staff. Performance is also found to be significantly higher for managers that predominantly operate their portfolios using a bottom-up, stock selection approach. Interestingly, the human capital of managers, measured as the years of tertiary education undertaken, does not explain risk-adjusted excess returns. Systematic risk is positively related to an institution's age and negatively related to both senior manager loyalty and the implementation of bottom-up portfolio management strategies. In terms of management expenses, fees are directly related to the Australian equities benchmark allocation, the years of tertiary education, the number of years service (loyalty) for non-senior investment professionals and the total years experience of senior money managers. This concluding essay also documents that changes in top management have significant performance effects. In the 12-month period after a change in fixed income director or chief investment officer, performance is significantly lower and significantly higher, respectively. There is no significant difference in performance where changes in top management occur for Australian equities. The years of service (loyalty) provided to asset management firms by equities directors is inversely related to risk-adjusted return.

The fifth and final essay examines the investment performance of active Australian bond funds and the impact of investor fund flows on portfolio returns. This essay represents a significant and original analysis in terms of its contribution to the literature, given the absence of Australian bond fund performance analytics and also the limited attention provided in the U.S. Both security selection and market timing performance is evaluated using both unconditional models and conditional performance evaluation techniques, which account for public information and the time-variation in risk. Overall, the results of this essay are consistent with the U.S. and international mutual fund evidence, where performance is found to be consistent with an efficient market. While actively managed institutional funds perform broadly in line with the index before expenses, the paper documents significant underperformance for actively managed retail bond funds after fees. The study also documents that retail fund flows negatively impact on market timing coefficients when flow is not accounted for in unconditional models.

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CERTIFICATION

This is to certify that to the best of my knowledge, the research reported in this dissertation is my own work and is original, except where duly acknowledged. This dissertation has not been submitted previously, either in entirety or substantially, for a higher degree or qualification at any other University or institute of higher learning.

David Robert Gallagher

16 January 2002

"The essence of performance evaluation is to measure the value of the services (if any) provided by the portfolio management industry. It is to investigate whether a fund manager helps enlarge the investment opportunity set faced by the investing public and, if so, to what extent the manager enlarges it. Put differently, if the manager provides a portfolio that is also achievable by the investing public, he offers no service; it is when the managed fund lies outside of the existing opportunity set faced by the public that the manager offers a genuine service."

Zhiwu Chen and Peter Knez, *Review of Financial Studies*, Vol. 9(2): p.512

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CHAPTER 1 – INTRODUCTION

1.1 Objectives of the Dissertation

This dissertation presents five research essays that revolve around a common theme – the evaluation of managed fund performance and therefore the ability of professional investment managers to achieve their investment objectives. The extent to which an appropriate assessment can be made concerning investment managers' performance is ultimately dependent on understanding a manager's mission statement that articulates their investment goals. Understanding an investment manager's strategy is therefore critical in portfolio performance measurement, specifically in terms of determining the appropriate benchmark index for performance comparison and, most importantly, being able to conclude whether the investment performance achieved is consistent with these objectives and strategies identified by the fund manager.

Each essay in this dissertation provides a unique study of investment performance issues and measurement across different asset class sectors offered to investors, predominantly in Australian and U.S. markets. The dissertation presents original research of fund performance with respect to the two competing investment strategies available to investors in the market – actively managed funds and index funds. Active management is concerned with the collection and synthesis of price-sensitive information in order to identify those securities that are either undervalued (buy or overweight relative to the benchmark) or overvalued (sell or underweight relative to the market index). Passive or index portfolio management offers investors both the returns and risks that are commensurate with the underlying benchmark.

The principal objective of this dissertation is to extend the performance evaluation literature. This is achieved through the consideration of other types of funds in terms of asset class exposure (i.e. diversified or multi-sector funds), evaluating performance with respect to the investment strategy adopted (active and index portfolio management), and investigating the extent to which fund manager characteristics/attributes and their specific portfolio management strategies relate to performance.

1.2 Motivation of the Dissertation

There exist a number of motivating reasons why a study concerning managed funds and their performance is important. The first and most obvious reason is the sheer size of the industry, valued in excess of $A717 billion as at 30 June 2001. In addition, the Commonwealth Government's emphasis on superannuation as the primary vehicle for increasing national savings has also ensured the investment industry and its performance has become closely scrutinised. Both employees and retirees (self-funded) have a direct interest in the performance of investment markets, as superannuation and personal savings have become the critical means for the provision of future goods and services. The Federal Government has also highlighted the significance of superannuation policy with two important inquiries in the 1990s, namely the Fitzgerald (1993) report on national savings and the Wallis (1997) report concerning Australia's financial system. The regulation of investment providers and the supervision of superannuation funds are also instances of how important the Australian investment industry has become.

Thirdly, there exists a lack of empirical investigation in Australia concerning the performance of managed funds. While the literature investigating U.S. mutual fund performance is extensive, evaluation of managed funds in Australia is significantly under-researched. Specifically, Australian research is limited to Bird, Chin and McCrae (1983), Robson (1986), Sinclair (1990), Hallahan (1999), Hallahan and Faff (1999), Sawicki (2000), Sawicki and Ong (2000), Holmes and Faff (2000), Gallagher (2001) and Hallahan and Faff (2001).

This dissertation also attempts to provide insight into the performance of different types of managed funds, both in terms of the portfolio management strategy adopted by investment managers as well as considering funds that invest in a diversity of financial securities.

In summary, an analysis of managed fund performance in Australia is of critical importance to investors, practitioners, academics and regulators in terms of providing a better understanding of the financial services industry, an analysis of the performance of investment providers as well as identifying the factors that explain performance outcomes.

1.3 The Importance of Investment Strategy in Performance Evaluation

The investment strategy adopted by managed funds is of critical importance in understanding (a) how portfolio performance should be measured, (b) the sources of investment performance and (c) the factors that differentiate performance between managed investment vehicles on the basis of qualitative and quantitative criteria. Assessments of investment manager performance by investors can only be made once a managed fund's investment objectives are clearly defined. This includes disclosure of the nature of securities that represents the investible universe available to investment managers and the investment process that will be implemented. Therefore, investors must identify the appropriate benchmark index that is applicable to the specific investment strategy being adopted. In the case of diversified or multi-sector funds, this will also include information on the asset-mix of funds.

Investment strategy is equally important to users of index funds, active funds and enhanced index funds. For index investors, investment manager strategy includes specification of the target benchmark index as well as the replication strategy to be adopted. For active investors, fund managers exhibit different beliefs concerning the way capital markets operate and how market inefficiencies can be exploited to deliver active returns to unit holders. These include an investment manager biasing the portfolio toward companies on the basis of valuation, growth and market capitalisation (i.e. large versus small stocks). In addition, the strategy is executed by individual investment professionals with varying levels of industry experience, loyalty (or tenure), degree qualifications (or education) and incentive structures (i.e. remuneration policies). The extent to which investment manager performance can be differentiated with respect to the investment strategies adopted, particularly in the Australian market, represents a gap in the literature.

1.4 Structure and Contents of the Dissertation

This dissertation proceeds as follows. Chapter 2 provides an extensive institutional details section surveying the Australian investment management market. This is important as the dissertation provides a unique synthesis concerning the Australian institutional structure, identification of the major participants, detailed information defining the types of managed funds available, and the different investment strategies undertaken by portfolio managers. This section also documents specific Australian investment manager characteristics, including the general operational structure of the funds management organisation, investment strategies implemented across various asset classes, the types of professional personnel employed (degrees, experience and loyalty), expenses charged and compensation arrangements offered. The chapter also documents merger and acquisition activity that has occurred in the Australian investment management industry between 1988 and 2001.

Chapter 3 of the dissertation provides a broad literature review of the published research in the mutual funds field. The goal of this chapter is to provide an overview of how the literature has evolved, the key findings with respect to mutual fund performance published in the literature, and the likely direction of research into the future. The literature specifically relating to the key empirical chapters in the dissertation (i.e. Chapters 4-8) are discussed within each relevant chapter.

The main body of the dissertation is contained in Chapters 4 to 8. The dissertation presents five essays evaluating the performance of managed funds with direct consideration of the investment strategies adopted by fund managers. While there are numerous studies that cover international markets in the performance evaluation area, little empirical work has been undertaken in Australia evaluating active funds and research is non-existent (in Australia) in the evaluation of passively managed investment offerings. The research also provides a significant contribution to the understanding of whether information asymmetries exist in the Australian market as well empirically testing the extent to which specific manager characteristics can predict investment performance. As such, this dissertation considers both actively managed funds, which attempt to outperform appropriate benchmark indices, as well as the ability of passive funds to replicate the returns and risk of the underlying benchmark index.

The first essay (Chapter 4) presented in this dissertation provides an analysis of actively managed, institutional pooled superannuation funds in Australia. Pooled superannuation funds are among the largest unitised investment products (in terms of asset size) offered by investment managers. These funds are also more complex for fund managers to administer as they are diversified across multiple asset classes, including domestic and international equities, domestic and international fixed interest, property and cash. This essay extends the literature in two ways. First, the analysis highlights the importance of using a correctly specified benchmark proxy where funds invest across multiple asset classes. Notably, Sinclair (1990) evaluated the performance of pooled superannuation funds against a benchmark that did not account for asset class exposure beyond the Australian equities sector. Sinclair (1990) found that pooled superannuation funds exhibited superior security selection ability coupled with perverse market timing, however, performance measurement, which is consistent with each fund's unique strategic benchmark, shows that security selection and market timing ability are indeed insignificant. Second, the study uses a unique data set of fund asset allocations relative to strategic benchmark weights. This detailed level of information provides insight into the tactical investment strategies that fund managers have adopted in their pursuit of active returns. Both arithmetic and geometric performance methodologies are used in the attribution of performance into market timing and security selection components. Overall, the results indicate that pooled superannuation fund managers do not exhibit superior portfolio management skill.

The second essay (Chapter 5) examines the performance of institutional Australian equity index fund managers seeking to replicate the ASX All Ordinaries Accumulation Index. The essay provides an examination of the magnitude of performance differentials between fund managers' returns and the underlying index (tracking error), and the potential drivers of tracking error in performance. Prior work is non-existent in the Australian market and very little empirical work evaluating index funds has been undertaken internationally. The most likely reasons for this absence are attributable to the relative infancy of the index fund market coupled with the increasing dissatisfaction of investors utilising active investment managers (i.e. investors having become aware that the majority of active managers/funds have been unable to outperform an appropriate market benchmark after expenses). While the implementation of an index strategy is theoretically straightforward, the existence of market frictions faced by passive managers, who are subsequently measured against an index that cannot be replicated perfectly, will cause tracking error in performance. While Australian equity index fund managers are shown to perform in line with their investment objectives over the long-run, that is the achievement of index performance before management expenses, this dissertation highlights three significant factors which cause managers index-mimicking difficulties. The essay represents an original and significant contribution to the performance evaluation literature, and this essay provides the first empirical evidence evaluating index fund manager ability and their attempts to deliver index performance to investors.

The third essay (Chapter 6) evaluates the performance of index mutual funds in the United States, benchmarked to the S&P 500 index. Little empirical work exists with respect to U.S. index mutual funds. This essay is similar in theoretical terms to the second essay (Chapter 5), however there are notable extensions to the Australian-oriented analysis. The focus of the essay concerns the documentation of tracking error magnitude, an analysis of the variation in tracking error over time as well as providing a direct performance comparison against large-capitalisation oriented active mutual funds. The securities comprising the S&P 500 are highly liquid and the magnitude of tracking error exhibited by S&P 500 index mutual fund managers is significantly smaller on average compared with

Australian index managers benchmarked to the ASX All Ordinaries Accumulation Index. The essay finds that despite the existence of tracking error in index mutual fund performance, index funds' performance objectives are not compromised. The essay also finds a seasonal pattern in tracking error magnitude over calendar months. Tracking error is significantly higher in the months of January and May and lowest in June. The existence of a strong quarterly pattern (trough) is also evident, suggesting S&P 500 index mutual funds experience improved replication ability in the months of March, June, September and December. The empirical results indicate that a delay in the receipt of dividends by index funds is one explanation for the seasonality phenomenon. The performance comparison between active mutual and index mutual funds indicates active funds, on average, significantly under-perform passive benchmarks. S&P 500 index mutual funds earned higher risk-adjusted excess returns after expenses than large capitalisation-oriented active mutual funds in the period examined.

The fourth essay (Chapter 7) presented in this dissertation examines the performance of Australian investment managers with respect to their characteristics and investment strategies. In particular, the performance of active Australian investment managers in Australian equities, Australian bonds and diversified (or multi-sector) funds at the institutional level are considered. The extent to which the investment performance of managed funds is related to investment manager attributes or characteristics is a largely unknown empirical issue. This is despite the significant attention given to individual investment management organisations and their specific investment products offered by market regulators, the media, institutional and retail investors, institutional asset consultants and fund ratings agencies. While academic research has largely concentrated on the measurement of portfolio performance and more recently the performance persistence phenomenon, research is sparse in evaluating fund performance with respect to the investment strategy and the specific attributes that differentiate the returns achieved by fund managers. Specifically, the essay examines the predictability of risk-adjusted returns, systematic risk and management expenses on the basis of investment managers' characteristics, including the experience and loyalty of investment personnel, educational qualifications, and the effect of top management turnover on portfolio performance.

The final essay in this dissertation (Chapter 8) provides an empirical examination of the performance of actively managed Australian bond funds in both the institutional and retail fund spheres. This empirical study is the first study to evaluate the domestic fixed income sector and also represents an original study in the context of the international literature in the application of conditional performance evaluation techniques to active bond funds. The conditional models represent an attractive alternative to unconditional approaches, as they are better able to account for the time-variation in fund risks as well as the ability to control for publicly available information accessible to active investment managers. The study also considers the effect of investor flows on the investment manager's ability to earn returns superior to the benchmark. Edelen (1999) argues that active managers are required to engage in a material volume of uninformed, liquidity-motivated trading, and as a result, performance models should account for the adverse effects of the liquidity function provided to investors. Therefore, failure to account for exogenous fund flow shocks experienced by portfolio managers may adversely impact on market timing estimates. Consequently, improved understanding of these factors enhances performance inferences concerning active bond fund managers in Australia.

The dissertation concludes with the key findings presented in Chapter 9 as well as suggestions for future research.

1.5 Publications Arising From This Dissertation

A number of publications in internationally refereed journals (either published or accepted for publication) have subsequently arisen as a consequence of the research undertaken while a doctoral candidate at The University of Sydney. These include publications and acceptances for future publication as follows:

- "Attribution of Investment Performance: An Analysis of Australian Pooled Superannuation Funds, *Accounting and Finance*, Vol. 41(1&2): pp41-62;

- "Is Index Performance Achievable?: An Analysis of Australian Equity Index Funds", *Abacus*, Forthcoming;

- "Tracking S&P 500 Index Funds", *Journal of Portfolio Management*, Vol. 28(1): pp44-55;

These publications comprise empirical research that is presented in Chapters 4, 5 and 6 respectively. These latter two chapters were subsequently published with Professor Alex Frino as a co-author. The work comprising this dissertation is both original and a significant product of my own effort.

1.6 Summary

The research essays presented in this dissertation provide an analysis of investment performance for managed funds with active and passive investment strategies, as well as funds which invest in a variety of sector-specific securities and those that invest across the broad asset-class mix such as listed shares, fixed interest, property and cash. Analysis is also performed in evaluating the performance of fund manager with reference to the unique characteristics or attributes exhibited by institutional asset management firms. In summary, this chapter articulated the objectives of the dissertation, outlined the motivation that supports an analysis of managed fund performance, and provided an overview of the dissertation's structure and content.

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CHAPTER 2 – INSTITUTIONAL DETAILS

2.1 The Australian Investment Market

The Australian funds management market is a significant industry in terms of its size and importance in encouraging national savings as a vehicle to promoting economic growth. The Reserve Bank of Australia at the turn of the millennium reported the gross national savings rate of Australia at approximately 21 percent of Gross Domestic Product (GDP). However, even more significant are national savings accumulated through the compulsory superannuation system. Superannuation assets have increased by more than 15 percent per annum since 1985, and currently exceed 70 percent of GDP. The investment industry is a significant component of the national financial system and includes numerous participants such as government, regulatory bodies, bank and non-bank financial institutions, corporations, professional bodies, investment advisory firms, investment management and corporate finance firms and the main users of investment services – wholesale and retail investors.

Australia's financial system and national savings policy in the 1990s was further developed through the Commonwealth Government's commissioning of two significant inquiries: the national savings inquiry of Fitzgerald (1993) and the Wallis (1997) inquiry into Australia's financial system.[1] The Wallis Report (1997) represented the first significant review since the initial financial system inquiry by the Campbell Committee

[1] V. W. Fitzgerald (1993), National Saving: A Report to the Treasurer, Australian Government Publishing Service, Canberra.

(1981) that recommended deregulation of the financial system.[2] Indeed, the Commonwealth Government's principal regulatory emphasis to date has been through Superannuation legislation and the development of a retirement income system promoting self-provision. In addition to superannuation, the household sector has also demonstrated an increasing interest in alternative investment options beyond the traditional retail banking products, including the participation in the equity market through large public floats. As a result Australia now exhibits the highest percentage ownership of shares in any OECD economy. Further, on-line stockbrokers have also grown significantly through private investors' interest and activity in on-line share trading. On-line brokers have also diversified their product offerings, including the availability of managed funds to their on-line clients. Both government policy and increasing private investor awareness of the importance of savings and investment will continue to ensure the investment industry grows rapidly.

In terms of the size of the investment market in Australia, Rainmaker Information estimated the industry to be valued at \$A717.4 billion as at 30 June 2001. Of particular note is the significant increase of assets invested over the last five years, where the industry's size has grown by \$A369 billion, or a two-fold increase in only half a decade.

[2] The Martin Review Group (1984) also provided a report to the Commonwealth Government examining further the Australian financial system and a review of the recommendations of the Campbell Committee.

Table 2.1 documents the market share statistics and funds under management for the largest 30 investment managers in Australia. The data show that the Australian investment industry is highly concentrated. The largest institutional investor alone, AMP Henderson Global Investors accounts for almost 10 percent of the entire Australian funds management industry. In addition, the four largest investment managers represent more than one-quarter of the market and the majority of Australian sourced funds under management are comprised of only the 10 largest investment entities. Rainmaker Information, in a recent survey of superannuation funds, identified 150 individual fund managers providing investment services, which clearly indicates that less than 10 percent of investment providers control more than half of the industry's assets. The concentration of the market has only increased over the past few years, as a result of mergers and acquisitions in the industry.

The Australian investment industry's assets are comprised of both institutional and retail market segments. While the total size of the industry is around $A717 billion, the majority of funds are sourced from institutional clients, where total assets are $A462 billion (or 64 percent of the total industry). Figure 2.1 and Figure 2.2 presents statistics showing the assets managed by the largest 20 investment managers servicing the institutional and retail market as at 30 June 2001.

Table 2.1 – Top 30 Australian Investment Managers by Assets Managed and Market Share Statistics as at 30 June 2001

Australian-based Investment Manager	Overall Rank	Assets Managed* $A Billion	Market Share %
AMP Henderson Global Investors	1	70.48	9.82
MLC Investment Management	2	51.40	7.16
Colonial First State Investment Managers	3	46.53	6.49
Deutsche Asset Management (Australia) Limited	4	36.54	5.09
BT Funds Management Limited	5	31.58	4.40
State Street Global Advisors Australia	6	30.83	4.30
Macquarie Investment Management	7	30.72	4.28
Commonwealth Investment Management	8	30.14	4.20
ING Investment Management Limited	9	30.00	4.18
Queensland Investment Corporation	10	27.80	3.88
Westpac Financial Services	11	22.66	3.16
Alliance Capital Management Australia Limited	12	22.60	3.15
Credit Suisse Asset Management (Australia) Limited	13	21.11	2.94
ANZ Investments	14	16.48	2.30
Merrill Lynch Investment Managers Limited	15	15.94	2.22
Perpetual Investments	16	15.63	2.18
Barclays Global Investors Australia Ltd	17	14.92	2.08
Maple-Brown Abbott Limited	18	14.55	2.03
INVESCO Asset Management Australia Limited	19	13.51	1.88
Vanguard Investments Australia Limited	20	12.66	1.77
Lend Lease Real Estate Investments	21	11.00	1.53
UBS Asset Management (Australia) Ltd	22	10.42	1.45
Rothschild Australia Asset Management Limited	23	10.08	1.41
NRMA Investment Management Pty Limited	24	9.86	1.37
Portfolio Partners Limited	25	9.46	1.32
Zurich Scudder Investments Australia Limited	26	8.86	1.23
Suncorp-Metway Investment Management Limited	27	7.21	1.01
Lazard Asset Management Pacific Co.	28	7.00	0.98
Fidelity Investments Australia Limited	29	5.92	0.83
Aberdeen Asset Management	30	5.49	0.76
Other Investment Managers	-	76.04	10.60
TOTAL	-	717.41	100.00

*Australian sourced funds under management
Source: Rainmaker Information

Figure 2.1 – Twenty Largest Australian Institutional Investment Managers at 30 June 2001 ($A Billion)

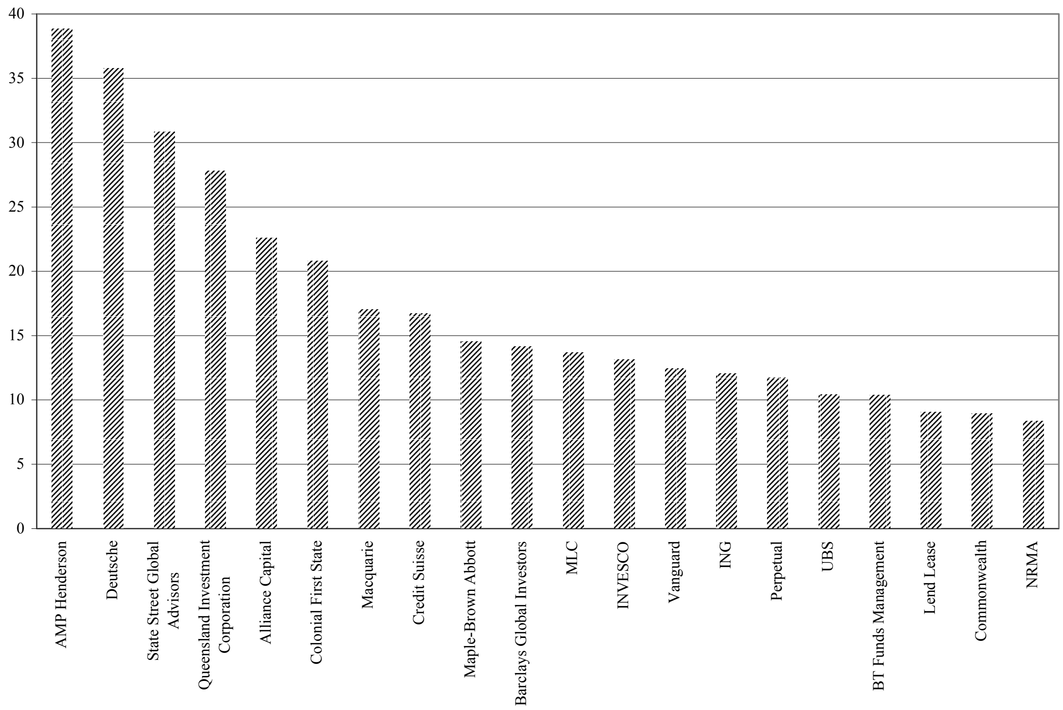
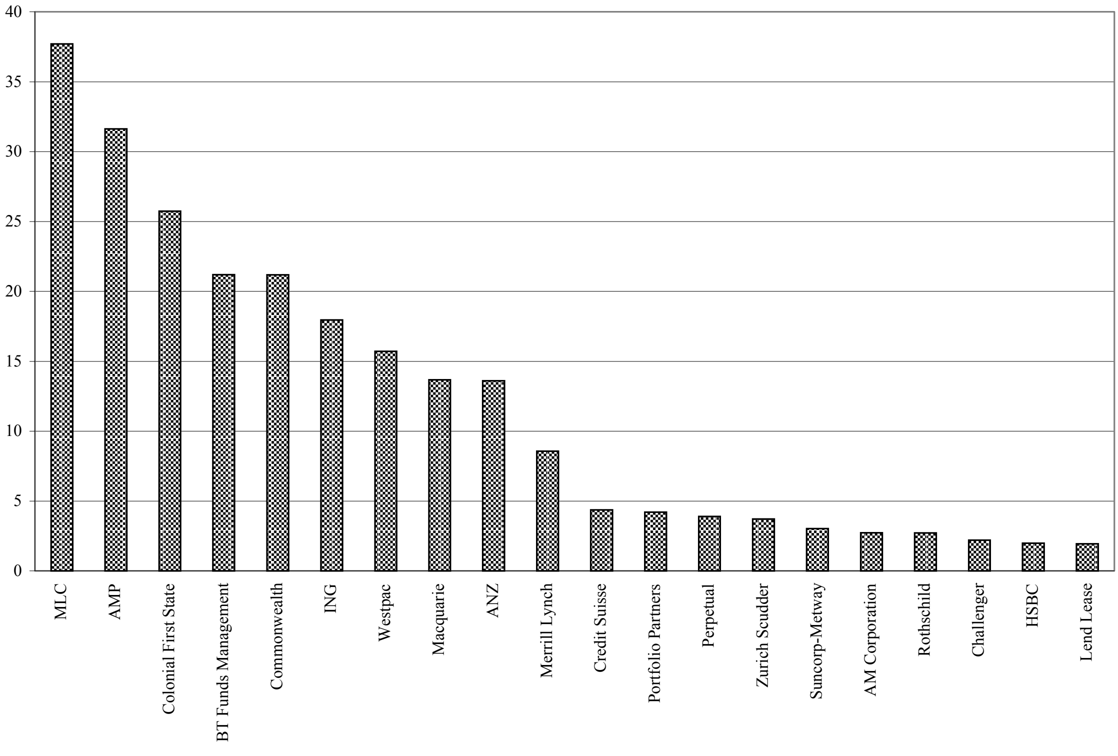


Figure 2.2 – Twenty Largest Australian Retail Investment Managers at 30 June 2001 ($A Billion)



Source: Rainmaker Information

2.2 Defining Asset Classes and Benchmark Indices

An asset class represents a group of financial assets. In theory there are numerous asset classes that may exist, however in investment markets, asset classes are typically defined in broad terms on the basis that the securities comprising the asset class have some degree of commonality in terms of their characteristics. In the Australian investment markets, the six largest and easily identifiable asset classes are Australian Equities, International Equities, Australian Bonds, International Bonds, Property and Cash.

Table 2.2 documents the size of the major asset classes that comprise the Australian investment industry.

Table 2.2 – Size of Australian Asset Class Sectors Managed by Investment Managers at 30 June 2001

Asset Class	$A Billion	Percentage (%)
Panel A: Growth Asset Classes		
Australian Equities	211.16	29.43
International Equities	140.22	19.55
Property	77.51	10.80
Panel B: Defensive Asset Classes		
Australian Bonds	123.81	17.26
International Bonds	28.54	3.98
Cash	85.37	11.90
Panel C: Other Assets		
Other Investments[3]	50.78	7.08
TOTAL	717.41	100.0

Source: Rainmaker Information

[3] Other assets include capital guaranteed assets, tactical asset allocation assets, life insurance policies and infrastructure investments.

The table shows that Australian investors have the highest exposure to domestic and international equities asset classes, with domestic bonds representing the third largest asset class in the market. The category 'other investments' identified in Table 2.2 includes private equity or venture capital, tactical asset allocation investments and infrastructure-type investments.

Asset classes may be dichotomised into two broad categories – growth assets or defensive assets, and this classification is ultimately defined in terms of the asset class' *ex-ante* returns and volatility. Given the centrality of modern portfolio theory, the mean-variance framework identifies that investors are ultimately concerned about *ex-ante* returns and volatility trade-offs. According to industry classifications of asset classes, growth assets are generally defined as including equity and property investments, where returns derived from such investments comprise income and changes in capital value. Defensive assets on the other hand are generally defined as investments in bonds (government and corporates) and highly liquid securities yielding delivering income returns. Defensive asset classes exhibit a degree of stability in the underlying value of an investor's initial investment. That is, highly liquid money market securities and bonds derive interest income from the underlying capital value, where the capital value remains of a fixed value. In the case of bonds held to maturity, the principal component or initial investment is redeemable at maturity. Debt instruments provide the investor with a legal claim to repayment of the principal value at a future date.

In addition, growth and defensive asset classes may be distinguished in terms of their historical returns, *ex-post* volatility and the level of asset class correlation existing between sectors. Table 2.3 presents the returns, volatilities and correlations between asset classes using data provided by William M. Mercer Pty. Ltd. All asset class returns are defined as holding period returns and account for changes in capital values and reinvestment of income. The asset class proxies used rely on the standard industry benchmarks widely referenced in the investment management industry and are presented in Table 2.4. While future returns and the volatility of asset classes are unknown, historical data provides investors with some degree of insight into the level of returns derived and the risks associated with each of the asset classes.[4] Considering historical data assists investors in being able to forecast what are the likely scenarios that may exist into the future.

Table 2.3 – Historical Annual Returns, Volatility and Correlations: 13-Year Period January 1988 – December 2000

			Correlation (%)						
Asset Class	**Return (% pa)***	**SD (% pa)**	**AEQ**	**IEQ**	**DP**	**LP**	**AFI**	**OFIH**	**Cash**
AEQ	11.6	13.8	100.0	33.8	0.2	52.2	34.8	17.1	0.1
IEQ	12.8	15.1	-	100.0	-3.9	27.8	17.6	31.1	-3.1
DP	5.8	4.6	-	-	100.0	-1.1	-12.6	-10.0	15.5
LP	11.6	10.1	-	-	-	100.0	41.8	28.0	-0.7
AFI	11.5	4.9	-	-	-	-	100.0	58.6	26.0
OFIH	11.3	3.3	-	-	-	-	-	100.0	27.2
Cash	8.4	1.1	-	-	-	-	-	-	100.0
CPI	3.3	2.2	-	-	-	-	-	-	-
AWE	3.9	2.5	-	-	-	-	-	-	-

* All asset class returns are measured in Australian dollar terms and account for the total return accrued (i.e. capital changes and dividend/income reinvestment.)

Table 2.3 reveals that international equities recorded both highest return and standard deviation in the 13-year period than any other asset class sector. As expected, growth asset classes exhibit higher standard deviations (or risk) than is the case for defensive asset classes. However the problems of evaluating returns and risk over static

[4] For this reason the evaluation period does not include data from 1987, as the October equity market crash would potentially distort the analysis.

periods is two-fold. First, such an approach does not provide for the analysis of returns and risks over different periods of time. The second disadvantage is that all observations are treated equally and therefore there is no scaling effect that applies greater weights to the most recent data. To better understand the relative returns and risks over varying time periods within the 13-year period evaluated, Figures 2.4 and 2.5 show the 5-year rolling returns and standard deviations for each of the major asset classes.

Table 2.4 identifies the benchmark indices used as proxies in the measurement of total returns (capital changes and income reinvestment) and the risks of asset classes. These indices are widely referenced within the Australian investment industry as broad, representative measures of the performance of a portfolio of securities available to investors in the market. Benchmark indices are defined as a statistical measure that enables changes in the value of a group of securities comprising a particular asset class to be calculated. Benchmark indices therefore allow market participants to measure the returns and risks of a portfolio of securities to serve as a yardstick or reference point when comparing alternative portfolios.

Table 2.4 – Benchmark Indices Employed as Asset Class Proxies

Asset Class	Code	Benchmark Index
Australian Equities	AEQ	S&P/ASX 200 Accumulation Index*
International Equities	IEQ	MSCI World (ex-Australia) Index in $A (net dividends re-invested)
Direct Property	DP	William M. Mercer Direct Property Index
Listed Property	LP	S&P/ASX Listed Property Accumulation Index
Australian Bonds	AFI	UBS Warburg Composite All Maturities Bond Index
Overseas Bonds	OFIH	Salomon Smith Barney World Government Bond Index Hedged in $A
Cash	Cash	UBS Warburg Bank Bill Index
Inflation	CPI	ABS Consumer Price Index
Average Weekly Earnings	AWE	ABS Average Weekly Earnings (All Males)

*ASX All Ordinaries Accumulation Index was used prior to March 2000. The difference in market capitalisation coverage between the S&P/ASX 300 and the S&P/ASX 200 is less than 3 percent.

Figure 2.3 – Five-Year Rolling Annual Returns (% per annum)

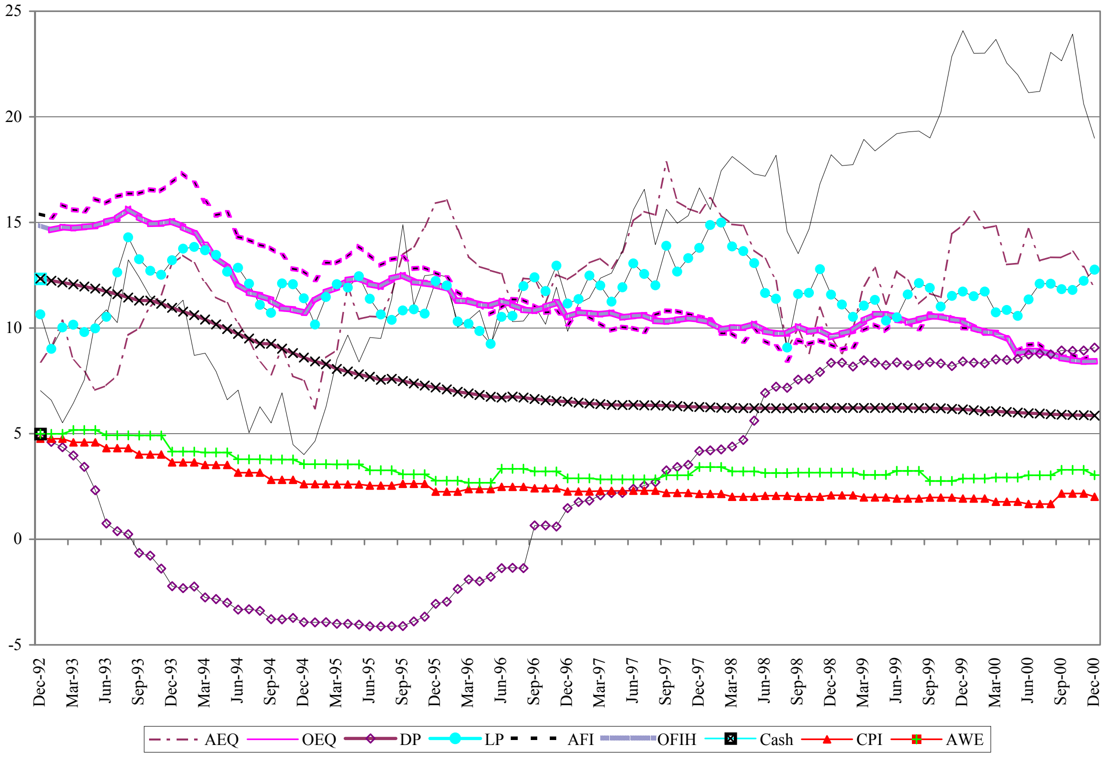
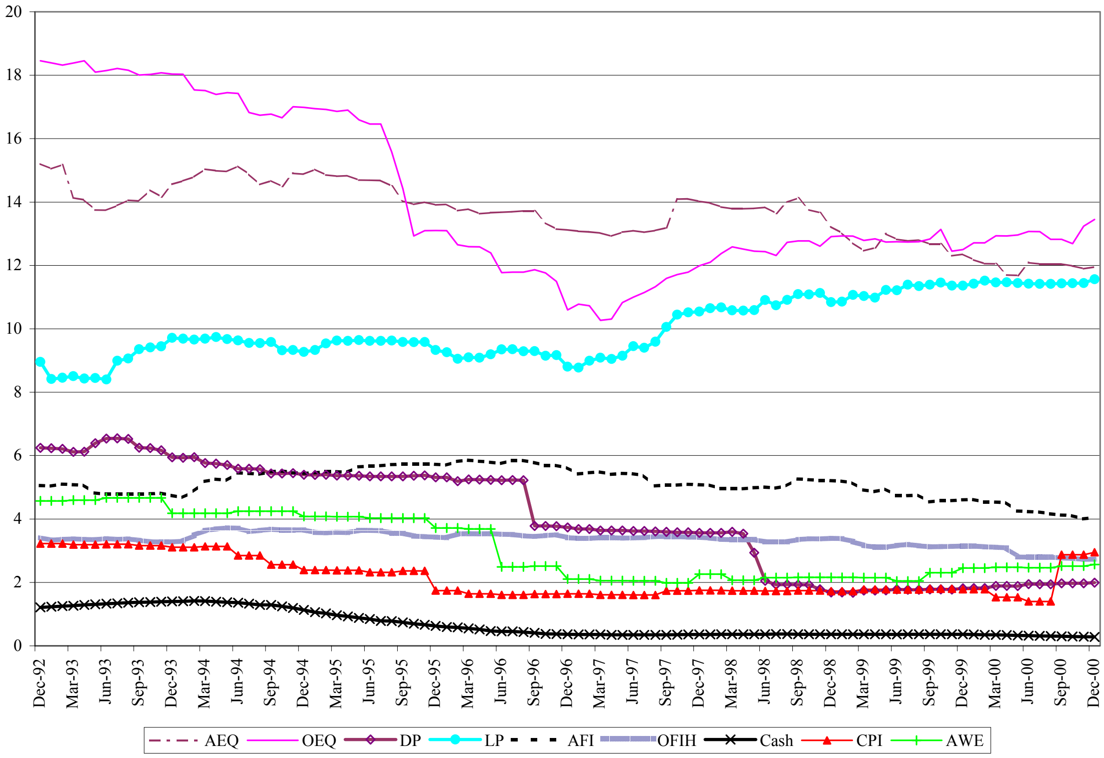


Figure 2.4 – Five-Year Rolling Annual Standard Deviations (% per annum)



The vast majority of benchmark indices across global markets are market-capitalisation weighted – where in the case of equity securities for example, larger companies exhibit a higher weighting within the index relative to smaller firms. Market-capitalisation-weighted indices have two distinct differences compared with an index calculated as an average, such as the Dow Jones Industrial Average. First, larger securities should have a higher emphasis within an index by the very nature of their size. Second, market-capitalisation-weighted indices ensure greater ease in replicability, where changes in the price of securities in the index do not require continual re-balancing.

The provision of index-related services within the investment industry is performed by many organisations and across various asset class sectors. Index providers allow participants to be able to objectively compare the performance of managed portfolios against a yardstick that is representative of a market-wide portfolio of securities. Table 2.5 documents the main providers of index-related services to the Australian investment industry.

Table 2.5 – The Major Providers of Index-Related Services to the Australian Investment Industry

Asset Class	Index Provider
Australian Shares	Standard & Poor's / Australian Stock Exchange
Australian Shares	Salomon Smith Barney
International Shares	Morgan Stanley Capital International
International Shares	IFC
International Shares	Standard & Poor's
Direct Property	Towers Perrin
Direct Property	William M. Mercer
Direct Property	InTech
Listed Property	Standard & Poor's / Australian Stock Exchange
Australian Bonds	UBS Warburg
Australian Bonds	Australian Debt
International Bonds	Salomon Smith Barney
International Bonds	Lehman
Cash	UBS Warburg

The necessary characteristics in the construction of indices are that they are replicable. That is, the indices require transparency and objectivity in terms of how they are constructed and the rules governing their operation. In addition, the securities comprising the index must have sufficient liquidity. The success of an index will therefore depend on the ease with which the index could be mirrored through the physical holdings of stocks in a portfolio. If there exist great difficulties in replicating an index, an investor may deem the index to be inappropriate as a useful yardstick for comparison to other investment portfolios. The major asset classes are described in the sections below.

2.2.1 Australian Shares

Australian equity investments typically refer to the ownership of shares in publicly listed companies on the Australian Stock Exchange (ASX). Prior to 3 April 2000, the ASX All Ordinaries Index was the broad measure of equity performance, and included between 229 and 330 companies on the basis of their market capitalisation size and the achievement of specific liquidity criteria. The ASX and Standard and Poor's have restructured the equity indices post April 2000, where the S&P/ASX 200 and S&P/ASX 300 have become the most widely tracked market indicators of equity performance. In terms of the S&P/ASX 300, 300 companies are included and these are classified into one of 24 sectors listed on the ASX. Table 2.6 and Table 2.7 show the summary statistics of the composition of the Australian S&P/ASX 300 Index in terms of market capitalisation as at 31 January 2001.

The Australian S&P/ASX 300 Index is highly concentrated across large capitalisation securities. The largest 20 securities comprising the index account for more than 60 percent of the benchmark. In addition, industrial stocks also dominate the composition of the index, representing 86.9 percent of the benchmark by market capitalisation. The banking and finance sector is the largest component of the Index, followed by Media and Telecommunications.

Table 2.6 – S&P/ASX 300 Structure at 31 January 2001

S&P/ASX 300 Index Composition	Benchmark Weight (%)
Top 20 Securities	65.2
Next 30 Securities	17.1
Next 50 Securities	9.7
Top 100 Securities	92.0
Top 200 Securities	98.4
Remaining Small-Cap Securities	1.6
All Industrials Securities	86.9
All Resources Securities	13.2
Total	100.0

Source: Australian Stock Exchange and SIRCA

Commencing 3 April 2000, the Standard & Poor's (S&P) Company restructured the ASX's 'old' suite of indices, re-defining the new All Ordinaries Index to account for 500 securities.[5] In a survey of investment manager intentions conducted by William M. Mercer Pty Limited prior to the ASX indices change, the vast majority of active and index managers elected to benchmark their Australian share portfolios to either the S&P / ASX 200 or S&P/ASX 300 indices rather than the 'new' S&P / ASX All Ordinaries Index. The main reason for the fund manager retreat from the 'new' All Ordinaries Index included the relatively lower liquidity of the stocks ranked outside the largest 200 (and therefore the higher transaction costs) and the relatively small increase in market capitalisation to be gained as a result of investing outside the largest 300 stocks. The S&P / ASX 200 was

[5] The 'old' ASX All Ordinaries Index required companies to have a market capitalisation of at least $A130 million. The 'new; S&P / ASX All Ordinaries Index is now much broader and includes 500 companies, where the minimum market capitalisation at 3 April 2000 was $A20 million. The 'new' All Ordinaries now accounts for a further 5 percent market capitalisation of all listed companies on the ASX, where the new index accounts for 97 percent of the market.

further confirmed to be the unofficial successor to the 'old' All Ordinaries Index when the Sydney Futures Exchange (SFE) announced the new Share Price Index (SPI) futures contract would be based on the S&P / ASX 200.

Table 2.7 – S&P/ASX 300 by Industry Classification at 31 January 2001

S&P/ASX 300 Index Composition	Benchmark Weight (%)
Panel A: All Resources	
Diversified Resources	8.9
Energy	2.6
Gold	0.8
Other Metals	0.9
All Resources Total	**13.2**
Panel B: All Industrials	
Alcohol & Tobacco	2.0
Banks	23.9
Building Materials	1.3
Chemicals	0.3
Developers & Contractors	2.6
Diversified Industrials	2.4
Engineering	0.1
Food & Household Goods	1.3
Healthcare & Biotechnology	2.9
Infrastructure & Utilities	1.7
Insurance	5.5
Investment & Financial Services	2.4
Media	13.8
Miscellaneous Industrials	1.9
Paper & Packaging	0.9
Property Trusts	5.6
Retail	3.6
Telecommunications	10.3
Tourism & Leisure	1.7
Transport	2.7
All Industrials Total	**86.9**

Source: Australian Stock Exchange and SIRCA

Later in the year 2001, S&P will re-classify the ASX industry classifications system in a way that ensures it is consistent with the Global Industry Classification System (GICS) developed jointly by S&P and Morgan Stanley Capital International (MSCI). Companies comprising the S&P / ASX 200 Index are now classified using the GICS system and comprise 12 sectors - S&P/ASX 200 Energy, Materials, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Financials, Information Technology, Telecommunication Services, Utilities, Financials (ex-Property Trusts) and Property Trusts. The final two sectors listed differ from the standard GICS to more accurately reflect the Australian market's significantly large property trust market.

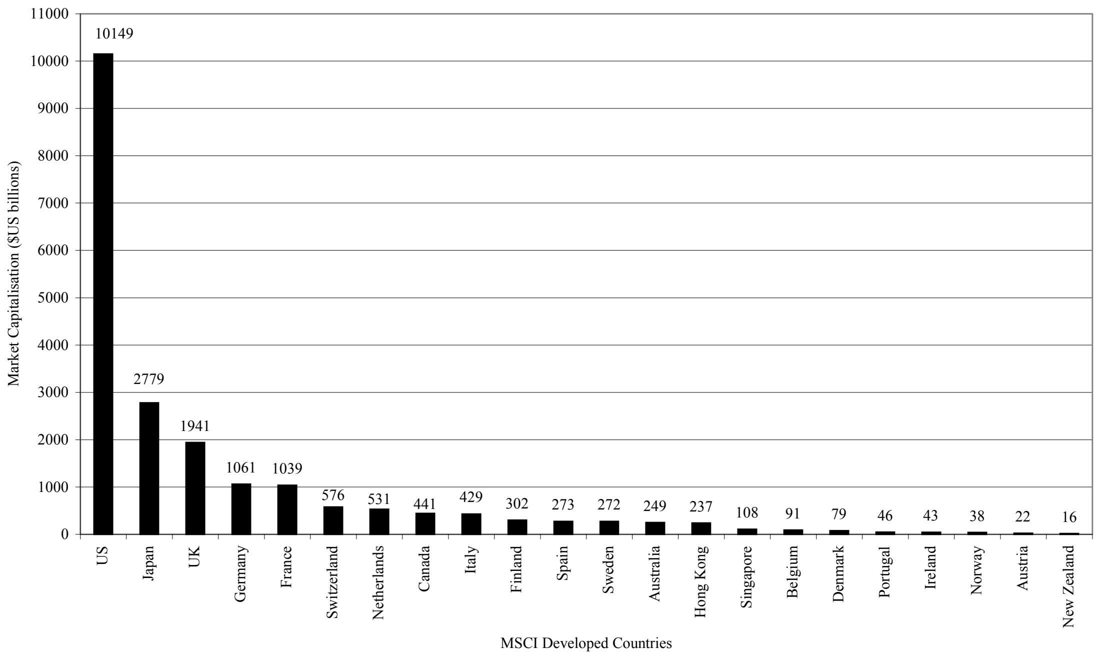
2.2.2 International Shares

Australia's capital market is very small in comparison to other industrialised economies. In terms of Morgan Stanley Capital International (MSCI) World Index, a widely referenced global index comprising equity securities around the world, the total market capitalisation of securities comprising the index exceeded $US21 trillion as at December 1999. Market capitalisation values for each country comprising the index are exhibited in Figure 2.6. The objective of MSCI indices is to provide benchmarks that best represent the opportunities available to institutional investors.[6] Therefore, replicability of the indices is essential. MSCI constructs the country indices by firstly considering the universe of listed securities and then filtering stocks on the basis of industry classification, liquidity and free float (percentage of shares freely traded). MSCI aims to have 60 percent of listed securities within any industry included in country indices. MSCI also seeks to avoid the indices being misrepresentative due to potential cross-ownership of stocks in the

[6] On 10 December 2000, MSCI announced that it will refine all of its equity indices for (a) free float and (b) that it will increase the target market representation from 60 to 85 percent coverage. These changes will be effective as at 1 December 2001 and as at 1 June, 2002, respectively. These changes are designed to ensure broader coverage and a more 'investable' suite of indices.

indices. After consideration of these factors, MSCI then weights all securities to be included in the indices in terms of each company's market capitalisation, which helps to ensure objectivity. The construction of the MSCI indices accounts for possible ownership restrictions imposed by some countries (e.g. foreign ownership). All indices constructed by MSCI are considered 'free' in the sense they account for these restrictions to non-domestic investors. MSCI also calculates non-free versions of some indices.

Figure 2.5 – MSCI World Index Country Market Capitalisations ($US billion) as at 31 December 1999



Source: MSCI

For Australian investors, the most widely referenced market index concerning the performance of the international equity market (excluding Australian equity securities) is the Morgan Stanley Capital International World (ex-Australia) Index with either gross or net dividends re-invested.[7] This is a market capitalisation-weighted benchmark that comprises only developed countries (21 excluding Australia). While some countries may

[7] The difference between gross and net dividends reinvested is whether or not withholding tax has been accounted for.

be perceived to be ‘developed’ (e.g. Taiwan or Israel), MSCI considers them to be ‘emerging’ economies due to either limits or bans on foreign ownership, inadequate securities market regulation, restrictions on capital flows or perceived political risks.

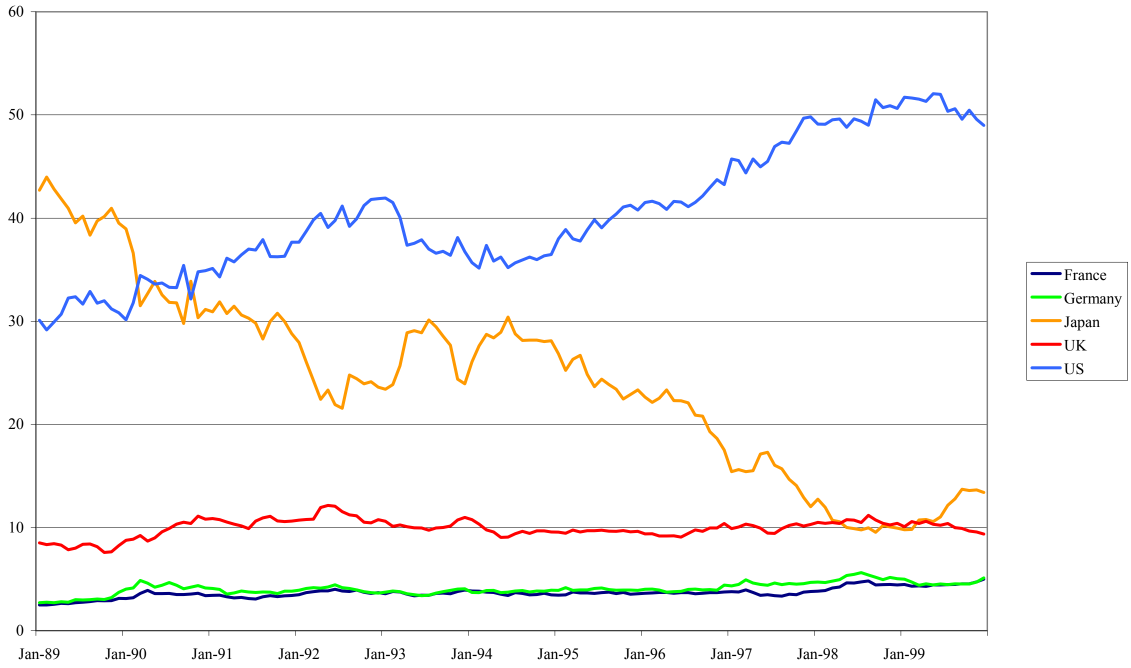
The regional weights comprising the MSCI World Index are shown in Table 2.8. The 5 largest countries within the MSCI World Index and their respective index weights over the 11-year period are documented in Figure 2.6. The North America region, which includes Canada and the U.S., dominates the MSCI World Index. The U.S. accounted for 49 percent of the total MSCI World Index at December 1999. Japan and the UK are the second and third largest markets within the MSCI World Index and represent 13.4 percent and 9.4 percent respectively.

Table 2.8 – MSCI World Index Regional Weights as at 31 December 1999

MSCI World Index – Major Regions	Weight (%)
North America	51.1
UK	9.4
Europe (ex-UK)	23.2
Japan	13.4
Asia (ex-Japan)*	2.9
Emerging Markets**	0.0
Total	100.0

Source: Barclays Global Investors and MSCI
* Includes Australia, Hong Kong, New Zealand, Singapore.
** Emerging Markets not included in the MSCI World Index

Figure 2.6 – The 5 Major Developed Countries Comprising the MSCI World Index and Respective Market Capitalisation Weights for the 11 Years to December 1999



Source: MSCI

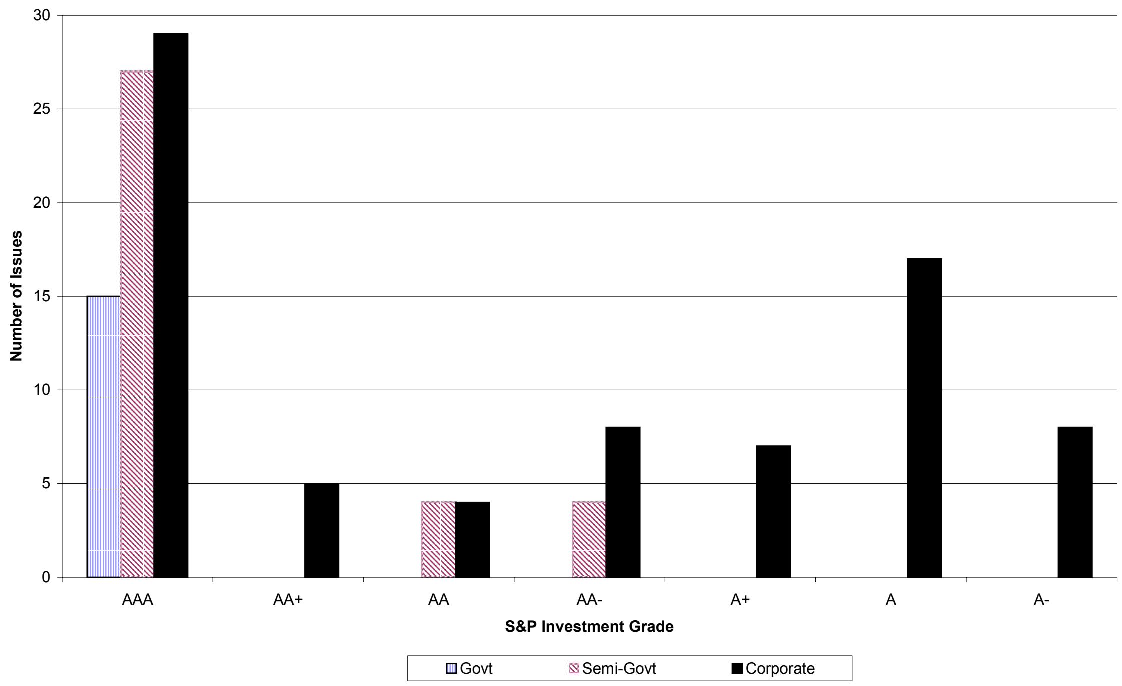
2.2.3 Australian Bonds

The Australian bond market is a significant industry in its own right, valued in excess of $A116 billion or 17 percent of the market as at 30 September 2000. The most widely referenced market index by investment managers concerning the performance of the Australian debt market is the UBS Warburg Composite Bond Index (UBSWI). This is a market capitalisation weighted benchmark that comprises Commonwealth Government bonds (CGB), Semi-Government bonds (SGB) and corporate issues, where the minimum credit rating issued by Standard and Poor's (S&P) is at the minimum A-.[8] The investment grade of fixed interest securities within the index is shown in Figure 2.7. The UBSWI

[8] The minimum market-cap of bond securities included within the UBSWI is $A100 million for all securities. The S&P ratings on the basis of credit quality are as follows (in descending order): AAA, AA+, AA, AA-, A+, A, A-. The highest S&P rating indicates an issuer exhibiting an extremely strong capacity to meet their financial obligations. An A rating represents an issuer holding a strong capacity to meet their financial commitments, however they may have a greater sensitivity to changing (adverse) economic conditions. BBB- is the lowest investment-grade rating, however these bonds are not included in the UBS Warburg Composite Bond Index.

comprised 128 issues at 30 September 1999, of which 15 securities were CGB, 35 SGB and 78 corporate stocks. All CGB and the majority of SGB had credit ratings of AAA. Only 37 percent of corporate issues had an investment grade of AAA. The second most common S&P rating (A) for corporate bonds accounted for 22 percent of the total corporate fixed income stocks within the UBSWI.

Figure 2.7 – Investment Grade of Australian Bond Securities by Issuer Type



Source: UBS Warburg

Table 2.9 presents the market capitalisation of Australian debt securities comprising the UBSWI according to maturity classification.

Table 2.9 – Market Capitalisation of UBS Warburg Australian Bond Indices at 30 September 1999 (Market Value in $A million)

	UBS Warburg Bond Indices			
Maturity	Composite	Government	Semi-Government	Corporate
0+YR	151,134	72,901	52,463	25,770
1+YR	138,336	63,499	50,958	23,879
0-3YR	43,657	22,328	13,012	8,317
0-5YR	85,561	38,209	28,521	18,831
3-5YR	41,904	15,881	15,509	10,514
5-7YR	22,261	8,474	9,623	4,163
7-10YR	38,684	22,939	12,969	2,776
5-10YR	60,944	31,413	22,591	6,939
10+YR	4,629	3,279	1,350	0

Source: UBS Warburg

The UBSWI had a market capitalisation value in 30 September 1989 of around $A61 billion, which had grown in size over the 10-year period by almost 150 percent to $A151 billion as at 30 September 1999. The three component UBS Warburg indices are also represented. While CGB, SGB and Corporate issues predominantly comprise Australian fixed interest portfolios, fund managers may also invest a small proportion of fund assets in cash and other securities including convertible notes, preference shares and index-linked bonds. The data in Table 2.9 reveals that more than 50 percent of the total value of fixed income securities represented by the UBSWI have a maturity horizon within a 5-year period, and almost three quarters of the value of corporate issues mature over the same period. In more specific terms, the duration (or weighted average term to maturity of cash flows derived from bonds) of the UBSWI as at 30 September 1999 was approximately 3.90 years.

2.2.4 International Bonds

International bond investments are typically made across government issued or 'sovereign' debt securities in North America, Europe, Japan and Asia. Security selection is predominantly made with reference to the country and regional weights that comprise an appropriate market index (usually defined as the Salomon Bros. World Government Bond Index), as well as the economic fundamentals that exist in each country.

2.2.5 Property

Property investments by Australian investment managers may occur through either ASX listed property trusts or direct ownership of commercial, industrial or residential property assets across the States and territories of Australia. Table 2.10 shows the benchmark weights applicable for the William M. Mercer Direct Property Index and the ASX Listed Property Index as at 31 March 2000.

Table 2.10 – Property Index Weights as at 31 March 2000

Property Sector Category	Direct Property Benchmark Weight (%)*	Listed Property Benchmark Weight (%)**
Diversified	-	37.4
Commercial	50	18.3
Retail	40	35.0
Industrial	10	6.9
Other	-	2.4
Total	100	100

Source: AMP Henderson* and BT Funds Management**

2.2.6 Cash

Investment managers use short-term money market securities as a means of ensuring their managed funds have satisfactory liquidity to meet redemption requests as well as for the purposes of reducing the volatility of portfolios that also have exposure to growth or other defensive asset classes. Generally, money managers invest in highly liquid assets with a maturity of less than 180 days, and usually an average maturity of less than 90 days, however this will depend on the duration of the underlying index and the manager's willingness to diverge significantly from the benchmark. Investment managers observe cash as the most defensive investment strategy available to them in the portfolio management process. Table 2.3 showed the UBS Warburg Bank Bill Index exhibited the lowest standard deviation of all mainstream asset classes coupled with extremely small correlations for the three growth asset classes presented (Australian shares, international shares and property). Fund managers typically invest in a mixture of cash and highly rated money market instruments that provide benefits similar to those of at-call bank accounts (i.e. highly liquid and secure). The types of money market securities typically comprising cash portfolios include treasury notes, bank accepted bills, bank term deposits, promissory notes, bills of exchange, floating rate notes, bank bill futures and options on bank bill futures. The portfolio process for an active money market fund will be highly influenced by both the existing and expected stance of monetary policy. The identification and selection of money market securities and the managed fund's sensitivity to interest rate movements (or duration management) are the most important determinants in the delivery of active returns above the benchmark index.

2.2.7 Alternative Asset Classes

A number of investment managers also offer their clients (predominantly institutional clients) access to alternative investments such as unlisted assets, including infrastructure assets, venture capital and other forms of private equity. Investments in private equity and venture capital generally occur when smaller firms require access to new equity capital in order to further develop a company's operations. Examples of private equity investments by fund managers include exposures to information technology and biotechnology firms. Private equity capital is most similar to listed share investments in terms of their risk-return nature, however their relative disadvantage is that they are generally not as liquid as listed equity securities and generally have a longer-term horizon associated with them. Examples of portfolio holdings in infrastructure assets by fund managers include investments in the construction and operation of toll-roads (e.g. Hills Motorway in Sydney and Transurban in Melbourne), and the ownership of airports (e.g. Brisbane airport) and electricity assets (e.g. Hazelwood in Victoria).

The Australian Venture Capital Association recently conducted an annual survey of institutional investor commitments. Of the 30 institutions surveyed, total venture capital assets amounted to over $A4 billion and spread across 133 separate mandates. These investors were reported as considering increasing their capital commitments to the venture capital sector by around $A1.35 billion in the financial year 2000/2001. The survey data as at 30 June 2000 are reported in Table 2.11.

Table 2.11 – Survey of Australian Institutional Venture Capital Commitments at 30 June 2000

Institutional Investor	Australia		Overseas		Total	
	$M	Managers	$M	Managers	$M	Managers
AMP Life	128.0	2	389.0	7	517	9
Australia Post Superannuation Scheme	95.0	11	165.0	20	260.0	31
Australian Retirement Fund	168.5	5	91.0	1	259.5	6
Bridges Financial Services / Questor	28.0	1	-	-	28.0	1
C+BUS	150.0	1	250.0	1	400.0	2
CM Abbott Pty Ltd	0.7	2	2.8	3	3.5	5
Deutsche Asset Management	60.0	5	110.0	5	170.0	10
Emerald Capital	-	-	0.5	1	0.5	1
Emergency Services Superannuation Scheme	20.0	2	-	-	20.0	2
Energy Industries Superannuation Fund	11.0	1	-	-	11.0	1
Equipsuper	5.8	2	-	-	5.8	2
Funds SA	85.0	8	70.0	2	155.0	10
Government Superannuation Office	73.8	9	-	-	73.8	9
Local Government Superannuation Scheme	130.0	1	-	-	130.0	1
Macquarie Investment Management	78.0	11	30.0	1	108.0	12
Mercantile Mutual / ING	67.5	3	95.0	4	162.5	7
National Asset Management	36.7	2	642.9	8	679.6	10
Retail Employees Super Trust	62.0	4	-	-	62.0	4
St. George Bank	40.0	1	-	-	40.0	1
Superannuation Trust of Australia	39.5	4	-	-	39.5	4
Tasplan	7.0	1	-	-	7.0	1
UBS Capital	15.0	1	-	-	15.0	1
UniSuper	204.0	12	37.0	1	241.0	13
Victorian Funds Management Corporation	74.0	10	-	-	74.0	10
Westpac Investment Management	30.0	3	16.0	1	46.0	4
Wilshire Australia	322.0	31	325.0	4	647.0	35
TOTAL	1931.5	133	2224.2	59	4155.7	192

Source: Australian Venture Capital Journal 4th Annual Survey

2.3 Australian Managed Funds

2.3.1 What is a Managed Fund?

A managed fund is an investment product made available to investors by professional investment managers. It is through managed funds that investors are able to access the investment services offered by fund managers. In Australia, managed funds are typically collective or pooled investment vehicles offered to investors as unit trusts (public portfolio), however investment managers may also provide investment services to large institutional clients through an individually managed (private) portfolio. In other words, a managed fund represents the combined assets of investors who have subscribed to the fund. With this pool of liquid assets, investment managers allocate funds across different securities and asset classes in accordance with the investment objective of the fund. Managed funds offered as unit trusts are established under a trust deed that governs the operation of the fund. The trust deed also dictates the means by which the unit trust can receive and redeem investments made by investors.

Morningstar, an international provider of managed fund information, listed 5,769 managed fund products (both institutional and retail) available to Australian investors. Table 2.12 shows the number of Australian domiciled managed funds across the asset class spectrum available to investors in January 2001. A description of the different types of managed fund products available to Australian investors is presented in section 2.3.2. The managed fund categories identified by Morningstar in Table 2.12 differ in respect to the type of assets an investment manager invests in (e.g. Australian equity trusts, multi-sector funds) and to the product structures that differentiate the types of investors (e.g. the type of investor (e.g. retail or institutional) and their tax-paying status).

Table 2.12 – Managed Funds Offered in Australia at 31 January 2001

Managed Fund Product Categories	Number of Funds	Percentage (%)
Panel A: Funds by Asset Class		
Diversified (or Multi-Sector)	2207	38.3
Australian Equities	1052	18.2
International Equities	650	11.3
Australian and International Equities	57	1.0
Australian Fixed Interest and Mortgages	682	11.8
International Fixed Interest	130	2.3
Property	189	3.3
Cash	445	7.7
Other*	357	6.2
TOTAL FUNDS	5,769	100.0
Panel B: Funds by Product Structure and Investor Type		
General Unit Trusts	897	15.5
Friendly Society Bonds	139	2.4
Insurance Bonds	484	8.4
International Funds	246	4.3
Pension Funds	712	12.3
Superannuation Funds	2270	39.3
Institutional Wholesale Funds – Non-Tax Paying	685	11.9
Institutional Wholesale Funds –Tax Paying	336	5.8
TOTAL FUNDS	5,769	100.0

Source: Morningstar
* 'Other' includes annuities, reserve-backed investments, master trusts and other miscellaneous funds.

Managed funds are attractive to investors, both institutional and retail, for many reasons. These include:

- diversification benefits – investments made in pooled investment vehicles provide greater ease to spread small monetary investments across a large number of asset classes and individual financial securities than would be possible without such a vehicle;

- economies of scale – transaction costs incurred by managed funds in physical transaction securities are likely to be much lower through collective investments than would be the case through smaller, private transactions. In addition, dividend imputation may allow managed funds to more efficiently utilise franking credits on domestic shares;[9]

- access to investment skill – investors may not have the necessary time or expertise (either locally or globally), to invest their capital in both a prudent and profitable manner; and
- portfolio administration services – investors may find the administration services provided, including record keeping, accounting and taxation services to be a valuable additional service.

2.3.2 Types of Managed Funds

Investment managers provide investors with access to a multitude of different managed investment products. These managed fund products can be differentiated on the basis of three main criteria:

- the investment objective;
- the spectrum of asset classes and securities comprising the managed fund; and
- the type of investor to which the product is structured or designed.

The investment objective or strategy to be implemented by a portfolio manager is the most significant differentiating feature of a managed fund. The investment strategy documents how the funds invested will be managed, including the investment style that will be followed. Managed fund assets are invested using (1) an active investment philosophy, (2) a passive or index approach or (3) an investment objective that is largely

[9] Dividend imputation allows investors of Australian companies, paying profits out as franked dividends, to be entitled to a reduction in the amount of their personal income tax. This is achieved by accounting for the corporate tax that has already been paid on profits. In other words, an investor who is taxed at their top marginal tax rate is only assessed for tax on the difference between the corporate tax rate and their top marginal tax rate if the dividends are fully franked.

passive in structure, however also incorporates some active strategies (e.g. enhanced index or quantitative strategies).

Essentially the active and passive investment philosophies are diametrically opposite to one another and their use will depend on investors' preferences and beliefs as to whether capital markets are efficient.

2.3.2.1 Actively Managed Funds

Active investment managers on the other hand believe that returns in excess of the underlying benchmark index are achievable through the use of security-specific and macroeconomic information. The identification of mispriced securities (security selection) and altering the portfolio's asset allocation in anticipation of market movements (market timing) are the two most common methods active managers use in their attempts to outperform benchmark indices.

2.3.2.2 Index Managed Funds

Index fund managers subscribe to the view that markets are broadly efficient and that, over time, index-mimicking portfolios will outperform the average active fund. Index managers also cite potential advantages in their funds being offered at lower cost to investors than active funds as well as the passive strategy minimising the crystallisation of capital gains tax liabilities. Index investment management in Australia accounted for 11 percent of total funds under management as at 31 December 2000. The Australian investment managers offering index funds to investors are presented in Table 2.13.

Table 2.13 – Index Investment Management Market Profile in Australia as at 31 December 2000

Investment Manager	Rank	$A Billion	% Total FUM Indexed	Market Share %
State Street Global Advisors	1	18.63	61.5	24.32
AMP Henderson Global Investors	2	10.65	15.6	13.91
Vanguard Investments Australia	3	10.43	100.0	13.62
Barclays Global Investors Australia	4	9.38	66.2	12.25
Commonwealth Investment Management	5	9.35	28.5	12.21
Macquarie Investment Management	6	4.43	14.9	5.78
County Investment Management	7	3.68	27.6	4.80
Westpac Financial Services	8	2.54	11.5	3.32
Alliance Capital Management Australia	9	2.06	51.0	2.69
Queensland Investment Corporation	10	2.00	7.5	2.61
Credit Suisse Asset Management Australia	11	1.16	6.2	1.51
Colonial First State Investments	12	0.88	2.4	1.15
Portfolio Partners	13	0.38	3.7	0.50
Advance Asset Management	14	0.29	12.5	0.38
Paradice Investment Management	15	0.16	100.0	0.21
AM Corporation	16	0.15	5.0	0.20
Tactical Global Management	17	0.15	1.0	0.20
Suncorp-Metway Investment Management	18	0.10	1.6	0.13
Merrill Lynch Investment Management	19	0.10	0.7	0.13
BNP Paribas Asset Management	20	0.05	3.0	0.07
SMF Funds Management	21	0.02	2.1	0.03
Ausbil Dexia	22	0.01	0.6	0.01
TOTAL	-	76.59	11.14	100.00

Source: Rainmaker Information

2.3.2.3 Enhanced Index Funds

Enhanced index funds attempt to earn returns above the benchmark index, however the achievement of active returns requires minimising the fund's tracking error (standard deviation of the difference between the fund's return and the target benchmark's return). Enhanced index funds represent a blended strategy between an active and index approach. The enhanced-passive approach is predominantly structured as an index strategy with small tilts relative to the underlying index. The objective generally involves the following enhancement strategies:

- investing in companies via initial public offerings (IPOs) ahead of an IPO's inclusion in an index;
- internal 'crossings' with other funds actively managed by the same investment manager. Securities may be acquired at more favourable prices than may exist in the market;
- receiving dividends in the form of shares by participating in dividend reinvestment plans (DRPs). The attractive feature of DRPs is the issue of shares at a discount to the current market price. DRPs can also provide cost benefits to the manager by minimising the required trading in index securities. Hence, the costs of order execution are minimised;
- very small sector bets within industries and stocks relative to the index; and
- employing derivatives, such as futures and options contracts, to take advantage of short-term market movements.

2.3.2.4 Exchange-Traded Funds

Exchange-traded funds (or ETFs) are relatively new investment vehicles that trade as a listed security on a securities exchange. ETFs are listed unit trusts or 'shares' representing investment in a basket of other listed securities. An ETF's market value is determined with respect to the market values of the individual securities comprising the basket. Because ETFs are equivalent to the purchase or sale of a security linked directly to an underlying index, these products represent an alternative to investing in index funds managed by professional investment managers. ETFs provide investors with an efficient and diversified security that tracks market indices. Indeed, ETFs in the United States levy lower expenses than open-end mutual funds. ETFs are also beginning to be used by investment managers as substitutes for futures contracts or in addition to derivatives.

The first ETF was launched in Canada and was listed on the Toronto Stock Exchange (TSE) in 1989. This Canadian ETF tracked the largest 35 TSE listed stocks. ETFs originated in the U.S. in 1993 with the introduction of the Standard & Poor's Depository Receipts (SPDRs), or Spiders, traded on the American Stock Exchange (AMEX). Spiders represent an investment in a value-weighted portfolio of common shares comprising the S&P 500 index, with the objective of providing investors with identical returns to the S&P 500. Spiders pay dividends equal to the proportional weight of stocks that actually declare dividends. The launch of the Spider was quickly followed by other ETF issues, Diamonds based on the Dow Jones Industrial Average, World Equity Benchmark Shares (WEBS) and iShares issued by Barclays Global Investors, and the NASDAQ listed Cubes (derived from their ticker symbol QQQ) tracking technology stocks. ETF assets offered in the U.S. have approximately doubled in the year to December 2000 to $US70 billion, which are invested across 80 ETF securities.

In Australia, ETFs have only recently been issued and are traded on the ASX. Salomon Smith Barney were the first to introduce an ETF on 2 March 2001 (called the IndexShare 100), where this listed unit trust tracks the S&P/ASX 100 index. State Street Global Advisors have announced the launch of their ETF product tied to the S&P/ASX 50 index. Barclays Global Investors are also expected to shortly announce their iShares ETF.

2.3.2.5 Hedge Funds

A U.S.-based Australian, Alfred Winslow Jones, first devised hedge funds in 1949. However both their number and growth has been significant since the 1960s.[10] As at 30 June 2001, the global assets invested in the hedge fund industry are estimated to be around $US500 billion.[11] Indeed, an estimated $US8 billion flowed into hedge funds in the second quarter of 2001, which was higher than the total inflows into hedge funds for the calendar year 2000. In Australia, hedge funds are relatively small in both number and asset size compared with hedge funds available overseas. The Colonial First State survey statistics presented in Table 2.14 provide estimates of the size of the Australian market. These indicate that total funds invested in hedge fund vehicles, either as individual funds or fund-of-funds, exceed $A3.4 billion at 30 September 2001. Fund-of-fund hedge funds invest across a number of individual hedge funds such that investors have access to different management, styles and diversification.

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[10] For an excellent discussion on the history, growth, styles and challenges concerning estimates of the market size, see Brown *et al.* (1999).
[11] TASS Asset Flows Report, June 2001.

Table 2.14 – Hedge Fund Providers and Australian-sourced funds as at 30 September 2001.

Investment Provider	**$A Million (Estimated)**
Panel A: Fund of Funds	
Absolute Capital	220
Alliance Capital / AXA	5
Coastal	15
Commonwealth Bank of Australia	200
Derivative Fund Management	15
Deutsche Strategic Investment Group	110
Hedge Funds of Australia	50
Macquarie Bank	114
OM Strategic Investments	1300
Rothschild	50
Warakirri	50
TOTAL	2079
Panel B: Individual Funds	
Basis Capital	17
Bluesky	25
Fleet	25
Grinham	800
K2 Asset Management	44
Optimal Funds Management	200
PM Capital	250
Triton	25
Vertex	15
TOTAL	1401

Source: Colonial First State Investments

Hedge funds may invest in both cash markets (physical holdings of securities) and derivative markets (synthetic instruments providing exposure to underlying assets) in such a manner that provides investors with leveraged exposure to various asset classes. While not all hedge funds use derivative securities, those hedge funds that do invest in such instruments take both long and short positions, such that investors exhibit an amplified exposure to asset classes than would otherwise be possible through physical holdings of actual securities. The use of derivative securities also permits hedge funds to exploit arbitrage opportunities. The marketable features used in 'selling' hedge funds includes:

- the ability of private investors to utilise a pooled investment vehicle which enables exposure to alternative assets not generally offered through managed or mutual fund products; and
- providing investors with different risk and return characteristics to those offered by managed funds. Historically, alternative investment returns have moved independently of equity and bond returns. This lack of correlation suggests that hedge funds utilising alternative investments provide additional diversification benefits to traditional portfolios.

Hedge funds have attracted much attention in the 1990s from market commentators, particularly since the 1998 collapse of U.S. hedge fund Long Term Capital Management (LTCM). The demise of LTCM was attributable to the fund's inability to properly understand the risks inherent in the investment strategy, lack of operational transparency and inadequate regulation. Indeed, Schneeweis (1998) highlights many investors of LTCM acted in a manner contrary to modern portfolio theory – that is they held a large proportion of their total assets within LTCM. While the literature documents a higher degree of attrition of hedge funds compared with mutual or managed funds, Schneeweis (1998) has addressed a number of common 'myths' concerning investments through hedge funds. Schneeweis (1998) argues hedge funds have both an important and legitimate role in financial markets. These include hedge funds:

- providing liquidity to capital markets and specific asset classes (e.g. private equity and emerging markets) which are relatively illiquid;
- acting as a counter party to derivative security contracts, ensuring the availability and efficiency of risk transfer.

2.3.2.6 Ethical and Socially Responsible Funds

Socially responsible investing and/or ethical investment relates to the inclusion or exclusion of securities within investment portfolios based on social, environmental or ethical criteria. Investment selection requires satisfying both financial and qualitative criteria. Socially concerned and/or ethical investors formulate various 'screens' that satisfy core moral beliefs. These include security selection filters related to:

- general corporate behaviour;
- employee relations (e.g. equality of opportunity and acceptable employment conditions);
- environment policies and practices;
- observance of basic human rights; and
- the promotion of safe and community-desired products and services (e.g. avoidance of tobacco, alcohol, gambling, armaments/weapons manufacture, animal testing, the mining of uranium).

The screening process applied by investors will differ with respect to the moral beliefs held. For example, religious organisations may be expected to hold stronger views relative to other socially concerned investors in the avoidance of investment in companies producing alcohol and tobacco or gambling services. This is intuitive given the Churches' significant role in society through charitable work.

Table 2.15 shows the size of the ethical and socially responsible investment market in Australia. These investments account for just over 1 percent of total assets in the Australian industry.

Table 2.15 – Ethical and Socially Responsible Market Profile in Australia as at 31 December 2000

Investment Manager	$A Million	Market Share %
Hunter Hall Investment Management	145	20.1
BT Funds Management	138	19.2
Australian Ethical Investments	118	16.4
Warakirri Asset Management	94	13.0
BNP Paribas Asset Management	82	11.4
Westpac Financial Services	47	6.5
Tower Asset Management	43	6.0
Portfolio Partners	23	3.2
Maple-Brown Abbott	17	2.4
Schroder Investment Management Australia	9	1.2
Suncorp-Metway Investment Management	5	0.6
TOTAL	721	100.0

Source: Rainmaker Information

2.3.3 Managed Fund Products

There are many different types of managed funds available to retail and institutional investors. The major distinction between retail managed funds and an institutional fund is the minimum initial investment and the fee structure applicable. Retail funds require lower minimum investments at application than is the case for institutional products, however retail funds levy higher management expense ratios. The fees levied will also be dependent upon the type of product being offered – the investment strategy (active or index) and the asset class sectors in which the fund will have exposure (for example, equity funds generally levy higher fees than bond funds). Fund managers generally offer a suite of managed funds for investors, superannuants and retirees across different asset classes. These funds offered to Australian domiciled investors are highlighted in the next section.

2.3.3.1 Domestic Equity Funds

- Australian share fund – investing in stocks comprising the S&P/ASX 200, 300 or All Ordinaries Index;
- 50 leaders fund – fund assets concentrated amongst the largest 50 securities listed on the ASX in terms of market capitalisation;
- future leaders fund – oriented toward small listed companies with strong growth potential;
- growth or value funds – stocks selected on the basis of their fundamental attributes;
- industrial and resources funds – portfolios comprise investments in stocks providing services, manufacturing and production (industrials) or minerals, energy and exploration (resources);
- imputation funds – portfolios configured to provide tax-effective income through investments in listed securities declaring dividends which attach high percentage franking credits;
- developing company funds – stock holdings in listed, small market capitalisation securities exhibiting future growth potential; and
- socially responsible or ethical funds – stocks are selected on the basis of environmental or social factors as well as prospective financial performance.

2.3.3.2 International Equity Funds

- MSCI World (ex-Australia) oriented funds – invest in stocks comprising developed economies, predominantly in the U.S., U.K., Japan and Europe;

- regional and country funds – investments in large international economies such as the U.S., U.K., Japan or regional funds in Asia, North America, Europe, Emerging economies; and
- global resources funds – portfolio assets include multi-national mining and energy stocks such as Rio Tinto, BHP Billiton, Anglo American, De Beers, Royal Dutch/Shell.

2.3.3.3 Property Securities Funds

- invest in ASX-listed (exchange listed) property trust securities with exposure to commercial, industrial and retail assets. The listed property trust's portfolio may differ from others in terms of the relative weights to the types of property asset exposure and their geographical location (e.g. Sydney Central Business District, Sydney suburban etc.)

2.3.3.4 Diversified or Multi-Sector Funds

- capital stable funds – invest in cash and fixed interest investments with the objective of protecting the capital value of the fund's investments;
- conservative funds – invest predominantly in cash and fixed income securities, however small allocations to equity investments are likely to occur;
- balanced funds – invest in the broad spectrum of asset classes, both defensive and growth oriented securities. More than half of the funds assets is generally allocated to equity and property securities; and
- growth and high growth funds – portfolios significantly concentrated in growth asset classes, particularly domestic and international shares, with smaller allocations to cash and fixed income.

2.3.3.5 Domestic Bond/Fixed Income Funds

- Australian bond funds – invest in Commonwealth government, semi-government and corporate debt (credit rating above Standard & Poor's BBB-) securities, and small allocations invested across money market securities;

- mortgage funds – investments in mortgage assets which earn income at either a fixed or floating rate;

- diversified fixed income funds – invest in domestic and international fixed interest securities and floating rate notes; and

- high yield corporate bond funds – invest in corporate issues and floating rate notes, where minimum investment grade varies from manager to manager depending on investment objective.

2.3.3.6 Cash Management Trusts

- cash management trusts – investments comprise highly liquid money market securities, including bank-accepted bills, bills of exchange, promissory notes, certificates of deposit, and treasury notes.

2.3.3.7 Tactical Asset Allocation Trusts and Currency Overlays

- Tactical Asset Allocation (TAA) trusts and overlays provide investors (commonly larger investors where total assets exceed $A100 million) with opportunities to allocate small proportions of portfolio's assets to professional managers with the view to exploiting movements in asset class returns over time. TAA trusts (pooled investment vehicles) are usually available to smaller investors whereas larger investors have greater access to specialist overlay mandates. William M. Mercer indicated that larger funds utilising overlay strategies generally commit 3-4 percent of the portfolio's total assets, whereas smaller investors accessing TAA trusts provide 15-20 percent of total portfolio assets. In general, the process involves the TAA manager employing the funds committed by the investor to alter the portfolio's asset allocation from the strategic benchmark allocation. The TAA overlay manager's strategy is first implemented by passive rebalancing of the portfolio's asset mix to its unique long-term or strategic benchmark weight. Secondly, the TAA overlay manager actively adjusts the portfolio's asset allocation away from the strategic benchmark with the view to enhancing overall portfolio returns and/or reducing portfolio risk. Asset allocation changes are achieved through the use of derivative instruments and do not impact upon the discretion of other fund managers charged with the responsibility of managing specialist mandates.

- currency overlays provide investors with additional currency management related to international investments. Specialist overlay managers attempt to exploit currency movements over time in a manner that improves overall portfolio returns. The currency overlay approach is managed separately from the underlying assets of the portfolio and involves the use of currency futures and forward foreign exchange contracts by overlay managers.

As discussed in Section 2.3.1, investment managers generally offer their investment services through unit trust vehicles, where investors make a formal application for units in the trust at the prevailing market-linked entry price. The pricing structure of a unit trust is determined with reference to the net asset value (NAV) of the fund (gross assets of the trust less expenses). In addition, unit trusts report both an application price and a redemption price, where the difference between the two quoted prices equates to the buy/sell spread. While the midpoint price (equidistant between the application and redemption prices) represents the actual market value of the fund's units based on the securities held in the portfolio, the buy/sell spread is argued to be necessary in recovering the trading and administrative costs in executing investor applications and redemptions. As such, the buy/sell spread helps to avoid existing investors continually bearing the cost of transactions that arise from new applications and redemptions. For retail investors, a percentage of the buy/sell spread may also reflect a commission payable to the financial advisor who promoted the managed fund on behalf of the fund manager.

Investors who own units in managed funds anticipate earning income from their unit trust, and in the case of managed funds investing across growth asset classes, capital gains as well. Depending on the type of trust and the investments held by the fund, earnings are generally paid to unit holders at regular intervals. For cash management trusts, this may be monthly or quarterly and for equity trusts, typically of a quarterly or semi-annual frequency. Investors may elect to receive income distributions in the form of cash disbursements or re-invest distributions within the fund and be entitled to additional units at the prevailing entry price.

2.3.4 Regulation

While Australia's financial system is regulated by three government authorities, namely the Reserve Bank of Australia (RBA), the Australian Prudential Regulation Authority (APRA) and the Australian Securities and Investment Commission (ASIC), the latter two organisations have the most significant responsibility in terms of supervising the participants within the investment industry.

APRA is the prudential regulator of a number of financial services entities – superannuation funds, insurance corporations, banks, credit unions, building societies and friendly societies. Essentially APRA "sets standards (including capital requirements) for the prudent management of banks, other depositors, insurance companies and friendly societies to maximise the likelihood that they remain financially sound and able to meet their obligations to depositors and policyholders. In the case of superannuation funds, APRA aims to ensure that trustees are aware of their obligations to members and manage the funds in their care prudently in the interests of members."[12]

The ASIC aims to promote confidence in the financial system through the protection of investors, depositors, superannuants and insurance policy holders. One area of regulation is the requirement that participants providing investment or securities advice be licensed. In terms of managed funds however, the ASIC is required to provide supervision of the investment offerings made by fund managers with respect to the prospectuses. For example, a managed fund offered as a unit trust by an investment manager requires the issuance of a prospectus duly lodged with the ASIC and compliant with the rules outlined in the Australian *Corporations Act 2001*. Overall, the prospectus must disclose sufficient information that reasonably allows investors to make informed decisions concerning the assets offered. Typically, managed fund prospectuses contain up-to-date information providing:

- background information which profiles the issuing entity;
- the stated investment objective of the fund offered;
- the inherent risks and volatility associated with investments;
- the rules governing how the fund will operate, including how the fund's unit price is determined, the fees payable etc.;
- past performance history of the pooled vehicle; and
- instructions outlining how an application for investment in the fund can be made.

[12] APRA website (http://www.apra.gov.au/corporateinfo/faq.htm#Q1)

The ASIC is also responsible for administering and ensuring compliance of the *Managed Investments Act 1998*. This legislation is an amendment to the *Corporations Act 1989*. One of the most fundamental and controversial changes has been the removal of the requirement that a managed investment scheme have both a manager and a trustee.

2.3.5 Managed Fund Ratings Companies

The Australian financial industry also includes a number of organisations dedicated to providing rigorous and independent scrutiny of the providers of investment and financial products. For example, full-service stockbrokers continue to provide their clients with recommendations concerning the prospects of listed entities and the investment potential of such securities. Within the bond market, agencies including Standard and Poor's and Moody's Investor Services attach ratings to sovereign debt and corporate issues on the basis of the financial strength of the borrower and their capacity to service their debts. Similarly, there exist a number of investment ratings agencies that provide both qualitative and quantitative information to investors concerning the product offerings of investment managers. The most well known providers of ratings for managed funds are typically oriented towards the retail market and include firms such as ASSIRT and Morningstar. While the institutional market is serviced by asset consulting firms, who provide investment advice on the suitability of investment managers, their individual ratings process tends to be proprietary and forms the basis of their manager search function requested by their clients.

The purpose of a managed funds ratings company is to provide investors with independent information concerning the suitability and quality of investment manager products. There are numerous criteria evaluated by investment ratings agencies, both qualitative and quantitative, with the end result being the provision of a 'star' rating which summarises the investment credentials of managed fund products available. Essentially, ratings agencies will consider three main areas in the analysis of managed fund products: the investment professionals who manage the fund's assets, the investment process adopted by the fund and the past performance achieved by the investment vehicle. In terms of the funds rated by ASSIRT and Morningstar, both entities rate Australian managed funds between one star (minimum rating) and five stars (maximum rating). The greater the number of stars attached to a managed fund, the more attractive the fund is considered to be for investors on the basis of the fund's adopted investment management strategy, portfolio managers implementing the fund's objectives and past performance. Table 2.16 presents the definitions used by ASSIRT and Morningstar in the classification of Australian managed funds.

Table 2.16 – Managed Fund Ratings in Australia

Star Rating	ASSIRT Definition	Morningstar Definition
*****	Excellent fund, strong management, comprehensive investment strategy, strong past performance	Excellent quality fund
****	Very good fund, strong management, sound investment strategy and solid past performance	Very good quality fund
***	Competently managed fund, either an unimpressive or limited fund performance history	Good quality fund
**	Weak fund in terms of management and strategy, poor or very limited data history	Poor quality fund
*	Poor quality fund with problems in strategy, management and performance	Very poor quality fund
On Hold	Temporary Suspension of Rating	-
RTS	-	Rating Temporarily Suspended
NYR	-	Not Yet Rated

Source: ASSIRT and Morningstar

The managed fund ratings are very similar for both ASSIRT and Morningstar, however their approach differs in the assignment of a fund's rating. Indeed, Morningstar reported in September 2000 that 77 percent of ratings assigned to managed funds by ASSIRT and Morningstar were not consistent.[13] The primary reason for this is the different system attached to both qualitative and quantitative characteristics of managed funds evaluated by ASSIRT and Morningstar. For example, ASSIRT does not rank managed funds relative to their competitors, as is the case with Morningstar. Morningstar distributes ratings across funds so that 15 percent of funds are allocated a five-star rating, 20 percent have four stars, 25 percent are awarded three stars, 25 percent exhibit two stars and the remaining 15 percent are considered to be 'very poor' managed funds. The following sections 2.3.5.1 and 2.3.5.2 provide a brief description of the ratings process implemented by Morningstar and ASSIRT, respectively.

2.3.5.1 The Morningstar Ratings Approach

While the computational process required to determine a fund's star rating is complex, Figure 2.8 provides an example of the process by which managed funds receive a star rating from Morningstar.

Investment managers are invited to participate in the Morningstar ratings process, which first begins with a pre-ratings briefing with the senior personnel of the investment management organisation.[14] When an investment manager agrees to participate in the ratings process, Morningstar conducts both a qualitative review (Ql) and a quantitative assessment (Qt) of the fund manager's investment products. The Ql component involves interviews with fund managers coupled with detailed reviews of investment manager questionnaires.

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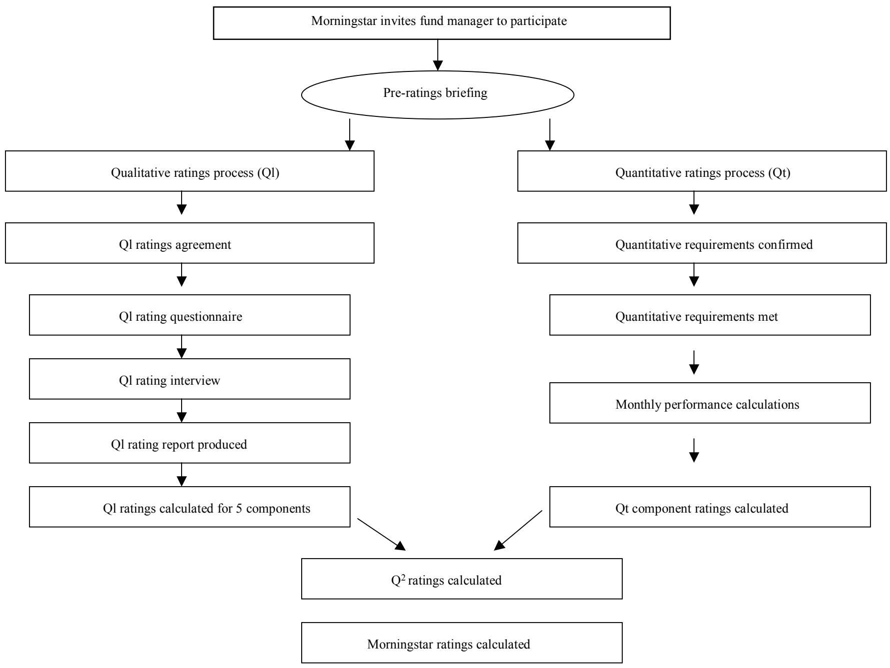
[13] *Position Paper, Attn Funds Management Industry*, 1 September 2000
[14] *Morningstar Star Ratings*

Figure 2.8 – The Morningstar Star Rating Process



Source: Morningstar

Ql ratings are essentially 'forward-looking' and are computed with respect to the:

(1) corporate strength of the fund manager;

(2) administration, technological and operational procedures,

(3) the experience, stability and expertise of the investment professionals in the organisation;

(4) sector strength of the portfolio managers who oversee the investment process; and

(5) product features available to investors utilising the fund manager's products.

The Qt ratings process is 'backward-looking' and involves assessment of five quantitative features of managed funds – the first four components are measured relative to other managed funds and the final category is assessed in absolute terms, independent of other funds. The Qt rating is determined with respect to a fund's:

(1) return rating – evaluates the average quarterly rates of return or time;

(2) average risk rating – volatility of returns (standard deviation);

(3) downside risk rating – average minimum returns over a period;

(4) risk/return rating – adjusts returns for the risks incurred by the fund; and

(5) age rating – the longer the life of the fund, the more stable the fund and the increased reliability in statistical tests associated with performance measurement. Morningstar rates the age of a fund up to a period of five years.

The Morningstar Ql and Qt ratings are then combined by multiplying both ratings to achieve a Q^2 rating which then allows for the star rating to be issued.

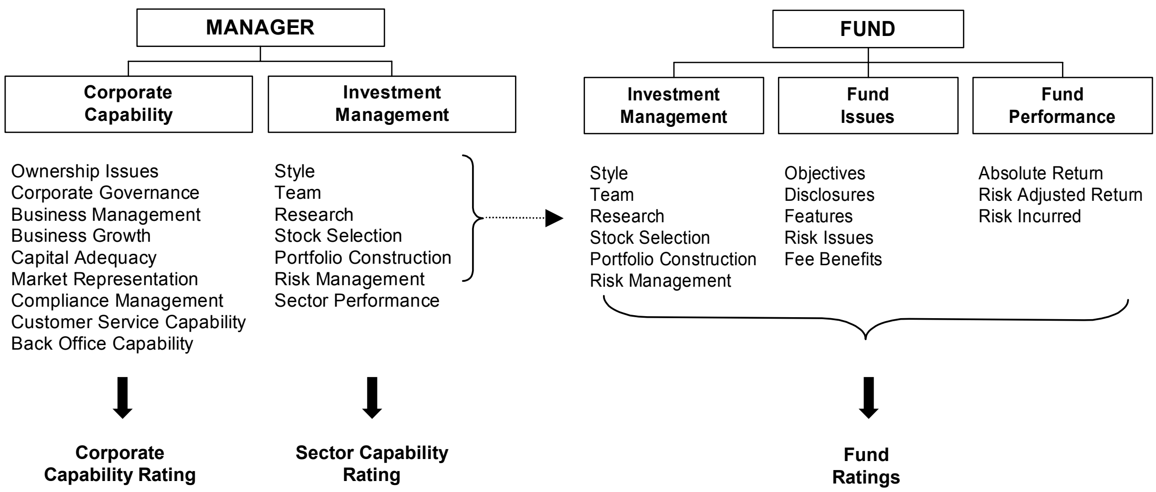
2.3.5.2 The ASSIRT Ratings Approach

ASSIRT also provides investors with a star rating system that, in broad terms, concentrates on similar characteristics to those identified in section 2.3.5.1. However, ASSIRT classifies these investment manager and fund attributes using a different framework to Morningstar. According to ASSIRT's ratings methodology, both the fund and funds managers are rated on the basis of their ability to manage funds in a manner that is consistent with their stated investment strategy.[15] An important difference to Morningstar's rating system is ASSIRT's focus on the strengths and weaknesses of individual managers and funds' investment process, rather than assessing investment organisations relative to their competitors. ASSIRT fund ratings apply for a period of one year, subject to significant changes in the investment organisation's stability, structure or performance.

[15] *ASSIRT Ratings*

Figure 2.9 demonstrates ASSIRT's broad ratings structure used to classify investment managers and managed funds.

Figure 2.9 – The ASSIRT Ratings Process



Source: ASSIRT

The three components used by ASSIRT account for both the investment manager and the individual managed fund:

- corporate capability – the extent to which the fund manager is capable of operating a successful business, including their stability of ownership, capital adequacy, market strength, compliance regime, delivery of customer service and internal management structures;

- sector capability – the manager's ability to deliver investors with consistent and competitive performance in each asset class relative to appropriate benchmark indices, in a manner that accurately reflects the pre-determined investment strategy. ASSIRT uses an 80 percent qualitative 'bottom-up' approach and the remaining 20 percent sector capability component accounts for past performance; and

- fund rating – the overall quality of the managed funds operated by an investment manager across specific asset classes. ASSIRT awards a rating for managed funds based on the criteria defined in Table 2.16. A fund's rating is determined with respect to the investment manager's capability (55 percent), the fund's past performance (25 percent) and the fund's product structure, including fee structure, disclosure of information and investment objectives (20 percent).

2.4 Primary Users of Investment Manager Services

2.4.1 Superannuation Funds

2.4.1.1 Superannuation Industry Overview

The Australian superannuation industry has grown significantly since June 1983. The Australian Prudential Regulation Authority (APRA), which acts as regulator on behalf of the Commonwealth Government, reported the size of the industry at $A32 billion in 1983, however total assets to September 2000 have grown 15-fold to around $A489 billion. This increase can be attributed to greater level of Commonwealth Government activism in response to the nation's aging population and the potential future strains on fiscal policy arising from the provision of aged pensions to retirees.[16] Successive governments have also highlighted the need to increase national savings through superannuation vehicles to improve Australia's productivity and economic growth (see

[16] The provision of retirement benefits through contributory superannuation schemes is further required due to the government pension being unfunded – pensions are expenditures from general revenue. Government pensions are means-tested, paid at a flat-rate and are generally indexed to around 25 percent of Australia's Average Weekly Earnings (AWE). See Edey and Simon (1996) for further information.

Fitzgerald report 1993). This has been achieved through increases in the Superannuation Guarantee Levy (SGL), requiring compulsory contributions by employers on an employee's behalf equivalent to 8 percent of salary (forecast to increase to 9 percent by 2002-2003). Approximately 80 percent of all Australian workers have superannuation coverage, whereas superannuation coverage for permanent full-time workers is around 98 percent.

2.4.1.2 Institutional Funds, Asset Consultants and Investment Manager Statistics

Table 2.17 presents summary statistics on the size and characteristics of superannuation fund assets, structures, investment approach and membership. In September 2000, APRA reported 217,158 superannuation funds were in existence in Australia, of which 98 percent are small superannuation funds containing fewer than five members. In terms of the number of member accounts, the large superannuation funds (or non-excluded funds) dominate the industry, where 2,312 funds account for 98 percent of total accounts.

The total size of institutional superannuation funds (corporate, government and industry funds) reported by APRA as at 30 September 2000 was approximately $A229 billion, or 47 percent of the total industry (see Panel A). Corporate funds are defined as those sponsored by a one or more non-government employers. Industry funds are those formed by sponsors linked to an industrial award. Public sector or government funds, on the other hand, are initiated by government employers and/or public-controlled entities. The remaining fund classifications are retail-oriented. Retail funds are either publicly offered unit trusts or policies. Small funds refer to self-managed superannuation funds containing fewer than five members.

Table 2.17 – The Australian Superannuation Industry – Descriptive Statistics as at 30th September 2000

	Number of Funds	Members (000's)	Assets ($A million)	Assets (%)
Panel A: Superannuation Funds By Type				
Corporate	2,296	1,489	79,541	16.3
Industry	70	6,863	41,263	8.4
Government	38	2,547	108,697	22.2
Retail	168	10,999	142,329	29.1
Small Funds (less than 5 members)	211,175	423	70,562	14.4
Annuities, Life Office Reserves, RSAs	-	-	49,468	10.1
TOTAL	213,747	22,321	488,944	100.0
Panel B: Superannuation Funds By Benefit Structure				
Accumulation	213,084	19,034	199,427	40.8
Defined Benefit	352	506	24,736	5.1
Hybrid	311	2,358	147,667	30.2
Unallocated (annuities/life office etc.)	-	-	117,114	24.0
TOTAL	213,747	22,321	488,944	100.0
Panel C: Superannuation Funds By Investment Implementation				
Directly Invested	-	-	146,133	29.9
Delegated to Investment Manager	-	-	191,353	39.1
Invested in Life Office Statutory Funds	-	-	151,458	31.0
TOTAL	-	-	488,944	100.0

Source: Australian Prudential Regulation Authority

In terms of Australian superannuation structures, funds exhibit one of the three following types – defined benefit, accumulation and a hybrid between defined benefit and accumulation structures. A defined benefit structure exists when benefits are determined on the basis of a calculation pertaining to a member's current salary, average salary over a period of time, or some other specified amount. Alternatively, an accumulation fund structure deems that each member's entitlement can be assessed with direct reference to fund contributions (both employer and employee) as well as fund earnings over the period of membership. Panel B of Table 2.17 indicates that the majority of superannuation funds in Australia are accumulation-type funds. In comparison, hybrid fund structures account for just over 30 percent of all assets in the superannuation industry, whereas defined benefit funds are insignificant in terms of the proportion of total superannuation assets.

A recent study of mandates in the institutional superannuation fund market by Rainmaker Information over the 1999-2000 financial year provides a comprehensive summary of the institutional investment market comprising asset consulting firms, superannuation investment managers and superannuation funds. Rainmaker's database was compiled using 365 wholesale superannuation funds each with assets of at least $A50 million. Total mandates for these institutional funds was approximately $A170 billion or around 80 percent of total institutional assets.[17] Table 2.18 presents descriptive statistics of the 30 largest institutional superannuation funds comprising the Rainmaker Information analysis.

Rainmaker identified more than 100 fund managers and 39 asset-consulting firms that provide investment services to the institutional superannuation fund industry. The investment consulting market to institutional clients is extremely concentrated. In terms of total institutional funds under advice, Table 2.19 shows that the 10 largest asset-consulting firms account for almost 95 percent of the entire industry. Indeed, the concentration is even more pronounced for the five largest asset consultants, who provide advice to clients representing 71 percent of the industry. These statistics for the investment consulting industry are particularly significant when comparisons are made to the size and diversity of participants in the investment management market. Table 2.20 indicates that the 10 largest investment managers to institutional clients account for 52 percent of wholesale superannuation fund assets. While there is a high degree of concentration across fund managers, concentration levels are even more pronounced in the asset consulting industry.

[17] Rainmaker collected data pertaining to the institutional superannuation fund market through various sources including fund reports, quarterly and annual surveys and propriety information.

Table 2.18 – Thirty Largest Institutional Superannuation Funds in Australia for Financial Year 1999-2000

	Funds Under Advice			Mandates				
Superannuation Funds	*$A Million*	*Market Share (%)*	*Rank*	*Number*	*Proportion (%)*	*Rank*	*Average $A Million*	*Rank*
State Superannuation Scheme	17,414	10.26	1	6	0.21	150	2,902	3
The State Superannuation Fund	7,362	4.34	2	14	0.48	33	526	9
QSuper Defined Benefit Plan	6,600	3.89	3	1	0.03	243	6,600	1
Superannuation Scheme for Australian Universities	6,038	3.56	4	27	0.92	7	224	14
State Authorities Superannuation Scheme	5,707	3.36	5	1	0.03	243	5,707	2
CSS Fund	5,618	3.31	6	28	0.96	5	201	17
Commonwealth Bank Officer's Superannuation Corporation	5,237	3.09	7	12	0.41	36	436	10
Telstra Superannuation Scheme	4,290	2.53	8	25	0.85	10	172	21
PSS Fund	3,473	2.05	9	29	0.99	4	120	31
Qantas Superannuation Plan	3,469	2.04	10	18	0.62	26	193	18
BHP Superannuation Fund	3,302	1.95	11	26	0.89	8	127	28
Emergency Services Superannuation Scheme	3,042	1.79	12	17	0.58	29	179	20
Australia Post Superannuation Scheme	3,000	1.77	13	12	0.41	36	250	13
Local Government Superannuation Scheme	2,901	1.71	14	14	0.48	33	207	16
Construction & Building Unions Superannuation	2,883	1.70	15	32	1.09	2	90	42
First State Superannuation Scheme	2,640	1.56	16	18	0.62	26	147	23
Retail Employees Superannuation Pty Limited	2,607	1.54	17	23	0.79	17	113	34

	Funds Under Advice cont.			Mandates cont.				
Superannuation Funds cont.	*$A Million*	*Market Share (%)*	*Rank*	*Number*	*Proportion (%)*	*Rank*	*Average $A Million*	*Rank*
Australian Retirement Fund	2,303	1.36	18	31	1.06	3	74	54
Health Super Fund	2,287	1.35	19	20	0.68	20	114	33
Westpac Staff Superannuation Fund	2,240	1.32	20	1	0.03	243	2,240	4
Health Employees Superannuation Trust Australia	2,224	1.31	21	26	0.89	8	86	45
Superannuation Trust of Australia	2,120	1.25	22	28	0.96	5	76	52
Local Authorities Superannuation Fund	1,852	1.09	23	18	0.62	26	103	38
Sunsuper Pty Limited	1,846	1.09	24	34	1.16	1	54	67
South Australian State Pension Scheme	1,797	1.06	25	24	0.82	11	75	53
Government Employees Superannuation Board	1,715	1.01	26	12	0.41	36	143	26
National Australia Bank Group Superannuation Fund "A"	1,650	0.97	27	15	0.51	31	110	37
State Super Personal Retirement Plan	1,464	0.86	28	10	0.34	94	146	24
COSAF Superannuation Plan	1,444	0.85	29	10	0.34	94	144	25
Queensland Local Government Superannuation Board	1,390	0.82	30	12	0.41	36	116	32
Other Funds	*59,835*	*35.25*	-	*2,382*	*81.41*	-	*25*	-
TOTAL	169,750	100.00	-	2,926	100.00	-	58	-

Source: Rainmaker Information

Table 2.19 – Ten Largest Institutional Asset Consultants in Australia for Financial Year 1999-2000

	Funds Under Advice			Mandates				
Asset Consulting Company	*$A Million*	*Market Share (%)*	*Rank*	*Number*	*Proportion (%)*	*Rank*	*Average $A Million*	*Rank*
InTech	26,267	17.3	1	38	1.4	10	691	1
William M. Mercer	23,371	15.4	2	897	33.7	1	26	15
Frank Russell	19,978	13.2	3	242	9.1	5	83	7
Towers Perrin	19,675	13.0	4	303	11.4	2	65	8
John A. Nolan & Associates	18,702	12.4	5	297	11.2	3	63	9
Frontier Investment Consulting / IFS	16,531	10.9	6	297	11.2	3	56	10
Total Risk Management	9,091	6.0	7	57	2.1	8	159	3
Frank Russell / Chifley	4,047	2.7	8	28	1.1	13	145	4
Towers Perrin / Quentin Ayers	4,015	2.7	9	33	1.2	12	122	5
PlanPerform	1,390	0.9	10	12	0.5	18	116	6
Other Consultants	*8,348*	*5.5*	-	*410*	*15.4*	-	*18*	-
TOTAL	151,415	100.0	-	2,663	100.0	-	57	-

Source: Rainmaker Information

Table 2.20 – Ten Largest Superannuation Investment Managers in Australia for Financial Year 1999-2000

	Funds Under Advice			Mandates				
Superannuation Investment Managers	*$A Million*	*Market Share (%)*	*Rank*	*Number*	*Proportion (%)*	*Rank*	*Average $A Million*	*Rank*
Deutsche Asset Management	24,383	15.48	1	28	1.04	25	871	3
Queensland Investment Corporation	9,746	6.19	2	8	0.30	55	1,218	2
State Street Global Advisors	9,129	5.80	3	77	2.86	10	119	20
Commonwealth Investment Management	8,670	5.50	4	37	1.38	23	234	7
AMP Asset Management	7,914	5.02	5	240	8.93	1	33	80
Credit Suisse Asset Management	5,011	3.18	6	133	4.95	4	38	71
Maple-Brown Abbott	4,482	2.85	7	116	4.31	6	39	70
BT Funds Management	4,370	2.77	8	171	6.36	2	26	97
Vanguard Investments	4,341	2.76	9	39	1.45	22	111	21
Lend Lease Investment Management	4,050	2.57	10	155	5.76	3	26	96
Other Investment Managers	75,410	47.88	-	1,685	62.66	-	45	-
TOTAL	157,506	100.00	-	2,689	100.00	-	59	-

Source: Rainmaker Information

2.4.1.3 Superannuation Funds, Trustees and Asset Consulting Advice

Superannuation funds are savings vehicles used by employers and employees with the objective of providing members with retirement benefits at a future date. These benefits arise through contributions provided by the member's employer and the employee's own contributions. In Australia, government legislation ensures member benefits remain preserved until (1) after the member's 55th birthday and (2) the member's cessation of full-time employment. Alternatively, the preservation of benefits ceases when the member reaches the age of 65, has died, leaves Australia permanently or is totally and permanently disabled.[18] Superannuation fund trustees are legally responsible for the management of the fund as well as ensuring all assets are prudently invested. Trustees must ensure the fund remains compliant with all rules (contained in a fund's trust deed) and government legislation.

The *Superannuation Industry (Supervision) Act 1993* (SISA) is the legislation governing the operation of Australian superannuation funds. SISA details how superannuation funds are to operate and the fiduciary obligations that must be satisfied by fund trustees towards members. APRA reported the number of institutional superannuation fund trustees in Australia to be around 28,000 as at August 2000. SISA requires fund trustees to define the investment strategy to be implemented. Such an investment strategy must be consistent with the fund's own objectives and will be determined with reference to the long-term risks and returns across the spectrum of asset classes, diversification, inflation expectations and economic cycles. Further, SISA requires trustees to maintain appropriate records and accounts as well as the provision of accurate

[18] Where benefits remain preserved beyond the member's 65th birthday, the benefit must be paid as a cash lump-sum, pension or annuity when either of the following occurs; (a) the member ceases being gainfully employed for at least 10 hours per week and is less than 70 years of age (b) the member attains 70 years of age and is not gainfully employed for at least 30 hours per week (c) the member dies.

and timely information to members concerning the management of the fund's assets. If the fund is deemed to be 'compliant' with SISA's regulations, the fund will then become eligible to receive concessional tax treatment.[19]

The asset consulting industry provides superannuation trustees with a number of advisory services, and as a result, direct performance measurement and/or comparisons across asset consultants can be both extremely difficult and controversial. The asset consulting services performed for wholesale superannuation fund clients include the formulation and development of a fund's investment objectives, the selection of investment managers to implement the fund's strategy and on-going review of the investment process, including performance monitoring and research into the investment management industry. Once the investment strategy has been formulated, trustees must then decide how the strategy will be implemented. These include whether fund assets will be managed internally or be delegated to an external investment manager. Secondly, the configuration of fund assets must be consistent with achievement of a fund's goals, where trustees must decide on whether to implement an active or passive management style (or some combination of the two). Third, where trustees elect to use external managers, the appointment of either balanced and/or specialist fund managers requires consideration. Implementation of a specialist strategy may provide trustees with additional managerial and style diversification benefits. Further, sector specialisation may appear attractive in terms of the argument that it is extremely unlikely that a balanced manager will have the highest competitive strength across all asset class sectors. Other roles consultants typically perform for the fund include advice relating to legal and taxation issues facing trustees, risk management assessments as well as transition management advice which encompasses

[19] The taxation system is quite complex, and the concessional nature of taxation applying to Superannuation fund assets have been gradually scaled back, particularly from 1983. The most recent amendment was the 1996 introduction of the Superannuation Surcharge, which reduced the concessional tax benefits of superannuation contributions from higher-income earners.

the transfer of fund assets between investment managers. The appointment of an asset consulting company is attractive to fund trustees to help ensure compliance with the legislative requirements and to ensure the fund receives expert and independent advice that will help ensure the fund's own investment objectives are achieved.

2.4.2 Private Investors

Retail investors are primarily classified as private individuals who invest across assets in significantly smaller parcels than institutional investors. Retail investors typically include 'mum and dad' type investors (or household investors) and small self-managed superannuation funds. Throughout the 1990s the retail sector has become more significant, particularly in terms of the size of assets invested and participation rates in the investment industry. In terms of the Australian equity market, retail investors have increased their participation in initial public offerings (floats), privatisations (particularly the large issues such as the Commonwealth Bank and Telstra) and demutualisations (e.g. AMP and NRMA). The Australian Stock Exchange's (ASX) *2000 Australian Shareownership Study* revealed that 54 percent (or 7.6 million) of the adult population owned shares either directly or indirectly.[20] The ASX study also found that Australia exhibited the highest per capita share ownership level compared with the U.S., U.K., Germany, Canada and New Zealand.

This high level of participation may be partly explained due to the nature of Australia's demography. Government policies have attempted to promote self-provision in retirement, particularly in response to Australia's aging population and the 'baby boomer'

[20] Direct share ownership in 2000 represented 41 percent of the adult population, equivalent to 5.7 million people. While Australia has the highest per capita share ownership levels, investors have high levels of shareholdings concentrated in only one or two stocks.

generation fast approaching retirement age.[21] As at June 2000, the Australian Bureau of Statistics (ABS) reported the median age of Australia's population to be 35.2 years and continues to increase as a result of continued low fertility rates. As a result, government policies have been directed towards increasing national savings and encouraging self-provision in retirement through compulsory superannuation.

2.5 Australian Investment Manager Characteristics

Investment management organisations operate in a highly competitive market. As the providers of investment services, fund managers attempt to differentiate themselves by highlighting what they believe are their strengths relative to their competitors. There are numerous characteristics investment managers may exhibit which makes them unique, including:

- the investment strategy adopted;
- the past success of the investment process;
- the calibre of the staff they employ in terms of their qualifications and experience;
- the pricing structure of their products; and
- the manager's ability to provide client service and technical support.

This section discusses the principal differences, both qualitative and quantitative, existing across the largest investment management organisations in Australia. The

[21] The 'baby boomer' generation includes people born between the years 1946 and 1964 inclusive. In 2001, the age range for this generation is now 37 and 55.

information was collected in the form of Investment Manager Questionnaires, issued by the Investment and Financial Services Association Limited (IFSA) to fund managers on an annual basis for the benefit of asset consulting firms and managed fund ratings houses. The information provided by the investment managers is current for the 1999-2000 financial year, where the sample includes more than 30 Australian-based investment managers.

2.5.1 Organisational Structure

Figure 2.10 presents a general organisational structure of an Australian investment manager. Essentially investment management entities have the same standard corporate governance structure as any other corporation, where shareholders elect directors to the board of the company. The chief executive officer (CEO) of an investment management company is typically also a director and is accountable to other company directors for the stewardship of the firm. The CEO is also responsible for:

- the appointment of personnel to executive positions, in particular the chief investment officer (CIO) as well as a continual review of management's performance;

- ensuring the company's administrative requirements are maintained, such as human resources and information technology (in consultation with the firm's chief operating officer (COO)), and managing the company's financial position (with the assistance of the chief financial officer (CFO));

- business development and marketing, including reviewing and giving approval to new products (in consultation with the head of business development);

- compliance with legislation and rules relating to the provision of investment products and the management of investment portfolios; and

- investment policy review and overseeing risk management controls.

While the CEO exhibits ultimate operational control of the investment management company, it is generally the CIO's sole responsibility to execute the company's investment strategy. The head of asset allocation also assists in this task, and may be directly accountable to the CIO in the company's organisational structure. The CIO's role may include:

- participating in the asset allocation committee along with the head of asset allocation, decision making concerning portfolio construction across various asset classes (domestic versus international equities, fixed interest, property and cash), and the strategy with respect to currency hedging; and[22]

- maintaining close contact with the investment sector heads and ensuring that all senior investment personnel implement fund manager's investment philosophy in a consistent manner.

The asset allocation committee meets regularly (usually weekly) and typically includes the head of asset allocation, CIO, chief economist, sector heads or strategists across the mainstream asset classes, and the head of business development (generally as an observer as well as facilitating accurate information dissemination to current and prospective clients). The committee is ultimately responsible for setting the investment

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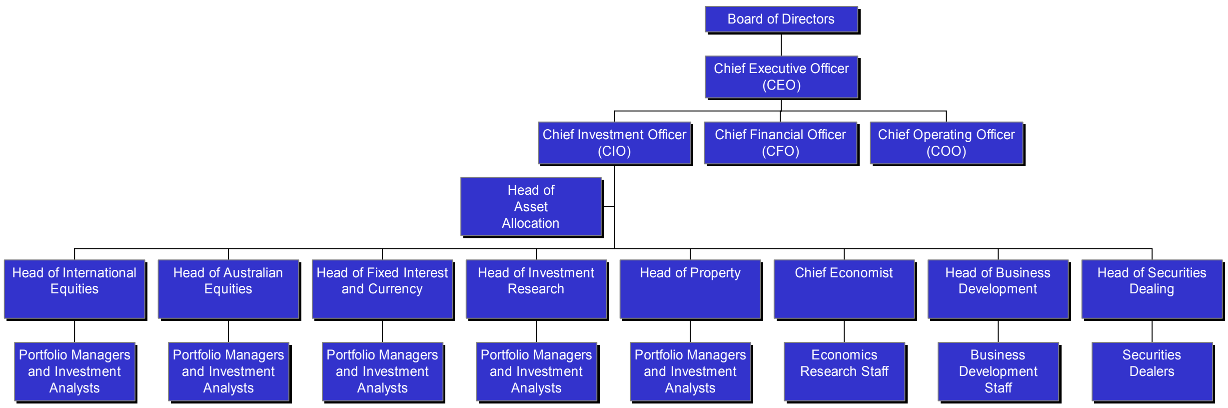
[22] In some investment management firms, the CIO does not chair the asset allocation committee, in which case the committee is chaired by the head of asset allocation.

manager's investment strategy and the portfolio weights to be adopted across multiple asset classes.

The asset class sector heads manage a number of portfolio managers and investment analysts across various sub-asset classes. For example, in Australian equities, the research function is divided into industrial and resources analysts who each specialise in sub-sectors including telecommunications, transport, tourism and leisure, banking and financial services. In the international equities sector, staff analyse securities in different regions around the globe and in specific sectors.

The head of business development is responsible for the expansion of the investment manager's services to new and existing clients. This function also includes managing the firm's communication's strategy to the market and the promotion of traditional and new managed investment products.

Figure 2.10 – General Organisational Structure for Australian Investment Management Companies



2.5.2 *Investment Manager Philosophy*

The investment philosophy of an investment manager represents the core beliefs and ideas that specific managers have concerning how capital markets work and the means by which investment strategies can be implemented to potentially earn superior returns to passive benchmark indices. For an active manager, the investment philosophy will be founded upon the belief that financial markets are inefficient, such that the collation and analysis of price-sensitive information represents an opportunity for the active fund manager to exploit securities that are mispriced. On the other hand, passive or index managers believe (a) capital markets are largely efficient, and while some inefficiencies do exist, they cannot be exploited in an economically significant manner or (b) an index approach may represent an attractive, lower cost strategy. Enhanced index strategies involve a combination of active and index philosophies, where the manager attempts to add small amounts of value above an index while simultaneously operating within tight risk-control parameters.

The investment strategies undertaken by asset managers also extend beyond market efficiency. In addition, investment managers will implement their investment process in a way that is consistent with their considered time horizon, style (value or growth stocks), market-capitalisation preferences (small or large) and risk-profile across the asset classes available to investors. Investment managers may also distinguish themselves on the basis of social and/or ethical concerns, the management of their investment team, and the manager's commitment to employing disciplined processes (i.e. methodical/systematic procedures) consistent with the overall strategy.

Portfolio managers also differentiate themselves with respect to portfolio construction, in that they either favour a 'top-down' approach or a 'bottom-up' methodology. In some cases it may be difficult to partition managers as either wholly top-down or bottom-up, however it is likely that where both approaches are incorporated, the manager will give preference to one of these strategies over the other. The top-down approach is implemented with respect to economic and capital market forecasts at a macro level, and investment managers allocate portfolio assets in a manner that ensures that changes in the economic cycle deliver the best possible returns for clients. For example, investment managers may foresee increased demand for raw materials together with economic conditions pointing toward increasing industrial production, rising consumer confidence and retail sales, and increasing corporate profitability. In such a scenario for a balanced or diversified portfolio, the investment manager may elect to overweight their portfolio toward equity securities. In cases where the investment manager is managing an Australian equities mandate, securities would be selected in such a manner which overweighted securities in those industries which are expected to perform well with respect to the current economic climate (consistent with the current example, this may include resource stocks, retail, tourism and leisure, developers and contractors, and banks). The bottom-up strategy on the other hand considers the available universe of securities on the basis of their individual fundamentals, and is less concerned with a macroeconomic perspective. That is, bottom-up managers are more concerned with an entity's balance sheet, competitive strength, market share and profitability.

2.5.3 Active Portfolio Management Strategies

The portfolio management of different asset classes is in most cases very unique. The following section describes the common investment strategies emphasised by Australian fund managers in the portfolio management process as well as their expected contribution to returns above the benchmark indices (or value-added). The sample comprises 31 Australian investment managers using survey data in the 2000 financial year from the Investment and Financial Services Association (IFSA). Each manager was asked to indicate the percentage weight each of the specific categories in the survey represented in their portfolio management strategy. However some fund managers do not offer to their client's specialist or balanced products across the entire asset class spectrum (e.g. international bonds), therefore survey data were not available. In addition, a small number of managers were unable to provide survey responses, for either confidentiality reasons or due to their organisation operating as a manager-of-managers. The asset-weighted averages are based on funds under management as at 31 December 1999 across each respective asset class. Tactical asset allocation is weighted by the manager's total funds under management at 31 December 1999. The size of asset managed by the 31 institutions comprising the sample at 31 December 1999 was around $A504.8 billion.

2.5.3.1 Tactical Asset Allocation

A diversified portfolio of assets comprising multiple asset classes renders the asset allocation decision of the investment manager as the most significant determinant of total risk and return for a fund. Indeed the founder of the Vanguard Group of Investment Companies, John C. Bogle, argues that "the most fundamental decision of investing is the allocation of your assets: How much should you own in stocks? How much should you own in bonds? How much should you own in cash reserves? According to a recent study, that decision has accounted for an astonishing 94% of the differences in total returns achieved by institutionally managed [U.S.] pension funds."[23] Blake *et al.* (1999) also confirmed the importance of the asset allocation decision using U.K. data. Accordingly, the investment strategy adopted by an active manager is significant and involves detailed

[23] Bogle (1994), page 235 in *Bogle on Mutual Funds*, McGraw-Hill.

research across all asset class sectors. Investment managers rely on the use of quantitative programs to determine the efficient frontier, representing the strategic long-term multiple asset class benchmark which reflects the highest expected total return for a given level of expected risk. Once the strategic benchmark allocation has been set, active managers implement tactical bets by adjusting the portfolio's weights across the asset classes on the basis of expected returns to those classes. Managers will overweight (underweight) those asset classes that appear undervalued (overvalued) and represent the most attractive (unattractive) expected returns. Investment managers will generally impose upper and lower bounds for each asset class, which restricts the portfolio from moving significantly from the stated strategic benchmark allocation. This may be achieved initially through the use of derivative instruments (where permitted by the fund) ensuring rapid exposure to an asset class in the short-term.[24] These synthetic exposures are then progressively equitised. The frequency of portfolio re-balancing required by the manager (due to market returns moving the portfolio weights away from strategic positions) is usually dependent on the manager's asset allocation ranges and expectations of economic and financial market conditions. The use of economic and capital market research by investment managers in adjusting the portfolio's asset allocation over time is an important element in the portfolio management process, as depicted by Table 2.21. Quantitative modelling and considerations concerning valuation of assets are also extremely important for active managers.

[24] Derivative instruments such as options and futures contracts can only be utilised where products in the market are available, such as equity and bond markets. For example, the property asset class does not have a derivative instrument.

Table 2.21 – Components of the Investment Strategy for Active Australian Investment Managers at the Millennium (Sample size = 23 Managers)

	Average Manager (%)	Median Manager (%)	Asset-Weighted Average (%)
Economic / Capital Market Forecasts	42.9	40.0	36.9
Market Psychology, Investor expectations	22.2	20.0	14.7
Historical Relative Value Relationships	30.5	25.0	24.6
Quantitative Modelling	31.5	20.0	20.1
Passive (minimal variation around long-term benchmark)	20.0	20.0	0.7
Other	9.2	10.0	3.0
TOTAL	-	-	100.0

2.5.3.2 Australian Equities

The Australian equities sector represents the largest single allocation to any asset class for balanced or diversified portfolios (see Table 4.1). Therefore, active managers view the domestic equities sector as critical in delivering active returns to balanced or multi-sector funds. Table 2.22 presents the IFSA survey data for the 2000 financial year, indicating the most important factors nominated by active managers in the management of active Australian share portfolios. Panel A indicates that valuation, projected growth and quality of the executive team of listed corporations are the most significant issues in the portfolio construction and management process. In addition, Panel B highlights the critical component of stock selection as the most fundamental determinant in the delivery of active returns to investors.

Table 2.22 – Components of the Investment Strategy for Active Australian Equity Managers at the Millennium (Sample size = 27 Managers (Panel A) and 28 Managers (Panel B))

	Average Manager (%)	Median Manager (%)	Asset-Weighted Average (%)
Panel A: Investment Strategy			
Valuation	35.5	30.0	29.5
Past Growth History	10.5	10.0	7.5
Projected Growth	28.0	30.0	28.5
Technical Analysis	3.5	3.5	0.1
Quality Management	17.7	15.0	14.5
Quantitative Methods	29.2	17.5	8.4
Index Weights	7.9	5.0	2.5
Other	28.3	20.0	9.1
TOTAL	-	-	100.0
Panel B: Expected Contribution to Performance			
Market Segment Focus (e.g. resources / industrials)	8.8	10.0	3.8
Industry / Sector Selection	18.1	17.5	10.4
Factor Tilts (value/growth, small/large capitalisation, yield)	20.3	13.8	9.1
Stock Selection	70.7	70.0	70.3
Cash Allocation	4.3	5.0	1.0
Other	17.0	15.0	5.4
TOTAL	-	-	100.0

2.5.3.3 International Equities

The international equity market's significant size generally requires investment managers to have access to a larger number of security analysts than is the case for the domestic equities sector. Due to the global nature of the investment activities, it is highly likely that investment managers will require dedicated investment professionals located within the major capital markets of the world to contribute to the investment process. The IFSA survey data for the 2000 financial year, presented in Table 2.23, indicate the importance of security valuations and quantitative models as the key factors required in the management of international equity portfolios. Capital market and economic forecasts are also reasonably important. The MSCI World (ex-Australia) benchmark index is the traditional market proxy measuring international equity performance, and the country weights comprising this index would represent an important reference point for international equity managers. Panel B suggests that individual stock selection is the most critical in earning active returns for the sample group of managers. In addition, deviations from the benchmark index's country weights and exposure to currencies also represent important sources of returns.

Table 2.23 – Components of the Investment Strategy for Active International Equity Managers at the Millennium (Sample size = 24 Managers (Panel A) and 23 Managers (Panel B))

	Average Manager (%)	Median Manager (%)	Asset-Weighted Average (%)
Panel A: Investment Strategy			
Economic and Capital Market Forecasts	26.1	20.0	14.0
Market Psychology / Investor Expectations	12.7	10.0	6.1
Judgmental Assessment of Relative Value	41.6	37.5	32.5
Quantitative Models	35.3	25.0	41.6
Passive (adjustments around long-term country allocation)	33.8	25.0	2.9
Technical Analysis	8.3	10.0	0.7
Other	30.0	30.0	2.1
TOTAL	-	-	100.0
Panel B: Expected Contribution to Performance			
Long-term Country Tilts	18.6	10.0	7.9
Shifts in Country Allocations	18.2	15.0	13.2
Industry Allocations	18.7	10.0	5.1
Currency Allocation	11.8	10.0	12.2
Individual Security Selection	56.8	60.0	58.6
Other	30.0	30.0	3.0
TOTAL	-	-	100.0

2.5.3.4 Australian Bonds

Investments in coupon bonds exhibit three risks facing investors – price risk, reinvestment risk and credit risk.

- price risk relates to changes in interest rates, where increases in interest rates cause devaluation in the bond's value. Bond prices are inversely related to interest rates. Further, price risk can only be eliminated when the bond is held until maturity;

- reinvestment risk occurs when interest payments accruing from bond securities cannot be reinvested at the equivalent or higher interest rates. If interest rates fall, although the bond price appreciates, interest payments will have to be reinvested at lower rates, reducing the potential yield to maturity. Holding the bond security to maturity cannot mitigate against reinvestment risk. Reinvestment risk exists because the calculation of yield to maturity assumes all coupon payments are reinvested at the same rate as prevailing yield to maturity at the acquisition date of the bond;

- credit risk refers to the chance the bond issuer will default in meeting coupon payments and/or the redemption of the bond at maturity;

The return on an Australian Commonwealth Government bond security has two components: the income received from semi-annual coupon payments (interest income) and the capital appreciation or depreciation in the bond's price. While the coupon payment remains fixed throughout the term of the bond's life, the market price of the bond deviates from the bond's par value (redemption value) until maturity (i.e. when the issuer redeems the bond). The price of the bond is determined with respect to the bond’s yield-to-maturity, which represents a market determined interest rate rendering the bond’s price equal to the present value of the future coupon payments derived from the bond. Shifts in the yield curve (or term structure of interest rates) result in changes to the price of the bond, such that, *ceteris paribus*, an upward (downward) sloping yield curve reduces (increases) the bond’s market value.

Active Australian bond fund managers predominantly manage their portfolios with respect to duration management (See Table 2.25 below). Duration is a measure indicating the length of time (in years) until the bond’s cash flows summate to equal the bond’s face value. However, duration management is ultimately concerned with the sensitivity of a bond security’s price given the potential change in interest rates. This sensitivity is considered by calculating the bond’s percentage change in price given an expected 1 percent increase or decrease in interest rates (see Sherris (1991) and Elton and Gruber (1995)). Duration is measured as the weighted average of the bond’s cash flows when they are received (comprising both coupon (or interest) payments and the principal). The applicable weights are the amounts of the payments discounted by the yield-to-maturity of the bond. Alternatively, the weights are the present values of the payments, using the bond's yield-to-maturity as the discount rate. The duration of a bond is expressed in terms of the number of years from the purchase date until the cash flows equate to the principal value of the bond. The duration measure for bonds allows bonds of different maturities and coupon rates to be compared directly, thereby overcoming the limitations inherent in making comparisons between bonds that differ on the basis of maturity and coupon rate. Table 2.24 summarises the effect on duration subject to differences in coupons, yield and bond maturity.

Table 2.24 – The Effects on the Duration of Bonds

	Higher Duration	Lower Duration
Higher Coupon Payments	-	YES
Lower Coupons Payments	YES	-
More Frequent Coupon Payments	-	YES
Less Frequent Coupon Payments	YES	-
Higher Yields	-	YES
Lower Yields	YES	-
Greater the Term to Maturity	YES	-
Lesser the Term to Maturity	-	YES

The management of bond portfolios also requires consideration of convexity of the yield curve (Sherris (1991)). While duration is a good measure of a bond's sensitivity to changes in interest rates, an additional and more accurate measure is concerned with the convexity of the yield curve. The yield curve is not linear therefore duration may not represent the most accurate means of analysis of a bond's true sensitivity to changes in interest rates. The convex nature of the yield curve means that for a given change in yield down or up, the gain in price for a drop in yield will be greater than the fall in price due to an equal rise in yields. Mathematically, duration is the first derivative of a bond's price with respect to yield, whereas convexity is the second derivative price with respect to yield. Alternatively, convexity is the rate of change of duration with yield, and accounts for the fact that as the yield decreases (increases), the slope of the price/yield curve (and duration) will increase (decrease).

Table 2.25 presents the aggregated IFSA survey results of Australian investment managers in the 1999-2000 financial year indicating the relative importance of each factor considered in the implementation and management of domestic bond portfolios. Duration management is the single most important concern to portfolio managers in the sector, followed by yield curve positioning, sector selection and credit analysis. Bond managers therefore rely heavily on forecasts concerning economic activity and the outlook for interest rates. While the duration and composition of the bond index represents a reference point for active managers, bond portfolios will be structured in a way that deviates from an index-mimicking strategy with the view of earning active returns above the benchmark.

Table 2.25 – Components of the Investment Strategy for Active Australian Bond Managers at the Millennium (Sample size = 27 Managers)

	Average Manager (%)	Median Manager (%)	Asset-Weighted Average (%)
Asset Allocation -Bonds/Cash/Index-linked bonds	5.0	5.0	0.1
Duration Management	49.1	50.0	54.1
Yield Curve Analysis (maturity distribution based on shape of yield curve)	18.9	15.0	16.9
Sector Selection (government, semis, corporate)	15.3	13.8	12.2
Issue Selection (including credit analysis)	14.7	10.0	11.7
Arbitrage, Spread anomalies using Forwards, Swaps.	8.5	5.0	3.8
Technical Analysis	5.0	5.0	0.0
Other	25.0	20.0	1.1
TOTAL	-	-	100.0

2.5.3.5 International Bonds

The international bonds asset class is typically the smallest component of a balanced fund’s strategic asset allocation. Investment managers are primarily concerned with the outlook for the global economy, particularly the interest rates, economic fundamentals and equity valuations in the larger industrialised nations. The relative value of bond securities and interest rate differentials across countries are significant. Investment managers predominantly invest in quality sovereign debt securities denominated in North America, Japan, European Monetary Union nations, and other non-Euro countries in Europe. Investment managers generally hedge their global bond portfolios back into Australian dollars, which is the converse for international shares.

Table 2.26 documents the survey responses of the sample of investment managers offering international bond exposures. Country and currency exposures as well as duration management represent the most significant factors influencing the investment strategy adopted by fund managers.

Table 2.26 – Components of the Investment Strategy for Active International Bond Managers at the Millennium (Sample size = 19 Managers)

	Average Manager (%)	Median Manager (%)	Asset-Weighted Average (%)
Asset Allocation -Bonds/Cash/Index-linked bonds	6.3	6.3	0.3
Duration Management	23.3	20.0	20.0
Yield Curve Analysis (maturity distribution based on shape of yield curve)	15.0	12.5	5.0
Sector Selection (government, semis, corporate)	10.4	7.5	7.8
Issue Selection (including credit analysis)	13.3	5.0	10.2
Arbitrage, Spread anomalies using Forwards, Swaps.	0.0	0.0	0.0
Country Allocation	32.4	30.0	26.8
Currency Exposure	26.2	25.0	26.2
Technical Analysis	10.0	10.0	0.5
Other	30.0	30.0	3.2
TOTAL	-	-	100.0

2.5.3.6 Listed Property

Table 2.27 presents the aggregated IFSA survey results of active listed property managers. The most important criteria in the management of property portfolios are distribution growth rates and the quality of the property assets. Investment managers rely on market forecasts concerning property values across the sectors (industrial, retail, commercial etc.) as well as regions across Australia. The most important issues inherent in managing successful listed property portfolios require the selection of securities which exhibit strong fundamentals, rental income streams which are relatively secure, attractive yields and excellent distribution growth prospects. The level of supply, vacancy rates and future demand is also important together with the expected economic conditions.

Table 2.27 – Components of the Investment Strategy for Active Australian Listed Property Managers at the Millennium (Sample size = 21 Managers)

	Average Manager (%)	Median Manager (%)	Asset-Weighted Average (%)
Quality of Tenants	8.4	7.5	7.3
Quality of Lease	11.0	10.0	7.9
Security Selection (Quality of Property)	21.2	15.0	17.1
Sector Selection	12.9	10.0	12.9
Geographic Selection	8.1	5.0	6.0
Price-to-Book Ratio	11.2	10.0	4.3
Economic Views	13.2	10.0	14.8
Net Market Flows	6.8	5.0	4.1
Distribution Growth Rates	22.1	20.0	23.3
Other	45.0	45.0	2.3
TOTAL	-	-	100.0

2.5.3.7 Derivatives Use

It is common that investment managers use derivative instruments including futures contracts, options, forwards, swaps and warrants when permitted to do so by the investment mandate. A derivative instrument is defined as a financial contract whose value is derived from an underlying asset. The principal uses of derivatives by investment managers in the portfolio management process includes risk management, execution of the investment strategy and adding value to the portfolio that is otherwise not available through the acquisition or disposal of physical assets. The use of derivatives however requires a comprehensive set of guidelines and controls such that synthetic instruments do not undermine the investment process or confidence of investors. In particular, derivatives should not be used by investment managers in a manner that gives rise to a leveraged (or geared) position or an effective exposure that is not covered by cash holdings or physical securities within the portfolio. Derivatives use is governed by APRA, which regulates professional investment managers through the Risk Management Statement (RMS). This is particularly important for Australian superannuation funds. In the case of fund managers, the RMS must detail the types of derivatives used, how they are implemented in the investment strategy and the risk controls governing their use.

2.5.4 Australian Investment Management Personnel

This section profiles the types of investment management personnel who are involved directly in the management of investment portfolios or who provide support services to the investment management organisation. The number of investment professionals will vary depending on the spectrum of asset classes in which the investment manager provides investment products and the emphasis given to servicing retail-oriented investors.

Investment professionals are defined in this survey as having a direct role in the strategic management of investment portfolios. The firm's chief executive officer (CEO) does not usually have a significant responsibility for the day-to-day management of the investment process. Rather, the firm's chief investment officer (CIO) is responsible for how the funds under management are invested. For the purposes of this analysis, the senior personnel of an investment organisation are defined as including the CEO, the CIO, and those who are directly responsible to the CIO – including the firm's sector heads, chief economist, head of investment research and head of asset allocation (where appropriate). Other investment professionals comprise those employees who are either portfolio managers or analysts across the various sectors providing direct research support to the money management process.

The survey data provided through the IFSA questionnaire contain the tertiary qualifications held by the individuals comprising the investment management team and their years of experience in the investment management industry and the years of service provided to their funds management employer since joining the company. As there is no deadline for submission of the completed questionnaire, fund managers returned the information to IFSA at varying stages throughout the year. In terms of the calculation of the number of years loyalty to the investment manager and the total experience in the industry, the statistics were calculated to 30 June 2000.[25]

Table 2.28 shows the cross sectional sample statistics related to type of degrees held by the personnel employed using an industry sample of 33 Australian fund managers. According to Rainmaker data concerning the size of the Australian investment industry as at 30 June 2000, these 33 investment managers controlled approximately $A508 billion in assets or 76 percent of the domestic investment management industry's assets. Table 2.28 presents the proportion of the total academic and industry accredited qualifications of all investment staff using sample data provided in the IFSA questionnaire. In a small number of cases, investment managers completing the IFSA survey only listed the master's qualifications of their staff and did not record the employee's bachelor degree. For example, if an employee is listed with a postgraduate degree in commerce (i.e. M. Com.), it is highly likely that the employee attained a bachelors degree in the same academic

[25] The IFSA questionnaires are dated by the investment managers. Because the end dates are not perfectly synchronous, the end of June 2000 was selected as the common date to evaluate investment manager's average employee experience and loyalty. This requires an assumption that no employee turnover occurs in the six months either side of the event window of 30 June 2000. Given the annual frequency of reporting by investment managers through the IFSA questionnaire, this is the best means by which comparisons can be made. The statistics presented in Table 2.7 indicate that the level of potential bias is likely to be small, as staff turnover is well above one year's duration on average.

discipline previously (i.e. B. Com.). The same argument can be applied to employees being listed by the IFSA questionnaire with a postgraduate arts degree (i.e. M.A.), where it is also highly likely the employee also holds an undergraduate arts degree (i.e. B.A.). This deduction can be made due to the standard academic progression through university requiring the fulfilment of an undergraduate degree as a prerequisite to commencing a postgraduate degree. Where the fund manager does not list the undergraduate degree, an assumption must be made that the employee holds a joint bachelors and masters degree in the same academic discipline.[26] If the data in Table 2.28 ignored this issue, the academic qualifications represented within the organisation would be distorted. Further, Table 2.28 concentrates on only the most important qualifications directly related to the management of investment funds by investment professionals.[27] Commerce, economics, business, management and science-oriented degrees are not only the most common qualifications conferred by academic institutions, they can be argued to be the most related and necessary skills required by investment management employees. The 'other bachelor' and 'other master' degree categories are principally law, engineering, education and arts degrees.

Table 2.28 presents the industry sample statistics based on 903 investment personnel whose degree qualifications are listed in each individual manager's IFSA questionnaire. The results are intuitive; particularly with respect to findings in Panel A, indicating the majority of investment management personnel (by percentage of personnel) hold an economics, commerce or business-related undergraduate degree. In terms of the percentage of undergraduate business degrees, almost half of fund manager employees hold a bachelors degree in an economic, finance, commerce or business-oriented discipline. These types of degrees are completed over three or four years full-time. Just

[26] The questionnaire data indicate that this assumption does not need to be made too frequently. Indeed, consultation with a few of the managers indicated this assumption was required.
[27] For this reason, diplomas and industry qualifications obtained outside and not closely related to the investment management industry were ignored.

under one quarter of investment management personnel hold an honours qualification and one-fifth hold a masters degree in commerce, economics, business administration or finance. The rapid decline in the number and proportion of investment management staff holding higher degrees suggests that:

- undergraduate qualifications in themselves are an appropriate minimum level of entry to the profession; and

- the additional years of investment in human capital may be outweighed by opportunity costs associated with their desire for career advancement in the short-term, desire to obtain industry-recognised qualifications and the amount of available leisure time outside of employment.

The number of investment professionals holding a Doctor of Philosophy degree is very small and represents only 2.5 percent of all academic degrees and 3.2 percent by investment personnel. This possibly suggests that research degrees may not be an important prerequisite to be employed by an investment manager, there may exist a lack of supply in the labour market, or alternatively, an investment manager may only require a small number of Ph.D.s within their investment operation. While most employees hold only one academic degree, just less than one-third of investment manager employees hold at least two academic degrees and only 4.3 percent of all employees hold at least three degrees.

Panel B of Table 2.28 presents the industry statistics for the sample of investment personnel who exhibit an industry-awarded qualification. The statistics show around 38 percent of employees hold at least one industry certification. The Securities Institute of Australia's A.S.I.A. (associate membership) and F.S.I.A. (fellow membership) qualification, awarded through the completion of a graduate diploma in applied finance and investment, represents 53.3 percent of all non-degree qualifications held, or 20.4 percent of all personnel in the sample. Accounting accreditations, such as the Australian Chartered Accountant (A.C.A.) and Certified Practising Accountant (C.P.A.) awards, and the internationally renowned Chartered Financial Analysts (C.F.A.) are held by 8.7 and 6.1 percent of personnel respectively.

Table 2.28 – Cross-Sectional Statistics of 33 Australian Investment Managers –Qualifications of 903 Investment Personnel

Qualifications	Number of Qualifications	Percentage by Qualification	Percentage by Personnel
Panel A: Academic Degrees			
B.Ec./B.Com./B.Bus. (Or Equivalent)	557	47.4	61.7
B.Sc. (Or Equivalent)	139	11.8	15.4
Honours degrees*	216	N/A	23.9
Other Bachelor Degrees	199	16.9	22.0
M.Com/M.Ec./M.B.A./M.App Fin. (Or Equivalent)	183	15.6	20.3
M.Sc. (Or Equivalent)	27	2.3	3.0
Other Masters Degrees	41	3.5	4.5
Ph.D.	29	2.5	3.2
TOTAL	**1175**	**100.0**	**N/A**
Panel B: Non-Degrees/Industry Qualifications			
CFA	55	15.9	6.1
FSIA/ASIA	184	53.0	20.4
FCA/ACA/FCPA/CPA	79	22.8	8.7
FIAA/AIAA	29	8.4	3.2
TOTAL	**347**	**100.0**	**N/A**
Panel C: Multiple Degrees Held			
More than 2 Degrees	287	N/A	31.8
More than 3 Degrees	39	N/A	4.3

*An honours degree is awarded in conjunction with an undergraduate bachelors degree or postgraduate masters degree. Accordingly, the percentage by degree column (column 3) is not applicable.

Table 2.29 presents the cross-sectional statistics relating to the period of employment by investment personnel with their current investment manager and their total years of experience within the investment management industry. Panel A presents the statistics for the senior personnel of the investment management organisation, defined as the CEO, CIO, sector heads, head of asset allocation (if applicable) and other staff required to attend the fund manager's asset allocation or investment committee. Panel B on the other hand shows the results for the remaining staff who are responsible in the investment management process. Senior staff on average across managers had around 16 years of investment experience, of which around 8 years has been served with their current employer. The remaining investment personnel have approximately 9 years investment experience and 4.8 years service had been provided with their current employer.

Table 2.29 – Cross-Sectional Averages for 33 Australian Investment Manager Entities – Experience of Personnel to 30 June 2000

	Average (in Years)
Panel A: Senior Investment Personnel	
Total Investment Experience - Average	16.2
Total Investment Experience – Standard Deviation	6.7
Total Years of Service to Current Employer – Average	8.1
Total Years of Service to Current Employer – Standard Deviation	5.1
Panel B: Other Investment Personnel	
Total Investment Experience - Average	9.2
Total Investment Experience – Standard Deviation	5.7
Total Years of Service to Current Employer – Average	4.8
Total Years of Service to Current Employer – Standard Deviation	3.3

2.5.5 Top Management Changes

Investment management organisations, as with other firms in different sectors, experience turnover in their human capital. The extent to which senior management turnover improves or detracts from investment performance is likely to be of significant interest to investors. However, this will be dependent upon why the change occurred (e.g. merger-related or otherwise), the nature of the investment team (experience and ability), the succession plans that exist and the extent to which the senior manager departing the firm exercised significant control in the execution of the investment process or was an important team-leader.

Studies by Khorana (1996, 2001) evaluating U.S. mutual fund performance and top management changes indicated that past performance (measured with respect to portfolio returns and asset growth) was reasonably able to predict the eventual replacement of managers. Further, Khorana (2001) found that subsequent poor performance prior to the change in management resulted in significantly improved performance for the fund. On the other hand, the strong returns attributable to overperforming managers could not be sustained after their departure.

In Australia, recent industry studies by Frank Russell Company and van Eyk suggest turnover by senior investment managers (CIOs and sector heads) is reasonably high. Their estimates range from between 20 and 50 percent in any given year. In the 6-year period from January 1994 to December 1999, Frank Russell Company identified 66 departures of Australian equities and fixed interest sector heads, and in more than half of these cases, performance in the post-replacement period was higher than previously. For heads of Australian equities and Australian fixed income, the average performance differentials before fees were 1.3 percent and 0.30 percent per annum, respectively.

Investment managers rarely disclosed the true reason behind a departure, however poor performance in the past is likely to become a contributing factor to the replacement of a manager. In some cases senior personnel have departed to commence operations as a boutique entity, including the commencement of Maple-Brown Abbott, Portfolio Partners, Platinum, Contango and Perennial. These departures may also have been partly caused due to remuneration or compensation issues.

One of the issues of turnover in senior investment staff is the likelihood of a 'ripple-effect' when one or more managers depart. Depending on the management structure of the funds management company and their succession planning, the departure of the CEO or managing director (who also provides significant input into the investment strategy) may result in the promotion of the CIO to fill the CEO vacancy. Where this occurs, a new CIO is subsequently appointed. In general, the new CIO is usually a prior CIO, managing director or a sector head in equities or bonds, either already employed by the incumbent manager or from a competitor. If there is an internal promotion to CIO, and where the new CIO does not combine their new role with their previous responsibilities, a new appointment will be required to fill the sector head's vacancy. Therefore, one change in senior management can induce changes in roles for the remaining senior managers. The stability of the investment team (professionals) in such a scenario is reasonably protected.

An analysis of senior staff departures for a sample of 177 positions over the period January 1989 to October 2001 was performed. The sample was compiled from investment manager surveys and media reports covering 52 Australian investment management firms. Three senior positions were analysed: CIO, heads of Australian equities and heads of Australian bonds. The sample statistics are presented in Table 2.30.

Table 2.30 – Top Management Changes in Australian Investment Management Firms in the Period January1989 to October 2001

	CIO	Head AEQ	Head AFI
Panel A: Actual Tenure Periods of Professionals			
Number of Staff Departures	39	41	16
Average Tenure (Arrival to Departure) (years)	3.47	3.13	3.48
Median Tenure (years)	3.01	2.92	3.00
Standard Deviation (years)	2.28	1.50	1.98
Panel B: Tenure of Existing Professionals (Not Departing)			
Number of Staff	34	26	21
Average Tenure Since Arrival to October 2001 (years)	3.20	2.97	3.79
Median Tenure Since Arrival (years)	2.79	2.04	4.25
Standard Deviation Since Arrival (years)	2.31	2.64	1.82

The statistics concerning tenure periods of senior staff (Panel A) suggest the length of time served in the roles of CIO, equities or fixed income director is around 3 years. Australian equities heads exhibited the shortest tenure, however the variability (standard deviation) for these managers is the lowest of all senior personnel classes. Panel B presents the survey results of top management who are currently employed in their role and have not departed as at 31 October 2001. Analysis of these individuals is important as it provides an indication of the general length of time senior executives have served their current employers. The tenure periods are generally similar to Panel A, however it is apparent that fixed income directors have served longer periods with their existing employers than is the case for CIOs or equities directors.

2.5.6 Compensation Arrangements for Investment Manager Personnel

Australian investment managers generally remunerate their staff in addition to their base salary. Depending on the investment manager and whether investment professionals meet their performance objectives – defined in terms of satisfying management within their role (subjective assessment) as well as portfolio performance relative to appropriate market indices (objective assessment). In the review process (where performance appraisal is generally considered over annual periods), money managers may also be eligible for:[28]

- fixed bonuses – where employees earn a percentage of their salary as a bonus;
- discretionary bonuses – awarded to employees as a 'once-off' when performance is deemed to be exceptional;
- deferred bonuses – where deferred compensation in the form of investment units in the funds directly managed by investment professionals vests after a minimum period of three years or a period of time equivalent to the medium term objective of the funds concerned;
- profit-sharing agreements; and
- equity in the organisation – through the use of options over the investment manager's stock or discounts to the current market share price. Fund managers may elect to allow for the provision of equity in the firm which vests over either medium or long-term time horizons.

In some cases, the use of variable elements of remuneration by investment managers such as bonuses and equity options can represent a significant proportion of an employee's total remuneration. The variable component of an investment manager's remuneration is typically between zero and 40 percent of the total remuneration package, however, in some cases the upper bound may be 60 percent. This is due to the highly

[28] Investment managers may also use review periods greater than one-year to encourage long-term performance and employee stability.

competitive nature of the investment industry. As a result, fund managers therefore need to both attract and retain high-calibre staff through the use of such incentive schemes to encourage and reward excellence. In addition to direct remuneration, staff may also be eligible to receive financial assistance towards the education costs associated with the completion of higher degrees offered through universities, or studies associated with the attainment of relevant industry qualifications.

Table 2.31 presents the distribution of total remuneration (in per annum terms) of professional money management staff employed in Australia in October 2000. The Financial and Remuneration Group (FIRG) and W. M. Mercer survey is an industry-wide analysis of remuneration across various financial services sectors. The survey relies on the partitioning of remuneration by job category, in a manner that also accounts for the differences in employee responsibility, job function and seniority. The employment levels 1 (lowest) to 5 (highest) represent levels of seniority, responsibility and required skills to undertake the role. In some cases, use of the entire five levels is not appropriate to define the specific role surveyed. The table below indicates that remuneration increases rapidly beyond the first tier. In particular, money managers employed in the International equities and Australian equities asset classes are the most highly remunerated of all investment management categories surveyed by FIRG.

Table 2.31 – Investment Management Total Remuneration Per Annum (Expressed in Thousands of Australian Dollars) - October 2000 Survey

Classification	Level 1	Level 2	Level 3	Level 4	Level 5
Panel A1: Research Analysis					
1st Quartile	28.5	55.0	69.5	162.8	194.0
Median	60.0	99.5	114.4	240.5	276.8
3rd Quartile	63.8	187.5	242.4	355.5	370.4
Panel A2: Research Analysis (Economics)					
1st Quartile	N/A	N/A	N/A	N/A	145.9
Median	N/A	N/A	N/A	N/A	164.8
3rd Quartile	N/A	N/A	N/A	N/A	223.8
Panel B: Risk/Quantitative Analysis					
1st Quartile	73.9	135.0	N/A	N/A	N/A
Median	100.4	162.0	N/A	N/A	N/A
3rd Quartile	136.5	203.7	N/A	N/A	N/A
Panel C: Asset Allocation (Strategy)					
1st Quartile	64.1	107.9	205.9	N/A	N/A
Median	84.0	143.3	319.3	N/A	N/A
3rd Quartile	134.1	166.3	398.3	N/A	N/A
Panel D: Australian Equities (Portfolio Management)					
1st Quartile	79.8	109.7	184.6	283.2	N/A
Median	117.7	163.7	221.0	399.4	N/A
3rd Quartile	166.8	185.9	333.3	567.5	N/A
Panel E: International Equities (Portfolio Management)					
1st Quartile	69.8	109.5	201.7	292.5	N/A
Median	79.7	130.2	260.0	508.8	N/A
3rd Quartile	162.5	205.5	395.0	824.2	N/A
Panel F: Fixed Interest/Bonds/Cash (Portfolio Management)					
1st Quartile	N/A	80.0	114.9	176.3	302.8
Median	N/A	99.8	156.4	200.0	358.3
3rd Quartile	N/A	120.0	210.9	282.5	501.4
Panel G: Property Investment					
1st Quartile	44.8	N/A	N/A	191.3	202.3
Median	81.0	N/A	115.0	234.9	323.7
3rd Quartile	114.5	N/A	N/A	255.8	385.1
Panel H: Dealing - Equities					
1st Quartile	59.5	92.5	187.0	N/A	N/A
Median	70.3	112.3	310.0	N/A	N/A
3rd Quartile	88.8	152.4	385.0	N/A	N/A

Classification cont.	Level 1	Level 2	Level 3	Level 4	Level 5
Panel I: Dealing – Fixed Interest/Bonds/Cash					
1st Quartile	64.7	86.1	N/A	N/A	N/A
Median	70.0	109.7	N/A	N/A	N/A
3rd Quartile	84.3	159.3	N/A	N/A	N/A
Panel J: Investment Analytics					
1st Quartile	39.0	48.1	82.7	115.3	N/A
Median	44.0	56.0	85.8	132.2	N/A
3rd Quartile	55.1	68.3	95.9	150.9	N/A

Source: William M. Mercer & Financial and Insurance Remuneration Group (FIRG)

2.5.7 Management Fees

Historically, investment management companies have been remunerated for the provision of their services through the levying of an asset-based fee, based on the size of the assets invested with the manager. The per annum percentage management fees applicable are typically inversely related to the size of assets invested with the fund manager. The sliding scale nature of fees levied by investment managers recognises that mandates have both fixed and variable cost components, and as asset size increases, the proportional fixed costs of investment decline. However over the last decade, investment managers have also offered institutional investors the opportunity of paying fees, which directly relates to stated performance objectives that can be measured. In addition to fixed asset-based fees, some managers also levy performance-based fees equal to a pre-defined percentage of the outperformance from an appropriate market benchmark over a period of time. Where an investment manager has identified and agreed to a baseline performance level, the contract may include a 'claw-back' clause enabling underperformance relative to the benchmark to be returned to the client before performance fees are payable. It is also prudent that clients place upper limits or maximum bounds on performance-based incentives to ensure the objectives of the investor are not potentially compromised.

A recent survey by Towers Perrin presented in Table 2.32, which included 43 institutional investment managers offering products in Australia found:

- performance-based fees are more commonplace in the growth asset class sectors, namely equities and property; and
- the majority of managers are willing to levy performance-based fees for individually managed accounts than is the case for pooled vehicles.

Table 2.32 – Towers Perrin Performance-Based Fee Survey - 28 February 2001

Asset Class	Currently Offered (%)	Willing to Offer (%)	Not Willing to Offer (%)
Panel A: Individual Mandates			
Australian Equities	49	49	2
International Equities	14	62	24
Property	18	68	14
Australian Bonds	27	50	23
Overseas Bonds	14	64	22
Panel B: Pooled Investment Vehicles			
Australian Equities	27	33	40
International Equities	4	39	57
Property	9	50	41
Australian Bonds	4	40	56
Overseas Bonds	4	42	54

Source: Towers Perrin

William M. Mercer conducted a survey of Australian investment managers and reported median institutional management fees as at 30 September 1999. Table 2.33 shows the sliding scale of fees as the size of the investment mandate increases. Those managers who apply fixed fees, which are independent of the asset size invested, are represented in the M.E.R. column. The percentages of fund managers in each sample group who charge institutional clients a performance-based fee are also shown.

Table 2.33 – Median Institutional Management Fees (in Percent Per Annum) as at 30 September 1999 MER (Management Expense Ratio), OPF (Offer Performance Fees).

Investment Strategy & Product Type	$A Million							MER (%)	OPF (%)	Sample Size
	$5	$10	$25	$50	$100	$150	$200			
Panel A: Balanced/Growth										
Active/Pooled	0.66	0.65	0.61	0.60	0.56	0.56	0.55	0.79	12.9	56
Active/Individual			0.60	0.55	0.49	0.48	0.47		50.0	28
Passive/Pooled	0.25	0.25	0.22	0.20	0.19	0.19	0.19	0.34	None	5
Panel B: Capital Stable										
Active/Pooled	0.60	0.57	0.55	0.55	0.51	0.50	0.49	0.75	9.7	26
Active/Individual			0.52	0.45	0.40	0.38	0.38		50.0	8
Passive/Pooled	0.23	0.23	0.19	0.16	0.15	0.15	0.15		None	2
Panel C: High Growth										
Active/Pooled	0.75	0.75	0.75	0.70	0.63	0.60	0.60		40.0	5
Panel D: Australian Equities										
Active/Pooled	0.62	0.61	0.60	0.59	0.56	0.55	0.54	0.74	22.0	54
Active/Individual			0.58	0.54	0.48	0.47	0.48		60.0	35
Enhanced Passive/Pooled	0.30	0.30	0.30	0.26	0.25	0.22	0.22		16.7	6
Enhanced Passive/Individ.				0.29	0.23	0.22	0.21		60.0	5
Passive/Pooled	0.20	0.20	0.13	0.10	0.08	0.07	0.06	0.24	None	6
Passive/Individ.				0.11	0.08	0.08	0.07		None	3
Panel E: Australian Small Companies										
Active/Pooled	0.72	0.70	0.64	0.60	0.60	0.60	0.60	0.77	None	10
Active/Individual			0.60	0.60	0.56	0.54	0.52		37.5	8
Panel F: Global Equities										
Active/Pooled	0.75	0.75	0.75	0.73	0.69	0.64	0.64	0.95	8.2	46
Active/Individual			0.67	0.66	0.60	0.57	0.53		46.9	29
Passive/Pooled	0.20	0.20	0.18	0.15	0.13	0.10	0.10	0.22	None	7
Passive/Individ.				0.12	0.09	0.08	0.08		None	4
Panel G: Emerging Markets										
Active/Pooled	1.08	1.08	1.08	1.08	1.06	1.02	1.02	1.38	None	8
Active/Individual			1.00	1.00	0.96	0.91	0.88		33.3	9

Investment Strategy & Product Type cont.	$ Million cont.							MER (%)	OPF (%)	Sample Size
	$5	$10	$25	$50	$100	$150	$200			
Panel H: Direct Property										
Active/Pooled	0.75	0.70	0.66	0.58	0.54	0.53	0.52	0.82	12.5	7
Panel I: Listed Property										
Active/Pooled	0.60	0.60	0.57	0.55	0.50	0.50	0.50	0.76	10.3	24
Active/Individual			0.58	0.54	0.48	0.46	0.45		43.8	16
Passive/Pooled	0.17	0.17	0.11	0.10	0.08	0.08	0.07	0.24	None	4
Panel J: Diversified Property										
Active/Pooled	0.65	0.61	0.61	0.58	0.54	0.53	0.52		None	3
Panel K: Australian Bonds										
Active/Pooled	0.40	0.40	0.40	0.38	0.35	0.33	0.33	0.45	13.5	34
Active/Individual			0.30	0.30	0.24	0.23	0.22		59.1	22
Enhanced Passive/Pooled	0.25	0.25	0.20	0.17	0.16	0.15	0.15	0.24	None	6
Enhanced Passive/Individ.				0.10	0.09	0.08	0.08		50.0	4
Passive/Pooled	0.15	0.15	0.10	0.08	0.06	0.05	0.05		None	3
Passive/Individ.				0.08	0.07	0.06	0.06		None	4
Panel L: Australian Index Bonds										
Active/Pooled	0.34	0.31	0.30	0.28	0.26	0.25	0.25	0.28	12.5	8
Active/Individual				0.19	0.16	0.15	0.15		75.0	4
Panel M: Global Bonds										
Active/Pooled	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.65	11.1	23
Active/Individual			0.47	0.44	0.35	0.31	0.30		34.8	22
Panel N: Diversified Fixed Interest										
Active/Pooled	0.43	0.43	0.42	0.40	0.39	0.37	0.37	0.44	None	6
Active/Individual			0.35	0.35	0.32	0.29	0.28		37.5	7
Panel O: Cash										
Active/Pooled	0.30	0.28	0.26	0.25	0.25	0.25	0.25	0.35	8.0	48
Active/Individual			0.20	0.20	0.17	0.16	0.16		50.0	18
Passive/Pooled	0.15	0.15	0.12	0.10	0.09	0.08	0.08	0.19	None	2
Panel P: TAA Trust										
Active/Pooled	0.55	0.55	0.55	0.54	0.52	0.50	0.49	0.65	None	7
Panel Q: TAA Overlay										
Active/Pooled					0.25	0.21	0.20		50.0	5
Panel R: Currency Overlay										
Active/Individual				0.25	0.25	0.23	0.23		33.3	3

Source: Mercer Wholesale Investment Management Fee Survey 1999, pp. 5-6

Table 2.34 – Retail Management Expense Ratios (MER) for Managed Funds as at 30 June 1999

Managed Fund Category	Average % MER per annum
Australian Equity Trusts – Diversified	1.86
Australian Equity Trusts – Property	1.68
Australian Equity Trusts – Small Companies	2.00
Australian Equity Trusts – Resources	1.87
Cash Management Trusts	1.01
Fixed Interest Trusts – Diversified	1.56
International Equity Trusts – Asia	2.17
International Equity Trusts – Asia Ex Japan	2.29
International Equity Trusts – Diversified	2.11
International Equity Trusts – Japan	2.30
International Equity Trusts – North America	2.14
International Equity Trusts – Western Europe	2.06
International Fixed Interest Trusts – Diversified	1.80
Mortgage Trusts – Diversified	1.09
Multi-Sector Trusts – Aggressive	2.10
Multi-Sector Trusts – Balanced	1.94
Multi-Sector Trusts – Defensive	1.82
Multi-Sector Trusts – Growth	1.88
Multi-Sector Trusts – Moderate	1.79
Unlisted Property Trusts – Diversified	1.78

Source: Morningstar

2.5.8 Merger and Acquisition Activity and New Start-Ups in the Australian Investment Industry

Mergers and acquisitions in competitive markets occur for a variety of reasons. The most significant benefits accruing to a larger entity include improved cost efficiencies, potentially reduced competition, as well as access to skills, talents not currently available to the fund manager.

The mergers and acquisition activity in the investment management industry has gathered pace over the last decade. Table 2.35 provides a brief summary of the merger and acquisition activity in the last 14 years to 30 September 2001. The industry has changed significantly in the last decade. These changes include:

- Life insurance companies and friendly societies having less significance in terms of their assets under management compared with the late 1980s;

- the major banks have all sought to diversify their businesses in the financial services industry, with greater emphasis on investment management services. This strategy has been in response to growing the bank's revenue through improved utilisation of the significant customer bases enjoyed by banks. This leads to the bank cross-selling managed funds to existing banking customers and diversifying the product range available to new and existing clients. Of the four major banks in Australia, Commonwealth and National Australia have been the most active acquirers of investment management firms. These include recent acquisitions of MLC, Colonial First State and Commonwealth Funds Management. Colonial has been significantly active in acquisitions prior to the Commonwealth merger;

- increased presence of international asset management domiciled organisations through the acquisition of local investment management companies. This is consistent with their globalisation strategy, achievement of economies of scale and increased competition in global financial services.

Table 2.35 – Mergers and Acquisitions Impacting on the Australian Investment Management Industry (Direct and Indirect) (1988-2001)

Date	Acquirer	Target (where applicable)
April 1988	McIntosh Asset Management	SPAL Management
September 1988	Hong Kong and Shanghai Banking Corporation (HSBC)	Wardley Australia (Wardley Investment Management)
December 1988	Prudential	Aetna Casualty and Life
January 1989	Prudential	Investors Life (Inlife)
August 1989	Security Pacific Australia	Kleinwort Benson Australia
December 1989	Citicorp Investment Management	PNC International Financial Services
February 1990	Macquarie Bank	Risk Averse Money Managers
April 1990	Potter Warburg Asset Management	Hambros Australia
December 1990	Commonwealth Bank	State Bank of Victoria
June 1992	Lend Lease	Australian Eagle
October 1992	Sun Alliance Group	Royal Insurance Australia
November 1993	Tower Corporation	Friends Provident Life Assurance Co Ltd (Friends Investment Management)
December 1993	Colonial Mutual Life Assurance Society Limited (Colonial Mutual Investment Management)	Scottish Amicable Life Assurance Society
April 1994	Tyndall Australia	NZ Guardian Trust Co
October 1994	Pacific Mutual Australia (Armstrong Jones)	Pyrford International
November 1994	Colonial Mutual Life	State Bank of NSW (First State Fund Managers)
May 1995	Tyndall	Global Funds Management Australia Ltd.
November 1995	Legal & General	SGIC Life/Superannuation
November 1995	Mercury Asset Management	Potter Warburg Asset Management
August 1996	CBA	CFM
September 1996	Mercantile Mutual	Pacific Mutual Australia (Armstrong Jones)**
October 1996	AXA	National Mutual Funds Management
December 1996	Suncorp	Metway Bank and Queensland Industry Development Corporation (QIDC)
December 1996	Commonwealth Investment Management	Commonwealth Funds Management
January 1997	St. George Bank	Advance Bank (SealCorp/Advance Asset Management)
May 1997	Deutsche Morgan Grenfell	Axiom Funds Management
July 1997	Zurich	Scudder Kemper Investments
October 1997	National Australia Bank	County Investment Management
October 1997	Tower Life	Advance Life
December 1997	ABN AMRO	BZW (Australia & New Zealand)
December 1997	Royal Sun Alliance	Connelly Temple

Date cont.	Acquirer cont.	Target (where applicable) cont.
January 1998	Merrill Lynch	Mercury Asset Management
February 1998	AMVESCAP	LGT Asset Management
February 1998	AMP	Henderson
March 1998	Union Bank of Switzerland (UBS)	Swiss Bank Corporation (SBC)****
April 1998	Challenger International	Poynton Asset Management
May 1998	Colonial	Legal & General Australia##
June 1998	Salomon Smith Barney	JP Morgan Investment Management Australia
July 1998	Challenger International	Howard Financial Holdings (Howard Funds Management)
August 1998	Colonial	Prudential Corporation of Australia
September 1998	Norwich Union Australia	Portfolio Partners
September 1998	Salomon Smith Barney***	Citicorp
December 1998	Perpetual	Wilson Dilworth
February 1999	Royal Sun Alliance	Tyndall Australia
June 1999	Principal	BT Funds Management
June 1999	Tower	FAI Life
August 1999	Perennial Investment Partners	IOOF
August 1999	Banque Nationale de Paris (BNP)	Paribas
September 1999	Mercantile Mutual	Heine Management Limited
November 1999	SMF Funds Management	United Funds Management
February 2000	AMP	GIO Australia
March 2000	Commonwealth Bank	Colonial Group
March 2000	CGU plc	Norwich Union Australia
April 2000	National Australia Bank	MLC
May 2000	BNP Paribas Investment Management	Massachusetts Financial Services (MFS)
October 2000	Aberdeen Asset Management	EquitiLink Investment Management
December 2000	Alliance Capital Management	AXA Asia-Pacific
December 2000	Challenger International	Integrated Equity
December 2000	INVESCO	County Investment Management
September 2001	Deutsche	Zurich Scudder

Source: Publicly available information in the financial press and Macquarie Research (Equities). # = remaining 50 percent acquired by Mercury Asset Management plc, † = takeover of GIO Australia included acquisition of GIO Asset Management. ** Includes MMI Insurance's 30 percent divestiture of Pacific Mutual to Mercantile Mutual. ## Tactical Global Management created as a stand-alone funds management business in 1998. *** Arises from Travelers Group's ownership of SSB and the merger with Citicorp (U.S.) ^ HSBC acquired the remaining 49 percent it did not own of Wardley Australia. N/A = undisclosed or not applicable. **** merged entity renamed Warburg Dillon Read (included SBC Brinson as the funds management arm)

In addition to mergers and acquisitions, a number of newly formed investment managers have commenced. These 'boutique' investment managers have now begun to rival their larger institutional competitors. In the year 2000, the Australian Financial Review reported boutique managers in Australia had captured more than $1 billion from traditional asset managers. At present there exist around 30 boutique managers. The most notable boutique entities include Portfolio Partners (commenced 1994) and Maple-Brown Abbott (commenced 1984). Portfolio Partners was formed by a number of senior investment professionals departing County Natwest Investment Management in 1994. Portfolio Partners was later sold to Norwich Union in 1998. Boutique managers generally aim to offer investors higher returns than traditional managers as well as providing a higher level of client service.

However, the actual definition of a 'boutique' manager varies within the industry. Classifications of boutique managers are typically made with respect to the firm's ownership structure, their specialisation within a specific asset class and the size of funds under management. In classifying Australian boutique managers, Rainmaker Information has proposed a definition that includes small wholesale funds managers and where the owners of the firm directly manage the client's investments. In a recent survey, and employing the above definition, Rainmaker reported the largest 10 Australian boutique managers controlled in excess of $A10 billion or 86 percent of total boutique assets. These statistics are presented in Table 2.36.

Table 2.36 – Australian Boutique Investment Managers as at 31 March 2001

Rank	Boutique Investment Managers	$A Billion
1	Balanced Equity Management	2.86
2	Hastings Funds Management	2.00
3	Ausbil Dexia Limited	1.34
4	Jardine Fleming Capital Partners	1.13
5	Concord Capital Limited	0.90
6	Bell Asset Management	0.81
7	Hopkins Partners Funds Management	0.55
8	Wallara Asset Management	0.47
9	Warakirri Asset Management	0.37
10	Perennial Investment Partners	0.33
-	Total Top 10	10.18
-	Total Boutique Market	11.80

Source: Rainmaker Information

2.6 Future Directions for the Australian Managed Funds Industry

The size of the Australian funds management industry, in terms of the total assets managed by professional investment managers, will continue to grow – principally as a result of increases in superannuation, accelerated by legislated increases in the superannuation guarantee levy. However there are a number of further areas in which the industry is likely to change in the future:

- increasing globalisation of investment markets that will continue to be facilitated through advances in technology and improvements in the speed and quality (e.g. granularity) of information dissemination. Australian investors are likely to seek an increase in their portfolio allocations to international investments at the expense of domestic asset classes (i.e. movement away from home country bias);

- the continuing competition in the industry, particularly through the relaxation of restrictions preventing foreign investment managers offering Australian investors access to their suite of mutual funds at a lower cost than is the case at the present time;

- increased merger and acquisition activity in the investment management industry, particularly as global firms continue to seek a presence in the Australian market place. This would then allow large investment managers to benefit from global economies of scale through their provision of capital, labour, distribution, technology and services;

- increasing competition from 'boutique' investment managers and new start-up entities (formed by talented fund managers) and offering highly specialised investment products. This has partly been encouraged by asset consulting firms favouring the 'core plus satellite' model in the awarding of mandates. Thus, even greater emphasis should be placed on sector specialisation rather than selecting diversified managers. This also provides investors with increased diversification of manager risk and style;

- greater specialisation across asset classes, dichotomised into sub-group categories. Investors may also exhibit greater acceptance of alternative investment classes such as absolute return strategies (including hedge funds), emerging markets equity and debt instruments, venture capital (or private equity) and infrastructure assets. For performance reporting purposes, investors may demand a higher degree of information in understanding the true source of performance (e.g. international equities classified into countries, regions and industries rather than aggregated);

- as a result of the Commonwealth Government's policy of debt reduction and improved fiscal management, investment managers will respond by focusing more on non-government debt instruments such as corporate issues and international fixed income securities;

- direct property investments are likely to decrease as a proportion of the total portfolio as investors reduce their allocation toward assets with relative lower liquidity (compared with exchange-listed securities);

- continued reliance on outsourcing of international assets exposure by the majority of domestic managers. This is mainly due to scale issues;

- retail fund managers continuing to maintain their concentration of retail assets due to the necessity of scale economies by providers and their established networks of distribution and ability to cross-sell products. Large retail managers also appear to receive preferential treatment by ratings agencies on the basis of their size or 'branding', which further ensures such concentration;

- increased competition in the pricing structures of institutional managed funds and greater flexibility in the compensation arrangements of investment managers which ties remuneration to direct performance outcomes rather than being completely derived from fixed asset-based fees;

- increasing attention given to passively managed index and enhanced-index funds in combination with active fund investments. This includes possible participation in exchange-traded funds (ETFs), where managed funds are bought and sold through a licensed stockbroker. A few investment managers, including Salomon Smith Barney Asset Management and Barclays Global Investors, have recently launched a series of ASX-listed equity funds. The ASX has also signalled their intention to offer existing retail managed funds (as an exchange-listed vehicle) to be transacted through the Stock Exchange Automated Trading System (SEATS);[29]

- changing role for asset consulting firms, where asset consultants provide more specialised services including direct management through a fund-of-funds approach. Also, potentially greater value placed on consultants that have a global presence;

- due to increasing investor education and participation in markets (primarily through superannuation) it is probable that a higher level of consumer awareness will lead to additional requests for information, commentaries on markets and strategic issues, and ultimately investment performance. With advances in information technology, investors are most likely to have greater interaction (e.g. web-based) with fund managers and superannuation fund administrators as well as the provision of more frequent and comprehensive reporting;

- the consolidation of superannuation funds into larger industry funds and master trusts should continue into the future. This process will result in further consolidation in decision-making power among fewer trustees and asset consultants. The trend for company funds to move to master trusts is likely to arise due to the complexity of superannuation legislation, legal liabilities faced by trustees, the increasingly generic nature of super funds (in that they all offer the same benefits and simultaneously makes it difficult to establish branding or differentiation) and the need for companies to focus on their primary business activities. Superannuation members are also likely to have greater choice (known as Member Investment Choice) in the types of options available

[29] *Australian Financial Review*, 21 March 2001, page 24

to them in terms of the aggressiveness or otherwise of how their retirement assets are managed;

- increased regulation of the Australian investment industry, particularly with respect to improved information disclosure and risk management procedures. This may ultimately arise in the form of a new industry body that is independent of both the Australian Securities and Investments Commission (ASIC) and Australian Prudential Regulation Authority (APRA).

3

CHAPTER 3 – LITERATURE REVIEW

3.1 Introduction

The empirical literature evaluating managed funds (or in the U.S., mutual funds and pension funds) has overwhelmingly been concerned with assessing the performance of actively managed investment portfolios.[30] Further, published research has been highly concentrated on the evaluation of U.S. mutual fund performance, however, the literature's coverage and analysis of mutual funds offered in other capital markets around the world has only until recently began to gather momentum.

According to the *Journal of Financial and Quantitative Analysis*'s special issue on performance measurement (Volume 35, 2000), the origins of the performance evaluation literature date back to the early work of Alfred Cowles. Cowles' (1933) publication in *Econometrica* evaluated the forecasting (or market timing) skills of money managers in the United States. His general finding indicated an inability of money managers to provide superior returns to the general market of common stocks. While the empirical work since Cowles (1933) has gathered momentum, including the use of more sophisticated performance evaluation techniques, the general conclusions reported by Cowles (1933) have seldom been contradicted. In essence the empirical evidence overwhelmingly finds

[30] In the U.S., mutual funds are comparable to retail managed funds in Australia. That is, mutual or retail funds are open to private investors generally allocating smaller monetary denominations to investment managers in return for units (or shares) in the pooled investment vehicle. Institutional or wholesale managed funds differ from retail products in the sense that they are open to investors who are able to allocate larger investment parcels, usually in the vicinity of a minimum $100-250 million. In Australia, such investors are typically high net-worth individuals, institutions or pension funds.

that actively managed mutual funds on average have been unable to earn superior returns to an appropriate benchmark proxy portfolio or index. The review of the empirical literature examining the performance evaluation of managed portfolios is presented in Section 3.2.

The evaluation of asset managers, and mutual funds in particular, has been significant since the 1960s. In the United States, from whence most of the literature has emanated, the increased attention to mutual funds and pension funds has arisen due to significant growth in the financial assets managed by institutions, the wide availability of ratings information by firms including Morningstar Inc., Lipper Inc., Wiesenberger Inc., the Investment Company Institute Inc. as well as the strict regulation of mutual funds by the U.S. Securities and Exchange Commission (SEC). Accordingly, this supervision of mutual funds has ensured the data available to investors are of a sufficient granularity and in standardised format that permits appropriate comparisons across funds. Similar to the U.S., data availability in Australia for managed funds has improved significantly, and the attention afforded to the industry has increased markedly. This can be explained due to the demographic structure of Australia's population (ageing population), the widening of superannuation coverage and the asset size pool of superannuation funds, as well as the increased competition, product availability and existence of investment services offered to institutional and retail investors.

The performance evaluation literature has been firmly grounded in the theoretical underpinnings of Modern Portfolio Theory (MPT), and more specifically the theory of how capital assets are priced. Nobel Laureates, specifically Harry Markowitz's (1952) and William F. Sharpe's (1964) contributions are of critical importance, as their theoretical work has provided an understanding of how investors should construct portfolios – with respect to expected return and risk.

The work of Sharpe (1964), Lintner (1965) and Mossin (1966) led to the development of the Capital Asset Pricing Model (CAPM), which is a two-parameter model that assumes investors are only concerned with mean and variance of asset returns. The traditional portfolio performance techniques developed by Treynor (1965), Sharpe (1966) and Jensen (1968, 1969) have all been extended from MPT and the theory of capital asset pricing. In particular, the Jensen (1969) and Sharpe (1966) methodologies have been the most influential techniques adopted by empiricists in the last three-and-a-half decades since their formulation. These metrics are discussed below in Section 3.2.

Shukla and Trzcinka (1992) have provided a comprehensive synthesis of the evolution of the performance evaluation literature. These authors offer a three-part decomposition of the history of developments in the evaluation of investment portfolios and mutual fund managers. According to their overview, the three generations have become further fragmented in terms of the scope of scientific work in the field over time. The generalised evolution can be seen as follows:

- understanding and accurately quantifying portfolio risk. The CAPM's influence in the derivation of risk models in the evaluation of investment performance has been critically important in the first generation of the literature, in particular Jensen's alpha (1968) and Sharpe's (1966) reward-to-variability ratio;

- closer scrutiny of the CAPM assumptions, both theoretically and empirically. Roll's (1977, 1978) critique of the CAPM, highlighting the problems associated with mean-variance inefficiency of the benchmark as well as specification of the reference portfolio are particular cases in point. Significant contributors to this branch of work extend to Admati and Ross (1985), Dybvig and Ross (1985a), and Lehmann and

Modest (1987). The second generation of the literature also led to finer decompositions of portfolio performance into market timing and security selection components. The work of Treynor and Mazuy (1966), Fama (1972), Jensen (1972), Merton (1981) and Henriksson and Merton (1981) are of significant importance; and

- extensions of portfolio performance beyond the sole reliance on benchmark portfolio proxies (Grinblatt and Titman (1989b, 1993) as well as improvements in the definitions of benchmark indices (for example, Elton *et al.* (1993), Elton *et al.* (1996a), Carhart (1997) and Daniel *et al.* (1997)). These extensions account for the types of securities included in portfolios as well as controlling for factor risks (market capitalisation, book-to-market equity and momentum) in addition to the common market factor. The findings of Fama and French (1993) concerning risk factors explaining common stock and bond returns represent a significant contribution to the literature. Shukla and Trzcinka (1992) also consider the performance persistence literature as belonging to the third generation. This includes the work of Grinblatt and Titman (1992), Hendricks, Patel and Zeckhauser (1993), Brown and Goetzmann (1995) and Elton *et al.* (1996a).

However, in the nine years since Shukla and Trzcinka's (1992) synthesis was published, an additional generation of performance evaluation literature has evolved. The areas of research belonging to the present era of literature include:

- wider scope of analysis to different asset class sectors beyond equity-oriented funds, specifically bond funds (Blake *et al.* (1993, 1995), Detzler (1999)), hedge funds (Ackermann *et al.* (1999), Agarwal and Naik (2000), Brown *et al.* (1999)), and real estate investment trusts or REITs (Kallberg *et al.* (2000));

- conditional performance evaluation models that account for public information available to active managers and the time-variation in risk and risk premiums (Ferson and Schadt (1996), Christopherson *et al.* (1998) and Becker *et al.* (1999))

- consideration of the influence of survivorship bias in performance evaluation studies (Brown *et al.* (1992), Elton *et al.* (1996b));

- performance attribution of diversified or multi-sector portfolios and the tactical asset allocation ability of investment managers (Brinson *et al.* (1986), Brinson *et al.* (1991), Blake *et al.* (1999));

- increased attention and scrutiny of index mutual fund performance (Gruber (1996), Keim (1999), Frino and Gallagher (2001));

- the liquidity service provided by mutual fund managers and explanations behind the inability of active mutual fund managers to outperform benchmark indices (Edelen (1999)).

- cash flows, predictability and fund performance (Gruber (1996), Zheng (1999), Carhart (1997));

- manager compensation arrangements/tournaments (Brown *et al.* (1996), Busse (2001));

- the effect of top management changes on mutual fund performance (Khorana (1996), Khorana (2001)); and

- manager characteristics as a predictor of performance (Chevalier and Ellison (1999b), Golec (1996)).

3.2 Empirical Evidence Concerning Managed Fund Performance

Table 3.1 to Table 3.4 provide summarised information of empirical studies evaluating the performance of managed portfolios. The literature concentrating on Australian, U.S. and U.K investment vehicles are evaluated individually. The concluding table includes a synthesis of other markets including France, Japan, Spain and Sweden. The literature widely confirms the inability of active investment managers to earn superior risk-adjusted excess returns to appropriate market indices, both before and after consideration of management expenses. While there have been some studies which have documented superior performance, in most cases, the typical explanations supporting these propositions have concerned misspecification of the model, misspecification of the benchmark or survivor-biased samples of funds (for example, see Elton *et al.* (1993)). However, some dissenting studies have recently emerged in the literature, arguing that a Grossman-Stiglitz (1980) view of market efficiency is in existence (e.g. Wermers (2000)). These issues are further discussed in Section 3.4.

Table 3.1 – Published Empirical Evidence Concerning Australian Fund Performance

The journal abbreviations are reconciled in the Appendix. 'Sector' classifies studies on the basis of the securities comprising portfolios (diversified accounts for funds which invest in the broad spectrum of asset classes, namely equities, bonds, property and cash). 'Returns Basis' classifies studies on the basis of whether returns are before investment expenses or after costs. 'Super' refers to funds that are designated pension funds, 'Non-Super' refers to other funds which are not classified as pension vehicles and used for general investment. Data frequency indicates whether the returns were daily (D), weekly (W), monthly (M) or yearly (Y). Fund structure differentiates between funds that are open to new money or funds that have a fixed number of shares/units and do not experience capital movements (i.e. closed). The remaining categories are self-explanatory.

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1983	Bird, Chin, McCrae	AJM	Diversified	1973-1981	104	Q	Net	Super	Open	Yes	Sharpe, Treynor, Jensen	Funds do not outperform
1986	Robson	A&F	Equities, Diversified	1969-1978	76	M	Net	Non-Super	Open	Yes	Sharpe, Treynor, Jensen	Funds do not outperform
1990	Sinclair	A&F	Diversified	1981-1987	16	M	Net	Super	Open	Yes	Jensen, Henriksson-Merton, Brown-Durbin-Evans	Funds do not outperform, market timing particularly perverse
1999	Hallahan	A&F	Diversified, Fixed Income	1989-1993	224	M	Net	Super	Open	Yes	Jensen, Sharpe	Performance persistence strong for fixed income funds
1999	Hallahan, Faff	JMFM	Equities	1988-1997	65	M	Net	Non-Super	Open	Yes	Jensen, Treynor-Mazuy, Cubic Model	General absence of market timing and stock selection ability
2000	Sawicki	AJM	Diversified, Equities, Property	1981-1995	124	M	Net	Super/Non-Super	Open	Yes	Jensen	Fund flows positively related to past performance
2000	Sawicki, Ong	PBFJ	Diversified, Equities	1983-1995	97	M	Net	Super/Non-Super	Open	Yes	Jensen, Ferson-Schadt, Treynor-Mazuy	Funds do not outperform
2001	Gallagher	A&F	Diversified, Equities, Bonds	1991-1998	16	M	Gross	Super	Open	Yes	Jensen, Treynor-Mazuy, Henriksson-Merton, Performance Attribution	Funds do not exhibit superior timing or selection ability

Table 3.2 – Published Empirical Evidence Concerning U.S. Fund Performance

'Equities' denotes funds investing entirely in equities or those funds that predominantly invest in equities. 'Sector' refers to the author's predominant focus on equity funds and/or funds investing mainly in equity securities. Other categories are defined as above in Table 3.1. N/A indicates the study does not provide the necessary information with which to make a conclusive classification, or else the information is not applicable.

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1933	Cowles III	ECON	Equities	1928-1932	45	W	N/A	N/A	N/A	Yes	Raw measure	Inability of investment companies to successfully predict market movements or specific stocks
1962	Friend, Brown, Herman, Vickers	U.S. S.E.C.	Equities	1953-1958	152	Y	Net	Mutual	Open	Yes	Quasi-risk adjusted	Funds do not outperform
1966	Sharpe	JB	Equities	1954-1963	34	Y	Net	Mutual	Open	Yes	Sharpe	Results consistent with capital market efficiency
1966	Treynor, Mazuy	HBR	Equities	1953-1962	57	N/A	Net	Mutual	Open	Yes	Treynor-Mazuy	No evidence of market timing ability by funds
1968	Jensen	JF	Equities	1945-1964	115	Y	Net	Mutual	Open	Yes	Jensen	Inability of funds to outperform
1970	Carlson	JFQA	Equities	1948-1967	122	Y	Net	Mutual	Open	Yes	Jensen, Sharpe	Performance sensitive to benchmark used; past performance lacked predictive ability; Good performers experience high cash inflow; Size and expense ratio is unrelated to performance.
1974	McDonald	JFQA	Equities and Bonds	1960-1969	123	M	Net	Mutual	Open	Yes	Jensen, Sharpe, Treynor	Overall, an inability of funds to earn significantly positive risk-adjusted returns. Systematic risk related to investment objectives
1978	Kim	JFQA	Equities	1969-1975	138	Q	Net	Mutual	Open	Yes	Jensen, Sharpe	Performance of mutual funds consistent with capital market efficiency
1978	Kon, Jen	JF	Diversified	1960-1971	49	M	Net	Mutual	Open	Yes	Jensen	Risk is not stationary through time
1979	Kon, Jen	JB	Equities	1960-1971	49	M	Net	Mutual	Open	Yes	Jensen, 2 & 3 regime model specification (Quandt)	Mixed findings concerning performance and funds' ability to outperform
1983	Kon	JB	Equities	1960-1976	37	M	Net	Mutual	Open	Yes	Kon-Jen approach based on switching regression model	Mutual fund managers have no market timing ability
1984	Chang, Llewellen	JB	Equities	1971-1979	67	M	Net	Mutual	Open	Yes	Henriksson-Merton	Funds overall did not outperform the market, indicating a lack of ability in timing and selectivity

Table 3.2 continued…

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1984	Henriksson	JB	Diversified, Equities	1968-1980	116	M	Net	Mutual	Open	Yes	Henriksson-Merton	Inability of mutual fund managers to derive superior returns attributable to market timing. Negative correlation between timing and selectivity coefficients
1987	Elton, Gruber, Rentzler	JB	Commodity /Futures	1979-1985	85	M	Net	Pool	Open	Yes	Sharpe	Commodity funds are not necessarily superior to mutual funds. Persistence in performance was weak
1987	Ippolito, Turner	FAJ	Diversified stock and bond	1977-1983	1526	Y	Net	Pension	Open	Yes	Jensen	Funds underperformed the S&P 500 but outperformed a weighted stock and bond index
1987	Lehmann, Modest	JF	Equities	1968-1982	130	M	Net	Mutual	Open	Yes	Jensen, Treynor-Black, Arbitrage-based risk model	Empirically demonstrates the importance of benchmark specification in tests of mutual fund performance. Abnormal performance of mutual funds exists in the study
1988	Edwards, Ma	JFM	Commodity /Futures	1976-1987	55	M	Net	Pool	Open	Yes	Risk-adjusted metrics	Information disclosure in prospectuses are not good guides to future returns
1989	Grinblatt, Titman	JB	Equities	1975-1984	274 157	M,Q	Net	Mutual	Open	Yes & No	Raw Returns, Jensen	Aggressive growth funds earn superior returns pre costs but not after costs
1989	Ippolito	QJE	Equities	1965-1984	143	M	Net	Mutual	Open	No	Jensen	Active funds earn risk-adjusted returns equivalent to fees and expenses
1990	Cumby, Glen	JF	International Equities	1982-1988	15	M	Net	Mutual	Open	Yes	Jensen, Positive Period Weighting Measure (PPW)	Inability to provide investors of funds with superior returns to an international index
1990	Elton, Gruber, Rentzler	FAJ	Commodity /Futures	1980-1988	130	M	Net	Pool	Open	No	Raw Returns	Performance is not attractive and there are high risks; dissolution rates are high
1990	Lee, Rahman	JB	Equity-oriented	1977-1984	93	M	Net	Mutual	Open	Yes	Bhattacharya-Pfleiderer	Some funds earn abnormal returns, however in general, most funds do not outperform the market in either timing or selectivity
1991	Connor, Korajczyk	RQFA	Equities	1968-1982	130	M	Net	Mutual	Open	Yes	Jensen, APT, Henriksson-Merton	Funds underperform. Demonstrate sensitivity of results to risk factors employed
1991	Cornell, Green	JF	Low-Grade Bonds	1960-1989	>90	M	Net	Publicly traded	Closed	Yes	Raw Returns, Multifactor risk model	Low-grade bonds exhibit higher systematic risk than high-grade bonds, are less sensitive to interest rate movements and exhibit higher returns than high-grade bond funds

Table 3.2 continued…

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1991	Eun, Kolodny, Resnick	JPM	International Equities	1977-1986	19	M	Net	Mutual	Open	Yes	Sharpe, Jensen, Treynor, Henriksson-Merton	Funds failed to outperform MSCI World Index
1991	Brinson, Singer, Beebower	FAJ	Diversified	1977-1987	82	Q	Net	Pension	Open	Yes	Performance attribution approach	Inability to earn active returns above strategic benchmarks of funds
1992	Brown, Goetzmann, Ibbotson, Ross	RFS	Equities	1976-1987	153	M	Net	Mutual	Open	No	Jensen	Existence of survivorship bias gives rise to apparent persistence in performance. Thus biased inferences arise
1992	Chen, Lee, Rahman, Chan	JBFA	Equities, Diversified	1977-1984	93	M	Net	Mutual	Open	Yes	Treynor-Mazuy	Funds are poor market timers; minority of funds have positive selectivity
1992	Grinblatt, Titman	JF	Equities	1975-1984	279	M	Net	Mutual	Open	Yes	Jensen Measure with additional benchmarks	Positive performance persistence exists
1993	Blake, Elton, Gruber	JB	Bonds	1979-1988	46	M	Net	Mutual	Open	No	Jensen, Multiple index model	Bond funds underperform market indices after expenses
1993	Coggin, Fabozzi, Rahman	JF	Equities	1983-1990	71	M	Gross	Pension	Open	Yes	Treynor-Mazuy, Bhattacharya-Pfleiderer	Security selection estimates are positive and market timing is negative on average. Negative correlation between timing and selectivity confirmed
1993	Elton, Gruber, Das, Hlavka	RFS	Equities	1965-1984	143	M	Net	Mutual	Open	No	Jensen, 3 Factor model	Active funds perform in line with appropriate indices
1993	Grinblatt, Titman	JB	Equities	1975-1984	155	Q	Gross	Mutual	Open	Yes	Portfolio Holdings Measures	Some evidence of funds outperforming (aggressive growth funds predominantly); some evidence of performance persistence
1993	Hendricks, Patel, Zeckhauser	JF	Equities	1975-1988	165	Q	Net	Mutual	Open	No	Jensen, multi-index benchmark	Evidence of performance persistence for growth-oriented funds over one-year evaluation periods
1993	Irwin, Krukemyer, Zulauf	JFM	Commodity /Futures	1979-1990	186	M	Net	Pool	Open	No	Raw Returns, Sharpe	Portfolio of commodity pools outperforms a passive buy and hold strategy after costs

Table 3.2 continued…

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1994	Droms, Walker	JFR	International Equities	1971-1990	108	Y	Net	Mutual	Open	Yes	Raw Returns, Sharpe, Treynor, Jensen	Alphas insignificantly different from zero, consistent with an efficient global capital market. Performance is not related to expense ratios levied, asset size or portfolio turnover
1994	Goetzmann, Ibbotson	JPM	Equities	1976-1988	728	M	Net	Mutual	Open	Yes	Jensen, Raw Returns	Past returns and rankings have predictive ability
1994	Grinblatt, Titman	JFQA	Equities	1975-1984	279	M	Net	Mutual	Open	Yes	Jensen, PPW, Treynor-Mazuy	Performance can be highly sensitive to benchmarks used; market timing ability absent from mutual funds
1995	Brown, Goetzmann	JF	Equities	1976-1988	829	M	Net	Mutual	Open	Yes	Raw, Jensen, 3-index model	Evidence of performance persistence
1995	Elton, Gruber, Blake	JF	Bonds	1986-1991	123	M	Net	Mutual	Open	Yes	Jensen, 4 index model, 2 other multiple factor models	Bond funds underperform the market
1995	Grinblatt, Titman, Wermers	AER	Equities	1975-1984	274	Q	Gross	Mutual	Open	Yes	Multi-Factor Jensen Model	Funds tend to hold past winners, indicating momentum preferences; Momentum strategies outperformed contrarian strategies
1995	Kahn, Rudd	FAJ	Equities & Bonds	1983-1994	300	M	Net	Mutual	Open	Yes	Jensen, Sharpe-based Information Ratio	Performance persistence found in bond funds only and not equity funds
1995	Malkiel	JF	Equities	1971-1991	724	Q	Gross & Net	Mutual	Open	No	Jensen, Total Returns	Funds underperformed on average both before and after expenses. Evidence of performance persistence in the 1970s but not in 1980s
1995	Volkman, Wohar	JFR	Equities	1980-1989	332	M	Net	Mutual	Open	Yes	Jensen	Performance persistence is documented. In particular persistence is positively (negatively) related to maximum capital gains funds (income funds). Persistence is positively (negatively) related to funds with low (high) management fees. No relationship in persistence between fund size and performance
1996	Bekaert, Urias	JF	Emerging Equities	1991-1993	80	W	Net	Listed	Closed	Yes	Sharpe, Mean-Variance Spanning Tests	U.K. emerging equity funds provide diversification benefits to investors, however U.S. funds do not
1996	Brown, Harlow, Starks	JF	Equities	1980-1991	334	M	Net	Mutual	Open	Yes	Raw Return, Risk adjustment procedure	Mid-year ‘losing’ funds tend to increase volatility in latter six-months compared with ‘winning’ mid-year funds

Table 3.2 continued…

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1996	Chen, Knez	RFS	Equities	1968-1989	68	M	Net	Mutual	Open	Yes	Conditional and Unconditional measures independent of asset pricing models	Performance measurement can be arbitrary. The authors demonstrate the need for evaluation techniques to encompass four minimal conditions
1996	Elton, Gruber, Blake	JB	Equities	1977-1993	188	M	Net	Mutual	Open	No	Four index model	Performance persistence arises for mutual funds using 1 and 3 year evaluation periods
1996	Elton, Gruber, Blake	RFS	Equities	1977-1993	361	M	Net	Mutual	Open	No	Three index model	Demonstrates the importance of controlling for survivor bias in mutual fund studies – excluding non-survivors improves performance
1996	Ferson, Warther	FAJ	Equities	1968-1990	63	M	Net	Mutual	Open	Yes	Jensen, Treynor-Mazuy, Conditional model	Conditional models improve mutual fund performance, however, mutual funds do not outperform. Fund flows may explain why betas indicate perverse timing ability
1996	Ferson, Schadt	JF	Equities	1968-1990	67	M	Net	Mutual	Open	Yes	Conditional and Unconditional Jensen, Treynor-Mazuy and Henriksson-Merton	Conditional evaluation models improve performance estimates compared to unconditional models. Conditional models correct for perverse timing estimates when unconditional models used
1996	Gallo, Swanson	JBF	Foreign Equities	1985-1993	37	M	Net	Mutual	Open	Yes	Sharpe, Treynor-Mazuy, Multi-factor model	Performance was consistent with market index, however some conjecture exists from other models
1996	Gruber	JF	Equities	1985-1994	270	M	Net	Mutual	Open & Closed	No	Raw Returns, Jensen, 4 index model	Active funds do earn superior returns to an index fund
1997	Bello, Janjigian	FAJ	Equities	1984-1994	633	M	Net	Mutual	Open	Yes	Treynor-Mazuy (including additional variables)	Negative correlation between timing and selectivity; evidence of superior timing and selection ability
1997	Carhart	JF	Equities	1962-1993	1892	M	Net	Mutual	Open	No	Jensen, Carhart 4-factor model	Persistence in performance is explained by common factors (e.g. momentum) in equities and mutual fund expenses. Persistence remains among poor performing funds
1997	Chevalier, Ellison	JPE	Equities	1982-1992	449	M	Net	Mutual	Open	Yes	Jensen, Semi-parametric model.	The flow-performance relation provides incentives for fund companies to alter the fund's risk level

Table 3.2 continued…

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1997	Daniel, Grinblatt, Titman, Wermers	JF	Equities	1975-1994	>2500	Q	Gross	Mutual	Open	No	Characteristic-based measures, GT measure, Carhart, Jensen	Aggressive growth funds exhibit security selection skill, however no market timing ability exists for the sample of funds
1997	Detzler, Wiggins	RQFA	Internationa l Equities	1985-1994	35	M	Net	Mutual	Open	Yes	Jensen, Positive Period Weighting Measure	International equity index found to be inefficient and outperformance arises. Performance persistence is also evident
1997	Fung, Hsieh	RFS	Hedge/Com modity	1991-1995	409	M	Net	Private vehicle	Open	Yes	Extended Sharpe (1992) style analysis	Hedge funds exhibit low correlation with mutual funds and also the standard asset classes identified and invested within by mutual funds. In addition to considering the asset mix (location of assets), additional style factors for hedge funds must also account for the trading strategy adopted and how leverage is used
1997	Shukla, Singh	GFJ	U.S. & Global Equities	1988-1995	104	M	Net	Mutual	Open	Yes	Sharpe, Treynor, Jensen	Global equity funds outperform. However U.S. funds superior to global equities
1998	Christopher son, Ferson, Glassman	RFS	Equities	1979-1990	273	M	Gross	Pension	Open	Yes	Ferson-Schadt Conditional model, Jensen	Performance persistence is strongly evident, particularly for conditional models
1998	Horan	JFR	Equities	1979-1993	1273	Q	Gross	Pension & Non-Pension	Open	Yes	Jensen, Fama-French	Pension assets more likely to be indexed and exhibit index attributes (beta close to unity and alpha zero). Around a third of institutional funds earned significantly positive alpha
1998	Sirri, Tufano	JF	Equities	1971-1990	690	M	Net	Mutual	Open	Yes	Raw Returns, Total Returns, Jensen	Investors chase past winners, but remain with poor performers. Flows are positively related to the size of the investment provider and attention received by the fund through the media. Such funds levy higher expenses
1999	Ackermann, McEnally, Ravenscraft	JF	Hedge	1988-1995	906	M	Net	Private vehicle	Open	No	Raw Returns, Sharpe	Hedge funds outperform mutual funds but not market indices. Hedge funds exhibit higher risks than mutual funds
1999	Becker, Ferson, Myers, Schill	JFE	Equity, Balanced and Asset Allocation	1976-1994	>400	M	Net	Mutual	Open	Yes	Conditional Jensen model, Conditional Treynor-Mazuy	Little evidence of market timing ability; performance closely aligned to appropriate benchmarks

Table 3.2 continued…

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1999	Brown, Goetzmann, Ibbotson	JB	Hedge	1989-1995	399	Y	Net	Private vehicle	Open	Yes	Raw Returns, Sharpe, Jensen	Positive risk-adjusted returns and high attrition rates of funds. Low correlation with U.S. equities market
1999	Busse	RFS	Equities	1985-1995	230	D	Net	Mutual	Open	Yes	3 and 4 index volatility timing models	Volatility timing demonstrated as another performance measure. Funds decrease their market exposure during periods of high volatility
1999	Chay, Trzcinka	JFE	Equities & Bonds	1966-1993 1974-1990	94 22	M	Net	NYSE, AMEX listed	Closed	Yes	Jensen, Carhart, APT, Ferson-Schadt Conditional model	Managerial performance of stock funds predictable based on the premium but not for bond funds
1999	Chevalier, Ellison	JF	Equities	1988-1995	492	Y	Net	Mutual	Open	Yes	Jensen, Carhart	Manager age and educational background significantly affects performance outcomes
1999	Chevalier, Ellison	QJE	Equities	1992-1994	N/A	M	Net	Mutual	Open	Yes	Jensen	Younger managers tend to avoid unsystematic risk more than older managers
1999	Detzler	JBF	Global Bonds	1988-1995	19	M	Net	Mutual	Open	Yes	Jensen, Positive Period Weighting Measure, Multiple index models	Active funds did not outperform the benchmark indices
1999	Edelen	JFE	Equities	1985-1990	166	M	Net	Mutual	Open	Yes	Jensen, Treynor-Mazuy, Henriksson-Merton, Edelen flow adjustment	Liquidity-motivated trading by mutual funds is equivalent to the underperformance of the index, flow explains negative market timing coefficients
1999	Edwards, Liew	JFM	Commodities/Futures	1982-1996	619	M	Net	Pools & Public Funds	Open	No	Sharpe	Commodity funds have diversification benefits in portfolios comprising traditional assets; Extent to which skill exists in performance is open to empirical investigation
1999	Keim	JFE	Equities	1982-1995	1	M	Net	9-10 Mutual	Open	-	Fama-French	Case study on a small-cap index fund tracking the 9-10 deciles of CRSP. With constraints of minimizing trading and stock illiquidity, the passive fund outperforms by 2.2% p.a.
1999	Liang	FAJ	Hedge	1992-1996	1162	M	Net	Private Vehicles	Open	No	Sharpe, multiple index Jensen	Hedge funds outperformed mutual funds on a risk-adjusted basis, which cannot be explained by survivorship bias. Incentive fees on hedge funds, where losses must be recovered first, outperform other hedge funds where the hurdle rates are high

Table 3.2 continued…

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1999	Lynch-Koski, Pontiff	JF	Equities	1992-1994	679	M	Net	Mutual	Open	Yes	Moments of distribution, Jensen, Henriksson-Merton	Fund performance attributes similar irrespective of whether derivatives are used by mutual funds or not. Derivatives users (21% of sample) exhibit less sensitivity to changes in risk over time
1999	Volkman	JFR	Equities	1980-1990	332	M	Net	Mutual	Open	Yes	Jensen, merged Carhart & Bhattacharya-Pfleiderer model	No ability to outperform through stock selection and market timing. Large funds outperform small funds and a negative relationship exists between selectivity and investment manager compensation
1999	Zheng	JF	Equities	1970-1993	1196	Q	Net	Mutual	Open	No	Raw Returns, Jensen, Fama-French, Conditional models	Funds receiving fund inflows outperform funds experiencing cash outflows. Fund flows have information content for investors
2000	Agarwal, Naik	JFQA	Hedge	1982-1998	746	Q	Net	Private vehicles	Open	No	Jensen, Appraisal ratio	Persistence among hedge funds exists, but only over short-term (quarterly) periods
2000	Bers, Madura	JFSR	Multiple sectors	1976-1996	506	M	Net	Listed	Closed	Yes	Multi-index Jensen approach	Performance persistence influenced by its expense ratio, history, part of a stable of funds and if traded on NYSE
2000	Blake, Morey	JFQA	Equities	1983-1997	635	M	Net	Mutual	Open	No	Sharpe, Jensen, 4-index model	Morningstar ratings a good predictor of poor out-of-sample performance for funds rated less than 3 stars. Weak evidence of 5-star funds outperforming 3 and 4-star funds
2000	Chen, Jegadeesh, Wermers	JFQA	Equities	1975-1995	2424	Q	Gross	Mutual	Open	No	Raw returns, DGTW model	Funds do not outperform the market; some evidence of superior stock selection; persistence attributable to momentum effect
2000	Davis	FAJ	Equities	1962-1998	4686	M	Net	Mutual	Open	No	Fama-French 3 factor model	Funds do not earn superior returns. Short-run performance persistence evident in growth funds and small-cap funds
2000	Fant, O'Neal	JFR	Equities	1976-1997	1423	M	Net	Mutual	Open	Yes	Raw Returns, Jensen	Confirms performance-flow relation from prior studies. However, the flow-performance relation is driven more by increases in aggregate flows to the industry rather than investors 'chasing' winning funds
2000	Fung, Hsieh	JFQA	Hedge/Commodity	1989-1998	322	M	Net	Fund-of-Fund	Open	No	Raw Returns (annual)	Highlights the differences in origins of biases for hedge funds compared to mutual funds. Funds-of-hedge-funds represent a good proxy of the market for hedge funds

Table 3.2 continued…

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
2000	Goetzmann, Ingersoll, Ivkovic	JFQA	Equity-oriented	1987-1998	558	M	Net	Mutual	Open	Yes	Treynor-Mazuy, Henriksson-Merton (including adjustment), Fama French with HM model	Little evidence of successful market timing
2000	Jain, Wu	JF	Equities	1994-1996	294	M	Net	Mutual	Open	Yes	Jensen, Carhart	Performance is superior to the market in the pre-advertised period but not superior in the post period
2000	Kallberg, Lui, Trzcinka	JFQA	Real Estate	1987-1998	68	M	Net	Mutual	Open	No	Jensen, 4-index model, 5-index model	REITs earn positive and statistically significant alphas, and perform best in down-markets. Fund performance is positively related to size and turnover
2000	Liang	JFQA	Hedge	1994-1998	1162 / 1627	M	Net	Private vehicles	Open	No	Total Return	Survivorship is a critical issue, particularly for hedge fund analysis. Hedge fund attrition rates are high. Poor performance is shown to be a significant determinant of hedge fund closure
2000	Statman	FAJ	Socially Responsible Equities	1990-1998	31	M	Net	Mutual	Open	Yes	Raw Returns, Jensen	SRI Funds outperform other (conventional) funds but the difference is not statistically significant. SRI funds underperform the S&P 500 index
2000	Wermers	JF	Equities	1962-1997	1788	M	Net	Mutual	Open	No	DGTW Measures, Carhart	Mutual funds perform in a manner consistent with Grossman-Stiglitz (1980). Before expenses, active funds outperform by 1.3% p.a.; after fees they underperform by 1% p.a.
2001	Busse	JFQA	Equities	1995	230	D	Net	Mutual	Open	No	Single and Four factor models, Volatility ratios	Daily data dispel the hypothesis that poor performing funds increase risk in their attempts to improve portfolio performance. Instead, the change in risk is driven by common stock risk factors
2001	Bollen, Busse	JF	Equities	1985-1995	230	D, M	Net	Mutual	Open	No	Treynor-Mazuy, Henriksson-Merton, Carhart (includes timing)	Timing ability more easily detected using daily data rather than using monthly data. No evidence however of widespread superior timing ability
2001	Patro	JBF	International Equities	1991-1997	45	M	Net	Listed	Closed	Yes	Jensen, Treynor-Mazuy, Conditional measures	Fund performance largely equivalent to passive funds in terms of timing and selectivity

Table 3.3 – Published Empirical Evidence Concerning U.K. Fund Performance

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1977	Firth	JMCB	Equities	1965-1975	72	Y	Net	Unit Trust	Open	Yes	Jensen	Funds do not outperform
1978	Guy	JF	Equities	1960-1970	47	M	Gross	Unit Trust	Closed	Yes	Jensen, Sharpe, Treynor	Funds do not outperform
1980	Saunders, Ward, Woodward	JFQA	Equities	1975-1977	30	M	Net	Unit Trust	Open	Yes	Stochastic Dominance	Outperformance
1992	Black, Fraser, Power	JBF	Equity	1980-1989	30	M	Net	Unit Trust	Open	Yes	Jensen	Majority of funds outperformed
1992	Luther, Matatko, Corner	AAAJ	Equities	1972-1990	15	M	Net	Unit Trust	Open	Yes	Jensen	Weak evidence of some outperformance by funds
1995	Fletcher	JBFA	Diversified	1980-1989	101	M	Not Stated	Unit Trust	Open	Yes	Jensen, Henriksson-Merton, Treynor-Mazuy	Overall funds underperform, market timing negative and stock selection positive
1995	Shukla, van Inwegen	JEB	International Equities	1981-1993	126	M	Gross	Mutual	Open	Yes	Sharpe, Jensen, Treynor, Treynor-Mazuy	U.K. funds investing in U.S. underperform U.S. funds
1997	Leger	AEL	Equities	1973-1993	72	M	Not Stated	Unit Trust	Open	Yes	Treynor-Mazuy, Pfleiderer-Bhattacharya	General absence of stock selection or market timing ability
1998	Blake, Timmermann	EFR	Multi-sector	1972-1995	2300	M	Gross	Unit Trust	Open	No	Conditional and Unconditional Jensen-type	Performance persistence and funds overall underperforming on average
1998	Klumpes	JBFA	International Equities	1982-1995	25	M	Net	Mutual	Open	Yes & No	Jensen,	A number of U.S.-based international equity funds outperformed, of which, such cases arose where a manager's incentives where most aligned with an investor's interests. U.K. and Australian-based international equity funds generally not able to outperform. Small sample inhibits study
1999	Allen, Tan	JBFA	Diversified	1989-1995	131	W	Net	Unit Trust	Open	Yes	Jensen	Performance persistence
1999	Bangassa	JBFA	Diversified	1980-1994	79	M	Net	Unit Trust	Open	Yes	Jensen-type, Treynor-Mazuy, Henriksson-Merton, Connor-Korajcyzk	Perverse timing ability and non-existent selectivity skill

Table 3.3 continued…

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1999	Blake, Lehmann, Timmermann	JB	Diversified	1986-1994	306	M	Net	Pension	Open	Yes	Brinson, Hood, Beebower Decomposition	Asset allocation did not add value above a passive strategy
2000	Thomas, Tonks	JAM	Equities	1983-1997	2175	Q	Net	Pension	Open	No	Treynor-Mazuy, Henriksson-Merton	Funds unable to earn superior returns attributable to timing or stock selection
2000	Quigley, Sinquefield	JAM	Equities	1978-1997	752	M	Net	Unit Trusts	Open	No	Jensen, Fama-French	UK equity managers unable to outperform market indices. Poor performance appears to persist over time when using net returns data

Table 3.4 – Published Empirical Evidence Concerning Mutual Fund Performance From Other Markets

Year	Author(s)	Journal	Sector	Period Evaluated	No. Funds	Data Freq	Returns Basis	Fund Type	Fund Structure	Survivor Biased?	Performance Approach/Model	Main Finding(s)
1974	McDonald	JF	French Diversified	1964-1969	8	M	Net	SICAV	Open	Yes	Jensen	Funds earned superior risk-adjusted returns
1995	Rubio	RQFA	Spanish Equities and Fixed Income	1970-1990	50	M	Net	Mutual	Open	Yes	Jensen, Connor-Korajczyk,	Funds underperform
1997	Cai, Chan, Yamada	RFS	Japanese Equities	1981-1992	64	M	Net	Mutual	Open	No	Jensen, Grinblatt-Titman, Ferson-Schadt	Funds underperform
1999	Cheng, Pi, Wort	JBFA	Various asset classes	1986-1995	387	M	Net	Mutual	Open	Yes	Raw Returns, Sharpe	Absence of performance persistence across mutual fund industry
2000	Dahlquist, Engstrom, Soderlind	JFQA	Swedish Equity, Bond and Diversified funds	1993-1997	210	W	Net	Mutual	Open	No	Jensen, Conditional models, Henriksson-Merton, Treynor-Mazuy	Mixed findings – some evidence of superior ability for equity funds, however bond and money market funds underperform. Large equity funds underperform smaller funds, however the reverse is the case for bond funds. Performance persistence evident in money market funds only
2000	Matallin Saez, Fernandez Izquierdo	JAM	Spanish Diversified	1992-1998	254	W	Net	Mutual	Open	Yes	Multiple index Jensen	Funds perform in line with market indices
2001	Brown, Goetzmann, Hiraki, Otsuki, Shiraishi	JB	Japanese Equities	1978-1995	1275	M	Net	Unit Trust	Open	No	Multiple index model	Confirms Cai, Chan and Yamada (1997) that equity funds earn significantly negative risk-adjusted returns

3.3 The Evolution of Traditional Performance Measures

The theoretical CAPM, where investors construct portfolios comprising both the riskless asset and risky assets within a mean-variance framework, is the cornerstone of the traditional performance evaluation metrics. The early performance evaluation techniques proposed adjusting portfolio returns with respect to the risks borne by investors.

Treynor (1965) proposed the first metric, where portfolio returns accounted for risk with specific reference to systematic or non-diversifiable market risk. Systematic risk is represented by beta (β) in the CAPM. The Treynor Index is computed as the average portfolio return in excess of the risk-free return, relative to the portfolio's systematic risk:

$$TreynorIndex_p = \frac{\overline{R}_p - \overline{R}_f}{\beta_p} \tag{3.1}$$

where:

$$\beta_p = \frac{\sigma_{pm}}{\sigma_m^2} \tag{3.2}$$

The Sharpe Ratio (1966) was the second metric proposed to adjust portfolio returns according to risk. The Sharpe (1994) measure, also known as the reward-to-variability ratio, is calculated by dividing a portfolio's average excess return by the portfolio's risk, where risk is measured as the standard deviation of the portfolio's returns.

$$SharpeRatio_p = \frac{\overline{R}_p - \overline{R}_f}{\sigma_p} \tag{3.3}$$

Risk-averse, return maximising investors prefer portfolio performance exhibiting higher rather than lower Sharpe Ratios. In particular, the Information Ratio, where the numerator in equation 3.3 is defined as the difference between the return of a portfolio and the market, has become widely used in addition to the Sharpe ratio in terms of quantifying portfolio performance.

The third performance metric, and the measure that has been cited and employed most in empirical studies, has been termed 'Jensen's Alpha'. The Jensen metric (1968, 1969) is measured as the intercept of a regression of fund returns on the market return, where returns are measured in excess of the risk-free rate.

$$\overline{R}_p - \overline{R}_f = \alpha_p + \beta_p(\overline{R}_m - \overline{R}_f) + \varepsilon_p \tag{3.4}$$

The portfolio's performance (alpha) is determined with respect to systematic risk, which captures the portfolio's return sensitivity to the market return. The Jensen approach also assumes the CAPM is the appropriate asset pricing model.

3.3.1 Market Timing Models

There have been a number of extensions to the Jensen approach since the late 1960s. Fama (1972) and Jensen (1972) identify two dimensions of investment performance, where portfolio managers differentiate between selection decisions and forecasting decisions. However the literature has also highlighted the potential bias that occurs when market timing ability is present, while simultaneously performance models exclude empirical tests of timing. For example, Grinblatt and Titman (1989b) demonstrate that successful market timers cause the estimate of systematic risk (β) to be biased upwards and the intercept term (alpha) to be biased downwards. In these scenarios, performance models to exclude market timing could lead to erroneous conclusions of performance. The first significant extension to the Jensen approach involved differentiating between these two components of investment performance, namely security selection and market timing. Treynor and Mazuy (1966) proposed an additional term to capture market timing ability, arguing that linear models were not entirely appropriate where investment managers attempted to forecast changes in market conditions. This was implemented using a quadratic term to account for managers who hold a greater (lower) proportion of their portfolios in risky securities where market movements were forecast to rise (fall). Other market timing approaches proposed in the literature include:

- the Henriksson and Merton (1981) model (where market timing is considered with respect to an investment manager's use of put option strategies). However, Jagannathan and Korajczyk (1986) have demonstrated the problems of empirical tests of market timing ability where funds hold option-like (or leveraged) securities;

- Fama (1972) proposed the measurement of market timing relative to a fund's specific target level of systematic risk. This was empirically tested by Kon (1983);

- Bhattacharya and Pfleiderer (1983) present a market timing approach that extends the theoretical approach of Jensen (1972). Their model relies on an investment manager who forecasts the market return, attempts to minimise the variance of their forecast error;

- Brinson *et al.* (1986) and Brinson, Singer and Beebower (1991) propose a simple decomposition of portfolio performance into market timing and stock selection components using portfolio asset allocation data with respect to a fund's strategic benchmark weights to the various asset classes;

- Grinblatt and Titman's (1989b) Positive Period Weighting (PPW) Measure, which attempts to correct for biases in the Jensen's alpha. The PPW approach avoids negative performance being assigned to mutual fund managers who exhibit true timing ability; and

- Edelen (1999) proposes an adjustment to the market timing models of Henriksson and Merton (1981) and Treynor and Mazuy (1966) that accounts for the liquidity motivated trading experienced by mutual funds. Ferson and Schadt (1996) and Ferson and Warther (1996) highlight the empirical issue of negative covariance between beta and market returns, and specifically the effect of fund flows on beta. The Edelen (1999) method shows mutual fund flows are the source of negative market timing.

Mutual fund studies involving tests of market timing ability, employing the Treynor-Mazuy, Henriksson-Merton and Bhattacharya-Pfleiderer approaches should also control for the influence of heteroskedasticity. Breen *et al.* (1986) highlight the problems associated with detecting market timing skill where heteroskedasticity is ignored. Their study shows ignoring heteroskedasticity results in a rejection of the null-hypothesis of no timing ability more frequently than should otherwise be the case.

There have also been studies in the literature evaluating the extent to which systematic risk is not stationary across time. These include the switching regression techniques of Kon and Jen (1978, 1979), and assessment of the performance of mutual funds in both bull and bear markets (Fabozzi and Francis (1979) and Viet and Chaney (1982)), however their results do not suggest any significant difference between such periods.

3.3.2 Other Performance Models

The traditional Jensen (1969) approach used in performance evaluation studies has been extended in different ways in order to accommodate additional factors that explain security market returns. Fama and French's (1992) paper is one distinguished study that casts doubt on the CAPM's ability to explain the cross-section of U.S. equity market returns. Performance evaluation models developed in the literature have been extended to include additional variables that control for specific market anomalies and hence improve the quantification of portfolio risk. The literature includes many studies of mutual fund performance that employ extended Jensen models:

- multi-factor or Arbitrage Pricing Theory (APT) approaches, including the studies of Lehmann and Modest (1987), Chang and Llewellen (1985) and Connor and Korajczyk (1986);

- Grinblatt and Titman's (1989a, 1989b) P8 benchmark, where portfolio returns are adjusted for risk using eight factors. This approach is similar in its objectives to the Lehmann and Modest (1987) 10-factor model;

- Elton *et al.* (1993) who reverse the conclusions of Ippolito (1989) by accounting for portfolio holdings of mutual funds beyond S&P 500 securities. An extension to their three-index model is encapsulated in Elton *et al.* (1996) four-index model, where the factors are defined as the broad market index, market capitalisation (small versus large stocks), growth and value biases and a bond market factor;

- Fama and French (1993) document common factors in stock returns can be explained by three factors; the broad market factor, market capitalisation and book-to-market equity. Carhart (1997) extends this three factor model with an additional factor that accounts for the one-year momentum anomaly in stock returns cited by Jegadeesh and Titman (1993);

- Elton *et al.* (1995) evaluate bond mutual fund performance with respect to market factors including default risk, term risk, unexpected changes in inflation and Gross National Product (GNP);

- Ferson and Schadt (1996) advocate the use of conditional models that control for time-variation in risk. The conditional performance evaluation approach accounts for lagged public information variables, namely dividend yield, the treasury note yield, term structure of interest rates, quality spread in corporate bonds and dummy variable for the month of January. The empirical findings suggest conditional models improve mutual fund performance compared with unconditional models;

- Daniel *et al.* (1997) employ a characteristic-based performance methodology that decomposes fund performance into characteristic timing, characteristic selectivity and average style; and

- Busse's (1999) volatility timing approach using more frequent data, namely daily returns.

3.4 Capital Market Efficiency

The investment strategy adopted by an investment manager should be influenced by the degree of market efficiency in capital markets. Fama (1965a) states that:

> "an efficient market is defined as a market where there are large numbers of rational, profit-maximisers actively competing, with each trying to predict future market values of securities, and where important current information is almost freely available to all participants. In an efficient market, competition among many intelligent participants leads to a situation where, at any point in time, actual prices of individual securities already reflect the effects of information based both on events that have already occurred and on events which, as of now, the market expects to take place in the future. In other words, in an efficient market at any point in time the actual price of a security will be a good estimate of its intrinsic value." (p.34).

Therefore, the extent to which market participants factor into securities prices all available information will influence the types of strategies implemented by investment managers. Fama (1970) extended the empirical tests for capital market efficiency by classifying three forms or degrees of efficiency:

- weak form efficiency – where the security's price reflects all past time series data concerning the security's price;

- semi-strong form efficiency – where a security's price reflects the past time series of price as well as all publicly available information; and

- strong form efficiency – where a security's price reflects fully all past prices, publicly available information and monopolistic forms (private) of information.

Fama (1970) concluded that weak form tests did support market efficiency. Although problems did arise with the serial correlation tests and filter tests, they in themselves were not able to render a market inefficient. Fama (1970) postulated that although positive dependence exists, the serial correlations were consistently close to zero and could not be used to outperform the buy-and-hold approach. Likewise the filter tests are impracticable due to transaction costs eliminating any gains over the passive approach. Tests for semi-strong market efficiency also provided evidence that markets were efficient.

Strong form efficiency tests were also used by Fama (1970) to see whether abnormal returns could be derived from the use of private or monopolistic information. Fama (1970) used tests of the strong-form efficiency by evaluating whether professional investment managers are able to out-perform a buy-and-hold strategy on the basis of different subsets of information held between them and other investors. In light of Jensen's (1968) empirical investigation of 115 mutual funds in the period 1955-64, 89 out of 115 funds in the study did not outperform the S&P 500 market index after investment management fees were deducted. Even when investment management fees were ignored, 72 out of 115 funds were unable to out-perform the market index. Thus it could be argued that the information sets of professional investment managers do not differ from ordinary investors in their abilities to outperform other investors.

Grossman & Stiglitz (1980) argue that market efficiency in a strict sense cannot occur without accounting for informed investors holding costly information (where costly information represents these investors becoming informed). Grossman and Stiglitz (1980) argued that “assumptions that all markets, including that for information, are always in equilibrium and always perfectly arbitraged are inconsistent when arbitrage is costly” (p.393). Hence, active investment managers will only incur expenses in obtaining information to become informed when they can be compensated for acquiring price sensitive information. Therefore, extrapolating the reasoning of Grossman & Stiglitz (1980) to the expenses charged by managers of active portfolios, these managers should be able to at least earn excess returns equal to the fees levied on the actively managed portfolio in order for capital market efficiency to be in equilibrium.

Ippolito (1989) reported consistent findings with respect to the Grossman and Stiglitz (1980) hypothesis, where active mutual fund managers earned risk-adjusted excess returns commensurate with their fees charged. However Elton *et al.* (1993), employing the same dataset as Ippolito (1989), contradicted the Ippolito (1989) conclusions. The Elton *et al.* (1993) findings highlight the importance of accounting for non-S&P 500 assets in performance measurement, which in essence reverse the findings of Ippolito (1989). A recent and comprehensive study by Wermers (2000) suggests the Grossman and Stiglitz (1980) proposition has some merit. Wermers reported the average active mutual fund outperformed the market by 1.3 percent per annum before costs, however the level of underperformance relative to the market was equivalent to –1 percent per annum. The difference of 2.3 percent was represented in two components: 1.6 percent being attributable to management expenses and transaction costs and the remaining 0.7 percent due to lower returns derived from non-stock holdings held by mutual funds. Wermers (2000) argues the level of outperformance before costs is roughly equivalent to the costs incurred in active management, and provides some confirmation of the Grossman and Stiglitz (1980) proposition. The Grossman-Stiglitz (1980) hypothesis is also supported empirically by the findings of Daniel *et al.* (1997), where their study reports the average mutual fund outperforms by a similar magnitude to the average management fee levied. Carhart (1997) also concludes that the top-decile of funds is the only category that delivers returns commensurate with their expenses, whereas other funds in the sample underperform on average by a magnitude roughly equivalent to the expense ratio.

Edelen (1999) also argues that the liquidity service provided to investors by active mutual funds must be considered in performance evaluation models, where the market is assumed to be in Grossman-Stiglitz informational equilibrium. Edelen (1999) postulates that uninformed liquidity-motivated trading activity is likely to have an adverse effect on fund performance. Uninformed liquidity traders (acting on behalf of the open-end mutual funds) will incur losses to informed traders due to informed traders recovering their costs arising from the costly acquisition of information. Hence, the Grossman-Stiglitz proposition appears to have merit where mutual funds experience exogenous fund flow shocks, and the necessity of incorporating flow variables in performance evaluation models. These issues will certainly be addressed in greater detail empirically in the future.

3.5 Criticisms of Performance Evaluation Techniques and Survivorship Bias

3.5.1 Benchmark Specification and Inefficiency

The criticisms of Roll (1977, 1978) concerning the CAPM market portfolio have been well documented in the literature. Indeed, the extent to which the market portfolio can be empirically tested as mean-variance efficient has been argued by Roll to be impossible. This issue is critical as the Jensen approach may attribute actively managed funds as earning superior risk-adjusted excess returns, when in reality such returns have arisen from the manager's ability to exploit inefficiencies in the market index. While tests of benchmark efficiency are difficult to perform, in that they require specific assumptions, two studies have evaluated the extent to which market indices are ex-ante mean-variance efficient. These tests have relied on the theoretical work of Gibbons *et al.* (1989).[31] Grinold (1992) found that four out of the five international indices tested were not mean-

[31] Green (1986) also provides a theoretical discussion on problems of benchmark portfolio inefficiencies.

variance efficient. In Australia, Finn and Koivurinne (2000) considered Australian equity indices and found some evidence of mean-variance inefficiencies in some benchmarks. However, Admati and Pfleiderer (1997) suggest one way of overcoming the potential problem of benchmark inefficiency may include computing the performance of an equally weighted portfolio of all managed investments in the sample as an alternative benchmark proxy.

Dybvig and Ross (1985a, 1985b), Jensen (1972) and Admati and Ross (1985) also criticise the Jensen's alpha approach where active mutual fund managers engage in market timing strategies. Grinblatt and Titman (1989a) demonstrate the negative bias in the Jensen Measure when market timing is indeed present.

Elton *et al.* (1993) have also demonstrated the importance of correctly specifying the benchmark proxy that accounts for the investible universe of securities held in mutual fund portfolios. As a consequence, their findings contradict the results of Ippolito (1989) who documents active funds performing in a manner consistent with Grossman and Stiglitz's (1980) information equilibrium.

3.5.2 Survivorship Bias Issues

The problem of survivorship bias, inherent in studies of mutual fund performance that do not evaluate all funds in existence in the observation period, has been shown by numerous studies to bias upwards the overall performance of the sample group. Elton *et al.* (1996b) show that survivorship bias arises due to poorly performing funds having a higher probability of attrition, *ceteris paribus*. In addition, the longer the horizon period evaluated, the greater the probability of survivorship bias in performance studies (Elton *et* *al.* (1996b)). Eliminating survivorship bias from studies of mutual fund performance can be difficult as data vendors including Morningstar Inc., Lipper Inc., Wiesenberger Inc. are generally only interested in tracking existing funds which meet the needs of investors and advisors making current investment decisions. Closed or terminated funds are therefore irrelevant to new investors. However researchers attempting to construct reliable and bias-free datasets comprising both surviving and non-surviving performance can experience significant difficulties in compiling the entire universe of funds. Most studies in the early literature evaluating the performance of mutual funds contain survivorship bias, and therefore the likelihood of positively biased findings (or the distribution of fund alphas skewed more to the right than would otherwise be the case).

There have been a number of studies in the last decade-and-a-half that directly consider the impact of survivorship bias on the performance estimates of mutual funds. These studies are documented in Tables 3.1 to 3.4. The general finding is that where survivorship bias is present, performance at the aggregate level will be overstated. A number of studies evaluating hedge funds and CTAs document that such investment vehicles have higher attrition rates than mutual fund studies.[32] For example, Grinblatt and Titman (1989b) found mutual funds in the period 1974-84 exhibited an average 4.3 percent attrition rate per year, Brown *et al.* (1992) documented an annual attrition rate of 4.8 percent per year in the period 1977-85. Further, Elton *et al.* (1996b) found that survivorship bias in mutual funds was not related to investment objective. In the case of CTAs, Fung and Hsieh (1997b) document an annual attrition rate on average of 19 percent in the period 1989-1995. For hedge funds, Fung and Hsieh (2000) document the drop out

[32] Estimates of survivorship bias in hedge fund studies can be extremely difficult as their operation and governance is largely unregulated.

rate at between 15 and 20 percent depending on the dataset used. Brown *et al.* (1999) in the period 1989-95 find an attrition rate for hedge funds of 20 percent per annum.

In performance terms, the extent of survivorship-biased performance estimates for mutual funds, CTAs and hedge funds indicates the exclusion of non-surviving funds positively biases performance for the sample. Fung and Hsieh (1997b) indicate the extent of bias for CTAs is around 3.6 percent per annum (raw returns), whereas Schneeweis *et al.* (1996) reports a lower level of bias in performance at 1.4 percent per annum. For hedge funds, Brown *et al.* (1999) estimates the bias in terms of raw returns at around 3 percent per year. In the case of U.S. mutual funds, the bias is up to 1.5 percent per annum depending on the study, mutual fund type, whether performance is measured in raw or risk-adjusted terms as well as the period examined. A number of studies document the magnitude of survivorship bias where mutual fund studies exclude terminated funds, and these include Blake *et al.* (1993), Grinblatt and Titman (1989b), Brown and Goetzmann (1993), Malkiel (1995), and Elton *et al.* (1996b). According to Dahlquist *et al.* (2000), Swedish mutual funds exhibit a bias of between 0.1 and 0.7 percent per year depending on the fund type. Swedish equity funds are shown to record the highest level of bias. In the U.K., Blake and Timmermann (1998) report survivorship bias using a sample of funds with different investment objectives. Overall, the survivorship bias premium was equivalent to 2.4 percent per annum. Further, international funds offered in the U.K. exhibited higher survivorship bias than domestic equity funds.

3.6 Performance and Investment Strategy

The performance evaluation literature has generally considered both equity funds as well as funds that predominantly invest in stocks. However a number of empirical studies have evaluated the performance of mutual funds with respect to the predominant investment objective implemented by active investment managers. In the U.S., the literature has generally involved an analysis of mutual funds using the following general classifications (ranked in descending order by aggressiveness of the strategy); 'aggressive growth', 'growth', 'growth and income', 'income', 'balanced', and 'special purpose'. Brown and Goetzmann (1997) have also reviewed funds' self-reported mutual fund objectives as well as having explored alternative classifications related to fund styles. They find that funds' self-reported classification does not always serve as a reliable indicator of their actual style on the basis of monthly return time-series.

The general conclusions of most empirical studies have documented self-reported aggressive growth funds outperforming other mutual funds with alternative investment objectives. The general findings of a sample of relatively recent studies specifically comparing funds by investment objective are presented in Table 3.5.

Table 3.5 – Mutual Fund Performance and Investment Objective

Year	Author(s)	Main Findings
1989b	Grinblatt, Titman	Aggressive growth funds and growth funds exhibit superior ability compared with other investment objective categories.
1993	Grinblatt, Titman	Aggressive growth funds exhibit the highest level of outperformance compared with other investment objective categories. Growth and income funds also exhibit superior performance, but underperform aggressive growth funds.
1995	Grinblatt, Titman, Wermers	Mutual funds generally exhibit herding behaviour, where funds implementing momentum strategies outperform other funds. Aggressive growth and growth funds had the highest reliance on momentum investing compared with other fund categories.
1997	Daniel, Grinblatt, Titman, Wermers	Aggressive growth funds exhibit the highest returns, followed by growth funds. Evidence supporting informational equilibrium in the Grossman-Stiglitz (1980) style.
2000	Davis	No investment style exhibited superior performance relative to the market. Evidence of performance persistence among some growth funds.
2000	Chen, Jegadeesh, Wermers	Growth-oriented funds exhibit superior stock selection skills compared to income-oriented funds. Funds with higher trading activity (or turnover) have slightly improved stock picking skills than low turnover funds.

3.7 Summary

The literature concerning the evaluation of mutual funds, pension funds and other investment products has been widely evaluated internationally by academics and practitioners spanning a number of decades. The general findings of such studies overwhelmingly conclude that actively managed mutual funds on average do not earn superior risk-adjusted excess returns when measured against appropriately specified benchmark indices, either before or after expenses. Such conclusions appear consistent with the efficient markets hypothesis. In Australia, the literature indicates findings consistent with the international evidence, however the topic area has lacked sufficient analysis, particular with respect to funds that invest beyond exclusive holdings of Australian equity securities. The literature also indicates that a gap exists with respect to managed funds with the investment strategy of closely tracking underlying benchmark indices (i.e. index funds).

The following chapters in this dissertation extend the performance evaluation literature with respect to the two most identifiable investment strategies available to investors; namely actively managed as well as index funds. Each chapter outlines the motivation in considering the specific topic area addressed in the chapter as well as the inclusion of literature-specific reviews.

4

CHAPTER 4 – ATTRIBUTION OF INVESTMENT PERFORMANCE: AN ANALYSIS OF AUSTRALIAN POOLED SUPERANNUATION FUNDS

4.1 Introduction

The performance of investment managers has long been of interest to practitioners and investors, and in academia the performance evaluation literature spans at least four decades. Indeed the debate within industry between active and passive investment management continues, despite the overwhelming empirical evidence that active funds, on average, do not earn superior risk-adjusted excess returns. This can perhaps be considered as paradoxical when consideration is given to the relative magnitude of assets actively managed in Australia. Rainmaker Information reports the size of the investment industry at September 2000 was around $A687 billion, of which the overwhelming majority (approximately 88.9 percent) of funds were actively invested.[33] In light of the active versus passive debate, this essay evaluates the market timing and security selection components of abnormal returns earned by active Australian pooled superannuation funds in the period 1991-1998.

Most performance evaluation studies have employed the Jensen (1968) approach where risk-adjusted performance measures the ability of funds to outperform the market (Jensen (1972); Lee and Rahman (1990)). However, the Jensen Measure ignores the potential market timing strategies employed by active portfolio managers as the model does

[33] Rainmaker Information *Roundup*, December Quarter 1999.

not partition the quality of information a manager holds from the aggressiveness of the investment strategy. Indeed, active investment managers commonly distinguish between both market timing and stock selection performance in the context of their investment objectives. Therefore, performance evaluation models ignoring market timing strategies assume that risk levels for managed funds remain stationary through time, causing the estimate of abnormal return to be downward biased where market timing ability is present (Dybvig and Ross (1985a) and Grinblatt and Titman (1989a)). As a result, models that fail to measure market timing and security selection simultaneously could lead to inaccurate inferences being made concerning the source of portfolio performance. Accordingly, this essay evaluates both components of investment performance – timing and selectivity.

Empirical evidence in the U.S. widely documents that active funds do not outperform the market (for example Jensen (1968); Grinblatt and Titman (1989b); Elton *et al.* (1993); Malkiel (1995); and Gruber (1996)). The literature also confirms that funds do not successfully 'time' the market (Treynor and Mazuy (1966); Kon (1983); Chang and Llewellen (1984); Henriksson (1984); Lee and Rahman (1990); Coggin *et al.* (1993); Ferson and Schadt (1996); Daniel *et al.* (1997); and Becker *et al.* (1999). Blake *et al.* (1999) present evidence from the U.K. indicating pension funds would have been better served through the use of passive index funds than active funds. Australian research supports the U.S. and U.K. evidence that funds do not earn significantly positive risk-adjusted returns attributable to security selection (Bird *et al.* (1983); Robson (1986) and Gallagher (2001)). Sinclair (1990) was the first Australian study to evaluate both market timing and security selection performance, finding that adverse market timing by funds eroded the gains attributable to stock selection. More recently, Hallahan and Faff (1999) examined selectivity and timing ability of Australian equity trusts, documenting that little evidence existed to support the view that such funds were successful market timers.

Sawicki and Ong (2000) also document the inability of funds to outperform market indices where a conditional performance evaluation methodology was adopted.

The essay makes the following contributions to the Australian performance evaluation literature. First, the market timing and security selection abilities of active pooled superannuation funds are evaluated at both the total portfolio level and across the three largest asset classes that comprise diversified superannuation portfolios; namely Australian equities, international equities and Australian fixed interest. Second, the essay demonstrates the importance of using correctly specified benchmarks in the measurement of performance where funds also hold non-Australian equity assets in their portfolios. This is important as performance benchmarks must account for the type of assets held in investment manager portfolios and the investment strategy adopted. Sinclair's (1990) finding that pooled superannuation funds exhibit both positive and significant selectivity skill coupled with significantly poor timing is shown to arise when the market portfolio proxy is misspecified. Specifically, Sinclair's (1990) analysis of multi-asset class superannuation funds was measured against an Australian equities benchmark only, and therefore excludes non-equity assets from the underlying benchmark. This essay also evaluates the potential bias in performance measurement resulting from the use of inefficient benchmark proxies. Finally, the study utilises a unique data set comprising pooled superannuation fund asset allocations relative to strategic benchmark weights and the performance of funds across individual asset classes. This detailed level of information provides insight into the tactical investment strategies that fund managers have used in their quest for active returns.

The remainder of this essay is structured as follows. Section 4.2 outlines the empirical tests for market timing and security selection. Section 4.3 describes the data and this is followed by the empirical results. The final section concludes and provides suggestions for future research.

4.2 Empirical Framework

4.2.1 Risk-Adjusted Performance Evaluation Models

Security selection represents the ability of an investment manager to identify and exploit mispriced securities (micro forecasting). On the other hand, market timing represents the ability of portfolio managers to position their portfolios to take advantage of predicted market movements (macro forecasting). Successful market timing occurs when portfolio risk is increased in anticipation of market rises. Extending Jensen's (1968) model (based on Sharpe's (1964) CAPM framework), Henriksson and Merton (1981) decompose performance into selectivity and timing as follows:

$$R_{pt} = \alpha_p + \beta_{p1} x_t + \beta_{p2} y_t + \varepsilon_{pt} \tag{4.1}$$

where:

R_{pt} = the portfolio return in period *t* in excess of the risk free return;

α_p = the abnormal return attributable to security selection;

β_{p2} = the coefficient estimating timing ability;

x_t = the market return in excess of the risk free rate in period *t*;

$y_t = \max[0, -x_t]$;

ε_{pt} = the random error term with expected mean of zero.

The term (β_{p2}) is used by Henriksson and Merton (1981) to capture the market timing component of investment performance following Jensen (1972), Grant (1977), Dybvig and Ross (1985) and Grinblatt and Titman's (1989a) demonstration of potential bias in the estimates. These authors argue that for market timers, the unconditional Jensen measure is based on an upwardly biased estimate of systematic risk (β_{p1}), and as a result this effect can bias downward the estimate for market timing (β_{p2}). The Henriksson-Merton model assumes fund managers target two systematic risk levels; one where the manager forecasts the riskless asset to outperform the market portfolio (β_{p1}) and the other where the market return is expected to outperform the risk-free rate (β_{p2}).[34] Successful market timing exists where the estimate of β_{p2} in (4.1) is significantly positive. The model does not predict the magnitude of the return differential between risky assets and the riskless asset, but rather considers the direction of the forecast that a portfolio manager uses to re-weight the portfolio between risky assets and the riskless asset.[35]

An alternative test for market timing ability is the Treynor-Mazuy model. Treynor and Mazuy (1966) propose the use of a quadratic term to capture market timing ability (compared with Henriksson-Merton's β_{p2} measure), arguing that funds with market timing ability will hold a greater (smaller) proportion of their portfolios in the market portfolio of risky assets when they expect the market to rise (fall). The Treynor-Mazuy approach indicates successful market timing where the coefficient γ is significantly positive.

[34] Henriksson and Merton's (1981) β_{p2} accounts for market timing on the basis of a fund manager engaging in a protective put option investment strategy. See Henriksson and Merton (1981) for a detailed description.

[35] The Henriksson-Merton model requires corrections for heteroskedasticity and this paper employs White's (1980) method of adjustment. The ordinary least squares estimates in the model are inefficient given systematic risk is not stationary. Henriksson and Merton (1981) show that the standard deviation of the error term is an increasing function of the absolute value of x_t. While Henriksson (1984) found that adjustments for heteroskedasticity did not affect the general conclusions made, other studies including Breen *et al.* (1986) and Lee and Rahman (1990) suggest that the presence of non-homoskedastic residuals significantly affects the power of tests for market timing. Breen *et al.* (1986) find that ignoring heteroskedasticity often leads to rejection of the null hypothesis for no market timing too often when in fact the null is true. The converse is also the case. The Treynor-Mazuy model also requires corrections for heteroskedasticity (Coggin *et al.* (1993).

$$R_{pt} = \alpha_p + \beta_p x_t + \gamma_p x_t^2 + \varepsilon_{pt} \quad (4.2)$$

Given the Henriksson-Merton and Treynor-Mazuy models both rely on the CAPM framework, empirical tests using these models assume the market portfolio proxy is mean-variance efficient. Roll's (1977, 1978) criticisms of the CAPM are well documented in the literature. Dybvig and Ross (1985) also warn of the potential dangers of an inefficient market portfolio proxy, where abnormal returns reflect these inefficiencies rather than being derived using superior investment skill. For example, Grinold (1992) found in tests of benchmark efficiency that the Australian All Ordinaries Index is ex-ante inefficient. Finn and Koivurinne (2000) also find evidence of benchmark inefficiency for Australian stock market indices. Measuring active performance relative to a passive benchmark index that is independent of private information and mean-variance inefficient can overstate performance. Admati and Pfleiderer (1997) suggest an alternative benchmark proxy that employs the average return earned by managed funds as a group may alleviate some of the problems of benchmark inefficiency in performance evaluation studies, and this approach is considered in the empirical results section.

4.2.2 Performance Attribution Framework

Performance attribution measures the effect of the portfolio manager's active investment decisions across asset sectors and their respective contribution to portfolio performance (Burnie *et al.* 1998). The monthly average asset allocations for each fund across each asset class within the portfolio are used, where the attribution framework decomposes the raw active return (fund return less return of the benchmark) into security selection and market timing components.[36] Attribution of investment performance can be performed using either an arithmetic approach (Karnosky and Singer (1995) and Singer *et al.* (1998)) or the geometric approach outlined by Burnie *et al.* (1998). In terms of the arithmetic approach, the methodology assumes the fund manager's portfolio management objective is to outperform using both 'top-down' and 'bottom-up' investment strategies. The active raw return of a portfolio in period t can be represented in arithmetic form by:

$$R_{pt} - R_{bt} = R_{st} + R_{at} + R_{rt} \tag{4.3}$$

where R_{pt} is the portfolio return at time t, R_{bt} is the return on the market proxy or benchmark, R_{st} is the return attributable to security selection, R_{at} is the market timing (or tactical asset allocation) component and R_{rt} is the interaction effect or residual term. The residual of active performance is not strictly attributable to either stock selection or asset allocation, representing the interaction between both sources of active management decision-making. Market timing, security selection and interaction components, respectively, of active performance for the portfolio over a single time period can be represented in arithmetic form (4.4 - 4.6) as:

$$R_{at} = \sum_i (\omega_i - \overline{\omega}_i)(\overline{r}_i - \overline{r}_b) \tag{4.4}$$

$$R_{st} = \sum_i (\overline{\omega}_i)(r_i - \overline{r}_i) \tag{4.5}$$

$$R_{rt} = \sum_i (\omega_i - \overline{\omega}_i)(r_i - \overline{r}_i) \tag{4.6}$$

[36] This study evaluates the components of performance in single currency terms. Where the portfolio manager makes active decisions with respect to currencies, additional terms must be added to the attribution framework.

where:

ω_i = average actual weight in asset class *i*;

$\overline{\omega}_i$ = benchmark weight in asset class *i*;

r_i = return earned by the fund in asset class *i*;

$\bar{r}_i$ = benchmark return representing a passive investment strategy in asset class *i*;

$\bar{r}_b$ = benchmark return for the total portfolio.

The approach outlined above assumes the fund manager's portfolio management objective is to outperform using both top-down and bottom-up investment strategies. While this assumption has merit, given managers are likely to use elements of both styles, the attribution framework above leads to the necessity of a residual term which is potentially ambiguous (see Karnosky and Singer (1995) and Singer *et al.* (1998)). Excluding the residual term requires differentiation between top-down and bottom up portfolio management strategies adopted by investment managers. In order to eliminate this residual or interaction term, Burnie *et al.* (1998) develop a general framework for geometric attribution designed to decompose the active return into security selection and market timing components only. The geometric framework measures investment performance given a portfolio manager's predominant style and assumes fund managers prioritise their portfolio management strategies between top-down and bottom-up styles. This methodology therefore renders the residual term obsolete.[37] This chapter concentrates on the geometric approach, which more accurately attributes performance on the basis of an investment manager's strategy. The empirical results for arithmetic and geometric approaches derive very similar conclusions, hence, the arithmetic results are not presented.

[37] The goal of partitioning managers on the basis of predominant style used is aimed at eliminating the interaction effect or residual term.

4.2.3 Top-Down Portfolio Management

Burnie, Knowles and Teder's (1998) geometric methodology assumes fund managers prioritise their portfolio management strategies between top-down and bottom-up styles, thereby rendering the residual term obsolete.[38] Top-down portfolio management assumes that investment managers' primary emphasis is asset allocation whereas the bottom-up strategy identifies security selection as taking precedence. The top-down asset allocation component (4.4) measures the portfolio manager's ability to underweight or overweight the asset classes within the portfolio relative to each fund's unique strategic benchmark. The security selection component (4.5) for a top-down portfolio manager measures the stock selection effect using the portfolio's actual asset class weights. Employing what has been termed by Burnie *et al.* (1998) as a 'geometric' framework, the total portfolio's active return (Tot), and the two components of total performance for a top-down investment strategy (asset allocation (R_a) and security selection (R_s)), can be expressed as:

$$Tot_t = [(1 + R_{at})(1 + R_{st})] - 1 \tag{4.7}$$

$$R_{at} = \frac{(1 + \sum_i \omega_i \bar{r}_i)}{(1 + \bar{r}_b)} - 1 \tag{4.8}$$

$$R_{st} = \frac{(1 + r_p)}{(1 + \sum_i \omega_i \bar{r}_i)} - 1 \tag{4.9}$$

[38] The goal of partitioning managers on the basis of predominant style used is aimed at eliminating the interaction effect or residual term. However, the dichotomy may appear overly simplistic, as some managers may not see themselves as clearly belonging to a single group, but a blend of the two.

where:

ω_i = average actual weight in asset class *i*;

$\overline{\omega}_i$ = benchmark weight in asset class *i*;

r_i = return earned by the fund in asset class *i*;

r_p = fund return for the total portfolio;

$\overline{r}_i$ = benchmark return representing a passive investment strategy in asset class *i*;

$\overline{r}_b$ = benchmark return for the total portfolio.

The individual asset class contributions for a top-down portfolio manager can be expressed geometrically as:

$$R_{at} = (\omega_i - \overline{\omega}_i)[\frac{(1+\overline{r}_i)}{(1+\overline{r}_b)} - 1] \tag{4.10}$$

$$R_{st} = \frac{\omega_i (r_i - \overline{r}_i)}{(1 + \sum_i \omega_i \overline{r}_i)} \tag{4.11}$$

4.2.4 Bottom-Up Portfolio Management

Portfolio management decisions that are predominantly bottom-up assume stock picking is of higher priority than asset allocation. Given that managers select securities across asset classes on the basis of fundamental value, bottom-up strategies are not limited by asset allocation weights in the portfolio. Accordingly, the security selection component for a bottom-up portfolio manager relies on a fund's benchmark weight in each of the asset classes. The bottom-up asset allocation component measures the impact of the portfolio's actual asset allocation divergence from the strategic benchmark based on the fund's portfolio returns rather than the performance of the benchmark. The bottom-up attribution framework at the total portfolio level, using the Burnie *et al.* (1998) geometric approach, can be expressed as:

$$Tot_t = [(1+R_{at})(1+R_{st})] - 1 \tag{4.12}$$

$$R_{at} = \frac{(1+r_p)}{(1+\sum_i \overline{\omega}_i r_i)} - 1 \tag{4.13}$$

$$R_{st} = \frac{(1+\sum_i \overline{\omega}_i r_i)}{(1+\overline{r}_b)} - 1 \tag{4.14}$$

The individual asset class contributions for a bottom-up portfolio manager can be expressed geometrically as:

$$R_{at} = (\omega_i - \overline{\omega}_i)\left[\frac{(1+\overline{r}_i)}{(1+\sum_i \overline{\omega}_i r_i)} - 1\right] \tag{4.15}$$

$$R_{st} = \frac{\omega_i (r_i - \overline{r}_i)}{(1+\overline{r}_b)} \tag{4.16}$$

The performance methodology outlined above is used to evaluate the extent to which fund managers exhibit superior market timing and security selection skills with reference to their predominant portfolio management strategy (top-down versus bottom-up), individual asset allocation decisions, strategic benchmarks and portfolio returns.

4.3 Data

This study uses monthly Australian pooled superannuation fund returns for 16 average and above average volatility funds over the period January 1991-December 1998 using a unique data set provided by Towers Perrin Australia.[39] Average and above average volatility funds invest broadly across the entire asset class spectrum and include domestic and international holdings in equities, bonds, property and cash. Towers Perrin provided the data on the understanding both the names of the investment managers and the funds would remain anonymous. The *Towers Perrin Pooled Superannuation Funds* database monitors fund performance across the entire Australian market and is therefore a representation of fund manager performance across multiple asset class sectors. Funds comprising the sample were included where Towers Perrin had complete historical information concerning performance, asset allocations and strategic benchmark weights provided by the investment managers over the entire 96-month period.

Towers Perrin classifies pooled superannuation funds on the basis of historic volatility in fund returns as well as fund investment style. Two of the funds in the sample (denoted fund A and B) are managed by the same investment organisation. Fund B has therefore been removed from Table 4.4 in the results section reporting the sector performances.[40] The period of evaluation is the 8-year period January 1991-December 1998. The total assets under management for these 16 funds at December 1998 were

[39] While the sample size is relatively small compared with U.S. studies, the Australian market is considerably smaller. Given the criteria for including funds, a number of funds were not included as they were either (1) not in existence at January 1991 and/or (2) did not have sufficient data (returns and asset allocations) to perform the analysis over the entire 8-year period. Therefore 10 funds (accounting for $A5.7 billion at December 1998 or 16 percent of the total eligible market size) could not be included because they did not exist for the entire 8-year period being evaluated (i.e. they were younger funds). Another valid point concerning the sample size is due to Australian fund managers (generally) not offering multiple pooled superannuation vehicles to investors (which may be contrary to sector specialist funds). Overall, these factors contribute to the relatively small number of funds included in the study.

[40] While funds A and B have identical sector performances in Australian equities, international equities and Australian fixed interest, these funds have different investment objectives. These include different weights across investment sectors and different total fund returns.

around $A29.9 billion and the investment performance of funds comprising the sample is measured in gross terms (i.e. before management fees and tax) and measure capital changes and income reinvestment. The market indices, outlined in Table 4.1, represent passive investment strategies across each asset sector and are measured as total returns (capital changes and dividend reinvestment).[41] The risk free rate used in the study is the 13-week RBA Treasury note converted to a monthly rate.

Table 4.1 – Market indices by asset class. Statistics are reported as at 31 December 1998.

All funds have exposures to Australian and international equities, property (either direct, listed or both), Australian fixed interest and cash. Not all funds in the sample, however, invest in International fixed interest or Australian inflation-linked bonds. For this reason, the sum of the Benchmark Weight column exceeds 100 percent. The mean strategic benchmark weight column is calculated by dividing the sum of weights to the respective sectors by the number of funds that have benchmark exposures to those specific asset classes. The Value-Weighted measure calculates the strategic benchmarks weights by fund value across the respective asset classes. The Morgan Stanley Capital International Index includes gross dividends reinvested and is converted back into Australian dollars. The Salomon Brothers World Government Bond Index (ex-Australia) is hedged back into Australian dollars.

Asset Class	Market Index	Benchmark Weight (%)	Value-Weighted Benchmark Weight (%)
Australian Equities	ASX All Ordinaries Accumulation Index	36.5	35.6
International Equities	MSCI World (ex-Australia) Accumulation Index	20.9	20.9
Australian Direct Property	Towers Perrin Direct Property Index	8.2	6.7
Australian Listed Property	ASX Listed Property Accumulation Index	7.1	4.8
Australian Fixed Interest	Warburg Dillon Read Composite Bond Index	20.1	18.6
International Fixed Interest	Salomon Bros. World Bond Index (ex-Australia)	6.6	6.5
Australian Inflation-Linked Bonds	Warburg Dillon Read Inflation-Linked Bond Index	5.7	3.0
Cash	Warburg Dillon Read Bank Bill Index	7.0	4.0

The Towers Perrin Pooled Superannuation Funds database includes monthly fund performance across individual sectors and the total portfolio.[42] Average asset allocations of

[41] These market proxies are the most commonly used/cited indexes in the Australian investment industry during the period evaluated.

[42] The sample group of superannuation funds in the study contains the standard survivorship bias problems faced by most performance evaluation studies in the literature, where funds included in the sample remain in existence at the end-date of the performance evaluation period. Studies including Brown *et al.* (1992) and Elton *et al.* (1996a) highlight the problems performance evaluation studies face where survivorship bias exists. The extent to which the results in the paper are biased is not known, however, analysis of Towers

each fund and across each month are also recorded, which allows inferences to be made concerning the asset allocation positions of investment managers relative to each fund's unique strategic benchmark. The investment managers provide these strategic benchmark weights for each of their pooled funds to asset consulting firms such as Towers Perrin in order to better understand the investment strategy.[43] Strategic benchmarks are generally fixed across time and represent a fund's long-term investment objective. Over the short-term, managers may adopt strategies of under or overweighting fund asset allocations relative to their own strategic benchmark in an attempt to enhance portfolio performance. The funds included in the sample are also classified, where possible, according to the two distinct investment management styles – top-down and bottom-up. The partitioning of funds was performed based on information provided to Towers Perrin by the fund managers. Half of the funds in the sample predominantly used top-down strategies; six funds managed their portfolios using a bottom-up approach. The other two funds could not be classified.

4.4 Empirical Results

4.4.1 Overall Portfolio Performance

The empirical results derived from both the Henriksson-Merton and Treynor-Mazuy models and presented in Table 4.2 do not support the hypothesis that funds collectively have security selection or market timing skill at the total fund level.

Perrin's historical performance surveys indicate that it is likely to be small. Given the major source of bias generally arises due to poor performing funds having higher attrition probabilities, survivor biased studies are likely to positively overstate performance than may otherwise be the case.

[43] These independent strategic benchmark weights provided by the investment managers have been used in the attribution analysis performed below.

Panel A of Table 4.2 (employing the Henriksson-Merton approach) reveals that a majority of funds exhibit security selection and market timing coefficients insignificant from zero. Three funds have selectivity estimates significantly different from zero, where two funds are significantly positive. Approximately half of the funds record negative stock selection estimates. The market timing performance of funds provides even greater evidence of an inability of fund managers to outperform. The results show that while a significant majority of funds (15 out of 16) have insignificant timing coefficients, the majority of funds (11 out of 16) have negative β_{p2} estimates. Further, the solitary fund exhibiting significantly positive market timing underperforms in security selection. Panel B of Table 4.2, reports the security selection and market timing estimates using the Treynor-Mazuy approach, and the findings are largely consistent with those in Panel A.

Table 4.2 – Pooled superannuation fund performance at the total portfolio level before expenses using the Henriksson-Merton model (Panel A) and Treynor-Mazuy model (Panel B) over the period January 1991 to December 1998.

Each fund's performance is measured against their unique strategic benchmark that accounts for all asset classes consistent with their stated investment objective (i.e. a multi-sector benchmark). Risk-adjusted performance due to security selection (α_p) is expressed in percentage terms per month. The Henriksson-Merton model and Treynor-Mazuy model have their coefficients estimated from models 4.1 and 4.2 respectively.

Panel A: Henriksson-Merton Model						
Fund	α_p	$t(\alpha_p)$	β_{p1}	β_{p2}	$t(\beta_{p2})$	R^2
A	-0.014	-0.20	0.985	-0.022	-0.34	0.971
B	-0.026	-0.45	0.966	0.006	0.09	0.968
C	-0.022	-0.22	1.039	-0.082	-0.64	0.924
D	0.050	0.39	0.889	-0.130	-1.18	0.868
E	0.000	0.00	0.947	-0.039	-0.58	0.967
F	0.005	0.06	1.004	0.041	0.54	0.959
G	0.106	1.02	0.920	0.091	1.20	0.927
H	0.168	2.40**	0.933	-0.129	-1.63	0.963
I	0.219	2.32**	0.933	-0.125	-1.36	0.952
J	0.131	1.63	1.096	-0.011	-0.14	0.954
K	-0.024	-0.30	1.065	-0.069	-0.77	0.955
L	0.009	0.09	0.974	-0.065	-0.65	0.933
M	-0.058	-0.59	1.043	0.001	0.01	0.956
N	-0.255	-2.47**	1.065	0.208	2.07**	0.938
O	-0.091	-0.74	1.048	-0.021	-0.21	0.928
P	0.063	0.55	0.966	-0.055	-0.52	0.926
α	9+	7-				
β_2	5+	11-				
α, β_2	2+	4-				
α, β_2 +/-	10					
Panel B: Treynor-Mazuy Model						
Fund	α_p	$t(\alpha_p)$	β_p	γ_p	$t(\gamma_p)$	R^2
A	-0.021	-0.40	0.996	-0.003	-0.37	0.971
B	-0.023	-0.54	0.963	0.001	0.06	0.968
C	-0.024	-0.33	1.078	-0.015	-1.09	0.924
D	0.019	0.18	0.952	-0.017	-1.43	0.869
E	-0.015	-0.27	0.965	-0.004	-0.68	0.967
F	0.031	0.56	0.984	0.002	0.31	0.959
G	0.154	1.90*	0.877	0.007	1.03	0.927
H	0.139	2.75***	0.997	-0.019	-2.09**	0.964
I	0.190	2.79***	0.993	-0.016	-1.76*	0.953
J	0.169	2.03**	0.980	0.000	0.00	0.928
K	-0.037	-0.58	1.099	-0.010	-0.96	0.956
L	-0.015	-0.20	1.004	-0.007	-0.57	0.933
M	-0.061	-0.86	1.043	0.001	0.08	0.956
N	-0.164	-2.21**	0.965	0.020	1.91*	0.938
O	-0.097	-1.07	1.058	-0.003	-0.31	0.928
P	0.033	0.38	0.992	-0.004	-0.37	0.926
α	7+	9-				
γ	6+	10-				
α, γ	3+	6-				
α, γ +/-	7					

*Significant at 0.10 level
**Significant at 0.05 level
***Significant at 0.01 level

The *t*-statistics are calculated using White (1980) heteroskedastic consistent standard errors. The coefficient of determination is the adjusted R^2.

An interesting finding documented in Table 4.2 is existence of strong negative correlation (cross-sectional) between the selectivity and timing estimates.[44] Around two thirds of funds exhibit either positive selectivity coupled with negative timing or positive timing and negative security selection coefficients. Both the Pearson (-0.635) and Spearman (-0.435) correlation coefficients are significant at the 0.01 and 0.10 levels respectively. Other studies, including Henriksson (1984) and Coggin, Fabozzi and Rahman (1993) find evidence of a strong negative relationship between timing and selectivity, indicating that perceived skill in one component of portfolio management activity does not necessarily imply skill in the other. Henriksson (1984) hypothesises the existence of a negative relationship due to the market proxy being misspecified or the model omitting relevant factors explaining the derivation of fund returns. While the former argument may appear to have little merit in this study, due to the tests for timing and selectivity relying on the use of a more appropriate benchmark, the issue remains an empirical question.

An alternative explanation for the negative correlation between timing and security selection may be due to performance models omitting important risk factors. In particular, Jagannathan and Korajczyk (1986) hypothesise that the negative correlation may occur as a result of portfolio managers holding options or option-like securities such as listed securities with high leverage. Coggin *et al.* (1993) indicate that the phenomenon of a negative relationship between timing and security selection is derived due to sampling errors of the two estimates being negatively correlated. However, while not reported directly in this essay, evidence of negative correlation (time series) between timing and selectivity is statistically weak when consideration is given to the geometric performance attribution approach. One problem of testing this phenomenon in this essay is the small

[44] Similar to the results in Table 2, Table 4 also shows a strong negative relationship (cross-sectional) between timing and selectivity estimates across Australian equities, international equities and Australian fixed interest.

sample size. Future research on the correlation between timing and selectivity is therefore warranted.

4.4.2 Performance Sensitivity to Choice of Benchmark

Previous performance evaluation studies in both Australia and the U.S. have relied on the use of an equity market proxy as the benchmark, even where funds have non-equity assets as some proportion of the total portfolio. Henriksson (1984) states the use of such a benchmark is a sufficient market proxy where fund performance is highly correlated with the true market proxy. However, in response to Ippolito's (1989) conclusion that U.S. mutual funds earned sufficient risk-adjusted returns to recover expenses, Elton *et al.* (1993) demonstrate that performance can be sensitive to the choice of benchmark used. These authors show that Ippolito's (1989) results were due to the benchmark proxy excluding the performance of non-S&P 500 securities.

In view of Elton *et al.*'s finding (1993), performance in this study is also analysed using the All Ordinaries Accumulation Index as the market proxy (following Sinclair's (1990) method) to evaluate the extent of possible bias generated for pooled superannuation funds.[45] As outlined in Table 4.1, pooled superannuation funds, on average, have less than 40 percent of their strategic benchmark allocations to the Australian equities asset class. Sinclair (1990) reports that 15 of the 16 funds examined in the period 1981-1987 exhibited significantly positive security selection estimates at the 0.05 level for the Henriksson-Merton model. In contrast to the results presented in Table 4.2, Table 4.3 clearly demonstrates the problems that arise where a benchmark is used for diversified funds that

[45] Fund returns in the sample, on average, had a correlation coefficient of 0.92 with the All Ordinaries Accumulation Index. This compares with a correlation coefficient of investment performance relative to each fund's specific strategic benchmark asset allocation of approximately 0.97.

ignore other asset class exposures beyond Australian equities. Funds in the sample exhibit significantly higher security selection estimates while simultaneously recording significantly worse market timing. While the results in both Table 4.2 (Panel A) and Table 4.3 provide consistent evidence that funds do not exhibit superior timing ability under the Henriksson-Merton approach, the use of an equity market proxy overstates both pooled superannuation funds' poor timing ability and successful security selection. These findings support Elton *et al.*'s (1993) correction of Ippolito's (1989) finding that mutual funds outperform.

Table 4.3 – Pooled superannuation fund performance at the total portfolio level before expenses using the Henriksson-Merton model over the period January 1991 to December 1998.

Performance is measured using the All Ordinaries Accumulation Index as the market proxy or benchmark index. Risk-adjusted performance due to security selection (α_p) is expressed in percentage terms per month and market timing estimates are represented in β_{p2}.

Fund	α_p	$t(\alpha_p)$	β_{p1}	β_{p2}	$t(\beta_{p2})$	R^2
A	0.254	1.95*	0.518	-0.107	-1.74*	0.903
B	0.150	1.22	0.427	-0.061	-1.01	0.882
C	0.398	2.52**	0.475	-0.213	-2.82***	0.851
D	0.444	2.00**	0.436	-0.208	-2.26**	0.801
E	0.424	2.49**	0.514	-0.155	-1.66	0.836
F	0.380	2.36**	0.483	-0.088	-1.14	0.849
G	0.418	3.77***	0.510	-0.041	-0.73	0.895
H	0.486	3.24***	0.411	-0.164	-2.30**	0.840
I	0.580	3.51***	0.466	-0.223	-2.68***	0.848
J	0.521	2.90***	0.505	-0.144	-1.54	0.852
K	0.350	2.06**	0.532	-0.146	-1.73*	0.867
L	0.178	1.38	0.519	-0.070	-1.08	0.888
M	0.324	1.96*	0.544	-0.126	-1.84*	0.858
N	0.104	0.68	0.577	0.008	0.11	0.863
O	0.282	1.79*	0.524	-0.129	-1.58	0.874
P	0.569	3.37***	0.457	-0.207	-2.68***	0.807

*Significant at 0.10 level
**Significant at 0.05 level
***Significant at 0.01 level
The *t*-statistics are calculated using White (1980) heteroskedastic consistent standard errors.
The coefficient of determination is the adjusted R^2.

4.4.3 Performance of Individual Sectors

Table 4.4 presents the security selection and market timing results (using the Henriksson-Merton model) for pooled superannuation funds for the three largest asset classes in which these pooled vehicles invest – Australian equities, international equities and Australian fixed interest.[46] The pooled superannuation funds comprising the sample invest across multiple asset classes, of which domestic equities, international equities and domestic fixed interest represent the three largest asset classes for all funds. The analysis presented involves using the sector specific benchmarks outlined in Table 4.1. Given these sectors are the most significant in terms of each fund's portfolio size, the performance across these individual sectors will be influential in terms of a pooled fund's overall portfolio return. In general, the results indicate that as a group, actively managed pooled superannuation funds were unable to outperform the relevant market indices.[47] Security selection performance is the most attractive for funds in the Australian equities asset class compared to other sectors (6 funds both positive and statistically significant), however around three-quarters of funds in Australian equities (2 funds significant) have negative timing coefficients. In Australian fixed interest 14 of 15 funds (1 fund significant) record negative timing estimates. International equities performance on the basis of security selection is the worst across all sectors, however only one manager recorded significantly negative selectivity. Market timing ability in the international shares sector is shown to be non-existent.

[46] The Treynor-Mazuy model was also evaluated and the results were consistent with the Henriksson-Merton approach, and as a result are not reported directly in the paper.

[47] Tests for market timing and selectivity were also performed to assess the potential bias in results arising from benchmark inefficiency following the approach outlined by Admati and Pfleiderer (1997). These alternative market proxies are more difficult yardsticks for funds to outperform as they represent the average performance of potentially informed investment managers. The security selection estimates were generally lower across all sectors for all funds and independent of the model used. Overall, the results indicated that funds do not exhibit superior selectivity or timing skill.

4.4.4 Geometric Performance Attribution

An alternative test for security selection and market timing ability used in this essay relies on a performance attribution methodology (discussed in section 4.2.2) decomposing the active raw return (not adjusted for risk) across asset sectors given the active decisions employed by investment managers. The relatively high granularity of data provides analysis of a fund's performance with direct reference to an investment manager's changes to the portfolio's asset allocation (relative to the fund's strategic benchmark allocation) and their selection of stocks in an attempt to outperform the fund's benchmark. The results presented in Table 4.5 report the average active returns above the benchmark, which are attributable to either market timing or stock selection. Market timing and stock selection ability is reported at the total portfolio level and across the three largest asset classes comprising these multi-sector pooled superannuation vehicles. Table 4.5 indicates that 2 funds exhibit positive and significant active returns at the total fund level, and only one fund is successful in both timing and stock selection.

The empirical results across the individual asset classes also indicate the majority of funds did not exhibit superior performance.[48] Stock selection in Australian equities was generally the most successful asset class for the funds in the sample, however no evidence exists of superior market timing ability. Four of the five funds with significantly positive selection record positive timing however none is statistically significant. The results concerning fund performance in the international equities and Australian fixed interest sectors also support the general finding that funds overall do not outperform benchmark

[48] Performance attribution was also performed using what has been termed an arithmetic methodology (see Singer, Gonzalo and Lederman (1998) and Burnie, Knowles and Teder (1998)), which assumes investment managers emphasise both security selection and market timing. The results were consistent with the evidence presented using the geometric performance attribution approach. Further, only 14 funds are evaluated as a result of 2 fund managers (C and M) not being easily partitioned into top-down or bottom-up styles.

indices – therefore timing and selection skill is absent. In international equities, 12 funds have negative mean security selection values (4 significant) and 8 of the 14 funds exhibit negative timing. Little evidence supports collective timing and selection skill by managers in the Australian fixed interest sector. Analysis of the performance of funds predominantly top-down or bottom-up does not indicate that funds exhibit superior skill in asset allocation or stock selection respectively.

Further tests of performance are contained in Table 4.6, evaluating the consistency of timing and selection skill for pooled superannuation funds. This is performed by analysing the number of periods (months) where investment managers make correct forecasts. Table 4.6 partitions managers into either top-down or bottom-up portfolio management strategies. These two categories account for whether the investment manager's portfolio strategy is predominantly asset allocation (top-down) or stock selection (bottom-up) driven. A correct forecast is defined as occurring when an investment manager outperforms their benchmark (i.e. an active return) in the particular month evaluated. Analysis is performed by calculating the proportion of months over the 8-year period in which the investment manager earns positive active returns.

Table 4.4 – The performance of pooled superannuation funds before expenses across the three major investment sectors using the Henriksson-Merton model. The period of evaluation is January 1991 to December 1998.

Risk-adjusted performance due to security selection (α_p) is expressed in percentage terms per month and market timing estimates are represented in β_{p2}. All funds in the sample invest in Australian equities, International equities and Australian fixed interest asset classes. Fund performance is measured across individual sectors using the market indices defined in Table 4.1. At the bottom of the table, summary measures indicate the number of funds exhibiting positive (negative) alphas, positive (negative) market timing coefficients (β_{p2}) and those funds which have alternate signs for both stock selection and market timing.

	Australian Equities				International Equities				Australian Fixed Interest			
Fund	α_p	$t(\alpha_p)$	β_2	$t(\beta_2)$	α_p	$t(\alpha_p)$	β_2	$t(\beta_2)$	α_p	$t(\alpha_p)$	β_2	$t(\beta_2)$
A	-0.009	-0.10	-0.042	-1.03	-0.063	-0.30	-0.084	-0.78	0.033	1.02	-0.024	-0.27
C	0.032	0.28	-0.055	-0.92	-0.374	-0.86	0.013	0.05	0.050	0.73	-0.091	-0.74
D	0.086	0.49	-0.086	-1.05	0.069	0.19	0.069	0.34	0.100	1.44	-0.270	-1.81
E	0.306	2.37 **	-0.075	-1.16	-0.481	-2.80 ***	0.073	0.83	0.041	0.44	-0.002	-0.02
F	-0.029	-0.25	0.067	1.12	0.067	0.44	-0.088	-0.95	0.010	0.22	-0.016	-0.19
G	0.403	2.23 **	0.030	0.33	0.218	0.48	0.093	0.44	0.030	0.38	-0.069	-0.45
H	0.191	2.51 **	-0.034	-0.93	0.085	0.42	-0.071	-0.60	0.049	1.40	-0.075	-1.13
I	0.198	2.57 **	-0.040	-1.13	0.103	0.47	-0.075	-0.61	0.083	1.59	-0.153	-1.29
J	0.488	2.77 ***	-0.062	-0.68	-0.281	-0.86	0.035	0.17	0.099	1.92	-0.164	-1.54
K	0.230	2.04 **	-0.129	-2.25**	-0.006	-0.03	-0.128	-1.11	0.023	0.60	0.051	0.65
L	0.026	0.22	-0.041	-0.68	0.024	0.07	-0.091	-0.51	0.002	0.02	-0.045	-0.41
M	0.033	0.29	0.002	0.03	-0.165	-0.72	0.081	0.73	0.079	1.03	-0.227	-1.62
N	0.014	0.12	0.013	0.19	-0.280	-1.43	0.139	1.55	0.171	2.61**	-0.327	-2.26 **
O	0.055	0.44	-0.038	-0.57	-0.103	-0.43	-0.018	-0.15	-0.017	-0.33	-0.074	-1.15
P	0.088	0.91	-0.101	-1.84*	0.343	0.93	0.060	0.30	0.000	-0.01	-0.006	-0.11
α	13+	2-			α	7+	8-		α	14+	1-	
β_2	4+	11-			β_2	8+	7-		β_2	1+	14-	
α, β_2	3+	1-			α, β_2	3+	3-		α, β_2	1+	1-	
α, β_2 +/-	11				α, β_2 +/-	9			α, β_2 +/-	13		

*Significant at 0.10 level
**Significant at 0.05 level
***Significant at 0.01 level
The *t*-statistics are calculated using White (1980) heteroskedastic consistent standard errors.

Table 4.5 – Pooled superannuation fund performance at the total portfolio level and individual sector level (before expenses) using the geometric attribution framework.

Performance is expressed as the mean active return per month in percentage terms over the period January 1991 to December 1998. Funds are partitioned on the basis of their predominant portfolio management style (top-down or bottom-up). A fund's active return at the total portfolio level is measured with respect to the strategic benchmark applicable to the fund. Each fund's sector performance is measured with respect to the market benchmarks defined in Table 4.1. At the bottom of the table, summary measures indicate the number of funds exhibiting positive (negative) stock selection, positive (negative) market timing, and those funds which have alternate signs for both stock selection and market timing.

	Total Portfolio			Australian Equities		International Equities		Australian Fixed Interest	
Fund	**Tot**	**R_s**	**R_a**	**R_s**	**R_a**	**R_s**	**R_a**	**R_s**	**R_a**
Panel A: Top-Down Portfolio Management									
A	-0.036	-0.034	-0.002	-0.029	-0.005	-0.043*	-0.017	0.006*	0.007
B	-0.035	-0.004	-0.030	-0.022	-0.004	-0.033**	-0.014	0.006	0.013
D	-0.101	-0.091	-0.010	-0.007	0.001	-0.004	-0.002	-0.007	0.011
E	-0.061	-0.039	-0.022	0.071**	0.003	-0.070***	-0.002	0.006	0.018
J	0.167***	0.109**	0.059**	0.159***	0.012	-0.033	0.000	0.005	0.002
K	-0.038	-0.057	0.020	0.027	0.011	-0.055**	-0.022**	0.011***	0.003
L	-0.047	-0.054	0.007	-0.001	0.005	-0.046	0.001	-0.001	0.004
P	0.004	0.045	-0.041*	-0.013	-0.003	0.066	-0.004	-0.001	0.002
Panel B: Bottom-Up Portfolio Management									
F	0.034	-0.013	0.047*	0.023	-0.001	-0.025	-0.001	-0.005	0.016
G	0.128*	0.195***	-0.067**	0.180***	-0.001	0.007	-0.002	-0.006	0.024**
H	0.054	0.034	0.021	0.030**	0.003	-0.019	0.010**	-0.002	-0.001
I	0.092	0.081*	0.011	0.036**	0.002	-0.025	0.009**	-0.005	0.003
N	-0.064	-0.025	-0.039	0.028	0.012	-0.029	0.009	-0.003	0.002
O	-0.081	-0.112*	0.031	0.012	0.010	-0.061	0.002	-0.003	0.021*
SS		5+	9-	9+	5-	2+	12-	5+	9-
MT		7+	7-	9+	5-	6+	8-	13+	1-
SS, MT		3+	5-	7+	3-	0+	6-	5+	1-
SS, MT +/-		6		4		8		8	

*Significant at 0.10 level
**Significant at 0.05 level
***Significant at 0.01 level

Table 4.6 – Evaluation of the ability of portfolio managers to make correct forecasts in their investment decision-making over the period January 1991 to December 1998.

A correct forecast is defined as the manager outperforming the relevant benchmark in the month. The benchmark at the total portfolio level relates to the each fund's strategic benchmark encompassing all asset classes comprising the fund's investment strategy. The individual asset classes are evaluated with respect to the benchmarks identified in Table 4.1. Funds are dichotomised between top-down and bottom-up portfolio management strategies with respect to whether the investment manager places greater precedence on asset allocation (top-down) or stock selection (bottom-up).

	Total Portfolio (%)		Australian Equities (%)		International Equities (%)		Australian Fixed Interest (%)	
Fund	R_s	R_a	R_s	R_a	R_s	R_a	R_s	R_a
Panel A: Top-Down Portfolio Management								
A	40.6*	50.0	47.9	45.8	46.9	37.5**	61.5**	55.2
B	47.9	42.7	47.9	47.9	46.9	37.5**	61.5**	58.3
D	37.5**	56.3	38.5**	52.1	53.1	54.2	50.0	62.5**
E	46.9	45.8	60.4*	49.0	32.3***	46.9	47.9	61.5**
J	55.2	58.3	63.5***	55.2	45.8	46.9	59.4*	53.1
K	43.8	47.9	58.3	53.1	40.6*	43.8	58.3	46.9
L	43.8	53.1	49.0	57.3	49.0	49.0	52.1	57.3
P	55.2	37.5**	47.9	55.2	61.5**	46.9	49.0	54.2
Panel B: Bottom-Up Portfolio Management								
F	47.9	55.2	52.1	42.7	47.9	44.8	42.7	57.3
G	67.7***	36.5***	68.8***	37.5**	47.9	45.8	49.0	61.5**
H	55.2	55.2	59.4*	61.5**	43.8	63.5***	53.1	50.0
I	55.2	47.9	59.4*	59.4*	42.7	65.6***	49.0	60.4*
N	45.8	45.8	52.1	47.9	44.8	55.2	53.1	56.3
O	40.6*	57.3*	53.1	57.3*	41.7	52.1	47.9	60.4*

*Significant at 0.10 level
**Significant at 0.05 level
***Significant at 0.01 level

The analysis is performed at the total portfolio level and across three individual asset classes – Australian equities, international equities and Australian fixed interest. Consideration of the frequency of successful monthly forecasts, rather than the actual magnitude of the forecasts, provides information regarding the relative success of the portfolio management process over time. Hypothesis tests are conducted over the 96-month period to identify the ability of investment managers to successfully anticipate market movements. The null hypothesis assumes the proportion of successful forecasts made by portfolio managers equates to 50 percent (H_0: p=0.5). Rejection of the null hypothesis concludes the portfolio manager exhibits evidence of positive skill where the proportion exceeds 0.5 for both market timing and stock selection (H_1: $p \neq 0.5$). In Australian equities, 5 funds record positive security selection significantly greater than 50 percent of months and 5 funds show significant consistency in market timing forecasts in the Australian fixed interest sector. However, the results provide further evidence that funds collectively did not exhibit successful security selection or timing skills.

4.5 Summary and Suggestions for Future Research

This essay evaluates the market timing and security selection capabilities of Australian pooled superannuation funds. The empirical evidence confirms that funds overall did not exhibit superior selectivity or timing skill in the period evaluated at either the total portfolio level, or in the Australian equities, international equities and Australian fixed interest sectors. These findings are consistent with the evidence presented in the literature that funds are unable to earn superior risk-adjusted excess returns relative to appropriately specified market indices. While funds are generally more successful in their security selection strategies than market timing, both components of performance do not provide investors with both positive and statistically significant risk-adjusted performance.

An interesting finding is the strong negative cross-sectional correlation between selectivity and timing using both the Henriksson-Merton and Treynor-Mazuy models, supporting U.S. studies as well as Sawicki and Ong (2000), however the phenomenon is not supported using the geometric performance attribution methodology. The negative correlation phenomenon requires further research, using an expanded data set and alternative evaluation models. Indeed Ferson and Schadt (1996) employ conditional models incorporating lagged public information variables and report strong negative covariance between fund betas and market returns, suggesting managers reduce (increase) their market betas when market returns are expected to be high (low). Ferson and Warther (1996) find that this result is in part driven by mutual fund cash flows, however further research should investigate the other factors causing such a relationship between beta and market return.

The essay also demonstrates the importance of using appropriate benchmarks that are consistent with the investment strategies and assets held in diversified or multi-sector portfolios such as pooled superannuation funds. Sinclair's (1990) finding that funds exhibit superior security selection skill and significantly perverse timing is shown to arise through the use of a misspecified market proxy that excludes assets other than Australian equities. Therefore alternative benchmarks that reflect each fund's unique investment strategy lead to more accurate inferences concerning portfolio performance. An extension of this research should include an investigation of the market timing and stock selection capabilities of funds using a conditional performance evaluation framework that accounts for public information and time variation in risk.

5

CHAPTER 5 – THE PERFORMANCE OF AUSTRALIAN EQUITY INDEX FUNDS

5.1 Introduction

Literature based on U.S. markets widely confirms the inability of active mutual funds to outperform passive benchmarks or indices such as the S&P 500 (Jensen (1968), Grinblatt and Titman (1989b), Elton *et al.* (1993), Malkiel (1995), Gruber (1996), Carhart (1997) and Edelen (1999)). The findings of Australian studies are consistent with the U.S. evidence (Bird *et al.* (1983), Robson (1986), Hallahan and Faff (1999), Sawicki and Ong (2000)). Unlike active funds, which aim to outperform their benchmark index, passive or index funds aim to replicate the performance of the benchmark.

While prior research on the performance of active investment funds is extensive, there exists a critical gap in the literature with respect to the performance of passive funds. Such literature is limited to Gruber (1996) and Frino and Gallagher (2001).[49] Gruber (1996) examines the performance of a sample of U.S. index funds between 1 January, 1990 and 30 December, 1994, and documents that they underperform the index by approximately 20.2 basis points per annum on an after-cost and risk-adjusted basis. Frino and Gallagher (2001) extend the analysis to a sample of 42 U.S. index equity funds between 1 March, 1994 and 28 February, 1999,

[49]While evidence on the performance of index funds is limited to Gruber (1996) and Frino and Gallagher (2001), Sinquefield (1991) and Keim (1999) examine the design of small-capitalisation index funds, while Horan (1998) examines the types of fund assets likely to use index investment products.

and document that they underperform the index by approximately 29.0 basis points per annum on an after-cost and risk-adjusted basis, and the magnitude of the difference between index fund performance and their benchmark averages between 3.9 and 11.0 basis points per month before costs. The main objective of this essay is to extend previous research by documenting the performance of Australian equity index funds. This is achieved by evaluating both the magnitude and determinants of index fund tracking error. An analysis of index fund performance is important as it provides investors with direct evidence concerning the ability of managers to exactly replicate the index as well as determining the success or otherwise of passive managers in meeting their performance objectives.

Since the aim of index funds is to replicate the performance of an index, then the difference between the return on a benchmark index and return on an index funds' portfolio (or tracking error) can be used to evaluate their performance. Tracking error in the performance of index funds is likely to arise from the difficulties inherent in management of passive portfolios. Theoretically, the management of an index portfolio is straightforward, requiring passive fund managers to hold each constituent index security in the same proportion to the benchmark (known as a 'full replication' strategy). In reality, index funds will experience considerable difficulty in replicating the target index, because the index represents a mathematical calculation that does not take into account market frictions. For example, index funds must physically transact in index securities in order to replicate the returns of the benchmark thereby incurring transaction costs and imparting price pressure. However, the calculation underlying the index assumes costless re-balancing may occur at any time at prevailing market prices.

Chiang (1998) identifies that transaction costs, index composition changes, corporate activity, fund cash flows, index volatility and the reinvestment of dividends are the main factors which give rise to tracking error in index fund performance. The existence of these factors is the main motivation for the research reported in this essay. The primary aim of this essay is to document the magnitude of tracking error in the returns generated by Australian equity index funds as a consequence of these factors. This essay also extends previous U.S.-based research by assessing the significance of these factors in explaining the magnitude of tracking error.

In the U.S. the first index mutual fund was launched in 1976 by Vanguard Group Inc., however it has only been in the last decade that indexing has grown significantly (Gruber (1996); Frino and Gallagher (2001)). In Australia, indexing has also grown substantially in terms of the size of funds under management. The amount of assets passively managed by Australian institutions as at September 2000 was reported by Rainmaker Information to be around $A75.9 billion, or 11 percent of the Australian investment management industry. In addition, an April 2000 survey by one of the Australian superannuation industry's journals, *Superfunds*, reported total assets indexed was around $A57.4 billion, representing an increase of 42 percent since the previous year.[50] Therefore, the research reported in this essay is also motivated by the significance and growth of index funds in Australia.

While the primary aim of this essay is to provide an understanding of the difficulties and performance of a relatively new and increasingly popular type of investment fund *per se*, the analysis also provides evidence relevant to two other issues in the funds management performance evaluation literature. To date, the

[50] *Superfunds*, August 2000, Volume 239, pp13-18. The percentage increase in the year to 1999 was 65 percent, and 90 percent of all indexed assets were invested in the Australian and international equity asset classes.

literature widely documents that active funds do not outperform appropriate benchmark indices, and suggests passive funds represent an appropriate alternative (e.g. Malkiel (1995); Elton *et al.* (1996b)). However, this argument implies that index funds are able to achieve their performance objectives. Given the difficulties faced by index funds, and the likelihood of tracking error, this essay provides new evidence relevant to assessing the merits of an active versus passive investment strategy.

The performance evaluation literature also identifies the importance of employing appropriate benchmark indices in the evaluation of fund performance. For example, Elton *et al.* (1993) show Ippolito's (1989) findings of superior performance for active U.S. mutual funds is attributable to an incorrectly specified benchmark. If index funds exhibit significant tracking error, then this implies that replication of index returns is problematic. This in turn may cast doubt on the appropriateness of an index as a technical benchmark in performance evaluation. The results of this essay are also relevant to this issue. The following section discusses the difficulties faced by passive fund managers in achieving their objective (index returns), and identifies a number of variables that are likely to be related to tracking error in passive fund performance.

This essay proceeds as follows. The next section provides a theoretical discussion of why tracking error in index fund performance arises as well as identifying a number of potential factors that cause passive fund managers difficulties in replicating the benchmark. This is followed by a description of the data used and the methodology employed in quantifying tracking error. The empirical results are then presented in Section 5.5. The final section concludes the paper and makes suggestions for future research.

5.2 Theoretical Discussion

The objective of a passive or index fund is to replicate the return on a benchmark index. This is typically achieved by an investor holding all securities comprising the benchmark index in their exact same proportion (full replication strategy) or holding a portion of the theoretical portfolio of securities underlying the benchmark index that mimics the returns on the index (i.e. a stratified sampling or optimisation strategy). An index is an arithmetic calculation measuring changes in the value of a group of securities within a particular asset class. The calculation of an index ignores market frictions in the sense that when the security weights within the index change, the index implicitly assumes that re-balancing of securities to reflect the new market weights can occur costlessly, instantaneously, and at prevailing market prices. However, index funds face a number of market frictions in attempting to mimic the index portfolio, or more specifically, returns on the index. These frictions can ultimately result in tracking error. Chiang (1998) identifies that transaction costs, client related cash flows, the treatment of dividends by the index, the volatility of the benchmark and changes in the composition of the index may all contribute to tracking error. Tracking error may also differ across index funds as a consequence of the portfolio strategy adopted in attempting to replicate the performance of the index. Each of these factors is discussed below.

Explicit costs associated with trading in securities markets, including brokerage fees and stamp duty, can influence the ability of passive funds to replicate index performance. The index itself is calculated as a ‘paper’ portfolio, which assumes transactions can occur costlessly (see Perold (1988)). In reality, passive funds incur explicit costs associated with transactions relating to client capital flows. For example, cash flow movements cause flow-induced trading for passive funds, requiring new cash to be invested across index securities or part of the portfolio to be liquidated. Apart from cash-flow induced trading, index funds also trade regularly for a variety of other reasons, associated with strategy implementation. Because index funds are required to trade, explicit transaction costs are incurred. These costs erode the value of the index fund by the amount of the explicit costs and lead to tracking error in performance measured after management expenses.[51]

Funds also incur implicit transaction costs in trading, including bid-ask spreads and the price impact of trading (Perold and Sirri (1994)). These will also cause tracking error in performance measured before management expenses. Transactions by passive funds can cause temporary demand and supply imbalances, which implies that they are not able to trade instantaneously at prevailing market prices (Chan and Lakonishok (1993), Perold and Sirri (1994)). Overall, this implies that client related cash-flow movements and the implicit costs of trading, such as bid ask spreads, are likely to be related to the magnitude of tracking error.

Another factor likely to be related to tracking error is the volatility of the underlying benchmark index. If the composition and weighting of stocks held by an index fund perfectly match those of the index, changes in the value of the index fund portfolio should match changes in the benchmark index. However, at any point in time, the composition of the portfolio of a passive fund is unlikely to be perfectly aligned with the index portfolio for a number of reasons. For example, most index fund managers are likely to use some form of proxy portfolio because the smaller, less liquid, stocks in the underlying index are more difficult to acquire. Other funds explicitly aim to hold an imperfect proxy portfolio with the objective of minimising

[51] Management expenses cover costs incurred by the fund manager associated with custodian services, trading and administration. They also include the profit earned by the fund manager.

the costs of assembling a portfolio to track the underlying index. New client cash inflows may also take time to be invested in the funds' desired portfolio, especially those involving less liquid stocks. As a result, unsystematic movements in the stocks underlying an index that are not in a passive fund managers portfolio will result in tracking error. Similarly, unsystematic movements in the overweight stocks in a fund manager's portfolio relative to the index portfolio will also cause tracking error. Consequently, higher benchmark index volatility is likely to be associated with higher tracking error.

Tracking error can also arise from dividends paid by stocks in the index. When a listed company in an index goes ex-dividend, the index effectively assumes that the dividend is re-invested in the stock from which it is derived on the ex-dividend date. However, investors (including passive funds) experience a significant time delay, which normally extends into weeks, in receiving cash in relation to a dividend. As a consequence, tracking error can occur for two reasons. First, there are transaction costs associated with re-investing the dividends once received, and these erode the value of the passive funds portfolio. In contrast, the index assumes that the proceeds from the dividend payment are re-invested costlessly at the prevailing market price. Second, the fund manager must wait for receipt of cash in relation to dividends prior to being able to re-invest it. Hence, there is likely to be a positive relationship between the level of dividends paid by stocks in an index and passive fund tracking error.

Tracking error may also be related to changes in the composition of the benchmark index. These include periodical index adjustments related to company additions and deletions, capitalisation changes and corporate restructuring. Fund managers may need to trade in order to adjust their portfolios to properly track the index following such changes. Transaction costs are also incurred in this trading which can also increase tracking error. Depending on the relative size of the stocks entering and exiting the index (in terms of market capitalisation), these changes may also require a number of costly odd-lot transactions in order to match the rebalanced index. The index manager also faces the additional challenge of executing orders at the best possible prices and in such a manner that minimises the crystallisation of capital gains tax liabilities to avoid significant erosion of returns. In the case of corporate restructuring, tracking error can also arise when index securities are involved in a merger or takeover by another company outside the index (Chiang (1998)). For example, a timing delay may exist between the date on which the index fund receives the cash settlement and the date when the target firm is removed from the index.

Periodical changes to the index can also make it difficult (and costly) for a passive fund to replicate the benchmark index.[52] Beneish and Whaley (1996) and Chiang (1998) identify that 'front-running' by market participants, who acquire index securities ahead of their inclusion in a benchmark, can have an undesirable impact on index funds.[53] Ultimately, changes in the composition of the index require passive funds to trade, which can result in transaction costs and tracking error. Overall, changes in the composition of the index are also expected to cause tracking error.

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[52] The ASX rules governing the inclusion and exclusion of securities from the All Ordinaries Index are made with regard to a stock's liquidity and market capitalisation. Full replication funds may experience increased difficulties as a result of index changes, given that smaller capitalised securities have a higher probability of not meeting the All Ordinaries Index liquidity rules

[53] For example in the U.S. from October 1989, Standard and Poor's pre-announced changes to the S&P 500 Index, where the index change became effective five days after the announcement. This amendment was designed to provide index funds with greater ease in acquiring the new securities ahead of their inclusion in the index. However, because index funds rebalance portfolios on the day the change becomes effective, this allows risk arbitrageurs the opportunity to sell the stock to index funds at a premium. The Australian Stock Exchange (ASX), in a similar manner to Standard and Poor's, pre-announces changes to the All Ordinaries Index, however the length of time between the announcement of the change and the actual index amendment depends on the size of the stock.

The magnitude of tracking error may differ across index managers depending on the portfolio management approach used to replicate returns on the index. The different approaches can be classified into 'full replication', 'stratified sampling' and 'optimisation' strategies.[54] Full replication strategies require that index funds hold *all* securities in the basket index in the same proportion as represented in the index. Stratified sampling and optimised portfolios on the other hand are non-replication strategies designed to mimic the index through investment in a *subset* of index securities, while at the same time ensuring the portfolio has similar risk and return characteristics as the index.[55] Non-replication strategies aim to minimise transaction costs compared with full replication strategies, however, the trade-off is potentially higher tracking error arising from the performance of excluded securities which comprise the underlying index (Olma (1998)). Optimised portfolios are constructed using highly quantitative, multi-factor risk models aimed at minimising tracking error through an understanding of the covariance between factors driving asset returns (Liu *et al.* (1998) and Olma (1998)). The expectation, *ceteris paribus*, is that tracking error will be systematically lower for full replication index funds compared with non-replication index funds.

The theoretical discussion above implies tracking error is likely to be related to cash flows and implicit transaction costs, index volatility, dividend distributions, changes in the composition of the benchmark index and the portfolio management strategy adopted by index managers. This essay empirically documents the magnitude of tracking error experienced by index funds, as well as assessing the significance of these factors in explaining the magnitude of tracking error.

[54] Olma (1998) suggests that the choice of portfolio management technique used to replicate the returns of an index is influenced by the liquidity of the constituent securities comprising that index.
[55] These characteristics include size, industry and dividend yield and other risk attributes such as those identified by BARRA.

5.3 Data

This research analyses the tracking error of all Australian equity index fund managers with at least one index fund benchmarked to the All Ordinaries Accumulation Index over the period July 1989 to March 1999. The monthly Australian equity index fund returns were initially obtained from asset consultant William M. Mercer Pty Ltd. and were subsequently checked against the returns supplied directly by the investment managers.[56] Performance of the funds includes both income returns and capital changes and are measured in gross terms (i.e. before the deduction of investment management fees and tax). The investment objective of the seven pure index funds examined involves replicating the performance of the All Ordinaries Accumulation Index. The investment managers also provided monthly cash flow data, fund size data and information concerning the portfolio strategy adopted by the fund (i.e. full replication, stratified sampling and optimisation). The Securities Industry Research Centre of Asia-Pacific (SIRCA) provided market bid-ask quote data for all stocks listed on the Australian Stock Exchange, as well as a database of stocks included and excluded from the All Ordinaries Index over the period evaluated.

There are seven index funds examined in this essay. Of these, three use full replication portfolio management strategies and the remaining four passive funds use stratified sampling and/or optimisation methods in order to mimic index returns. The

[56] Other fund managers were also surveyed to ensure that the Mercer database included all managers offering passive equity funds. The Australian index fund market is particularly small compared with the universe of active equity managers that exist in Australia. In order to evaluate each manager's performance, we collected data for each manager's first Australian equity index fund. This ensures the maximum evaluation period possible. While some managers have more than one index portfolio, the approach used in this paper provides a representation of each index manager's ability to replicate the All Ordinaries Accumulation Index. Enhanced index funds and 'quant' funds were excluded from the analysis as they do not represent pure index strategies.

combined assets of the index funds in this essay are approximately $A5.0 billion as at 31 March 1999. The essay is free of survivorship bias.[57]

5.4 Methodology

The performance evaluation literature has predominantly evaluated the risk-adjusted performance of actively managed funds in assessing their ability to outperform market indices. The three classical performance evaluation techniques typically employed by prior studies have involved the Sharpe Ratio (1966), Jensen Measure (1968) and Treynor Index (1965). These approaches are consistent with attempting to determine whether active funds meet their investment objective, which is to outperform the benchmark.

Index fund strategies differ from actively managed funds in that passive funds aim to *replicate* the return and risk of the underlying benchmark index (Keim (1999)). If an index manager is unable to perfectly replicate the returns on a benchmark index (i.e. it experiences tracking error), then this is *prima facie* evidence that an index fund is not meeting its investment objective. Roll (1992) also argues that the level of tracking error in performance is an important criterion for assessing fund manager's (both active and passive) performance. This is because the variability of a fund's differential returns provides the performance analyst with a level of statistical confidence that the manager's investment process has been implemented successfully. For these reasons, this essay investigates the ability of index funds to exactly mirror

[57] The Mercer database covering wholesale funds includes both surviving and non-surviving funds. For the index fund category, no funds ceased to exist. Correspondence with the portfolio managers concerning their competitors and discussions with William M. Mercer Pty. Ltd. indicated that this study includes the population of Australian equity index fund managers over the period examined. The infancy of the passive funds market also helps to mitigate problems of survivorship. However, given the study uses only one fund for each manager, the study may have selection bias.

the performance of the underlying index to which they are benchmarked – their tracking error.

5.4.1 *Measures of the Magnitude of Tracking Error*

Tracking error represents the extent to which the performance of a fund differs from the underlying benchmark index (Roll (1992)). Pope and Yadav (1994) identify a number of different ways tracking error may be measured. These are (1) the average of the absolute difference in returns between the fund and benchmark index, (2) the standard deviation of return differences between the fund and index, and (3) the standard error of a regression of fund returns on benchmark returns. All of these measures are applied in this essay.

Tracking error measured as the average absolute difference in returns ($TE_{1,p}$) is calculated as follows:

$$TE_{1,p} = \frac{\sum_{t=1}^{n} \left| e_p \right|}{n} \tag{5.1}$$

where:

$e_{pt} = R_{pt} - R_{bt}$

R_{pt} = the return of index portfolio p in period t;

R_{bt} = the return of the benchmark index b in period t; and

n = the number of observations in the period.

This definition of tracking error provides a measure of the extent to which the returns on portfolio p differ from the returns on the underlying benchmark index b

over the sample period. This definition treats any deviation in returns (outperformance or underperformance of the index portfolio) as tracking error.

Tracking error measured as the standard deviation of return differences between the fund and index is measured as follows:

$$TE_{2,p} = \sqrt{\frac{1}{n-1}\sum_{t=1}^{n}(e_{pt} - \bar{e}_p)^2} \qquad (5.2)$$

It is important to note, however, if an index fund consistently underperforms the index by *x* percent per month, then the use of this method will result in zero tracking error over the period (Roll (1992)). The converse is also the case and would provide different conclusions concerning tracking error relative to ($TE_{1,p}$). The well-known market model can also be used to generate an estimate of tracking error ($TE_{3,p}$). If the returns on the index funds portfolio *p* are regressed on the returns on the benchmark index *b*, as follows:

$$R_{pt} = \alpha_i + \beta_i R_{bt} + \varepsilon_{pt}$$

The standard error of the regression equation (the volatility of residuals (ε_{pt}) around the regression line) represents an estimate of tracking error. While this method should provide similar results to (2), Pope and Yadav (1994) identify that if the beta of a portfolio is not exactly equal to one, then the regression residuals will differ from the tracking error metric $TE_{2,p}$. If the relationship between the two sets of returns is non-linear, then this approach will overstate tracking error.[58]

5.4.2 Measures of Bias in Tracking Error

The tracking error metrics above are concerned with the *efficiency* with which funds are able to track the All Ordinaries Accumulation Index, however, they do not indicate if there is a *bias* in performance. That is, they do not determine whether passive funds systematically underperform (or indeed outperform) the index. This essay assesses whether there is any bias in the performance of passive funds using two measures. First, the variance or standard deviation statistic is a traditional measure of the efficiency of an estimate, while the expected or mean value can be used to assess bias (Gujarati (1995), p. 781). Analogously, in addition to examining the standard deviation of return differences ($TE_{2,p}$) to assess the efficiency of passive fund performance in tracking the index, the average difference in the return on the index fund and return on the index is examined to assess bias. Second, given that the objective of pure index funds is to mimic the performance of the All Ordinaries Accumulation Index, the coefficient α in the market model (equation 5.3) is expected to be zero and $\beta = 1$. Hence, the significance of the α coefficient is also examined for evidence of bias in tracking error.

5.4.3 Determinants of Tracking Error

The theory section identifies cash flows, transaction costs, index volatility, dividends, changes to the composition of the index and the index replication strategy

[58] In addition to the market model, the parameters of the Capital Asset Pricing Model were also estimated. The parameters for the CAPM were virtually identical to those reported for the market model.

employed by index equity funds (i.e. full replication and non-replication approach) as potential determinants of tracking error. To test the significance of these variables in explaining tracking error, the following model is estimated:

$$\left|e_{pt}\right| = \alpha_i + \beta_1 CF_{pt} + \beta_2 SPR_t + \beta_3 VOL_t + \beta_4 DIV_{pt} + \beta_5 INOUT_t + D_6 FR_{pt} + \varepsilon_{it} \quad (5.4)$$

where $\left|e_{pt}\right|$ is the absolute value of tracking error in period *t* for fund *p*, CF represents the absolute value of the funds net monthly cash flow scaled by the index fund's size (or normalised cash flow as per Gruber (1996)) and SPR is the market capitalisation-weighted and time-weighted average bid-ask spread across securities in the index in percent (see McInish and Wood (1992)). VOL measures the volatility of the All Ordinaries Index and DIV is the dividend yield of securities comprising the index.[59] INOUT measures the percentage market capitalisation of stocks included and excluded from the All Ordinaries Index each month.[60] FR is a dummy variable taking on a value of 1 if observation *t* is drawn from a full replication fund, otherwise 0.

5.5 Empirical Results

The tracking error and risk-adjusted performance of index equity managers evaluated in this essay are reported in Table 5.1 together with a number of other descriptive statistics. Panel A of Table 5.1 reports the magnitude of tracking error for the entire sample period available for each fund.

[59] DIV is measured as the difference in returns of the All Ordinaries Accumulation Index and All Ordinaries Price Index. Volatility was measured using the standard deviation of daily returns for the All Ordinaries Price Index each month. Alternative measures of volatility, including the Parkinson (1980) estimator (also outlined in Wiggins (1991)) were also evaluated, however these methods also provided consistent findings.

[60] The ASX amends the All Ordinaries Index at the close of trading each month. This could be inferred as the change occurring at *t-1*. However the change affects the market in period *t*.

Based on $TE_{1,p}$ the magnitude of monthly tracking error ranges from an average of 3.0 basis points to 24.2 basis points across funds. There is also evidence of considerable variability in tracking error for each fund through time. For example, tracking error for fund VI ranges between 0.1 and 106.9 basis points across months. Given that differences in average tracking error are likely to be driven by time specific factors, the tracking error metrics in Panel A are not strictly comparable across funds because of the differences in sample periods. Panel B reports tracking error metrics for the 4 funds with 60 months (5 years) of continuous data to March 1999. The magnitude of monthly tracking error based on $TE_{1,p}$ still exhibits considerable variability across funds ranging from an average of 7.4 basis points for fund III to 22.3 basis points for fund VI. Monthly tracking error based on $TE_{2,p}$ is similar in magnitude ranging from 9.7 basis points for fund III to 28.5 basis points for the funds with 60 months of continuous data in Panel B. Finally, measures of tracking error based on $TE_{3,p}$ are almost identical to those based on $TE_{2,p}$.

While the magnitude of the tracking error documented in Table 5.1 is small, a number of observations can be drawn. First, Frino and Gallagher (2001) find that the tracking error for a sample of U.S. index funds averages between 3.9 and 11.0 basis points per month. The comparable figures for Australian Index funds documented in this essay are substantially higher, ranging between 7.4 and 22.4 basis points. Hence, passive funds in Australia appear to have greater difficulty in achieving index returns. This reflects, in part, the higher cost of trading the underlying portfolio of stocks in Australia.[61] Second, a recent survey of Australian pooled index equity funds suggests that management fees range from approximately 0.5 basis points to 1.7 basis points

[61]For example, Aitken and Frino (1996) estimate that the average bid-ask spread of the largest 429 stocks listed on the ASX in the second half of 1992 averaged 4.4 percent, while Jang and Venkatesh (1991) estimate that the average bid ask spread of all stocks trading on the NYSE averaged 1.4 percent in an earlier sample period.

per month (William M. Mercer, (1999)). Hence, the tracking error documented in this essay, which is an implicit cost of investing in index funds, is many times greater than the explicit cost charged by the fund manager to investors (i.e. the management fee). Third, the average magnitude of the monthly movement in the All Ordinaries Accumulation Index over the five-year period examined in this essay was 2.93 percent. Hence, tracking error ranging between 7.4 and 22.3 basis points ($TE_{1,p}$) represents between 2.5 percent and 7.6 percent, respectively, of the average magnitude of the movement in the benchmark.

While there is evidence of significant tracking error in Table 5.1, there is no evidence of significant bias in performance. For example, the mean difference in returns documented in Table 5.1 is negligible, and not significant based on standard t tests. Further, the estimated α coefficients are also negligible in magnitude and not significant for any of the funds or sample periods. This confirms that passive funds neither systematically outperformed nor underperformed the All Ordinaries Accumulation Index over the sample period. In turn, this implies that investors with a long-term investment horizon will achieve investment returns that are similar to index returns. However, investors with shorter investment horizons (e.g. 1 month) are likely to experience significant under or overperformance relative to the index.

Table 5.1 – Australian Equity Index Funds – Tracking Error And Risk Adjusted Performance

Fund	Strategy	N	Absolute Difference in Returns							Differences in Returns			Market Model Parameters				
			Mean ($TE_{1,p}$)	SD	Min	Q1	Q2	Q3	Max	Mean	*t*-stat	SD ($TE_{2,p}$)	S.E. Reg. ($TE_{3,p}$)	α	*t*-stat	β	R^2
*Panel A: All Index Funds Since Inception to March 1999 (Monthly Data)**																	
I	FR	10	0.030	0.024	0.003	0.010	0.026	0.052	0.071	-0.002	-0.18	0.040	0.041	-0.001	-0.05	0.998	1.000
II	FR	117	0.120	0.113	0.000	0.046	0.104	0.163	0.781	0.006	0.36	0.165	0.167	0.006	0.37	1.000	0.998
III	FR	80	0.112	0.122	0.001	0.030	0.076	0.152	0.797	-0.023	-1.24	0.164	0.165	-0.025	-1.35	1.004	0.998
IV	O,S	36	0.122	0.122	0.000	0.036	0.086	0.173	0.556	0.036	1.27	0.170	0.172	0.034	1.16	1.003	0.998
V	O,S	60	0.103	0.094	0.003	0.039	0.085	0.135	0.480	0.017	0.96	0.139	0.137	0.014	0.79	1.006	0.999
VI	O	63	0.242	0.205	0.001	0.079	0.210	0.374	1.069	0.000	-0.01	0.319	0.315	0.007	0.17	0.982	0.993
VII	O	21	0.104	0.111	0.001	0.042	0.071	0.157	0.466	0.018	0.53	0.153	0.157	0.019	0.55	0.997	0.999
*Panel B: 5 Years to March 1999 (Monthly Data)**																	
II	FR	60	0.099	0.087	0.000	0.047	0.077	0.142	0.455	-0.016	-0.91	0.132	0.128	-0.011	-0.64	0.991	0.999
III	FR	60	0.074	0.063	0.001	0.028	0.065	0.103	0.267	-0.012	-0.96	0.097	0.095	-0.009	-0.73	0.994	0.999
V	O,S	60	0.103	0.094	0.003	0.039	0.085	0.134	0.480	0.017	0.96	0.139	0.137	0.014	0.79	1.006	0.999
VI	O	60	0.223	0.175	0.001	0.078	0.170	0.368	0.648	0.012	0.34	0.285	0.285	0.017	0.46	0.990	0.994

* Panels A and B document tracking error metrics for All Ordinaries Accumulation Index funds. Index funds are partitioned on the basis of portfolio strategy adopted in replicating the performance of the index where FR = full replication, S = stratified sampling and O = optimisation. Panel A reports tracking error metrics from the inception of index funds to March 1999 using monthly data. Panel B documents tracking error for index funds with continuous 5-year performance history to March 1999 using monthly data. All metrics are expressed in percentage terms. N represents the number of observations for each index fund used in the analysis.

Table 5.2 reports the results of regression analysis testing the significance of the determinants of tracking error. All *t*-statistics are adjusted for heteroskedasticity and autocorrelation using procedures developed by Newey and West (1987). The *F*-statistic tests the joint significant of coefficients, and is significant at the 0.001 level. This confirms that the overall model is significant.

Table 5.2 – Determinants Of Tracking Error In Index Fund Performance

Variable	Coefficient	*t*-stat
Intercept	0.034	1.28
CF	0.005	1.76 *
SPR	0.147	2.14 **
VOL	0.034	1.68 *
DIV	0.028	0.77
INOUT	0.005	0.61
FR	-0.045	-2.94 ***
R^2 Adjusted	0.089	
F-statistic	3.67 **	
Condition Index	6.316	

* significant at 0.10 level
** significant at 0.05 level
*** significant at 0.01 level
t-statistics have been adjusted for heteroskedasticity and autocorrelation using the Newey-West (1987b) method.
The coefficients are expressed in percentage terms (i.e. 10^2)

Consistent with expectations, the table documents the coefficients on CF, SPR and VOL are all positive and statistically significant. This confirms that tracking error is positively and significantly related to fund cash-flows, the cost of trading stocks in the index portfolio and the volatility of the benchmark. While the coefficients on DIV and INOUT are both positive, as expected, they are not statistically significant. Hence, dividend payments and the entry and exit of stocks in the index are not significantly related to tracking error. One explanation for the insignificance of dividend payments may lie in the use of dividend re-investment plans. Dividend re-investment plans (DRPs) allow investors to elect to receive stock to the value of the dividends paid in place of cash dividends. DRPs can be used by fund managers to eliminate the costs of re-investing the dividends in the index portfolio, as well as differences in the actual time between the day the dividend is paid and re-invested and that assumed in constructing the index. In Australia, index managers are likely to elect to use DRPs where possible to minimise tracking error in performance.

Apart from suggesting that index funds experience significant (but unbiased) and time-varying tracking error *per se*, the results above also have at least two other implications. First, in relation to the merits of an active versus passive investment strategy. The result that passive funds perform in line with the benchmark over a long-term period on a *before expenses* basis implies that they necessarily systematically underperform their benchmark on an *after expenses* basis. In contrast, previous research has found that although active funds do not outperform the benchmark index, they perform roughly in line with the benchmark on an *after expenses* basis. For example, Sawicki and Ong (2000) report an alpha for a sample of active Australian equity funds comparable with the index funds examined in this essay. The alpha is close to zero and statistically insignificant.[62] Consistent with Gruber (1996) we interpret this as evidence that passive funds are not necessarily an unambiguous alternative to active funds. Second, the results also have implications for the appropriateness of an index as a technical benchmark for measuring the performance of active funds. The finding that passive fund performance is unbiased over the long term implies that the benchmark is achievable, and hence appropriate for use in performance assessment over a long sample period. However, the tracking error experienced by passive funds over short term periods (i.e. one month) casts doubt over the

[62] The most comparable result for active funds relative to the sample of passive funds examined in this study is the performance of NPST Australian Equities reported in Table 2 of Sawicki and Ong (2000). Lines 7 and 8 of Panel A in Table 2 report the results for active funds where performance estimates are based on before tax (and after expense) returns and a traditional Jensen model.

use of the technical benchmark in performance evaluation over short time intervals.[63] The results imply that underperformance/overperformance in any month may simply be a function of a fund manager's exposure to the factors that cause tracking error in the performance of passive funds, and cannot be attributed to the skill of a particular manager. Perhaps a more appropriate benchmark of performance over shorter periods is the performance of a comparable passive fund.

5.6 Conclusion

This is the first Australian study to examine the ability of Australian equity index funds to exactly mimic the underlying All Ordinaries Accumulation Index, and the first study to provide evidence on the determinants of tracking error in passive fund performance. This essay confirms that Australian equity index funds do indeed exhibit tracking error in their performance, and there is considerable variability in performance both across funds and through time. The magnitude of tracking error is significantly related to fund cash-flows, the cost of trading stocks in the index portfolio, the volatility of the benchmark and the investment strategy used by the fund manager. This tracking error reflects the difficulties facing index equity managers in approximating the performance of a frictionless index, and represents an additional risk to investors in passive funds.

While this essay provides evidence of tracking error in index fund performance, there is little evidence of a bias in fund performance over the sample period. This implies that investors who engage the services of index managers with long investment horizons ultimately achieve returns that are commensurate with those of the All Ordinaries Accumulation Index before expenses.

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[63] Asset consultants regularly compare the performance of specific active funds on a monthly basis and draw conclusions regarding changes in their performance (e.g. performance surveys).

The results reported in this essay also have implications for the debate on whether passive funds represent a better investment than active funds, and the appropriateness of an index as a benchmark in performance evaluation. First, a comparison of results to previous research on active funds (e.g. Sawicki and Ong (2000)) suggests, after taking into account costs, that passive funds are not necessarily a superior alternative to active funds. Second, the results also imply that while the All Ordinaries Accumulation Index is suitable for estimating performance over a long sample period, the degree of tracking error experienced by passive funds on a monthly basis casts doubt on the appropriateness of using an index as a benchmark for assessing performance over short-term periods.

6

CHAPTER 6 – TRACKING S&P 500 INDEX FUNDS

6.1 Introduction

"When we buy an actively managed fund, we are like gamblers in Vegas. We know it is likely to be a losing proposition, yet somehow we feel we are getting our money's worth."

The Wall Street Journal, February 27, 2001

This recent quote from *The Wall Street Journal* highlights both investors' and gamblers' psychology in their attempt to maximise the returns attributable to their respective activities. However, the implication of this statement is that both agents are rational with respect to the likely outcome – an acceptance of the economic and statistical laws that ensure the strategy cannot be 'successful' for all participants. Indeed, Gruber (1996) highlights the apparent 'puzzle' surrounding the growth in actively managed mutual funds, where investors have directed significant mutual fund flows into the sector. In addition, the Investment Company Institute reported significant growth in U.S. stock mutual funds over the last calendar year. Net new cash flows increased to a record $US309 billion as at December 2000, with the vast majority of net new money allocated to active funds. This preference in favour of active funds has continued despite the large volume of empirical evidence indicating active funds do not earn abnormal returns. While Zheng (1999) documents evidence of a 'smart-money' effect in the short-term, where new money flows predict future performance, in aggregate active funds with positive new money flows do not beat the market. In addition, despite performance persistence being well documented in the literature, Carhart (1997) finds the phenomenon is almost completely attributable to common factors in stock returns and investment expenses rather than superior portfolio management ability.

The rationale behind the average investor allocating capital to active funds appears to make little economic sense, especially when one considers the definition of a benchmark index and the implications an index has for performance measurement. Sharpe (1991) asserts in the 'Arithmetic of Active Management' that on average, active managers cannot outperform the returns derived from passive investment strategies. The reasoning is that the performance of the index equals the weighted-average return of both active and passive investors before investment expenses. Therefore by definition, active management is a zero-sum game.[64]

Despite the significant attention received by active funds in the performance evaluation literature, empirical research evaluating index funds is surprisingly scarce. This is even more perplexing when one considers U.S. stock-index mutual funds and other index portfolios accounted for more than $US1.5 trillion in assets at December 2000. Significant growth has occurred in both the proportion of indexed assets invested in diversified U.S. stock funds and the number of index mutual funds available. Lipper Inc. reports that indexed assets represented about 12 percent of total assets at December 2000, compared to around 5 percent in 1995. In terms of index mutual fund offerings, Morningstar Inc. tracked 190 index mutual funds at December 2000, or more than double the number five years ago. Approximately half of these funds (94 funds) track the S&P

[64] If index assets as a proportion of the total index increases, *ceteris paribus*, the average active investor must still earn the return on the underlying index, such that active management remains a zero sum game. The assumption is active and passive investors select stocks from the same basket of securities, with the only difference being their relative weighting.

500 and are valued in excess of $US272 billion.[65] Indexing also has increased in significance with respect to the growth in exchange-traded funds (ETFs). Since the introduction of the first ETF in 1993 (the Standard & Poor's 500 Depository Receipt (SPDR) or 'Spider'), total ETF assets have approximately doubled in the past year to $US70 billion at December 2000.

While the 'theory' and objectives of an index strategy are both simple and well known, potential difficulties arise for index managers attempting to exactly replicate the returns of the target benchmark. There are a number of factors that are likely to influence the magnitude of index fund tracking error, however the primary source of the problem is due to the underlying index being measured as a 'paper' portfolio, which assumes transactions may occur at any time without cost. Tracking error in index fund performance is therefore unavoidable given the existence of market frictions facing index managers. Therefore, the secondary objective for index managers involves managing these constraints so as to minimise the divergence in performance from the underlying benchmark index.

This essay highlights the difficulties faced by index funds, examines both the magnitude and variation of tracking error over time for a sample of S&P 500 index mutual funds, and provides a direct performance comparison between index and active mutual funds. Consistent with the empirical evidence, S&P 500 index mutual funds are found to outperform active funds, on average, after expenses in the period examined.

[65] Another specific example of the growth in indexing is the total assets invested in the Vanguard 500 Index Fund. The Vanguard 500 grew from around $US2 billion to over $US100 billion in the period 1990-2000 to become the second largest U.S. mutual fund.

6.2 The Challenge Facing Index Managers

Index funds aim to deliver the returns and the risk of the underlying benchmark index. Theoretically, the management of index portfolios is straightforward, requiring investment in all constituent index securities in the exact same proportion as the underlying benchmark (known as a 'full replication' strategy).[66] However in reality, fund managers adopting an indexing approach cannot guarantee their portfolios' performance will be identical to the benchmark index. This is due to the fact that an index represents a mathematical calculation derived from a portfolio of securities that are not subject to the same market frictions faced by index mutual funds. If the composition of the underlying index changes, the index assumes the theoretical portfolio's new weights to each security can be achieved automatically. However, index fund managers cannot make the same assumptions, as physical trading in index stocks will be required in order to re-align the portfolio to mimic the underlying benchmark. Market frictions in the management of passive portfolios ensure that tracking error, measuring the differences in returns between the portfolio and the index, must be minimised in order that an index fund's objectives are not significantly compromised.[67]

Chiang (1998) identifies the main factors driving index fund tracking error as transaction costs, fund cash flows, the treatment of dividends by the index, the volatility of the benchmark, corporate activity and index composition changes. The liquidity of the underlying index will also have implications for transaction costs and hence the tracking

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[66] Alternative approaches to full replication involve either 'stratified sampling' and 'optimization' portfolio strategies. Stratified sampling and optimized portfolios on the other hand are non-replication strategies designed to mimic the index through investment in a *subset* of index securities, while at the same time ensuring that the portfolio has similar risk and return characteristics as the index (e.g. risk attributes pertaining to size, industry and dividend yield). The portfolio technique employed by index managers will in part be dependent upon the liquidity of the underlying index. S&P 500 index mutual funds predominantly adopt a full replication approach.

[67] Tracking error is also commonly expressed in terms of the volatility (standard deviation) of return differences between the fund and the index (see Roll (1992)).

error incurred by index funds (Keim (1999)). Consequently, tracking error in performance will be inherent in the management of index portfolios, leaving index managers with the dual objective of minimising tracking error in performance as well as minimising the costs incurred in tracking the index as closely as possible. Therefore a trade-off exists between tracking error minimisation and transaction costs.

Transaction costs associated with trading in securities markets influence the ability of index mutual funds to replicate the performance of the index. The index itself is calculated as a 'paper' portfolio that assumes transactions can occur instantaneously, in unlimited quantities and without cost (Perold (1988)). In reality, index funds incur transaction costs that are associated with portfolio implementation, rebalancing and client capital flows.[68] For example, cash flow movements cause flow-induced trading for open-end index mutual funds, requiring the new cash to be rapidly invested across index securities. The size and timing of the cash flows, as well as the index manager's use or otherwise of derivative instruments, may also be related to tracking error in performance. Since index funds are required to trade securities in order to mimic the underlying benchmark index, transaction costs (both explicit and implicit) ensure index funds exhibit tracking error. The liquidity of stocks comprising the index also has implications for transaction costs, as full replication index funds require some proportion of fund assets to be invested in less liquid securities (Keim (1999)).

Tracking error may also be related to changes in the composition of the index. These include index adjustments related to company additions and deletions, share changes and corporate restructuring. Periodical changes to the index can make it difficult for an

[68] Transaction costs for index mutual funds include both explicit costs (brokerage and taxes) and implicit costs (market impact and market bid-ask spreads). Opportunity costs are non-existent for index funds, as passive funds do not engage in information-motivated trading (see Keim and Madhavan (1998)).

index fund to exactly replicate the target benchmark return. Again, additional transaction costs are incurred, as changes in the composition of the index require passive funds to trade index securities in order to re-align their portfolios with the 'new' index. Depending on the relative size of the stocks entering and exiting the index (in terms of market capitalisation), changes will require a number of odd-lot transactions in order to match the rebalanced index. The index manager also faces the additional challenge of executing orders at the best possible prices and in such a manner that minimises the crystallisation of capital gains tax liabilities to avoid significant erosion of returns. In the case of securities, which are subject to corporate restructuring, such as a merger or takeover by another company outside the index, a timing delay may exist between the date when the index fund receives the cash settlement and when the target firm is ultimately removed from the index. In addition, 'front-running' by 'risk arbitrageurs' (who acquire securities ahead of their inclusion in the index) may also have an undesirable impact (Beneish and Whaley (1996)).

If an index fund is perfectly aligned with the index, *ceteris paribus*, index volatility should not result in tracking error. However, where index portfolios do not exactly mirror the benchmark, volatility of the index will induce tracking error for index funds. Indeed, the magnitude of tracking error should be directly related to the extent of volatility of the underlying securities comprising the index. Dividends may also cause tracking error in performance where there is a timing delay in their receipt as well as the index rules governing the treatment of dividends in the index. For example, if there is a timing delay between when the index incorporates the dividend (at the ex-dividend date) and the actual receipt of the dividend by the index fund (after the ex-dividend date), tracking error will be unavoidable. In the case of S&P 500 constituent securities, actual receipt of dividends can take as long as several weeks. This 'dividend effect' may be minimised by index managers through participation in dividend reinvestment plans, however it is generally uncommon for S&P 500 constituent securities to distribute dividends in the form of new securities. Where an index assumes that dividends are 'smoothed', the dividend effect may cause index managers to incur tracking error in their performance.

While tracking error will be inherent in index fund performance, investors reasonably expect index fund returns will only underperform the underlying index by a similar magnitude to the management fees charged by mutual funds. Indeed, investors may consider index performance net of index fund charges to be a more optimal investment strategy than active management. There are a number of sound reasons why this philosophy may exist. Firstly, the overwhelming majority of performance evaluation studies over the last three-and-a-half decades has confirmed empirically the inability of active mutual funds to outperform market indices (for example, Elton *et al.* (1993), Malkiel (1995) and Gruber (1996)). Secondly, if active management incurs significantly higher transaction costs in executing the strategy (compared with passive management), then the higher expense ratios charged by active mutual funds will translate into lower after expenses returns to investors (see Keim and Madhavan (1998)). In the third instance, the higher turnover exhibited by active funds has a potentially larger effect on future capital gains tax liabilities, which further diminishes after expenses and after tax performance.

6.3 Analysis of S&P 500 Index Fund Tracking Error

The essay uses a sample of 42 S&P 500 index mutual funds contained on the *Morningstar Principia Pro* CD-ROM in measuring tracking error.[69] The analysis period

[69] The Morningstar data set has the standard survivorship-bias problem contained in the vast majority of performance evaluation studies. Funds ceasing to exist typically have their performance records removed from the database, as subscribing clients would find historical records of prior funds irrelevant. However, in terms of survivorship bias for index mutual funds, the bias is expected to be small for two reasons; (1) the limited evaluation period arising from the relative infancy of the index mutual fund market and (2) by virtue of the strategy employed by index funds.

spans the five years to February 1999, and while relatively short, is limited due to data availability arising from the relative infancy of the index mutual fund market.[70] The five-year time-frame maximises both the number of funds included in the sample and the length of the evaluation horizon. Morningstar reports total monthly fund returns data (income and capital gains) after expenses. In order to estimate tracking error before expenses, the index fund returns have been adjusted with reference to the reported historical fund expenses ratios in order to approximate gross returns (i.e. expenses are added back to net returns).[71] All S&P 500 index funds are classified by Morningstar as exhibiting a growth-and-income prospectus objective, which is consistent with a passive, style-neutral strategy. Funds under management for the sample grew from $US18.0 billion as at December 1993 to more than $US161 billion as at February 1999, representing an approximate nine-fold increase. The two Vanguard index mutual funds included in the sample account for approximately $US102 billion of total sample assets indexed to the S&P 500 at February 1999.

Roll (1992), Pope and Yadav (1994) and Larsen and Resnick (1998) identify a number of ways in which tracking error can be measured. In this essay, tracking error is measured using three methods. First, tracking error in month t is calculated as the absolute difference in returns of the index portfolio and benchmark index ($e_{pt} = R_{pt} - R_{bt}$), where the monthly average absolute tracking error over n months ($TE_{1,p}$) is defined as follows:

[70] While the Vanguard 500 index mutual fund was the first passively managed product offered to investors in 1976, the availability of these types of funds was extremely limited until the 1990s. The sample period adopted both maximized the number of funds included in the sample as well as providing a reasonable performance horizon for analysis. The criterion for inclusion of index mutual funds in the sample required availability of 60 continuous months of performance data in the five-year period. Gruber's (1996) evaluation of index fund performance was similarly constrained due to index funds having relatively short performance histories. Gruber's evaluation period for index mutual funds was the five years 1990-1994.

[71] Morningstar Inc. reports returns after expenses, which account for management fees, administration and 12b-1 fees and other asset-based costs, but excludes brokerage costs. Morningstar reports that mutual fund expense ratios are accrued on a daily basis, ensuring minimal daily effects to a fund's net asset value (NAV).

$$TE_{1,p} = \frac{\sum_{t=1}^{n} \left| e_p \right|}{n} \tag{6.1}$$

An alternative test for tracking error, and the standard methodology used in industry, measures the month-to-month variability (standard deviation) of the difference in returns between the index portfolio and the underlying benchmark index return ($TE_{2,p}$) and is expressed as:[72]

$$TE_{2,p} = \sqrt{\frac{1}{n-1} \sum_{t=1}^{n} (e_{pt} - \bar{e}_p)^2} \tag{6.2}$$

Tracking error may also be quantified as the standard error of the residuals of a returns regression ($TE_{3,p}$). If the return on the index portfolio *p* is regressed on the return of the benchmark index *b*, the standard error of the regression equation provides an estimate of tracking error. The model is as follows:

$$R_{pt} = \alpha_i + \beta_i R_{bt} + \varepsilon_{pt} \tag{6.3}$$

While this method should provide similar results to (2), Pope and Yadav (1994) note that if the beta is not exactly equal to one, then the regression residuals will differ from $TE_{2,p}$. That is, if the relationship between the index portfolio and benchmark index returns is non-linear, then this approach will overstate tracking error.

[72] Roll (1992) notes, however, that if an index fund consistently outperforms the index by *x* percent per month, then the use of this method will result in zero tracking error. The converse is also the case. Pope and Yadav (1994) also warn of potential estimation bias in tracking error arising from the use of high frequency data (i.e. daily or weekly data). They show that negative serial correlation in tracking error can bias upwards the estimate of tracking error. The use of less frequent data (i.e. monthly) does not lead to significantly negative serial correlation in our analysis.

6.4 Tests for Seasonality in Tracking Error

This essay evaluates the potential existence of seasonality in index fund tracking error. The financial economics literature has documented the existence of seasonality in both stock returns and market bid-ask spreads, particularly the infamous 'January effect'. The existence of seasonality in tracking error of S&P 500 index mutual funds would then require identification of the drivers explaining the time variation in tracking error. For example, seasonality may be shown to exist in months where stocks go ex-dividend or in months of abnormal volatility. Seasonality in mean monthly tracking error is tested using the following dummy variable OLS regression:

$$|e_{pt}| = \pi_{1} + \sum_{t=2}^{12} \pi_{i} D_{it} + \varepsilon_{pt} \qquad (6.4)$$

where:

π_1 = the intercept of the regression model measuring the average absolute tracking error in month of January;

D_{it} = seasonal dummy variable for calendar month *i;*

i = February,…, December;

ε_{pt} = random error term with expected mean of zero.

The dummy variable coefficients indicate the mean difference in index fund tracking error between January and each respective month. If tracking error is not significantly different across calendar months, the coefficients on the dummy variables will be close to zero and the *F*-statistic (measuring the joint significance of the dummy variable coefficients) will be statistically insignificant.

6.5 S&P 500 Mutual Fund Raw and Risk-Adjusted Performance

Mutual fund performance for active mutual funds is evaluated using a raw returns approach (method A) and three risk-adjusted performance models (methods B, C and D) where returns are measured in excess of the risk free rate (or return in excess of T-bills). These methodologies are described below:

(A) the raw returns approach (ignoring risk adjustment in performance), which measures the contribution of value added or lost by the fund relative to the S&P 500;

(B) the single index model, where fund risk-adjusted excess returns (in excess of Treasury bills) are estimated using the S&P 500 index as the market portfolio (i.e. equation 3, where returns are measured in excess of the risk free rate);

(C) the Elton, Gruber and Blake (1996a) four-index model:

$$R_{pt} = \alpha_{4p} + \beta_{SPp} R_{SPt} + \beta_{pSL} R_{SLt} + \beta_{pGV} R_{GVt} + \beta_{pB} R_{Bt} + \varepsilon_{pt} \qquad (6.5)$$

where α_4 measures a fund's risk-adjusted excess return with respect to the set of risk factors, defined as the S&P 500 (β_{SP}), two Prudential Bache indices controlling for market capitalisation (β_{SL}) and growth-value strategies (β_{GV}), and a proxy for bond returns (β_B) using the Lehman Brothers Aggregate Bond Index.[73] Elton *et al.* (1993) and Elton *et al.* (1996a) advocate the use of additional indices due to potential sensitivity of fund performance to the choice of benchmark used. The

[73] See Elton *et al.* (1996a) for an extensive description of the market capitalization, growth-value and bond indices used in their model. Our bond factor did not account for high-yield bonds. The four-index model has similar proxies (albeit with an additional factor) to the Fama-French three-factor model.

additional indices also capture risk characteristics with respect to mutual fund investment style as well as accounting for non-S&P 500 securities that may comprise part of an active fund's portfolio. These additional benchmarks improve the quantification of portfolio risk.

(D) a performance attribution model combining the Treynor-Mazuy (1966) market timing model and Elton-Gruber-Blake (1996a) four-index model. The TMEGB model decomposes fund performance into security selection (α_{4p}^{SS}) and market timing (γ_{SP}) components. The TMEGB model is defined as follows for portfolio p:

$$R_{pt} = \alpha_{4p}^{SS} + \beta_{pSP} R_{SP_t} + \gamma_{SPp} R_{SP_t}^2 + \beta_{pSL} R_{SLt} + \beta_{pGV} R_{GVt} + \beta_{pB} R_{Bt} + \varepsilon_{pt} \qquad (6.6)$$

The coefficient on the quadratic term is used to determine the market timing ability of an active mutual fund. The TMEGB model therefore provides a direct comparison between the security selection performances of index and active mutual funds.

Index mutual fund performance is measured using methods A and B only, as these methods represent the most appropriate performance methodologies with respect to an index fund's investment objectives. S&P 500 index funds attempt to replicate the performance of the S&P 500 and, as a consequence, do not exhibit style biases. In addition, index funds do not engage in market timing activities. Therefore, methodologies C and D are not appropriate performance models to assess index fund performance and are therefore not considered in the analysis.

The performance of active and index mutual funds are evaluated after expenses. The study evaluates active funds classified by Morningstar within the large-capitalisation category, as these funds are the most appropriate for directly comparing active fund performance relative to S&P 500 index funds.[74] All funds comprising the sample were required to have continuous performance histories over the respective observation periods. Performance is analysed using two sample periods: the first evaluation horizon is the eight-year period to February 1999 and the second period is the five years to February 1999. The eight-year horizon contains a sample of 343 active and 15 index mutual funds while the five-year sample evaluates 607 active and 42 index mutual funds. The shorter five-year period was included in an attempt to increase the sample of index funds and hence aid performance comparisons against active funds. Overall, both evaluation periods are somewhat constrained due to the limited number of index mutual funds available in the Morningstar database, however the analysis permits sufficient comparison between active and passive portfolio management.

The analysis was also performed with reference to the Morningstar prospectus descriptions over time, which permitted funds to be partitioned on the basis of the portfolio management approach adopted (full replication or non-replication) and the investment

[74] Morningstar classifies equity mutual funds on the basis of a fund's self-reported investment objective (aggressive growth, growth, growth and income, income) and according to investment style. In terms of investment style, Morningstar ranks funds on the basis of market capitalization and valuation relative to the S&P 500 index. Investment style is then classified into a three-by-three matrix where market capitalization is represented on the vertical axis and valuation on the horizontal axis. Market capitalization is dichotomized into large, medium and small and the valuation category is split into value, growth and 'blend' (where blend is a combination of value and growth). The first criteria for inclusion in the sample required equity funds to be classified within the large-capitalization category. All S&P 500 index funds are categorized within Morningstar's large-blend category, hence it is most appropriate that active funds are also selected from the large-cap category. This is due to active funds in the large-cap category being more likely to hold a larger proportion of S&P 500 stocks in their portfolios. Second, each active fund's investment objective was evaluated to determine the appropriateness of applying the S&P 500 Index as a performance benchmark. Third, active funds were removed where security selection limitations existed (for example, if the fund was required to meet ethical and/or environmental criteria).

strategy adopted by active funds (aggressive growth, growth, growth and income, income).[75]

The Morningstar data set has the standard survivorship-bias problem contained in the vast majority of performance evaluation studies, where funds ceasing are excluded from the data records. Survivorship bias skews the results toward the more successful funds, as there is generally a higher attrition rate among the poor performers.[76]

6.6 Empirical Results

Table 6.1 documents the magnitude of tracking error and risk-adjusted performance of index mutual funds comprising the sample. The cross-sectional average $TE_{1,p}$ is equal to 5.9 basis points per month and is in the range of 3.9 and 11.0 basis points per month before expenses. In other words, market frictions induce tracking error in S&P 500 index fund performance. Tracking error estimates using $TE_{2,p}$ or $TE_{3,p}$ methods, as expected, provide very similar results. The cross-sectional average S&P 500 index mutual fund's tracking error ($TE_{2,p}$) in the sample period is 8.0 basis points per month or 27.6 basis points per annum. $TE_{2,p}$ across funds ranges between 5.1 and 20.8 basis points per month, equivalent to 17.7 and 72.1 basis points annualised.[77] In light of Pope and Yadav's (1994) warning of potential tracking error estimation bias, the serial correlation results (presented in the S.C.C. column) indicate the use of monthly data is not problematic. In terms of the risk-adjusted performance of index mutual funds, all alphas are equal to or very close to zero and systematic risk (β) is in line with the S&P 500. In summary, these results

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[75] The majority of S&P 500 Index mutual funds in our sample employ a full replication approach, which is not surprising as stocks comprising the S&P 500 are highly liquid.
[76] See Brown, Goetzmann, Ibbotson and Ross (1992) and Elton, Gruber and Blake (1996b).
[77] Consistent with Pope and Yadav (1994), the annualized TE_2 metric is calculated by multiplying the standard deviation (employing monthly data) by $\sqrt{12}$.

demonstrate tracking error over time is inherent in performance, however, the overall performance objectives of index funds are not compromised.

Table 6.2 and Figure 6.1 present the results of tracking error variation over time for index funds in the sample. The evidence clearly indicates the presence of a seasonal pattern in S&P 500 index mutual fund tracking. Tracking error is significantly higher in the months of January and May and lowest in June. The existence of a strong quarterly pattern (trough) is also evident, suggesting S&P 500 index mutual funds experience improved replication ability in the months of March, June, September and December. These quarterly troughs are followed by sharp reversals in each of the subsequent months, with the exception of October, although the month of October still exhibits higher tracking error post-September. Further analysis of individual calendar years (not directly reported in this essay) also appears to support the quarterly seasonal pattern of a trough in tracking error in the months of March to December as well as significantly higher tracking error for index funds in January compared with other months.

Table 6.1 – S&P 500 Index Mutual Fund Tracking Error And Risk-Adjusted Performance

Tracking error and risk-adjusted returns are expressed in percentage terms per month, where expenses have been added back to index mutual fund returns to approximate gross returns.

S&P 500 Index Mutual Fund	Absolute Difference in Returns							Return Differences		S.C.C.	S.E.R.	S.I.M. Parameters		
	Mean	SD	Min	Q1	Q2	Q3	Max	Mean	SD	ρ (1)*	Error	α*	β	R^2
	(TE_1)								*(TE_2)*		*(TE_3)*			
BlackRock Index Equity Instl	0.073	0.058	0.002	0.028	0.057	0.096	0.230	-0.015	0.093	-0.092	0.092	-0.009	0.996	0.999
BlackRock Index Equity Inv A	0.110	0.176	0.002	0.025	0.051	0.116	1.035	-0.014	0.208	-0.087	0.208	-0.004	0.993	0.997
BlackRock Index Equity Svc	0.079	0.060	0.000	0.026	0.078	0.122	0.254	-0.014	0.099	-0.090	0.097	-0.006	0.994	0.999
BT Instl Equity 500 Index	0.048	0.054	0.000	0.006	0.039	0.073	0.331	0.005	0.072	-0.089	0.072	0.009	0.997	1.000
BT Investment Equity 500 Idx	0.060	0.060	0.000	0.014	0.039	0.103	0.323	0.005	0.086	-0.086	0.085	0.011	0.996	1.000
California Invmt S&P 500 Idx	0.059	0.050	0.004	0.020	0.044	0.094	0.220	0.005	0.078	-0.088	0.075	0.014	0.994	1.000
DFA U.S. Large Company	0.056	0.047	0.002	0.018	0.045	0.083	0.174	0.003	0.073	-0.090	0.071	0.011	0.995	1.000
Dreyfus Basic S&P 500 Stock	0.054	0.068	0.000	0.016	0.036	0.062	0.465	-0.001	0.087	-0.089	0.087	-0.001	1.000	1.000
Dreyfus S&P 500 Index	0.049	0.043	0.001	0.016	0.030	0.085	0.156	-0.002	0.065	-0.089	0.066	-0.001	0.999	1.000
Evergreen Sel Equity Idx Is	0.092	0.077	0.002	0.034	0.068	0.136	0.438	-0.012	0.120	-0.081	0.117	-0.001	0.993	0.999
Federated Max-Cap Instl	0.059	0.048	0.001	0.018	0.051	0.081	0.198	-0.003	0.076	-0.092	0.075	0.002	0.996	1.000
Federated Max-Cap Instl Svc	0.059	0.047	0.002	0.022	0.055	0.077	0.223	-0.006	0.076	-0.092	0.075	-0.001	0.997	1.000
Fidelity Spartan Market Idx	0.046	0.035	0.001	0.019	0.041	0.064	0.162	0.009	0.058	-0.091	0.058	0.010	0.999	1.000
Fidelity Spartan U.S. Eq Idx	0.049	0.037	0.000	0.023	0.040	0.075	0.158	0.002	0.062	-0.091	0.062	0.004	0.999	1.000
First American Equity Indx A	0.049	0.037	0.000	0.018	0.040	0.074	0.177	0.005	0.061	-0.092	0.061	0.008	0.998	1.000
First American Equity Indx Y	0.049	0.040	0.002	0.019	0.038	0.073	0.158	0.006	0.063	-0.089	0.062	0.012	0.996	1.000
Firstar Equity Index Instl	0.051	0.036	0.005	0.020	0.046	0.076	0.188	0.013	0.061	-0.092	0.062	0.014	1.000	1.000
Galaxy II Large Co Index Ret	0.052	0.041	0.001	0.018	0.045	0.074	0.197	0.004	0.066	-0.090	0.065	0.010	0.996	1.000
Kent Index Equity Instl	0.058	0.042	0.001	0.024	0.052	0.082	0.167	-0.008	0.071	-0.089	0.066	0.002	0.993	1.000
Kent Index Equity Invmt	0.049	0.042	0.000	0.016	0.035	0.072	0.167	-0.009	0.064	-0.090	0.061	-0.001	0.995	1.000
MainStay Equity Index A	0.071	0.054	0.000	0.029	0.065	0.102	0.280	-0.007	0.090	-0.087	0.084	0.005	0.992	1.000

Table 6.1 Continued…	Absolute Difference in Returns							Return Differences		S.C.C.	S.E.R.	S.I.M. Parameters		
S&P 500 Index Mutual Fund	**Mean**	**SD**	**Min**	**Q1**	**Q2**	**Q3**	**Max**	**Mean**	**SD**	**ρ (1)***	**Error**	**α***	**β**	**R^2**
	(TE_1)								***(TE_2)***		***(TE_3)***			
MainStay Inst Indx Eq Inst	0.057	0.046	0.001	0.022	0.050	0.077	0.201	0.009	0.073	-0.088	0.072	0.013	0.997	1.000
MasterWorks S&P 500 Stock	0.060	0.060	0.003	0.024	0.045	0.076	0.366	-0.009	0.085	-0.090	0.085	-0.006	0.998	1.000
Munder Index 500 A	0.052	0.043	0.001	0.014	0.050	0.075	0.192	-0.007	0.067	-0.093	0.067	-0.004	0.998	1.000
Munder Index 500 K	0.051	0.044	0.000	0.019	0.041	0.064	0.190	-0.007	0.068	-0.091	0.067	-0.001	0.996	1.000
Munder Index 500 Y	0.050	0.038	0.002	0.020	0.042	0.078	0.148	-0.004	0.063	-0.090	0.062	0.001	0.997	1.000
Nations Equity-Index Prim A	0.058	0.047	0.001	0.017	0.047	0.089	0.212	0.002	0.076	-0.090	0.072	0.012	0.994	1.000
Northern Instl Equity Idx A	0.044	0.038	0.002	0.015	0.031	0.059	0.163	-0.007	0.058	-0.091	0.058	-0.004	0.998	1.000
One Group Equity Index A	0.060	0.049	0.003	0.021	0.052	0.081	0.255	0.000	0.078	-0.087	0.074	0.010	0.993	1.000
One Group Equity Index B	0.070	0.098	0.000	0.021	0.043	0.069	0.517	0.001	0.121	-0.089	0.111	0.018	0.988	0.999
One Group Equity Index I	0.057	0.049	0.005	0.021	0.044	0.081	0.252	0.003	0.075	-0.085	0.067	0.016	0.991	1.000
Pegasus Equity Index A	0.066	0.069	0.001	0.022	0.046	0.108	0.445	0.015	0.095	-0.095	0.094	0.021	0.995	0.999
Pegasus Equity Index I	0.068	0.072	0.001	0.015	0.049	0.104	0.456	0.008	0.099	-0.096	0.098	0.013	0.996	0.999
Prudential Stock Index Z	0.070	0.071	0.003	0.023	0.055	0.083	0.333	0.004	0.100	-0.083	0.094	0.017	0.991	0.999
SEI Index S&P 500 Index E	0.055	0.048	0.000	0.025	0.044	0.074	0.283	0.001	0.074	-0.088	0.074	0.005	0.998	1.000
SSgA S&P 500 Index	0.054	0.053	0.000	0.013	0.030	0.093	0.257	-0.010	0.075	-0.093	0.076	-0.010	1.000	1.000
Stagecoach Equity Index A	0.051	0.039	0.001	0.014	0.043	0.074	0.138	-0.004	0.065	-0.090	0.060	0.005	0.994	1.000
T. Rowe Price Equity Idx 500	0.039	0.035	0.000	0.012	0.028	0.052	0.165	0.012	0.051	-0.090	0.051	0.014	0.999	1.000
Vanguard 500 Index	0.042	0.030	0.002	0.019	0.033	0.067	0.133	0.010	0.051	-0.091	0.051	0.010	1.000	1.000
Vanguard Instl Index	0.045	0.034	0.002	0.019	0.040	0.072	0.155	0.010	0.056	-0.091	0.056	0.010	1.000	1.000
Victory Stock Index	0.103	0.146	0.006	0.034	0.061	0.115	0.860	-0.011	0.097	-0.094	0.179	-0.003	0.996	0.998
Wachovia Equity Index A	0.063	0.060	0.001	0.020	0.050	0.087	0.256	-0.005	0.087	-0.090	0.087	-0.001	0.998	1.000

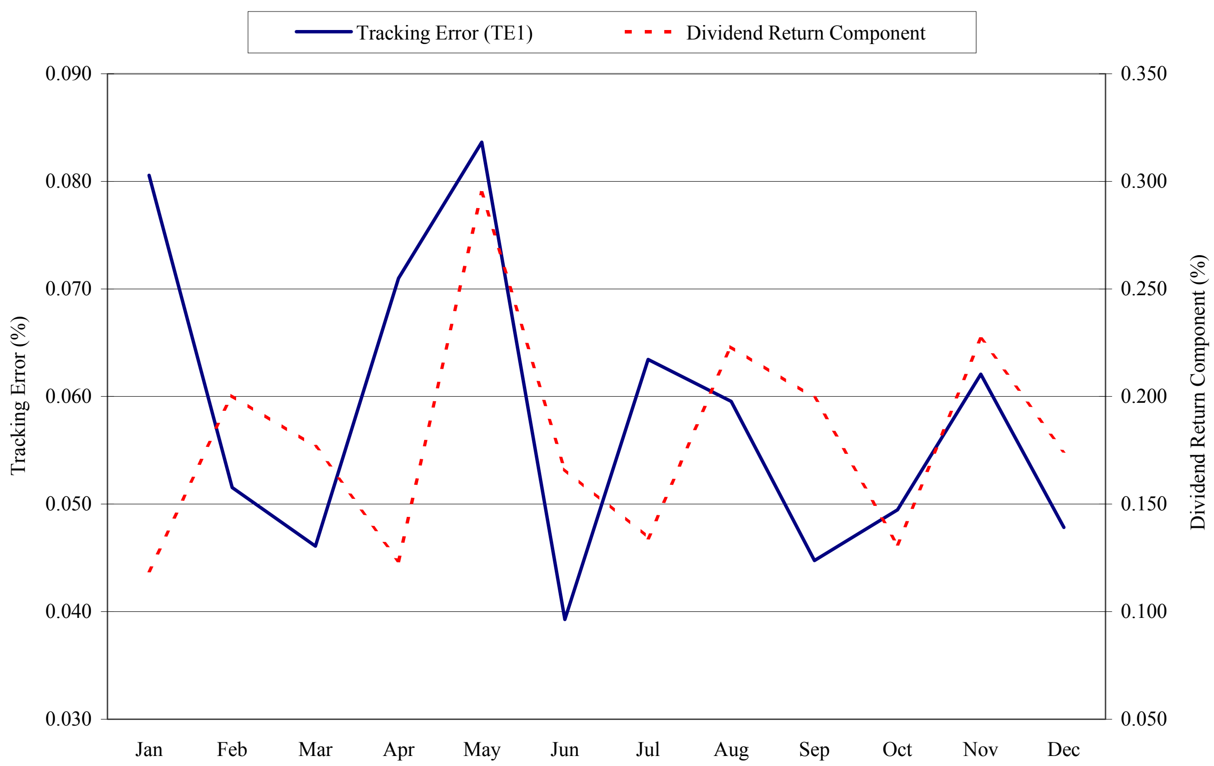
* The returns difference method (TE_2), serial correlation coefficient (S.C.C.) and risk-adjusted excess returns for S&P 500 index funds are all statistically insignificant. The performance results are consistent with the expectations of an index investment management strategy, where alpha (α) is statistically indistinguishable from zero before costs and systematic risk (β) is equal to or approximates unity.

Table 6.2 – Dummy Variable OLS Regression Model Evaluating Seasonality In S&P 500 Index Mutual Fund Tracking Error ($TE_{1,p}$)

	Coefficient	*t*-statistic
Intercept (January)	0.081	21.71 ***
February	-0.029	-5.53 ***
March	-0.034	-6.58 ***
April	-0.010	-1.82 *
May	0.003	0.59
June	-0.041	-7.89 ***
July	-0.017	-3.27 ***
August	-0.021	-4.01 ***
September	-0.036	-6.83 ***
October	-0.031	-5.94 ***
November	-0.018	-3.53 ***
December	-0.033	-6.25 ***
F-statistic	-	15.07 ***
DW-statistic	-	1.43

* Significant at 0.10 level
*** Significant at 0.01 level

Figure 6.1 – Average S&P 500 Index Mutual Fund Tracking Error (TE_1) And Average Dividend Component Return On The S&P 500 Over Calendar Months: 1994 – 1999 (In Percentage Terms Per Month)



There are a number of factors that may explain the seasonality phenomenon of tracking error for index mutual funds.[78] In particular, a 'dividend effect' may explain the sharp rises in tracking error for S&P 500 index funds immediately following the quarters ending March-June-September-December (although October's reversal is not as dramatic). An evaluation of the return component attributable to dividends over the sample period reveals quarterly peaks for the months preceding the quarter ends, namely February, May, August and November.[79] The month of May is particularly pronounced, followed by November, August and February respectively. Constituent dividend-paying securities in the S&P 500 are assumed to reinvest dividends at the ex-dividend date, however there is likely to be a time lag between the ex-dividend date and actual receipt of the dividend. Mutual funds may not receive dividend disbursements until several weeks later and potentially in the month following the ex-dividend date. Timing delays in the receipt of dividends makes perfect replication of the S&P 500 unachievable, and consequently tracking error arises.

An empirical examination of the role of dividend payments reveals strong statistical evidence of a dividend effect driving the sharp increases in index mutual fund tracking error. The dividend effect is particularly pronounced in May. This coincides with the same month exhibiting the highest dividend component of return encapsulated in the S&P 500 total return index. The Pearson and Spearman correlation coefficients between tracking error ($TE_{1,p}$) and the return attributable to dividends are both positive and statistically significant ($\rho = 0.138$ and 0.101 respectively at the 0.01 level). Figure 6.1 can

[78] Exhibit 1 indicates that some index funds exhibited abnormal or extreme monthly absolute tracking errors in the period. Our seasonality analysis excluded an extremely small number of observations for three funds to help ensure seasonality was not significantly influenced by such outliers.
[79] The dividend component of returns is measured as the arithmetic difference between the S&P 500 Composite index accounting for dividend and capital value changes (total return index) and capital value changes only (price index).

therefore be interpreted as index mutual fund managers experiencing tracking error when stocks go ex-dividend, however improved replication of the S&P 500 is achieved as dividends are received in the following month.

Additional explanations for index mutual fund tracking error may be related to S&P 500 index changes. These include company additions and deletions as well as quarterly Index Divisor adjustments required to update all common shares outstanding for constituent S&P 500 stocks. Standard & Poor's pre-announces amendments to the S&P 500, and index changes generally become effective up to five business days after the announcement. While this policy is aimed at easing order imbalances, index managers typically wait until the effective date before portfolio adjustments are made to reflect the 'new' S&P 500. Index additions and deletions are unlikely to follow a consistent seasonal pattern, as amendments are generally not predictable. Theoretically, tracking error may be related to S&P 500 index changes. The magnitude of tracking error is likely to be dependent on the relative market capitalisation weights of stocks added or removed from the S&P 500 in the period.

Tracking error for index mutual funds may also be significantly higher in January due to mutual fund flows. Large net cash flows require the index manager to rapidly engage in securities trading to avoid 'cash-drag', or tracking error induced by holding liquid assets and not stocks. Further, the existence of tax-related selling in December could also potentially drive the high tracking error recorded in the month of January.[80] Indeed, further research is warranted with respect to the determinants of tracking error in S&P 500 index fund performance.

[80] Index managers not permitted to use derivatives may use S&P 500 'Spiders', an exchange-traded security listed on AMEX, to equitise cash and improve index tracking.

Table 6.3 presents the after expenses performance of active and index mutual funds. As expected, index funds earn significantly negative raw and risk-adjusted excess returns, where the margin of underperformance is roughly equivalent to the average expense ratio. This is consistent with an index fund's performance objective net of expenses. In terms of performance comparison relative to active funds, Table 6.3 indicates index mutual funds outperformed active mutual funds. The most appropriate performance measure for active funds is the Elton-Gruber-Blake (1996a) four-index model and the TMEGB performance attribution model. Systematic risk (β_{SP}) and the growth-value risk factor sensitivities (β_{GV}) are consistent with the investment strategies adopted by active mutual funds. In terms of risk-adjusted performance, the alphas estimated from the single index model (α_1) and the four-index model (α_4) both indicate the average active mutual fund significantly underperforms. While index mutual funds also have significantly negative alpha (α_1), the magnitude of underperformance is approximately equal to the average expense ratio levied by index mutual funds (2.9 and 3.4 basis points per month for the eight-year and five-year periods respectively). Interestingly, active funds with growth-and-income investment objectives (the same investment objective as S&P 500 index funds) record the worst performance of all active funds, and this result is consistent with Gruber's (1996) findings. Davis' (2001) recent study corroborates the conclusions reported in this essay, where the performance of active equity mutual funds was evaluated with respect to the Fama-French three-factor model. After controlling for factor sensitivities related to the market portfolio, market capitalisation and the ratio of book-to-market equity (or value/growth tilts), Davis (2001) also documents the inability of active funds to generate significantly positive risk-adjusted excess returns. These findings were consistent across all investment styles.

Table 6.3 – Performance Comparison Between Active And Index S&P 500 Mutual Funds

Returns are expressed in percentage terms per month after expenses.

	$R_p - R_b$	α_1	α_4	β_{SP}	β_{SL}	β_{GV}	β_B	R^2	α_4^{SS}
Panel A: 8-Year Period									
All Index Funds - Replication	-0.036 ***	-0.031 ***	-	0.996	-	-	-	0.999	-
All Active Funds	-0.198 ***	-0.125 ***	-0.072 ***	0.917	0.161	0.038	0.048	0.884	-0.074 ***
Active - Aggressive Growth#	-0.097	-0.188 ***	-0.032	0.947	0.302	0.367	0.129	0.844	-0.014
Active - Growth	-0.119 ***	-0.120 ***	-0.037 **	0.943	0.176	0.157	0.047	0.876	-0.035 **
Active - Growth and Income	-0.255 ***	-0.149 ***	-0.121 ***	0.920	0.139	-0.055	0.030	0.901	-0.135 ***
Active - Income	-0.311 ***	-0.045 **	-0.052 **	0.824	0.161	-0.208	0.097	0.891	-0.019
Panel B: 5-Year Period									
All Index Funds	-0.035 ***	-0.029 ***	-	0.996	-	-	-	0.999	-
Index – Replication	-0.034 ***	-0.027 ***	-	0.995	-	-	-	0.999	-
Index – Non Replication	-0.041 ***	-0.036 ***	-	0.997	-	-	-	0.999	-
All Active Funds	-0.355 ***	-0.293 ***	-0.162 ***	0.944	0.131	0.041	-0.044	0.916	-0.170 ***
Active - Aggressive Growth#	-0.115	-0.379 ***	-0.083	1.043	0.219	0.403	-0.040	0.893	-0.112
Active - Growth	-0.300 ***	-0.312 ***	-0.174 ***	0.969	0.121	0.134	-0.066	0.910	-0.178 ***
Active - Growth and Income	-0.389 ***	-0.280 ***	-0.162 ***	0.937	0.134	-0.052	-0.028	0.928	-0.181 ***
Active - Income	-0.555 ***	-0.216 ***	-0.116 ***	0.833	0.155	-0.236	0.023	0.922	-0.105 ***

** Significant at 0.05 level
*** Significant at 0.01 level
# Statistical significance affected due to small sample size
In the case of index funds, R^2 is the coefficient of determination. For active funds, R^2 represents the adjusted coefficient of determination.

In terms of the security selection performance of active mutual funds derived from the TMEGB model (α_4^{SS}), additional evidence is presented showing active funds underperform index funds. While income-oriented active funds in the eight-year period show evidence of risk-adjusted performance after costs, approximating the return attributable to an index strategy, income equity funds are found to significantly underperform over the five-year horizon. The potential influence of survivorship bias can also be observed for the active mutual fund sample by comparing the average eight-year and five-year risk-adjusted excess returns. Active funds over the eight-year period outperformed the sample of active funds comprising the five-year period, indicating the likelihood of positive bias in fund alphas (or fund alphas having shifted to the right of the distribution) represented in the eight-year sample period.

6.7 Conclusions and Suggestions for Future Research

This essay highlights the reasons why tracking error is inherent in index fund performance, empirically evaluates the magnitude of S&P 500 index fund tracking error and compares the performance of active funds relative to index mutual funds. Index funds experience difficulties replicating the returns of the target index due to market frictions faced by index managers compared with an index that has no frictions and is calculated on the basis of holding a 'paper' portfolio of index securities. Seasonality in S&P 500 index mutual fund tracking error is demonstrated, where tracking error is significantly higher in the months of January and May, together with a seasonal trough in the quarters ending March-June-September-December. Statistical evidence indicates tracking error is both positively and significantly correlated with the dividend payments arising from constituent S&P 500 securities. There are also likely to be other determinants that explain tracking error variation, including the size and timing of adjustments to the S&P 500 Index Divisor.

Future research is already well under way with respect to tracking error determinants and the existence of seasonality.

The results of this essay concerning the performance of active mutual funds are consistent with the evidence presented in the literature. Active funds on average significantly underperform passive benchmarks. S&P 500 index mutual funds, on the basis of this research, earned higher risk-adjusted excess returns after expenses than large capitalisation-oriented active mutual funds in the period examined. One may therefore conclude the S&P 500 is consistent with capital market efficiency. These findings strongly suggest an absence of economic benefit accruing to the average investor utilising actively managed U.S. equity mutual funds investing in large-capitalisation stocks.

7

CHAPTER 7 - INVESTMENT MANAGER CHARACTERISTICS, STRATEGY, TOP MANAGEMENT CHANGES AND FUND PERFORMANCE

7.1 Introduction

The extent to which the investment performance of managed funds is related to investment manager attributes or characteristics is a largely unknown empirical question. This is despite the significant attention given to investment management organisations and their specific investment products by market regulators, the media, institutional and retail investors, institutional asset consultants (including William M. Mercer, Towers Perrin and Frank Russell Company) and fund ratings agencies and data providers such as Morningstar, ASSIRT and Rainmaker Information.

While academic research to date has largely concentrated on the measurement of portfolio performance and the persistence phenomenon, research is sparse with respect to the determinants of investment performance and the specific characteristics or attributes differentiating the returns achieved by managers. This study is motivated by the lack of empirical investigation, particularly due to the absence of Australian evidence, and evaluates performance differences on the basis of fund manager characteristics and strategy. In particular, this essay examines whether a relationship exists between fund performance and an investment manager's specific attributes. In other words, this study considers the extent to which investment manager 'ability' or 'skill' is related to observable characteristics.

An examination of investment manager characteristics and fund performance is warranted on the basis of a number of institutionally motivated criteria. First, the significant size of assets delegated by investors to professional fund managers in Australia ensures the issue is of great importance. Rainmaker Information reported the total size of funds directly managed by asset managers at December 2000 was around $A692 billion, and has increased in the last year by 9.9 percent.

Second, the aggressive marketing of investment managers, particularly in the retail market, results in significant advertising resources being expended to promote the investment manager's brand name, track record of past success and educational propaganda highlighting the prospective advantages of future investments within their existing product offerings. The marketing effort undertaken by an investment manager is typically geared around differentiating the investment strategy and performance of the institution relative to competing organisations. The implication at the very least is that investment managers engage the public to believe that performance is indeed related to the 'quality' of the investment manager, their staff, and the past performance success of their managed funds.[81] The Australian Securities and Investments Commission (ASIC) must also ensure investment managers issue prospectuses outlining the investment activities and objectives of managed fund products in a manner that complies with the Corporations Law.

Third, the reliance of institutional and retail investors on independent financial and investment advice is an additional motivating factor in the consideration of investment performance and manager characteristics. Institutional superannuation funds typically employ the services of asset consultants in both the formulation and implementation of a

[81] Fund managers are generally prudent in their advertising, where they use a variety of legal disclaimers mitigating their risk of loss through litigation by investors. These disclaimers refer to the uncertainty of the future and the possibility that past performance is not a guide to future performance. In addition, advertisements also encourage investors to seek professional advice before making investment decisions.

Plan's investment strategy. A recent study by Rainmaker as at 30 June 2000 indicated total institutional assets under the advice of asset consultants was in excess of A$150 billion. The selection of investment managers is a significant requirement of Plan trustees in the execution of their responsibilities to other Plan members. Board trustee meetings involving a prospective investment manager generally proceed with a rigorous interview of short-listed candidates. The actual short-list of investment managers is heavily reliant on both the qualitative and quantitative research undertaken by the asset consulting entity. The awarding of a new investment mandate by institutional investors therefore requires the differentiation of an asset manager's product offerings, skills and organisational stability from competitors.

In addition to institutional advice, retail investors are also served by financial planning organisations that rely on both internal and external research of investment manager products. For example, ASSIRT and Morningstar have published fund manager and product ratings in the form of a 'star' rating, which attempts to provide investors with independent information concerning the suitability and quality of investment manager products. There are numerous criteria evaluated by investment ratings agencies, both qualitative and quantitative, with the end result being the provision of a 'star' rating which summarises the investment credentials of managed fund products available. Essentially, ratings agencies give consideration to three main issues – the investment professionals who manage the fund's assets, the investment process adopted and the past performance achieved by the fund. The extent to which one, two or a small number of investment professionals exercise significant control or direction over the implementation of an investment manager's philosophy will also be a significant factor in determining the rating of a fund manager and the possible risks associated with departures of these key individuals.

Fourth, the financial media provide investors with regular commentaries concerning managed funds, their current unit prices, quarterly performance against an industry 'peer' group, new product offerings and significant personnel changes to the investment team or investment strategy adopted by the manager. Investments in managed funds may therefore be seen to have similarities in the selection criteria applied to direct investments traded on securities exchanges, such that rational, risk-averse investors use all available information to determine whether a shareholding in the entity is an attractive investment strategy.

This study makes a number of important contributions to the literature. While managed fund performance measurement has received significant attention in the literature, there remains a significant gap concerning whether Australian managed fund performance can be explained by specific manager characteristics. Primarily, this study evaluates the extent to which investors can use past information and events surrounding the operation of investment management organisations to predict investment performance. In other words, this is the first Australian study to examine whether investment performance can be differentiated on the basis of investment manager attributes, and provides an Australian perspective to the work undertaken by Chevalier and Ellison (1999b) and Golec (1996) for U.S. mutual fund managers. The study considers the years of tertiary education represented within the investment organisation, the investment management experience (and staff loyalty) exhibited by their personnel, the expenses charged by the manager, the size of assets under management, and the sensitivity of performance to changes in the senior management of the investment team. The research also evaluates the mismatch between the period of tenure served by senior portfolio managers implementing the investment process and the actual operational life of managed funds. In cases where the senior staff departs the firm, the study examines the extent to which senior individuals are responsible for the manager's performance and the extent to which mean reversion occurs in managed fund performance due to senior staff changes.

The remainder of this essay is structured as follows. Section 7.2 provides further background concerning the importance of investment manager attributes and managed fund performance as well as a review of the literature. Section 7.3 outlines the methodology used in evaluating whether investment manager performance can be differentiated on the basis of investment strategy, institutional size, quality of investment team and years of funds management experience. The essay also considers the extent to which performance is affected due to significant changes in a fund manager's senior investment personnel. Section 7.4 describes the institutional environment in the Australian investment management industry and the data employed in the analysis. Section 7.5 presents the empirical results. The final section concludes the study and makes suggestions for future research.

7.2 Background and Literature Review

7.2.1 Performance Evaluation

The literature evaluating the performance of actively managed funds is extensive and the overall conclusions have been remarkably consistent, indicating that the average active fund is unable to earn significantly superior risk-adjusted excess returns to appropriate market or benchmark indices. These findings have been largely consistent over almost 70 years, originating with the early work of Cowles (1933) through to the seminal studies of Sharpe (1966), Treynor and Mazuy (1966) and Jensen (1968). The empirical evidence over the last decade further supports the notion of capital market efficiency, including Elton *et al.* (1993), Malkiel (1995), Gruber (1996), Ferson and Schadt (1996), Cai *et al.* (1997), Blake and Timmermann (1998), Edelen (1999), Dahlquist *et al.* (2000) and Brown *et al.* (2001).

However more recently, Wermers (2000) and Edelen (1999) have both questioned the finding that active managers underperform the index. In the case of Edelen (1999), liquidity motivated trading by active mutual funds is documented as a significant explanation of why active funds underperform the benchmark, and in particular, that flow is an important determinant of poor market timing ability. Meanwhile, Wermers (2000) finds that active mutual funds operate in an environment consistent with Grossman and Stiglitz's (1980) informational efficiency hypothesis, where the average active fund selects stocks in a manner that delivers superior returns before costs, however after transaction costs and expenses, funds underperform. Daniel *et al.* (1997) also present evidence consistent with the Grossman-Stiglitz hypothesis.

The Australian evidence concerning managed fund performance is broadly consistent with other markets in the U.S., U.K., Japan and Sweden (for example, Robson (1986), Sinclair (1990), Hallahan and Faff (1999), Sawicki and Ong (2000), Gallagher (2001)). However, the extent to which performance is predictable based on investment manager characteristics or attributes remains an important empirical question. While the Australian literature documents active managers underperform market indices on average, the literature is almost non-existent in determining whether some managers exhibit better skills, investment philosophies, or are better able to earn superior returns through the implementation of their investment processes. Indeed, the funds themselves are likely to be in existence for longer periods than the individuals comprising the investment team;

hence an evaluation of managed funds without reference to the investment team managing the fund represents an area of evaluation yet to be considered by the mainstream literature.

7.2.2 Performance, Manager Characteristics and Strategy

There exists a number of criteria likely to be considered by share investors, including the corporate strategy adopted, the profitability of the organisation (or likelihood of the firm continuing to operate into the future), the skills embodied by the firm's senior executives and the overall corporate governance structure. The selection of an investment manager should be similar, where the products offered to investors are scrutinised on the basis of the past success of the manager, stability, skills and experience of the investment team, acceptance of the investment philosophy implemented, and costs involved in utilising the manager's services. While there exists a large body of literature devoted to the measurement of mutual fund performance, the empirical work investigating the factors differentiating performance, and fund manager characteristics and incentives remains an emerging area of research.

In the U.S., Chevalier and Ellison (1997, 1999a, 1999b) have been significant contributors, specifically evaluating portfolio manager incentives, mutual fund risk, and the relationship between performance and the education and experience of investment personnel.[82] They find cross-sectional evidence indicating that fund managers attending more selective undergraduate universities or colleges exhibit higher risk-adjusted excess returns. In addition, Chevalier and Ellison (1999b) find evidence that younger managers outperform those with more years of experience.[83] Golec (1996) has also evaluated mutual

[82] Brown *et al.* (2001) have also evaluated career concerns pertaining to hedge fund managers, performance, risk and survival.
[83] Chevalier and Ellison (1999b) suggest this phenomenon may be attributable to older managers being comparatively less educated than younger managers, younger managers showing a stronger work ethic as a

fund manager characteristics and their performance, finding younger managers holding M.B.A. degrees and with longer tenure deliver investors superior risk-adjusted excess returns.

The literature has also sought to disaggregate performance on the basis of the investment style or objective exhibited by mutual fund managers. These studies have been motivated by an attempt to identify whether managers implementing different styles or investment objectives deliver investors superior returns to other strategies (including Grinblatt and Titman (1989, 1993), Elton *et al.* (1993), Gruber (1996), and Becker *et al.* (1999)). Daniel *et al.* (1997) also analyse performance with benchmarks that account for differences in characteristics across mutual fund managers. They find that aggressive growth and growth funds are able to deliver superior returns to investors after expenses, even though their investment expenses are the highest of all fund categories evaluated. Grinblatt and Titman (1993) also report that aggressive growth funds earned significantly positive risk-adjusted returns. While Ippolito (1989) reports mutual fund performance consistent with Grossman-Stiglitz information efficiency, Elton *et al.* (1993) demonstrate that this conclusion is entirely attributable to the performance of non-S&P 500 assets held by mutual funds, and that adjustments to the benchmark reverse Ippolito's (1989) findings. This essay also goes beyond the traditional investment objective and style classifications by considering the investment managers' investment process and the implementation of their strategy.

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means for rapid career advancement or due to the successful older managers retiring earlier or moving across to institutional funds management.

7.2.3 Performance Predictability

Investors who rely on the advice of their stockbroker concerning the recommendations on equity securities may also rely on information from their financial adviser (retail investor) or asset consultant (institutional and superannuation investors) concerning the 'rated' managed funds offered by professional fund managers. Indeed, a number of intermediaries including ASSIRT and Morningstar provide investment-related information in the form of a 'rating' across various asset classes for investment managers and the products offered to investors. These recommendations rely on qualitative information based on the investment management team as well as quantitative data based on past returns to determine how well the investment manager's strategy has been implemented and the track record of a manager's investment performance.

While past performance is one of the criteria considered in the ratings process, disclaimers are commonly used in the industry by both fund managers and ratings agencies expressing that "past performance is not necessarily indicative of future performance". However, while these disclaimer clauses may be legally prudent, there have been a number of empirical studies citing a strong relation between performance in a prior period and subsequent performance (for example, Grinblatt and Titman (1992), Brown and Goetzmann (1995), Elton *et al.* (1996a), Christopherson *et al.* (1998), and Allen and Tan (1999)). In Australia, Hallahan (1999) also found past performance was a good predictor of future fund performance. However Carhart (1997) found the persistence effect in U.S. mutual fund data was almost entirely attributable to the common factors in stock returns and management expense ratios levied by mutual funds. In terms of predictive ability of ratings and U.S. mutual fund performance, Blake and Morey (1999) consider the role of out-of-sample Morningstar ratings and their predictive power concerning future mutual fund performance. They find evidence of high predictive ability among low-performing funds. However, there is weak evidence of superior predictive power for 5-star rated funds.[84]

The literature also documents a performance-flow relation, where investors allocate funds on the basis of past performance, with the expectation of such funds outperforming in a subsequent period (for example, Gruber (1996), Sirri and Tufano (1998), Zheng (1999) and Sawicki (2000)). Jain and Wu (2000) investigate U.S. mutual fund advertising and find that while superior performance is detected in the pre-advertised period, funds do not earn superior returns in the post-advertising period. In other words, advertising appears to be significantly related to superior performance prior to publication.

7.2.4 Top Management Turnover and Performance

Khorana (1996) examines the relationship between top management turnover for mutual fund managers and their prior performance. Khorana (1996) finds evidence of an inverse relationship between manager replacements and performance (where performance is measured according to portfolio returns and the growth rate in assets). The study also reports the replacement of mutual fund managers can be predicted up to two years prior to the eventual management change, and that replaced managers tend to exhibit higher portfolio turnover rates, higher expenses and greater systematic risk than non-replaced managers. In a later study concerning the changes in management staff of equity and bond mutual funds and their effects on performance and asset inflows, Khorana (2001) reports a significant improvement (deterioration) in post-replacement performance for underperforming (overperforming) managers in prior periods, however the changes did not

[84] Sharpe (1998) and Blume (1998) have also examined the underlying properties of the ratings system used by Morningstar.

lead to managers deriving superior returns relative to market benchmarks. Khorana (2001) also documents manager replacement being responsive to asset inflows, where poorly performing managers experience significantly lower asset inflows.

7.3 Data

This study employs a unique dataset of investment manager information and performance data spanning the 10-year period January 1991 to December 2000. Most performance studies in the literature have relied on time-series data reported by investment managers concerning the performance of individual product offerings. This study extends the literature by also considering qualitative information pertaining to individual investment management institutions, the processes and strategies implemented and other characteristics directly relevant to the firm.

Qualitative information was obtained directly from the investment managers via standard Investment and Financial Services Association Limited (IFSA) annual manager surveys. IFSA is the industry body that acts as the representative of the Australian investment management industry, and the surveys are undertaken for the benefit of and on behalf of asset consulting and investment advisory companies servicing the institutional market. The annual questionnaire requires investment managers to provide detailed information on various aspects of their organisation. This includes information pertaining to the ownership and capital structure of the firm, the professional staff employed (including qualifications held, investment experience, the number of years service (loyalty) accumulated with the current firm), the manager's investment philosophy and style, the asset allocation strategy, investment charges, and products available to institutional clients.

The questionnaire permits the investment manager to provide both qualitative and quantitative information for the previous five-year period, and provides the analyst with an understanding of how the organisation functions, the operational and risk management procedures in place and any significant changes which have occurred over time. The questionnaire also captures information describing the significant changes that have occurred within management, investment style and strategy. In some cases the analysis is able to refer to successive yearly questionnaires to extend the manager's five-year observation window. In other cases, the study only has available one questionnaire, which limits the observation interval for such managers to five years. Where possible, information was also checked against public information reported by the financial media. While the information reported in the IFSA questionnaires is assumed to be accurate, given the detailed level of information it would be extremely difficult to verify every piece of information reported. Certainly where cross-checking could be performed, the information was highly accurate. Further, while the information disclosed in the questionnaires is not mandated by legislation, any inaccuracies or biases that exist should be small. Significant discrepancies in questionnaires would be expected to cause substantial losses in reputation, the potential for failure in the awarding of new institutional mandates and the potential for investors to bring litigation (e.g. misrepresentation).

Due to the sensitive nature of the information contained in these questionnaires, and the restrictions in information dissemination by IFSA, this study does not disclose specific information for individual investment management organisations, or the individual personnel comprising these firms. Table 7.1 provides summary statistics based on the final questionnaires of investment managers evaluated, such that an aggregate description of the characteristics of the managers can be ascertained as at December 2000. The institutional investment management companies comprising the study are identified in Tables 7.4, 7.6

and 7.7 where performance is reported. These 28 individual funds management companies comprising the study are domiciled in Australia and engage in active investment strategies. Rainmaker Information data indicate the 28 investment managers controlled in excess of $A495 billion or 71.4 percent of all assets professionally managed as at 31 December 2000.

Table 7.1 – Descriptive Statistics Based on Last Reported Questionnaire for 28 Active Australian Investment Managers

Senior Professionals are classified according to job description provided by the manager. Staff are considered senior if they are Chief Investment Officers (CIOs), asset class sector heads, chief economists, Chief Executive Officers (CEOs) with direct involvement in money management, heads of asset allocation (where appropriate), or other participants involved in the asset allocation team. Due to different reporting dates of questionnaires, all questionnaire information relating to experience and loyalty was accrued to 31 December 2000 to ensure comparability between institutions.

	Average	**Standard Deviation**
Asset Size of Managers ($A billion)	17.7	15.1
Per Capita Tertiary Years Education (years)	3.5	0.5
Manager Experience – Senior Managers	16.2	3.6
Manager Experience – Other Managers	9.2	2.2
Manager Loyalty – Senior Managers	8.0	2.8
Manager Loyalty – Other Managers	5.0	1.9

Monthly performance data for these active investment managers were provided by the asset-consulting firm William M. Mercer, specifically from Mercer's *Manager Performance Analytics* (MPA) database.[85] Performance is evaluated for each investment manager in active Australian equities, active Australian bonds and diversified or multi-sector portfolios offered to investors. Performance in the diversified portfolio sector is measured after expenses and tax, whereas other returns are reported before expenses and tax.

[85] This study does not consider index-mimicking products as it is concerned with the performance of active managers. Quantitative strategies and enhanced index products are also excluded.

The study employs performance data that are 'representative' of the investment performance of investment managers in Australian equities, Australian bonds and diversified (or 'balanced') portfolios (i.e. diversified pooled superannuation funds investing in securities across the broad asset class spectrum).[86] The number of balanced funds evaluated numbered 22, 28 managers were evaluated in the assessment of Australian equities performance, and 24 were Australian bond fund managers. The balanced fund performance data included benchmark weights that provide an understanding of the implemented investment strategy across multiple asset classes, such that appropriate benchmarks can be used to assess risk-adjusted performance.

The market indices used in calculating each manager's specific benchmark for diversified asset class investments are presented in Table 7.2.

Table 7.2 – Benchmark Indices Employed in Performance Measurement by Asset Class

Asset Class	**Market Index**
Australian Equities	ASX 200 or ASX 300 Accumulation Indices (dependent on manager's stated benchmark)
International Equities	MSCI World (ex-Australia) Accumulation Index, Net Dividends Reinvested in $A
Australian Direct Property	W. M. Mercer Direct Property Index
Australian Listed Property	ASX 300 Listed Property Accumulation Index
Australian Fixed Interest	UBS Warburg Composite Bond Index
International Fixed Interest	Salomon Bros. World Bond Index
Australian Inflation-Linked Bonds	UBS Warburg Inflation-Linked Bond Index
Cash	UBS Warburg Bank Bill Index

Note: The ASX All Ordinaries Accumulation Index and ASX Listed Property Accumulation Index were employed for Australian equities and listed property prior to 1 April 2000.

[86] In some cases, where sector pools were unavailable for bonds and equities, the investment manager's composite portfolio performance is considered to ascertain the manager's overall performance in these asset classes.

While the selection of funds included was determined using W. M. Mercer Company surveys, each manager is consulted by Mercers to determine the appropriateness of the performance data included in the survey as being 'representative' of the institution. This process is transparent and Mercers employs strict rules in the maintenance of the selection procedure. Accordingly, investment managers are unable to 'cherry-pick' what performance series is ultimately reported. In evaluating the institution's performance, the analysis avoids problems with survivorship bias.[87] This is achieved as follows:

- where composite performance is reported (including all surviving and non-surviving funds), the data is 'representative' of the investment manager in aggregate;

- where sector pools are reported and where funds cease, these investment vehicles are also included in the analysis such that survivorship bias cannot overstate the manager's true performance. Where possible, to obtain performance data over a maximum possible horizon for analytical purposes, returns data in the specialist sector surveys were supplemented with returns derived from the relevant sector 'carve-outs' of balanced pooled products in Australian equities and Australian bonds;

- while a few investment managers merged or were acquired by other entities during the observation period, the analysis accounts for these mergers where the

[87] Survivorship bias exists where the performance of funds and/or managers is omitted from managed fund datasets due to these products not 'surviving' throughout the entire evaluation period. Hence, non-surviving funds are omitted from the performance records compiled by data vendors. The literature has found that survivorship bias will overstate the general population of 'surviving' funds' performance, as fund termination is highly related to poor performance. See Brown *et al.* (1992) and Elton *et al.* (1996b) for a thorough discussion of the issues inherent in survivorship biased studies.

acquirer either integrated the existing firm within its own organisation or the acquisition resulted in a significant loss of autonomy in the investment process.

Table 7.3 below provides descriptive statistics of the variables used in the regressions to explain the predictability of performance, risk and management expenses given the attributes of investment management firms. The performance data employed are the manager's balanced fund, indicating the collective performance of the manager across all asset class sectors. The investment manager qualitative variables (education, experience and loyalty) used in the subsequent regression analysis employ year-end averages as a measure of the institution's unique attributes observed by investors. In other words, individual staff data for each firm is compiled on a yearly basis and evaluated at 31 December, where for each of the qualitative variables at the firm level, the average for each variable is then computed.

Table 7.3 – Descriptive Statistics for 28 Active Australian Investment Institutions in the Period January 1994 to December 2000

The data are aggregated at the firm level on a per annum basis using calendar years. Regressions are then employed to evaluate the predictability of manager characteristics with respect to performance, risk and expenses for balanced funds. The definitions of variables and their measurement are described in greater detail in the following section. Alpha measures the risk-adjusted excess return per month for funds managers using calendar year monthly data. Beta is a measure of systematic risk for balanced funds using annual data. The Expense Ratio captures the per annum management charges levied to institutional investors. The coefficient of determination (R^2) is reported from the market model. The natural logarithm is applied to year-end data of the total size of funds invested by managers and the number of years since inception of the organisation. The Benchmark Allocation to Australian Equities represents the strategic benchmark weight applicable to the domestic equities sector as a component of the total portfolio of assets. Per Capita Tertiary Years Education represents the average years enrolment at a University or college of advanced education by an individual for each investment firm. Manager Experience and Manager Loyalty represents for each firm the average years employed in the sector and tenure with the incumbent employer, respectively. 'Senior' and 'Other' are dichotomised on the basis of whether staff held a position of responsibility with the asset allocation committee (or investment strategy committee).

	Number of Observations	**Average**	**Standard Deviation**
Alpha (per month in %)	124	-0.059	0.173
Beta	124	1.060	0.129
Expense Ratio (per annum in %)	124	0.624	0.11
R^2	124	0.941	0.068
Log Asset Size of Managers ($A billion)	151	9.068	1.084
Log of Institution's Age (years)	168	4.059	1.115
Benchmark Allocation to Australian Equities (%)	156	37.942	2.956
Per Capita Tertiary Years Education (years)	155	3.550	0.474
Manager Experience – Senior Managers (years)	150	17.238	3.505
Manager Experience – Other Managers (years)	138	10.338	2.240
Manager Loyalty – Senior Managers (years)	156	9.079	2.913
Manager Loyalty – Other Managers (years)	156	6.066	2.040

7.4 Evaluating Investment Manager Characteristics and Performance

7.4.1 Performance Methodology

The first metric evaluates the raw return or active return of an investment manager. This approach measures the return differential between the portfolio (R_p) and the underlying benchmark index (R_b) in a manner that does not account for the risk exhibited by the portfolio manager. The raw return (RR) is expressed as:

$$RR_{pt} = R_{pt} - R_{bt} \tag{7.1}$$

Second, the first risk-adjusted performance metric considered in this study and commonly referred to by industry participants is the Information Ratio (IR). This approach is similar in specification to the Sharpe Ratio (1966, 1994), where portfolio performance is adjusted with respect to the variability (or standard deviation σ_p), of return differences in the period. The Information Ratio can be expressed as:

$$IR_p = \frac{R_p - R_b}{\sigma_p} \tag{7.2}$$

Alternative risk-adjusted performance metrics (in addition to Sharpe (1966)) and commonly employed in the literature rely heavily on the theoretical Capital Asset Pricing Model (CAPM). Risk-adjusted abnormal performance in markets explained by the CAPM can be measured following the seminal work of Jensen (1968). Jensen’s Alpha, capturing the abnormal excess return of active funds, is estimated using ordinary least squares regression, where an active fund’s return in excess of the risk-free rate is regressed on the excess return of the market proxy portfolio. The standard excess returns market model regression is therefore expressed as follows:

$$R_{pt} = \alpha_{1p} + \beta_p R_{bt} + \varepsilon_{pt} \tag{7.3}$$

where:

R_{pt} = the return of fund p in period t in excess of the risk-free rate;

α_{1p} = the unconditional risk-adjusted excess return of fund p in the period;

β_p = systematic risk of the fund, measuring the sensitivity of the excess return of fund p to the excess return on the Index;

R_{bt} = the return on the market portfolio in period t in excess of the risk-free rate; and

ε_{pt} = the residual term of the model.

The investigation of Australian equity manager performance also employs a three-index model to account for additional factors that have been found to explain security returns. The three-index model is based on both the Elton *et al.* (1993) and Fama-French (1993) approaches. This three-index model controls for fund returns attributable to an active manager loading up on the factors that explain cross-sectional patterns in equity returns. The model therefore excludes active returns that are attributed to active managers 'riding' known style factors in their attempts to earn superior risk-adjusted excess returns. Elton *et al.* (1993) and Elton *et al.* (1996a) also advocate an extension to the single index model due to the potential sensitivity of performance to the choice of benchmark used as the reference portfolio. In particular, Elton *et al.* (1993) show Ippolito's (1989) conclusions (where active mutual funds satisfy the Grossman and Stiglitz (1980) definition of market efficiency in an environment accounting for costly information acquisition) arise due to the benchmark proxy excluding securities held in mutual fund portfolios. The model is essentially the same as that employed by Elton *et al.* (1996a) and is specified as follows:

$$R_{pt} = \alpha_{3p} + \beta_M R_{Mt} + \beta_{GV} GV_t + \beta_{SL} SL_t + \varepsilon_{pt} \tag{7.4}$$

where α_3 measures a fund's risk-adjusted excess return with respect to the set of risk factors, defined as the broad market factor (β_M) (proxied using the S&P/ASX 300 Accumulation Index), and two style factors controlling for book-to-market equity (β_{GV}) (or growth-value strategies) and market capitalisation (β_{SL}). This essay employs the Salomon Smith Barney (SSB) style indices (All Value and All Growth benchmarks) that encapsulate seven style factors in the partitioning of Australian-listed stocks – four value factors and three growth factors.[88] The size factor is measured as the difference between the return on the S&P/ASX Small Ordinaries Accumulation Index (small-cap firms) and the S&P/ASX 20 Accumulation Index (large-cap firms). The Elton *et al.* (1996a) bond factor is omitted, as equity managers do not invest in fixed income securities, hence the model would otherwise be misspecified.[89]

The additional indices therefore attempt to capture additional risk characteristics with respect to an investment manager's investment style as well as accounting for the possibility that equity securities from outside the market portfolio actually comprise part of the active fund's portfolio. The model can be considered as a performance metric that

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[88] SSB style factors consider 4 value factors, namely earnings per share to stock price, book value to stock price, sales revenue to stock price and cash flow to share price. The three growth factors consider the past 5-year period of historical earnings per share growth, historical sales revenue growth and the average internal growth rate per annum. SSB indices are reconstituted annually as at 31 May and re-balancing of the index occurs on a quarterly basis due to corporate actions etc.

[89] While the bond factor was excluded, an analysis was also performed to consider the effect on risk-adjusted performance where the UBS Warburg Composite Bond Index was used as an additional factor. As expected, the bond factor had a negligible impact on the performance estimates, and therefore did not change the conclusions.

accounts for investment managers exhibiting preferences for either high or low beta securities (systematic risk), small versus large-cap securities and growth versus value stocks. Overall, this model is argued to improve the quantification of active Australian equity managers' portfolio risk.

7.4.2 Manager Characteristics and Strategy

Empirical studies evaluating whether performance is related to experience, loyalty and educational qualifications require specific assumptions in order to identify and measure the relationship these variables have to fund performance. In evaluating the predictability of performance with reference to fund manager characteristics, this study relies on aggregated characteristics data at the institutional funds management level.

The study employs the same methodology as Chevalier and Ellison (1999b) by assessing the characteristics of managers at 31 December of year *t-1*. As outlined previously, differences in manager questionnaire reporting dates can cause some challenges in identifying all staff at the end of each year. This challenge is mainly attributable to staff turnover within the organisation, and can cause difficulties in achieving an accurate estimation of the firm-wide characteristics. The analysis in this study attempts to account for such changes by tracking individuals after the staff member resigns from the organisation. The questionnaires indicate the money management personnel who have departed each firm. Therefore, in cases where specific individuals cannot be 'tracked', and where staff turnover is relatively low, little variation is likely in the aggregated data across the period examined. Further, the attributes of an investment company in terms of the individuals employed at a point in time represent a good proxy for the firm's preferences with respect to the individual qualities of money management staff.

7.4.2.1 Experience and Loyalty

The dataset permits classification of individual staff members into two groups – 'senior personnel' and 'other personnel'. Senior personnel represent individuals who have executive responsibilities in leadership of the investment team, either as the chief investment officer of the firm, the head of an individual asset class or members of the asset allocation team. Other personnel are the residual investment professionals providing support to the senior executives.

Investment managers arriving at the firm are included for the year in which they join and individuals leaving the firm are included up to the year prior to their departure date. This ensures that the measurement of manager attributes accounts for all staff at the firm at 31 December each year. While this study attempts to track changes in personnel between investment firms, in some cases individual personnel characteristics are omitted. Where this occurs, and to minimise potential bias in the aggregated data for investment managers, the analysis assumes the former employee exhibits both the same educational characteristics and experience as the new appointee. This approach appears to have merit, as the individual qualities of departing personnel are likely to be replaced by people with very similar qualities.[90] Overall, the proportion of staff unable to be tracked appears to be relatively small.

In terms of performance, investors may hypothesise performance as being positively related to both the experience and tenure of the institution's employees. Greater years of experience for staff suggests a proven track record (tenure), team stability (tenure), and greater likelihood that historical fluctuations and changes in markets can be more easily identified and exploited by individuals who exhibit many years of experience

[90] Indeed, private discussions with a number of senior investment executives indicated this assumption was appropriate and broadly consistent with firms' recruitment policies.

in the industry. In terms of risk, investors may hypothesise beta as being inversely related to experience (which may be considered a proxy for age) as well as tenure. Expenses levied may be positively related to both tenure and experience, given higher levels of loyalty indicate success (or survivorship at the current firm) whereas experience may be associated with more senior executive roles and the receipt of higher levels of remuneration.

7.4.2.2 Educational Characteristics

Classifying and measuring the extent to which performance is related to the individual educational qualities of staff is more problematic and requires specific assumptions. In this study, an individual's years of tertiary education are used as a proxy for aptitude and scholastic achievement. An individual's aptitude or ability is measured with respect to the educational years enrolled at tertiary institutions in light of the standard durations of full-time candidature required to successfully meet the University requirements.[91] This study assumes a standard undergraduate degree requires three years of full-time study. Honours degrees are assumed to involve one-year of additional enrolment. Double degrees at undergraduate level are assumed to require five years of full-time candidature. Non-M.B.A. master degrees are assumed to be one year. For the purposes of this study, the minimum candidature for an M.B.A. is assumed to be one-and-a-half years.[92] Doctoral degrees are equivalent to a three-year full-time minimum

[91] In rare cases, universities may have slightly different duration periods for satisfactory completion of degrees. The manager questionnaires do not always identify the tertiary institution from which the individual has graduated, and therefore an assumption is required in calculating the length of time a candidate has been enrolled.

[92] Even where the minimum candidature for an M.B.A. is assumed to be two years, the empirical findings are consistent with those reported in this research. The 1.5-year period was used to ensure conservatism with respect to minimum enrolment periods.

enrolment period.[93] Using these standard duration periods according to degree type, an analysis may be performed to determine whether money management firms can be differentiated from their competitors on the basis of educational years of employed staff.[94]

A further assumption is that degrees awarded by educational institutions are held for the entire five-year period used for analysis. The investment manager questionnaires provide details of staff over the five-year period, and the degrees listed are all qualifications as at the reporting date. While the personnel arriving and departing the organisation can be tracked, the dates on which degrees were conferred are not reported. Therefore, the extent of possible bias in the analysis is unknown where such an assumption is made. However, in aggregate, it is expected to be small for the following reasons. First, investment managers have listed the previous experience (years) directly served in the funds management industry as well as a separate category detailing the number of years experience in other professions (if appropriate). If the standard assumption is that total experience is equal to or less than five years, an assumption can be made that the individual has most likely graduated with an undergraduate degree within the period. Therefore the conferral date can be inferred and the individual's professional experience represents the period of time subsequent to graduation. For other investment staff with greater than five-years of experience, it can be argued that graduation from their undergraduate studies has, in general, occurred prior to the commencement of the observation window.[95]

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[93] Some students may prolong their study beyond the assumed minimum durations, however the dataset collated does not permit identification of the number of years of successful study in attaining degrees. In reality, this is not expected to seriously bias the measurement of an institution's educational years per capita.
[94] In some cases it was difficult to track all departing investment managers and their qualifications held. However, most managers were included so that possible bias is extremely small.
[95] Interviews with investment managers confirmed that such assumptions had merit and were appropriate.

Second, if postgraduate studies occurred within the five-year period of the questionnaire, and the questionnaire indicates the completion of studies at the reporting date, this provides a signal of aptitude as well as the benefits of education accruing each year of study undertaken by individuals.[96] Not having held the degree for the entire period should not be too problematic, as most individuals can be assumed to have held their degrees over the entire period. Further, the eventual conferral demonstrates a propensity to acquire knowledge and to broaden skill sets with the view to career advancement, hence this assumption has some merit. Analysis of qualifications is then determined on a per capita basis for each funds management organisation. The quality of individual graduates, in terms of average academic grades, is not available.

In terms of the predictability of performance, risk and expenses given the years of tertiary education of investment managers, this essay hypothesises a positive relationship with risk-adjusted return, beta and expenses. This is because the educational years variable is a proxy for aptitude or ability, and individuals exhibiting higher levels of ability should earn higher returns. It also is hypothesised that individuals with greater ability may have increased preparedness to engage in and successfully exploit more risky stocks. Finally, in terms of the expenses incurred by managers, more gifted and able individuals are likely to receive higher remuneration, which should ultimately be incorporated into the manager's expense ratio, hence the expense ratio is expected to be positively related to education.

7.4.2.3 Manager Strategy

The investment manager's self-stated investment approach is used to determine investment strategy. This includes information that provides inference with respect to

[96] The data indicate that the general entry requirement in the industry is an undergraduate degree. It is extremely rare for an individual managing money not to hold a degree qualification. Therefore, it is highly likely that undergraduate degrees were obtained prior to commencement with a funds management organisation. Second, postgraduate degrees are a much smaller proportion of total degrees.

whether the manager emphasises a ‘top-down’ or ‘bottom-up’ approach to portfolio management. Managers emphasising top-down strategies place greater weight in the decision making process on the allocation of assets to various asset classes on the basis of expected market returns. Top-down managers therefore seek to overweight (underweight) the portfolio, relative to their strategic benchmark asset allocation, in those sectors expected to provide higher (lower) returns. Top-down managers then select the individual securities for their portfolios within their asset allocation constraints. Bottom-up managers, on the other hand, place greater emphasis on the fundamentals of individual securities within each asset class, rather than placing strict limits on the maximum or minimum asset class weights applicable in each asset class sector (for diversified asset class funds) or industry sector (for sector specialist portfolios). Certainly, the differentiation of investment managers into one of these two groups is likely to induce some degree of subjectivity bias, however the general description provided by the managers does indicate the process in which the investment firm intends to manage portfolios and also advertise to investors.

In the sectors of Australian equities and Australian bonds, the predominant investment strategies are reported within each of the questionnaires, permitting an understanding of the degree of emphasis placed on each component strategy. Specifically, Australian equities managers identify the percentage weight placed on factors such as valuation, projected growth, past growth history, management quality and technical analysis. For Australian bonds, managers have identified the emphasis placed on duration, yield curve management, issue and sector selection and arbitrage in their attempts to earn active returns.

7.5 Empirical Results

7.5.1 Do Active Australian Investment Managers Outperform?

This study evaluates manager performance in Australian equities, Australian bonds and portfolios diversified across the broad asset class spectrum (Balanced). Table 7.4 presents the performance results of active Australian equity managers, and suggests active equity managers indeed beat the market before management expenses. The majority of managers evaluated exhibit both positive and statistically significant raw and active returns (raw = 27 and α_3 = 17). The average equity manager outperformed the index in the 10-year period by 21.9 (α_3) basis points per month, statistically significant at the 0.01 level. The risk-adjusted excess returns using either a one-factor or three-index model both support the finding that the majority of active Australian share managers derive superior returns to the market. The performance results indicate that controlling for additional risk factors that the literature has identified as explaining cross-sectional patterns in equity market returns is unable to account for the superior returns delivered by institutional managers.

Table 7.4 – Active Australian Equities Managers – 10 Year Period to 31 December 2000

This table shows the performance of active Australian equity managers in the 10-year period to 31 December 2000 before expenses. RR measures the average raw return of funds in the period, where raw returns are measured according to equation 7.1. IR represents each manager's information ratio, computed in accordance with equation 7.2. The one and three-index models are also used to measure risk-adjusted excess returns, according to models 7.3 and 7.4 respectively. Performance (RR, α_1 and α_3 is expressed in percentage terms per month. The coefficients on the style factors relating to growth-value and market capitalisation can be interpreted as follows: managers exhibiting biases towards growth (value) stocks derive positive (negative) coefficients on the GV factor. Managers exhibiting greater sensitivity to small-cap securities (large-cap) derive positive (negative) coefficients on the SL variable.

Managers	**Raw Active Returns**							**1 Factor Model**			**Three Factor Model**					
	RR	**t(RR)**	**SD**	**Max**	**Min**	**%>0**	**IR**	α_1	**t(α_1)**	β	α_3	**t(α_3)**	β_M	β_{GV}	β_{SL}	**R^2 Adj**
Aberdeen	**0.624**	3.60	1.070	2.891	-2.164	76.3	0.583	0.185	1.03	**1.039**	0.188	1.01	**1.040**	-0.071	0.011	0.902
AMP Henderson	**0.721**	11.70	0.676	2.844	-1.376	88.3	1.068	**0.380**	4.42	**1.017**	**0.437**	4.99	**1.013**	0.052	**0.054**	0.961
ANZ	**0.742**	10.75	0.756	3.447	-0.607	86.7	0.981	**0.222**	3.14	**0.999**	**0.247**	3.56	**0.982**	**0.088**	-0.036	0.962
AXA	**0.614**	9.07	0.741	2.988	-1.325	82.5	0.828	0.063	0.98	**1.053**	0.078	1.20	**1.041**	0.055	-0.029	0.970
BGI	**0.525**	6.33	0.907	4.065	-3.602	79.2	0.578	**0.185**	2.38	**1.021**	**0.194**	2.38	**1.020**	0.028	0.001	0.980
BNP Paribas	**0.924**	7.81	1.078	3.121	-1.778	85.5	0.857	**0.464**	4.10	**0.910**	**0.528**	4.80	**0.919**	0.035	**0.108**	0.918
BTFM	**0.418**	3.24	1.304	5.270	-3.170	70.6	0.321	0.073	0.58	**0.910**	0.165	1.40	**0.894**	**0.227**	**0.090**	0.900
Colonial F.S.	**0.870**	4.96	1.616	4.618	-8.070	77.6	0.538	**0.438**	2.59	**0.884**	**0.541**	3.31	**0.876**	0.140	**0.145**	0.833
Commonwealth	**0.575**	8.09	0.779	2.284	-1.559	80.8	0.738	**0.211**	2.12	**0.996**	**0.218**	2.09	**0.994**	0.019	-0.008	0.946
County	**0.645**	10.23	0.691	2.910	-1.101	85.0	0.934	**0.146**	2.47	**0.966**	**0.141**	2.34	**0.962**	0.000	-0.023	0.969
Credit Suisse	**0.587**	6.41	0.917	2.769	-4.022	79.0	0.641	0.108	1.15	**1.010**	0.103	1.13	**0.993**	0.024	**-0.092**	0.949
Deutsche	**0.688**	10.81	0.562	2.331	-0.981	88.5	1.224	**0.181**	2.90	**1.029**	**0.189**	2.88	**1.028**	0.010	0.006	0.977
HSBC	**0.602**	11.06	0.525	1.866	-0.860	88.2	1.147	**0.113**	2.06	**1.018**	**0.123**	2.26	**1.009**	0.044	-0.031	0.983
JB Were	**0.625**	8.34	0.822	3.199	-2.166	83.3	0.761	0.135	1.81	**0.959**	**0.143**	2.07	**0.932**	**0.074**	**-0.091**	0.960
Macquarie	0.263	1.36	1.729	4.968	-6.531	70.0	0.152	-0.223	-1.14	**0.994**	-0.160	-0.86	**1.027**	-0.127	**0.176**	0.827
MBA	**0.967**	8.85	1.197	3.790	-3.341	82.5	0.808	**0.440**	4.13	**1.011**	**0.337**	3.47	**1.030**	**-0.254**	-0.035	0.931
ING	**0.833**	8.11	1.126	3.739	-3.201	81.7	0.740	**0.328**	3.21	**0.976**	**0.297**	2.85	**0.982**	-0.079	-0.008	0.915
Perpetual	**0.691**	5.61	1.207	5.873	-3.311	77.1	0.572	**0.292**	2.49	**0.882**	**0.312**	2.61	**0.884**	0.028	0.053	0.894
Portfolio Partners	**0.523**	4.13	1.073	2.944	-2.226	65.3	0.487	0.072	0.58	**0.942**	0.043	0.33	**0.951**	-0.070	0.008	0.906
Rothschild	**0.502**	6.18	0.796	3.163	-2.327	79.2	0.631	0.064	0.81	**0.941**	0.061	0.76	**0.935**	0.012	**-0.050**	0.957
Salomon	**0.560**	8.07	0.761	3.574	-1.431	81.7	0.736	0.051	0.73	**0.988**	0.025	0.36	**1.002**	**-0.083**	0.025	0.961
Schroder	**0.731**	8.79	0.744	2.703	-0.664	82.5	0.982	**0.268**	3.20	**0.948**	**0.279**	3.27	**0.937**	0.062	-0.022	0.953
SSGA	**0.694**	8.84	0.638	2.275	-1.340	84.8	1.088	**0.237**	3.03	**0.977**	**0.230**	2.82	**0.976**	-0.001	-0.021	0.965

Continued…

Managers	Raw Active Returns							1 Factor Model				Three Factor Model					
	RR	**t(RR)**	**SD**	**Max**	**Min**	**%>0**	**IR**	α_1	**t(α_1)**	β		α_3	**t(α_3)**	β_M	β_{GV}	β_{SL}	**R^2 Adj**
Suncorp	**0.596**	14.12	0.462	1.918	-0.837	94.2	1.289	**0.151**	2.37	**0.999**		**0.175**	2.65	**0.996**	0.042	0.005	0.982
Tower	**0.868**	9.61	0.989	3.603	-2.024	80.0	0.877	**0.310**	3.45	**1.059**		**0.314**	3.41	**1.054**	0.019	-0.014	0.942
Tyndall	**0.836**	3.46	2.650	6.675	-11.781	65.8	0.315	0.417	1.75	**0.845**		0.282	1.22	**0.901**	**-0.400**	0.071	0.637
UBS	**0.669**	6.65	1.015	4.015	-2.874	80.4	0.659	0.194	1.84	**0.996**		0.201	1.86	**1.000**	0.009	0.035	0.926
Westpac	**0.433**	5.32	0.806	2.929	-2.202	74.5	0.538	-0.054	-0.65	**1.019**		-0.033	-0.43	**0.997**	**0.095**	**-0.072**	0.964

Note: Statistical significance of RR, α_1, α_3, β_{GV}, β_{SL} is at the 95 percent confidence level and is indicated in bold text. *F*-statistics on all regressions are significant at 0.01 level.

These results for Australian equities are at first glance perplexing, given the overwhelming majority of studies in the literature suggest active managers do not earn superior risk-adjusted returns. Ippolito's (1989) findings of superior performance were shown by Elton *et al.* (1993) to be attributable to the benchmark failing to account for non-S&P 500 securities. Misspecification would not be expected to drive these findings as appropriate benchmarks for individual managers have been undertaken. This is achieved through the managers' participation in W. M. Mercer Performance Surveys. Further, the conclusions for equity managers are not inconsistent with the recent findings of Daniel *et al.* (1997) and Wermers (2000). These studies document active U.S. mutual funds being able to earn back most of their expenses in the form of active returns, which is consistent with the Grossman and Stiglitz (1980) informational efficiency hypothesis. Secondly, this study confirms the performance results of Joye (1999) for active institutional Australian equity funds before expenses. While the analysis of performance is measured using gross returns, after expenses returns analysis is not possible as fund manager expenses are not available. Gallagher (2001) also suggests some active managers exhibit superior selectivity skill in Australian equities before costs. However, the W. M. Mercer *Fee Survey* of managers for 1999 and 2000 provides an estimate of the potential impact of fees on performance.[97]

[97] Mercer's survey of fees indicates that over the past few years, fees have generally been declining, albeit gradually. Over the past four years, the average decline in fees per annum for larger mandates (greater than $50 million) was reported by Mercers is between 5 and 10 basis points per annum at the upper end.

Table 7.5 – Institutional Active and Index Management Fees in Australia

This table shows the institutional management expenses levied by institutional investment managers for balanced funds, Australian equities funds and Australian bond funds for the years 1999 and 2000. Fees (per annum) are for pooled investment mandates equal to $A50 million.[98]

Sector	**Average 2000**			**Average 1999**		
	Active	*Index*	*Differential*	*Active*	*Index*	*Differential*
Australian Equities	0.60	0.15	0.45	0.59	0.10	0.49
Australian Bonds	0.33	0.11	0.22	0.38	0.08	0.30
Balanced	0.60	0.18	0.42	0.60	0.20	0.40

Source: W. M. Mercer

The average active equity manager in the past few years has levied management expenses around 5 basis points per month, compared with index equity managers of approximately 1 basis point per month (see Table 7.5). The results in Table 7.4 suggest that the average α_3 net of expenses is 16.9 basis points per month. Even if fee levels were levied at double the period-end observation window over the 10-year period, the average manager would still outperform in risk-adjusted terms by more than 1.4 percent per annum. These findings suggest that the average active manager in the Australian equities asset class has earned active returns that have exceeded their investment expenses.

One final consideration of the findings reported for active Australian share managers may be due to the sample exhibiting selection-bias issues. The sample is constructed so that each manager is represented once through the use of one performance series. While Mercers survey investment manager performance regularly using the firm's 'flagship' product, strict rules are maintained to ensure that self-selection of performance reporting cannot be manipulated by the investment managers. If the product used in the surveys ceases to exist, Mercers retains the past return records such that bias in their surveys is eliminated. Where managers reported more than one product, performance was

[98] Average fees applicable to the individual managers comprising the sample in equities, bonds and balanced are extremely close and consistent with the fees presented in the Table.

evaluated for the other funds to determine the extent to which the inclusion of a single 'flagship' fund actually overstates the general performance of managers. The results (not reported) indicate that each manager's returns are highly correlated over time with the flagship fund, and the results reported earlier are generally consistent with those presented in Table 7.4.

The empirical results in the 10-year period suggest Australian equity managers are predominantly growth oriented and are almost equally split between portfolios biased toward large and small capitalisation stocks. The evidence also indicates that outperformance of the index occurs in the overwhelming majority of months. Performance consistency, measured as the percentage of observations in excess of the Australian equities benchmark return, occurs between 65.3 and 94.2 percent of months in the 10-year period. This is even more surprising when consideration is given to the balanced funds and bond funds which exhibit lower levels of performance consistency (see Table 7.6 and Table 7.7).

In terms of the performance of active Australian bond fund managers, Table 7.6 indicates that investors earn returns commensurate to the index, before expenses have been deducted. While only two managers demonstrate the ability to earn significantly positive α_1, the majority of managers earn risk-adjusted returns insignificantly different from zero before costs. Similarly for diversified asset class managers, Table 7.7 indicates that the majority of active managers are unable to deliver investors with superior returns, after consideration of their heterogeneous fund strategic benchmark asset allocations.

Table 7.6 – Active Australian Bond Managers – 10 Years to 31 December 2000

This table shows the performance of active Australian bond managers in the 10-year period to 31 December 2000 before expenses. RR measures the average raw return of funds in the period, where raw returns are measured according to equation 7.1. IR represents each managers' information ratio, computed in accordance with equation 7.2. The single-index model is also used to measure risk-adjusted excess returns, according to model 7.3. Performance (RR and α_1) is expressed in percentage terms per month.

Managers	Raw Active Returns							1 Factor Model			
	RR	t(RR)	SD	Max	Min	%>0	IR	α_1	t(α_1)	β	R^2
Aberdeen	0.008	0.44	0.126	0.248	-0.527	55.6	0.059	0.017	0.99	**0.970**	0.988
AMP Henderson	0.026	1.51	0.188	0.440	-1.312	61.7	0.138	0.019	1.07	**1.021**	0.983
ANZ	0.049	1.54	0.346	1.993	-0.837	70.0	0.141	0.029	0.92	**1.058**	0.951
AXA	**0.059**	2.90	0.224	0.867	-0.653	63.3	0.265	**0.045**	2.20	**1.043**	0.979
BGI	-0.019	-0.55	0.383	0.990	-1.594	55.0	-0.050	0.004	0.12	**0.931**	0.925
BNP Paribas	0.100	1.17	0.791	4.372	-3.473	51.7	0.127	0.115	1.33	**0.919**	0.711
BTFM	0.062	1.60	0.390	1.492	-1.262	50.0	0.158	0.051	1.32	**1.040**	0.933
Colonial F.S.	-0.061	-1.08	0.615	0.746	-5.347	58.3	-0.099	-0.060	-1.03	**0.998**	0.837
Commonwealth	0.007	0.25	0.298	0.952	-1.269	53.3	0.023	-0.033	-1.41	**1.118**	0.975
County	0.012	0.50	0.262	0.709	-0.917	53.3	0.045	-0.012	-0.51	**1.070**	0.974
Credit Suisse	0.010	0.66	0.155	0.664	-0.578	70.0	0.067	0.006	0.34	**1.020**	0.988
HSBC	0.006	0.17	0.422	1.790	-1.449	51.7	0.015	0.008	0.20	**0.995**	0.916
JB Were	0.009	0.64	0.136	0.353	-0.586	50.0	0.064	0.014	1.02	**0.980**	0.989
Macquarie	0.008	0.39	0.221	0.993	-0.906	55.0	0.035	-0.012	-0.63	**1.059**	0.981
MBA	0.001	0.01	0.465	1.582	-1.057	48.3	0.001	0.012	0.29	**0.965**	0.895
ING	0.015	0.50	0.326	1.223	-1.462	56.7	0.046	-0.004	-0.15	**1.057**	0.956
Rothschild	0.048	1.10	0.478	1.215	-2.111	53.3	0.100	0.025	0.57	**1.067**	0.910
Salomon	0.012	0.81	0.164	0.371	-0.567	51.7	0.074	0.021	1.38	**0.974**	0.986
Schroder	-0.001	-0.02	0.379	0.778	-1.884	55.0	-0.002	-0.012	-0.34	**1.033**	0.936
Suncorp	**0.080**	2.87	0.305	1.761	-0.665	66.7	0.262	**0.077**	2.69	**1.008**	0.955
Tower	0.072	1.09	0.721	3.175	-4.869	40.0	0.099	0.034	0.51	**1.111**	0.829
Tyndall	0.023	0.85	0.302	0.803	-0.912	48.3	0.077	0.033	1.15	**0.973**	0.954
UBS	**0.047**	2.46	0.211	1.012	-0.592	66.7	0.225	0.032	1.69	**1.045**	0.981
Westpac	0.018	0.91	0.222	0.808	-0.793	56.7	0.083	-0.010	-0.59	**1.085**	0.985

Note: Statistical significance of RR and $\alpha_1$is at the 95 percent confidence level and is indicated in bold text. *F*-statistics on all regressions are significant at 0.01 level.

Table 7.7 – Active Diversified Asset Class Managers – 10 Years to 31 December 2000

This table shows the performance of active diversified asset class managers in the 10-year period to 31 December 2000 after expenses and tax. RR measures the average raw return of funds in the period, where raw returns are measured according to equation 7.1. IR represents each managers' information ratio, computed in accordance with equation 7.2. The single-index model is also used to measure risk-adjusted excess returns, according to model 7.3. The benchmarks employed for each manager are dependent on the stated strategic benchmark allocations across the broad spectrum of asset classes. Performance (RR and α_1) is expressed in percentage terms per month.

Managers	Raw Active Returns							1 Factor Model (Mgr. Specific)			
	RR	t(RR)	SD	Max	Min	%>0	IR	α_1	t(α_1)	β	R^2
AMP Henderson	-0.034	-1.19	0.292	0.932	-0.541	44.8	-0.116	-0.037	-1.29	**1.014**	0.968
ANZ	0.083	1.36	0.668	2.362	-2.273	60.0	0.124	0.046	0.78	**1.117**	0.903
AXA	-0.010	-0.20	0.528	1.605	-1.094	43.3	-0.018	-0.057	-1.27	**1.119**	0.948
BGI	-0.063	-1.10	0.626	2.161	-1.617	47.5	-0.101	**-0.118**	-2.20	**1.140**	0.926
BNP Paribas	0.030	0.39	0.680	1.585	-2.254	51.3	0.044	0.020	0.24	**0.962**	0.843
BTFM	-0.048	-0.87	0.602	2.562	-1.766	45.8	-0.080	-0.074	-1.35	**1.072**	0.914
Colonial F.S.	**0.194**	2.12	0.626	2.045	-1.241	61.7	0.309	**0.188**	2.04	**1.016**	0.914
Commonwealth	-0.024	-0.55	0.473	1.428	-1.452	49.6	-0.051	-0.036	-0.81	**1.038**	0.929
County	-0.037	-1.01	0.397	1.312	-1.042	43.3	-0.092	-0.057	-1.58	**1.047**	0.968
Credit Suisse	0.065	1.36	0.377	1.431	-0.813	56.5	0.173	0.064	1.28	**1.003**	0.962
HSBC	**0.137**	2.28	0.661	2.489	-1.614	53.3	0.208	0.097	1.67	**1.136**	0.902
Macquarie	-0.102	-1.46	0.678	1.534	-2.119	42.6	-0.150	-0.111	-1.55	**1.023**	0.884
MBA	**0.143**	2.78	0.563	1.917	-1.158	60.8	0.254	**0.179**	3.55	**0.912**	0.912
ING	0.042	0.74	0.553	1.220	-1.313	51.0	0.076	**0.221**	2.22	**1.016**	0.695
Portfolio Partners	-0.002	-0.03	0.442	1.034	-1.271	55.9	-0.005	0.003	0.05	**0.988**	0.945
Rothschild	0.053	0.99	0.586	2.035	-1.558	51.7	0.091	0.014	0.26	**1.102**	0.932
Salomon	0.025	0.59	0.456	1.328	-1.105	48.3	0.054	0.004	0.09	**1.059**	0.941
Schroder	0.050	1.01	0.484	1.902	-1.158	51.0	0.104	**0.238**	2.45	**0.976**	0.732
Suncorp	0.078	1.50	0.572	1.961	-2.203	54.2	0.136	0.046	0.90	**1.115**	0.901
Tower	-0.046	-0.95	0.528	1.435	-1.556	46.7	-0.086	-0.033	-0.67	**0.974**	0.934
Tyndall	-0.075	-1.18	0.626	1.425	-1.496	44.8	-0.120	0.119	1.12	**1.041**	0.701
Westpac	-0.014	-0.27	0.567	1.642	-2.202	50.8	-0.025	-0.044	-0.86	**1.081**	0.925

Note: Statistical significance of RR and $\alpha_1$is at the 95 percent confidence level and is indicated in bold text. *F*-statistics on all regressions are significant at 0.01 level.

7.5.2 Performance by Tenure Period

An outstanding issue existing in the literature is that performance is only evaluated at the aggregate funds manager level. Accordingly, such analysis ignores the likelihood that senior investment professionals serve shorter periods of time with their employers than is the case for the lives of funds. There is also an implicit assumption that top management should be ultimately responsible for the investment decisions made and the performance delivered to investors. Therefore, the extent to which individuals driving the investment process and managing the investment team are capable of earning superior returns remains an empirical issue.

While the empirical literature widely confirms the inability of funds to outperform appropriate benchmark indices, the literature has seldom evaluated fund performance with respect to the tenure periods of key investment staff (for example, see Khorana (1996, 2001) and Golec (1996)). Where performance periods disregard key staff changes, improper performance inferences may be drawn – i.e. fund performance may be mean reverting. In other words, superior (or inferior) performance may occur more often when evaluation periods consider tenure periods of senior staff than at the funds level over longer time frames. Analysis of performance in the 7.5-year period to 30 June 2001 for heads of domestic equities and domestic bonds was performed and results are presented in Table 7.8.

Table 7.8 – Performance of Individual Sector Heads in the period 1 January 1994 – 30 June 2001

Performance is evaluated for all sector heads during their tenure in the 7.5-year period as well as for managers commencing and departing within the 7.5-year period. Managers must have served at least 12 months for reasonable regression estimates to be derived. Alpha is expressed in percentage terms per month before fees and tax for equities and bonds and after expenses and tax for balanced.

	Model	**Number**	**Mean** α	**Median** α	**# Sig** α**>0***	**# Sig** α**<0***	**#** α **Insig***
Panel A: All Management Periods							
Heads of Australian Equities	3 Factor	52	0.206 ***	0.125	14	0	38
Heads of Australian Equities	1 Factor	52	0.184 ***	0.147	12	0	40
Heads of Australian Bonds	1 Factor	34	0.012	0.013	3	0	31
Chief Investment Officers	1 Factor	43	-0.046 **	-0.048	2	10	31
Panel B: Management According to Strict Tenure							
Heads of Australian Equities	3 Factor	19	0.218 ***	0.140	5	0	14
Heads of Australian Equities	1 Factor	19	0.201 ***	0.187	5	0	14
Heads of Australian Bonds	1 Factor	2	-0.005	-0.005	0	0	2
Chief Investment Officers	1 Factor	13	-0.027	-0.016	0	0	13

** Significant at 0.05 level
*** Significant at 0.01 level

Panel A of Table 7.8 evaluates performance of sector heads and CIOs for the periods of service within the 7.5-year period examined. Both the single and three-index models for Australian equities indicate that around one-quarter of all appointed sector heads were able to deliver investors with superior risk-adjusted returns before expenses at the 95 percent confidence interval. The conclusion for Australian shares suggests performance measurement is independent of whether a single or multi-index model is employed to adjust for risk. In other words, the three-factor model cannot eliminate the source of value added which is attributable to the common factors that explain equity returns. The average α_3 of the superior managers was 47.1 basis points per month (not reported directly), which outperformed the other sector heads by 36.2 basis points per month. This performance differential is statistically significant at the 0.01 level. An examination of the factor loadings of the successful appointments (not reported directly) indicates 11 out of 14 and 10 out of 14 managers exhibited positive loadings to the market capitalisation (i.e. small-cap biased) and growth factors respectively. Of further note was the finding that the remaining Australian equities sector heads did not significantly underperform the index before expenses. Therefore, performance is in line with the objectives of an index fund. However, the average equity manager's performance not deriving superior performance is equal to 10.9 basis points per month above the index.

On the other hand, the findings for Australian bonds sector heads and chief investment officers in Panel A of Table 7.8 indicate that very few individuals driving the investment process are able to deliver investors with superior risk-adjusted excess returns. In terms of balanced manager returns, it may be argued that the chief investment officer is more reliant on key individuals driving the individual sectors, and that overall, the performance attributed to them is not entirely reliant on their own stewardship of the investment firm. Another insight may be that managers have better skills in only one or two sectors, and that inferior performance attributable to these other investment classes detracts from value-added. Overall, the analysis of individual managers in domestic bonds and balanced sectors confirms the main findings in managed fund studies, in that actively managed portfolios are unable to earn superior returns to appropriately specified market benchmarks.

The results presented in Panel B of Table 7.8 evaluate performance with respect to strict tenure periods of senior investment managers. These findings are generally consistent with the results of Panel A.

There are a number of caveats with respect to the results in Panel B of Table 7.8. These include the sample size being restricted due to data availability, the time period considered and the relatively small number of managers comprising the study. Also, a manager's poor short-term performance may be the predominant reason for a change in personnel, in which case the measurement of top management's ability from commencement may represent an inaccurate event window for evaluation purposes. In addition, the absence of clear reasons given by the investment management firms for changes in top management can create 'noise' in the data. While there is every likelihood management changes are performance-related, the extent to which the superior performers are 'poached' by competitors and the poor performers are terminated is an area for future research.

7.5.3 Manager Performance and Top Management Turnover

This section provides an empirical analysis of senior staff departures and performance for the following top management roles: head of domestic equities, head of domestic bonds and chief investment officer in the period January 1994 to June 2001. The literature concerning U.S. mutual funds indicates performance is related to top management changes (for example, see Khorana (1996, 2001)). However, the extent to which the departure of a senior investment manager is related to performance remains an empirical question in the Australian literature. Top management changes in investment management firms may well occur in cases of both poor performance (prompted by significant cash outflows, ultimately affecting firm profitability) and superior performance (manager is 'poached' by a competitor or occurs due to inadequate compensation offered to the incumbent manager).[99]

One of the problems in analysing performance surrounding a change in top management is that such changes are rarely accompanied by an accurate disclosure of the exact reasons for the departure. The database compiled and used in this study included some cases where the company stated the reason behind the departure of key individuals and in others the departure was noted, however no explanation accompanied the disclosure. In all cases, the formally stated reason provided in the IFSA Questionnaires included politically sensitive descriptions such as 'personal interests', 'career opportunities', 'resigned', 'confidential', 'joined competitor', and 'restructure of group'. Other changes may arise due to the retirement of a key member or due to the acquisition of another investment management entity. However, from the descriptions provided by managers, it is extremely difficult to accurately identify whether the change was effected on the basis of performance issues alone (good and bad) or due to a combination of issues. Indeed, these problems also arise in other studies, notably Jensen and Murphy (1990) examining the turnover in CEOs, and Khorana (1996) in terms of changes in top mutual fund managers. While poor performance may well be the most likely factor contributing to a change in senior management (see Khorana (1996)), an analysis that decomposes performance

[99] Staff movements may also occur through internal promotions or changes in existing roles.

between the pre and post periods in terms of the real reasons underpinning a departure represents a very arduous task.

This section evaluates two questions related to top management changes. First, the analysis considers the effect on performance where changes in top management arise for Australian equities, bonds and diversified asset class sectors. Second, the study examines the possibility that performance is related to the length of tenure served by top management in the Australian equities asset class.

7.5.3.1 Pre and Post Top Management Changes

Analysis is performed at the aggregate fund manager level employing pre-and-post performance periods of six and twelve months given the departure of a senior staff member. Hypothetically, in cases of poor performance leading to the termination of a key investment member, the new appointee would be expected to implement changes to the existing portfolio, and in the short-term, *ceteris paribus*, performance is likely to be negatively impacted due to the restructure. However, after the portfolio has been reconfigured, the expectation would be that performance should have improved from the prior period. Performance is measured using equation (7.1) to calculate raw returns (or returns not adjusted for risk).

Table 7.9 presents the pre/post findings for both the six and twelve-month periods surrounding the departure of sector heads and chief investment officers. The results indicate that a change in Australian equities leadership increases performance in the subsequent 12-month period, however statistical significance prevents the general conclusion that personnel changes significantly improve performance. The departure of heads of Australian fixed interest indicates that performance further deteriorates in both six-and-twelve month periods after the appointment of a new sector head. Both periods are statistically significant at the 0.10 and 0.05 levels respectively. In terms of changes applicable to the general management of investments at the organisational level, a change in chief investment officer indicates that both the subsequent six and twelve month periods delivered investors with superior returns compared with the prior period.

Table 7.9 – Percentage monthly return difference (post period less pre period) in the Period January 1994 to June 2001

Panel A of this table provides summary statistics of departures of top management in Australian equities, Australian bonds and chief investment officer levels. Panel B evaluates the pre and post performance from the benchmark index using both 6 and 12-month evaluation periods.

	Head AEQ	**Head AFI**	**CIO**
Panel A: Descriptive Statistics			
Number of Departures in Period	44	16	39
Average Tenure to Departure (in years)	2.47	N/A#	2.01
Average Tenure in 7.5 Year Period (in years)	4.04	4.77	4.47
Panel B: Pre/Post Performance Analysis			
6 Month Pre/Post Period	-0.020	-0.059	0.121
t-stat	-0.23	-1.88*	1.78*
12 Month Pre/Post Period	0.084	-0.049	0.093
t-stat	0.82	-1.98**	1.92**

Small sample size of 2 top management personnel makes the average distorted, however the mean tenure of these fixed income senior managers is 6.33 years.
Significance levels evaluated at 0.10 (*) and 0.05 (**)

7.5.3.2 Tenure, Manager Service and Australian Equities Performance

Another empirical question surrounds the issue of whether performance is related to the length of time (years) served by senior investment professionals. Risk-averse investors may well prefer their investment managers to have longer rather than shorter tenure periods, *ceteris paribus*, as longer tenure is likely to indicate relative management stability, founded on a proven and disciplined investment process that has succeeded over a long period of time. Indeed, Golec (1996) examines the issue of tenure periods for U.S.

mutual fund managers and documents those managers with longer tenure earn higher returns.

Track record is also likely to be an important and desirable trait in the awarding of a new investment mandate by prospective clients. Given this preference by investors, coupled with Khorana's (2001) empirical findings that poor performance leads to asset outflow, higher turnover in senior management ranks should subsequently arise. The theory described above hypothesises investment performance being directly related to a senior manager's tenure period. The implicit assumption is that good performers are retained through appropriate remuneration policies for their superior management capabilities and that their compensation structure is suitably tied to future performance.[100] The theory also assumes the majority of turnover in top management is ultimately performance dependent.[101]

Cross-sectional regressions evaluating risk-adjusted performance and tenure periods for Australian equities sector heads are considered to determine the relationship between these two variables. Due to the limited sample size, analysis is restricted to Australian equities, which comprise the greatest number of staff movements.[102] Tenure period is measured as the number of months served in the role, after excluding both the month of the commencement and month of departure. The exclusion of starting and ending months helps to ensure complete months of service are counted.

[100] Whether performance is 'good' is likely to be determined by investors on the basis of both performance relative to the benchmark, as well as performance relative to a predetermined peer group of investment managers.
[101] The turnover of staff from Australian equities and Australian fixed income sector heads to promotion to Chief Investment Officer role in the incumbent firm is very small in the sample. In some of these cases, the sector head retained their sector responsibilities in conjunction with the CIO position.
[102] Combining all management changes for equities, bonds and balanced sectors was not performed in light of the performance differences in sectors noted earlier.

The results in Panel A of Table 7.10 account for all Australian equities directors in the 7.5-year period (irrespective of whether such individuals remained in their roles at the end of June 2001).

Table 7.10 – Cross-sectional Regression of Australian Equities Performance by Management Period

This table shows the results of a regression, where risk-adjusted performance is regressed on the number of months served in the role of Australian equities director. Panel A includes all management changes during the periods served within the 7.5 years to 30 June 2001. Panel B examines those top managers that both commence and terminate within the 7.5-year period to 30 June 2001.

	AEQ α_3	*t*-stat		AEQ β_3	*t*-stat	
Panel A: All Top Management Changes						
Constant	0.329	3.96	***	1.030	62.88	***
Independent Variable	-0.003	-1.70	*	-0.001	-2.23	**
R^2	0.054	-		0.090	-	
F-stat	-	2.88	*	-	4.96	**
Panel B: Management Changes According to Strict Tenure Periods						
Constant	0.268	2.19	**	1.027	34.40	***
Independent Variable	-0.002	-0.46		-0.001	-1.11	
R^2	0.012	-		0.068	-	
F-stat	-	0.21		-	1.23	

* Significant at 0.10 level
** Significant at 0.05 level
*** Significant at 0.01 level

The findings presented in Panel A suggest risk-adjusted performance is inversely related to the months tenure served in senior equity positions. This suggests Australian equities managers' performance declines as the length of time served in the position increases. In terms of systematic risk, Panel A indicates that managers serving longer periods as equities director exhibit significantly lower market risk. In other words, systematic risk for Australian equities directors is inversely related to the tenure period served. Where consideration is provided to equities directors that commence and leave within the observation period Table 7.10, Panel B), a more strict definition of service provides a similar negative relationship between tenure and performance as well as tenure and systematic risk. However, due to the earlier discussion of the limitations in sample size, the statistical tests are inconclusive. Further analysis is therefore warranted using an expanded data set, encompassing a longer period of evaluation. This is another area for future research.

7.5.4 Investment Performance, Strategy and Manager Characteristics

Chevalier and Ellison (1999b) consider the extent to which manager characteristics predict the cross-sectional distribution of returns derived by U.S. mutual funds. This is an important issue, as investors making future investment decisions are likely to consider all available information concerning the characteristics exhibited by investment managers and their likely ability to earn superior returns. This essay employs the same methodology to examine the predictive ability of manager characteristics, where investors rely on manager characteristics information in the period prior to making investment decisions.[103] Annual data are used and the measurement of variables is at calendar year end (i.e. 31 December). This study incorporates similar variables to Chevalier and Ellison (1999b), however there are some differences, which largely arise from data availability.

The data cover yearly periods from January 1994 to December 2000 for which investment manager information was available. Yearly evaluations were performed to minimise the potential of bias arising from changes in risk profiles of investment manager organisations (see Chevalier and Ellison (1999b). The quantitative data are measured as at the end of each calendar year in the period examined.

[103] The analysis recognises that investors make selection decisions using all available information, recognising that the future cannot be predicted with certainty.

The cross-sectional analysis considers the extent to which balanced (or multi-sector) fund performance is predictable using variables that account for investment manager characteristics and strategy. The determinants of investment performance (α) are considered using the regression model below:

$$\begin{aligned}\alpha_{pt} &= \gamma_0 + \gamma_{AST} AST_{t-1} + \gamma_{InsAge} INSAGE_{t-1} + \gamma_{Aeq} AEQ_{t-1} \\ &+ D_{Port} PORT_{t-1} + \gamma_{Edu} EDU_{t-1} + \gamma_{Exp} EXP_{t-1} + \gamma_{Loy} LOY_{t-1} + \varepsilon_{pt-1}\end{aligned} \tag{7.5}$$

Additional models are also considered when evaluating the relationship between manager characteristics, systematic risk (β) and management fees (MF) charged as follows:

$$\begin{aligned}\beta_{pt} &= \eta_0 + \eta_{AST} AST_{t-1} + \eta_{InsAge} INSAGE_{t-1} + \eta_{Aeq} AEQ_{t-1} \\ &+ D_{Port} PORT_{t-1} + \eta_{Edu} EDU_{t-1} + \eta_{Exp} EXP_{t-1} + \eta_{Loy} LOY_{t-1} + \varepsilon_{pt-1}\end{aligned} \tag{7.6}$$

$$\begin{aligned}MF_{pt} &= \pi_0 + \pi_{AST} AST_{t-1} + \pi_{InsAge} INSAGE_{t-1} + \pi_{Aeq} AEQ_{t-1} \\ &+ D_{Port} PORT_{t-1} + \pi_{Edu} EDU_{t-1} + \pi_{Exp} EXP_{t-1} + \pi_{Loy} LOY_{t-1} + \varepsilon_{pt-1}\end{aligned} \tag{7.7}$$

The independent variables evaluated are the natural logarithm of the institution's total assets (AST), the natural logarithm of the parent company's age (in years) (INSAGE), the strategic benchmark weight of balanced funds invested in the largest asset class sector (Australian equities (AEQ)), a dummy variable taking on the value of 1 if the predominant portfolio strategy is bottom-up stock selection (PORT), the educational years study at tertiary institutions (EDU), the average years experience of senior and non-senior managers at the firm level (EXPS and EXPO respectively), and the average years of loyalty (or tenure) of senior and other staff at the firm-wide level (LOYS and LOYO).[104]

This section evaluates risk-adjusted performance, systematic risk and management expenses with respect to a set of investment management characteristics information for investment companies. The results are presented in Table 7.11, and discussed in sections 7.5.4.1 to 7.5.4.3. An analysis of investment strategy and performance for Australian equities and Australian bond managers is outlined in section 7.5.4.4.

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[104] An evaluation of the potential econometric problems associated with multicollinearity was considered. The correlation matrix, presented in Appendix 4, indicates most variables have low correlations, and according to Gujarati (1995) (p.335), these do not appear to be problematic.

Table 7.11 – Aggregate Manager Characteristics, Strategy and Performance (Diversified Funds) in the Period January 1994 – December 2000

The evaluation of manager performance, risk and expenses are regressed on a number of manager attribute and strategy variables in the period January 1994 to December 2000. The observations employed in the analysis are in years. Performance is measured as the risk-adjusted excess return (α) per month over calendar year periods. Where alpha is the dependent variable, the statistical significance of the parameter estimates is determined using heteroskedastic-adjusted standard errors. Beta (β) and Management Fee (MF) models are also evaluated using Newey-West consistent standard errors. Management fees (MF) are estimated with respect to the annual expense ratio applicable in the calendar year for a $A50 million portfolio.

	Alpha (α)			**Beta (β)**			**Management Fees (MF)**		
Variables	**Coefficient**	***t*-stat**		**Coefficient**	***t*-stat**		**Coefficient**	***t*-stat**	
Constant	0.916	1.55		1.072	2.60	**	-0.158	-0.89	
Log of Assets (AST)	-0.029	-1.05		0.022	1.56		-0.001	-0.13	
Log of Institution's Age (INSAGE)	-0.040	-2.25	**	0.039	2.92	***	0.008	1.54	
Australian Equities Benchmark Allocation (AEQ)	0.005	0.65		-0.004	-0.64		0.009	3.25	***
Portfolio Strategy Dummy (PORT)	0.096	2.88	***	-0.105	-2.99	***	-0.162	-10.01	***
Educational Years (EDU)	-0.183	-1.43		0.016	0.36		0.100	4.27	***
Senior Manager Experience (EXPS)	0.003	0.46		0.001	0.18		0.005	1.94	*
Other Manager Experience (EXPO)	0.010	0.95		-0.017	-1.59		0.008	1.72	*
Senior Manager Loyalty (LOYS)	-0.007	-0.86		-0.010	-1.70	*	-0.001	-0.40	
Other Manager Loyalty (LOYO)	-0.029	-2.66	***	0.006	0.64		0.005	2.07	**
R^2 (Adjusted)	0.066	-		0.063	-		0.492	-	
F-statistic	-	1.67	*	-	1.66	*	-	10.48	***

* Significant at 0.10 level
** Significant at 0.05 level
*** Significant at 0.01 level

7.5.4.1 Risk-Adjusted Performance and Manager Characteristics

With respect to risk-adjusted returns, the diversified portfolio performance of Australian investment managers is significantly negatively related to the institution's age (INSAGE), significantly positively related to bottom-up (rather than top-down) investment strategies (PORT) and significantly negatively dependent on the loyalty of money management staff who do not comprise the senior levels of the organization's hierarchy (LOYO).

The negative relation between performance and an institution's age (INSAGE) may be related to the ownership structure of the firm, where more recently formed boutique's with a higher degree of equity ownership exhibit higher incentives related to performance compared to older and more potentially bureaucratic firms. The culture exhibited by a younger firm may also be associated with smaller teams of individuals, a flatter hierarchical structure, improved efficiencies and an increasing willingness to take on new challenges and refine existing processes with enthusiasm and drive.

Bottom-up portfolio strategies outperform top-down strategies (PORT), and this finding may occur given the very nature of the process' first priority involving a rigorous examination of an individual stock's fundamentals, such as balance sheet, profit and loss statement and cash flows, combined with the strategic direction of the corporation over the medium to long term. Such an approach, based on the empirical findings, has significant performance advantages over a top-down strategy.

In terms of the loyalty of non-senior staff (LOYO) (which comprise the substantial majority of an investment firm's human capital), the results imply that performance is inversely related to loyalty. This may be explained in two ways. First, the more successful investment managers may be more willing to recruit talented individuals from competitor firms, which in turn causes the average loyalty of 'emerging' senior professionals to be relatively lower. In turn, the inclusion of these new staff delivers superior performance in the following year. This may also infer that new employees are pro-active and determined to succeed in their new roles. Second, fund managers exhibiting relatively higher levels of loyalty among non-senior personnel may indicate that senior staffs are less willing to discipline poor performance, career progression to senior levels is more difficult, or the firm's recruitment at non-senior levels is less active (thereby forgoing the opportunity of integrating new staff, who in turn contribute new ideas to current processes and improve synergies).

The insignificant coefficients on educational years (EDU) and experience (EXPS and EXPO) suggest the measure of quality, aptitude or track record of staff cannot be used to distinguish between superior and inferior performance of investment managers. This result indicates that education levels and experience are relatively homogenous across institutions or are inappropriate proxies of manager skill. An alternative explanation for the insignificant coefficient on EDU is that educational years alone may not represent the most accurate proxy of a manager's intellectual aptitude. Risk-adjusted performance is also shown to be unrelated to the benchmark allocation of managers to the largest asset class component of diversified funds, namely Australian equities (AEQ). This is surprising, particularly in light of the relative success that a substantial number of actively domestic equity managers in earning superior risk-adjusted returns. In the end, it may well be that due to the cross-sectional strength of managers in this sector, and it's dominance over all other sector allocations, differential aggregate performance cannot be easily distinguished across the group of managers. The results also indicate that the institutional investment manager's asset size (AST) does not serve as a useful predictor of performance.

The empirical findings presented in this essay are in some ways unique when comparing performance with the U.S. evidence of Golec (1996) and Chevalier and Ellison (1999b). This is mainly due to the differences in the analyses. This essay involves slightly different measurement methods for the variables, and in some cases unique variables, as well as the investment manager characteristics data being aggregated from across the company (i.e. compiled using all money management individuals employed by the asset management firm). This is in comparison to both U.S. studies that analyse performance and characteristics from a more individualistic mutual fund level (where either one of a few individuals are responsible for an individual mutual fund). In terms of α, this essay does not identify education (EDU) as being a useful predictor of superior performance across managers, whereas Golec (1996) and Chevalier and Ellison (1999b) both find strong evidence that younger managers with M.B.A.'s from higher SAT schools earn superior returns. While the analysis presented in this essay does not allow for tests of individual's performances based on their educational qualifications, the aggregation, measurement as well as the inability of the EDU variable to differentiate across university institutions does not provide useful information in predicting performance. As discussed previously, inferring 'quality' in an institution's stock of human capital using aggregate data may inhibit inferences being made and therefore may not allow confirmation of the findings of Golec (1996) and Chevalier and Ellison (1999b). Interestingly, tenure (loyalty) is significantly negatively related to α for the non-senior manager category (LOYO). While LOYO and LOYS are controlled for separately, Golec (1996) finds tenure is significantly positively related to alpha, whereas Chevalier and Ellison (1999b) report a positive coefficient that is not significant at standard confidence intervals. While this difference at the first instance is perplexing, the contradiction is likely to be attributable to the variables' measurement.

7.5.4.2 Systematic Risk and Manager Characteristics

Regressions are also performed to determine the relationship between aggregate manager characteristics and strategy with respect to the systematic risk of managers' performance and the investment expenses charged (models 7.6 and 7.7, respectively). The analysis for risk and expenses employs Newey-West adjusted standard errors, as the expectation is the residuals of the model will be affected by serial correlation. Chevalier and Ellison (1999b) find evidence of managers with longer tenure as well as those managers without M.B.A.s exhibit significantly lower betas. In terms of systematic risk, Table 7.11 indicates that older institutions exhibit significantly higher systematic risk than younger institutions. This result may be related to the lower performance levels achieved by investment firms with greater longevity, who may take on higher systematic risk to improve poor past performance. Alternatively, senior management loyalty (or tenure) is significantly negatively related to risk, and is more comparable to the U.S. results of Golec (1996). This finding suggests managers mitigate exposing their portfolios to higher risks due to perceived difficulties in future employment prospects or damage to reputation, as senior staff are likely to be perceived as exhibiting greater responsibility for the institution's performance outcomes. Chevalier and Ellison's (1999b) results with respect to tenure and systematic risk also appear consistent with this essay's findings.

Table 7.11 also reports systematic beta risk as being negative and statistically significant, implying that beta is significantly lower for portfolio managers that emphasise bottom-up strategies. Bottom-up managers, by definition, will construct portfolios with greater attention to an individual asset's qualities and fundamentals, rather than setting macro-level goals attached to the sector weights and subsequently identifying the best combinations of assets within those asset classes. The evidence also suggests that bottom-up managers may provide closer attention to the actual portfolio's security weights (relative to the appropriate market benchmarks), and hold more securities in their portfolios such that systematic risk is minimised.

In terms of education (EDU), the Australian findings in relation to risk do not corroborate the U.S. evidence. Golec (1996) and Chevalier and Ellison (1999b) both report evidence of educated managers with M.B.A. degrees as exhibiting significantly higher β risk, due in part to their tuition reinforcing that only beta risk is compensated and not residual risk (i.e. unsystematic risk, measured as the standard deviation of the residuals of portfolio returns). While the results in Table 7.11 appear consistent with the U.S. evidence, indicating managers with higher levels of educational participation exhibit higher systematic risk, the coefficient is not significantly different from zero at standard confidence levels.

7.5.4.3 Expenses and Manager Characteristics

In terms of investment charges, Chevalier and Ellison (1999b) report that managers from higher-SAT institutions have significantly lower expenses and turnover, as well as managing significantly larger funds. In this study, Table 7.11 indicates expenses are not significantly related to a manager's aggregate asset size. This result is likely to be explained due to the use of aggregate funds under management for each investment manager as well as providing consideration to the fact that the Australian investment management industry is highly concentrated (and dominated) by asset managers actually comprising the study. Accordingly, the low variability in assets under management does not yield a statistically significant point estimate. However Table 7.11 shows that management fees are significantly higher for managers with larger Australian equities benchmark allocation exposures, managers whose investment in educational years is higher as well as being directly related to experience (senior and other) and loyalty (other).

W.M. Mercer surveys of expenses indicate that active equity mandates have the highest fees of all asset classes, so these findings concerning Australian equities benchmark allocations and expenses should be expected. Golec (1996) also reports a significantly positive relationship between expenses and years of education, which is consistent with human capital theory. The significance of experienced professionals suggests fund managers levy a premium on their management fees according to the stability of their investment team. The results also indicate managers who emphasise bottom-up portfolio strategies charge significantly lower management expenses and fees are directly related to the years of loyal service provided by non-senior staff.

7.5.4.4 Investment Strategy and Performance

This study also evaluates the predominant investment strategies employed by active investment managers in the Australian equities and Australian bonds sectors. This section evaluates these two sectors using data provided by the investment managers to determine the extent to which performance is related to specific investment strategies. Manager performance is considered using monthly data over calendar year periods, consistent with Chevalier and Ellison (1999b). Performance is measured using α_1 (fixed income) and α_3 (Australian equities) for which each manager has specified qualitative information over the relevant periods. The data can be applied to analyse managers across the entire period, except where there have been changes in the investment policy during the evaluation period. Where such changes were indicated within the questionnaires, the analysis evaluates performance in a manner consistent with the manager's change of strategy.

In Australian equities, investment strategy is generally identified as follows. Performance is evaluated with respect to a finer partitioning of the importance of the major components in the manager's portfolio strategy and the factors expected to contribute to performance. The variables identified in terms of strategy are – ‘valuation’, ‘past growth history’, ‘projected growth’, ‘technical analysis’, ‘quality management’, ‘quantitative methods’, and ‘index weights of stocks’. The components expected to contribute to performance in Australian equities are identified as ‘market segments’, ‘industry and sector selection’, ‘factor tilts’, and ‘stock selection’. Investment managers attribute percentage weights to identify how strongly each component (if appropriate) contributes towards the implementation of their unique strategy. In terms of Australian bonds, investment managers also identify factors expected to deliver performance as well as the significance of each component. These components for bonds are as follows: ‘duration’, ‘yield-curve/maturity’, ‘issue selection’, ‘arbitrage-oriented’ and ‘technical analysis’.

Analysis is performed to determine the extent to which performance is related to specific factors cited by fund managers in achieving risk-adjusted returns. The data provided by the fund managers include the expected drivers of performance for both Australian shares and bonds as well as more specific investment strategy information for the Australian equities asset class. Investment managers indicate the relative importance of specific factors used in the portfolio management process by reporting the percentage weighting given to each factor. Where the investment manager does not rely on a factor, a zero percentage weighting applies. The purpose of the analysis is to determine the relative importance of each cited component in the derivation of performance across Australian portfolio managers. This methodology helps to standardise the respective factors across managers and to identify the importance of each factor in their decision making process. Alpha and systematic risk by manager is then sorted according to whether each component of the manager’s strategy is ranked above or below the median manager. This process then allows evaluation in terms of whether the manager places either lower or higher emphasis on each of the specific strategies. The results are presented in Table 7.12.

The results suggest risk-adjusted performance for Australian equities managers is significantly higher where managers place greater emphasis on the past earnings growth history of listed securities, as well as placing higher importance on index weights of stocks comprising the benchmark. While not directly reported, investment managers emphasising growth strategies in Australian equities outperformed managers that implemented other styles in the period examined.

Systematic risk is significantly higher where investment managers emphasise technical analysis, quantitative methods and market segmentation between industrials, resources, large and small capitalisation stocks. Australian bond managers exhibited significantly higher systematic risk where greater emphasis was placed on duration management. Beta was also significantly higher for managers indicating higher preference for yield-curve management.

Overall, managers were well diversified across a number of Australian equities strategies, however duration management in domestic bonds was the single most important strategy identified. Future research should investigate further the extent to which investment managers' surveyed responses accurately reflect their portfolio strategies and their relative contribution to active performance.

Table 7.12 – Investment Strategy and Performance for Active Australian Equities and Australian Bond Managers in the Period January 1994 to December 2000

This table presents the performance differences across investment strategies in actively managed domestic equities and domestic bonds. Alpha (BM) and Beta (BM) represents the average portfolio of fund manager's risk-adjusted returns and systematic risk, respectively, where the manager's weight of importance attached to the specific investment strategy is below the median manager's weight of importance. The converse is the case for managers who are above median, denoted Alpha (AM) and Beta (AM). Risk-adjusted performance is reported before expenses and tax on a monthly basis in percentage terms.

	Alpha					Beta				
Management Strategies	**AM**	**BM**	**AM-BM**	***t*-stat**		**AM**	**BM**	**AM-BM**	***t*-stat**	
Panel A: Australian Equities										
Valuation	0.105	0.214	-0.109	-1.57		0.961	0.988	-0.027	-1.36	
Past Growth History	0.223	0.067	0.156	2.11	**	0.970	0.981	-0.011	-0.52	
Projected Growth	0.191	0.127	0.064	0.92		0.971	0.978	-0.007	-0.36	
Technical Analysis	0.270	0.152	0.118	1.07		1.045	0.970	0.075	2.72	***
Management Quality	0.179	0.114	0.065	0.71		0.973	0.978	-0.005	-0.20	
Quantitative Methods	0.173	0.145	0.028	0.39		0.991	0.956	0.035	1.72	*
Index Weights	0.229	0.106	0.123	1.81	*	0.975	0.974	0.001	0.06	
Market Segment	0.209	0.117	0.092	1.33		0.993	0.950	0.043	2.18	**
Industry and Sector Selection	0.169	0.146	0.023	0.31		0.972	0.967	0.005	0.23	
Factor Tilts	0.147	0.174	-0.027	-0.36		0.960	0.984	-0.024	-1.12	
Stock Selection	0.192	0.123	0.069	0.97		0.971	0.969	0.002	0.08	
Panel B: Australian Bonds										
Duration	0.027	0.031	-0.004	-0.31		0.997	0.949	0.048	2.21	**
Yield Curve/Maturity	0.037	0.020	0.017	1.30		0.956	0.999	-0.043	-2.14	**
Sector Selection	0.032	0.025	0.007	0.52		0.991	0.963	0.028	1.37	
Issue Selection	0.025	0.034	-0.009	-0.55		0.981	0.974	0.007	0.30	
Arbitrage	0.035	0.024	0.011	0.71		0.975	0.980	-0.005	-0.24	

* Significant at 0.10 level
** Significant at 0.05 level
*** Significant at 0.01 level

7.6 Conclusion and Suggestions For Future Research

This essay examines the performance of active Australian investment managers, the performance of senior investment personnel by tenure period, and the relationship between risk-adjusted returns and fund manager characteristics for institutional balanced (or diversified asset class) funds.

In terms of investment manager attributes, performance of balanced funds is negatively related to the institution's age and the loyalty of non-senior investment staff. Performance is also found to be significantly higher for managers that predominantly operate their portfolios using a bottom-up, stock selection approach. Interestingly, the human capital of managers, measured as the years of tertiary education undertaken, does not explain risk-adjusted excess returns. Systematic risk is positively related to an institution's age while negatively related to both senior manager loyalty and the implementation of bottom-up portfolio management strategies. In terms of management expenses, fees are directly related to the benchmark allocation to Australian equities, the years of tertiary education, the number of years service (loyalty) for non-senior investment professionals and the total years experience of senior money managers. While this research is the first Australian empirical study, further investigation should be performed using a longer time period, larger sample and more explanatory variables in an attempt to provide further evidence on the attributes that predict fund manager performance.

This study finds that changes in top management have significant performance effects. In the 12-month period after a change in fixed income director and chief investment officer, performance is significantly lower and significantly higher, respectively. There is no significant difference in performance where top management changes occur for Australian equities. The years of service provided to asset management firms by equities directors is inversely related to risk-adjusted return.

Perhaps the most perplexing issue identified in this study is the success of a large proportion of active Australian equity managers that earned superior risk-adjusted excess returns in the period. This finding is consistent with Joye (1999) in the Australian institutional market as well as other U.S. studies, notably Daniel *et al.* (1997) and Wermers (2000). Research is currently under way in terms of providing an explanation for this apparent contradiction to the majority of managed fund studies in the literature.

There are a number of avenues for future research. These include an analysis of additional factors beyond absolute or relative performance that influence the termination or resignation of senior investment staff using a larger sample of data over a longer time period. Khorana (1996) indicates that replacement of mutual fund managers is indeed predictable based on past performance, however Australian evidence is non-existent. Khorana (2001) also identifies asset inflows being an important determinant of manager replacement, representing the means by which investors exercise their role in the managerial decision process. Such analysis in an Australian context is therefore warranted.

The Australian literature should also consider the influence of compensation arrangements and their role in rewarding performance and retaining staff. While all managers in this study exhibit various profit-sharing agreements and/or incentive structures (in addition to base-level remuneration), analysis of the structure of such agreements and their relation to investment performance and risk is an important research issue. The author is currently examining this issue.

8

CHAPTER 8 – THE PERFORMANCE OF ACTIVELY MANAGED AUSTRALIAN BOND FUNDS

8.1 Introduction

The performance evaluation literature concerning managed funds has been extensively addressed internationally, where the empirical evidence widely documents the inability of active funds to outperform market indices (Jensen (1968), Cumby and Glen (1990), Elton *et al.* (1993), Malkiel (1995), Gruber (1996), Cai *et al*. (1997), Blake and Timmerman (1998), Blake *et al.* (1999)). Australian research supports the international evidence (Bird, *et al.* (1983), Robson (1986), Hallahan and Faff (1999), Sawicki and Ong (2000)). However, almost all of the empirical research conducted internationally has investigated the investment performance of equity funds or funds that invest in diversified portfolios comprising both equity and non-equity securities.

In Australia, published research concerning the investment performance of domestic bond funds is largely non-existent. While Hallahan (1999) investigates performance persistence of rollover funds in Australia (including fixed interest funds), investment performance measurement was not the objective of the study. This gap in the Australian literature is surprising, given that Australian bond securities managed by investment managers, either as specialist vehicles or as part of balanced or multi-sector funds, represented more than $A110 billion or around 20 per cent of total assets under management at 30 September 1999.[105] This represents the second largest of all asset classes managed by institutional fund managers in Australia. Given the fixed interest sector's size as a proportion of the total market and the absence of empirical investigation, this study fills a gap in the performance evaluation literature through the analysis of actively managed domestic bond funds. The study also provides a performance comparison between the two segments of the funds management market in the Australian bonds sector – actively managed institutional and retail products.

The handful of studies which have evaluated the performance of bond mutual funds appears to be largely confined to the U.S., where research concludes that active funds do not outperform passive benchmarks (Blake *et al.* (1993), Elton *et al.* (1995)). Cornell and Green (1991) investigate the performance of high-yield U.S. bond funds and find no evidence of significant performance differences between high-grade and low-grade funds. However evidence presented by Blume and Keim (1987) and Blume *et al.* (1991) indicates that lower grade bond portfolios earn higher returns than portfolios of higher investment grade, even after accounting for risk. Detzler (1999) evaluates the performance of active global bond mutual funds and finds no support of superior fund performance net of expenses against a wide range of benchmarks.

This study evaluates the performance of active Australian bond funds using both unconditional and conditional approaches. Ferson and Schadt (1996) argue that the use of the traditional or unconditional performance evaluation techniques can lead to performance measurement biases which arise due to common time variation in managed fund risks and risk premia. With the exception of Sawicki and Ong (2000), all published Australian

[105] Rainmaker Information Services. In correspondence with a number of the managers and William M. Mercer Pty. Ltd., these sources indicated that active bond fund management was the predominant strategy adopted by domestic fixed interest managers.

studies have relied on the use of unconditional performance evaluation methods, while in the U.S. and other international markets the conditional performance approach has not been extended to bond funds. Accordingly, this study provides an indication of the level of potential bias existing between unconditional and conditional methods for active bond funds. The conditional methodology incorporates public information variables in addition to the naive benchmark (market) proxy to provide more accurate inferences concerning the magnitude of abnormal returns – that is returns earned beyond information that is widely available to the public. In the U.S., Fama and French (1992, 1993) found that two factors explained the variation in bond returns, namely default risk and maturity. Elton *et al.* (1995) evaluate the performance of relative asset pricing models for bond portfolios to help determine the factors exhibiting the greatest influence on returns. They find that bond fund returns are best explained by return indices and fundamental economic variables, namely inflation and economic growth. An innovation also used in the Elton *et al.* (1995) study is the employment of expectations data that capture unexpected changes in macroeconomic variables. However, Ferson and Harvey (1999) caution the use of the Fama and French (1993) and Elton *et al.* (1995) models where no attempt is made to control for systematic patterns in risk and expected return.

This study also provides evidence concerning the influence of fund flow volumes on active portfolio performance for Australian retail funds. The literature concerning the impact of fund flow on performance is non-existent in the Australian literature and limited in the U.S.[106] Edelen (1999) argues that where an active manager, trading in a market in informational equilibrium, experiences an exogenous fund flow shock that is material, underperformance cannot be avoided. Indeed, Edelen (1999) documents that where

[106] Sawicki (2000) evaluates the relation between fund flow and past performance, however the focus of the study does not assess the impact of flow on performance. Other international studies evaluating fund flows and performance include Warther (1995), Ferson and Schadt (1996), Edelen and Warner (1998).

performance measurement techniques are applied to open-ended funds that ignore the level of uninformed, liquidity-motivated trading activity, security selection and market timing estimates will be adversely affected. Edelen (1999) shows that funds' negative market timing estimates based on traditional performance measures are completely attributable to fund flow. However, where the relative magnitude of the liquidity shock each fund experiences is small, it may be argued that the negative impact on active returns could be negligible. From an empirical perspective, this study considers the extent to which active bond fund performance, conditioned on publicly available information and fund flow, improves inferences in performance measurement.

The remainder of this study is structured as follows. Section 8.2 outlines the methodology used in measuring investment performance for Australian bond funds. Section 8.3 describes the data used in the analysis. Section 8.4 provides a discussion of the empirical results. The final section concludes the research.

8.2 Methodology

8.2.1 Performance Measurement – Unconditional Measures

The CAPM-based approach, where risk-adjusted abnormal performance is measured following the seminal work of Jensen (1968), has been used extensively in the performance evaluation literature. Jensen's alpha, capturing the abnormal excess return of active funds, is estimated using ordinary least squares regression, where an active fund's return in excess of the risk-free rate is regressed on the excess return of the market proxy portfolio.

The standard excess returns market model regression is therefore expressed as follows:

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \varepsilon_{pt} \tag{8.1}$$

where:

R_{pt} = the return of fund p in period t in excess of the risk-free rate;

α_p = the unconditional risk-adjusted excess return of fund p in the period;

β_p = systematic risk of the fund, measuring the sensitivity of the excess return of fund p to the excess return on the Index;

R_{bt} = the return on the market portfolio in period t in excess of the risk-free rate; and

ε_{pt} = the residual return of fund p in period t not accounted for by the model.

The Jensen (1968) approach, however, does not consider an active investment manager's attempts to outperform the market portfolio through the use of 'timing' strategies. Treynor and Mazuy (1966) proposed the use of a quadratic term in addition to (8.1), arguing that funds with market timing ability will hold a greater (smaller) proportion of their portfolios in the market portfolio of risky assets when they expect the market to rise (fall). This attribution model decomposes active performance into either security selection or market timing ability. The intercept term in the Treynor-Mazuy model captures abnormal excess returns attributable to stock selection skill only and successful market timing exists where the coefficient γ is significantly positive:

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \gamma_p R_{bt}^2 + \varepsilon_{pt} \tag{8.2}$$

8.2.2 Performance Measurement – Conditional Measures

Ferson and Schadt (1996) propose the use of conditional performance evaluation methods given that the unconditional approach assumes that risks and risk premia remain constant over time. They argue the failure to account for the time variation in risks and returns may lead to biases in the evaluation of investment performance. Indeed, Ferson and Schadt (1996) and Becker *et al.* (1999) find supporting evidence of negative Jensen alphas more often when an unconditional approach is adopted relative to a conditional methodology. In semi-strong form efficient capital markets, security prices fully reflect all publicly available price sensitive information. However, Ferson and Schadt (1996) argue that the traditional CAPM-based approach ignores the role of publicly available information used in the portfolio management process. Indeed, Becker *et al.* (1999) argue that the role of conditional models is to account for the potential predictability in future market returns given the existence of publicly available information. In other words, active managers should not be attributed with superior performance as a result of exploiting publicly known market anomalies. Where a portfolio manager incorporates public information within the investment strategy, unconditional models may indicate the fund exhibiting superior risk-adjusted performance when in actual fact none exists. Therefore a potential bias may exist when traditional performance models are used.

The conditional approach involves an extension to the traditional Jensen (1968) model where a vector of lagged public information variables is incorporated to estimate alpha that is conditional on the public information they possess. In other words δ_p are the response coefficients of the conditional beta (or incremental changes in beta) for all lagged public information variables (i.e. Z_{t-1}). In the measurement of conditional betas using the regression model (8.3), the excess market return must first be multiplied by each lagged public information variable.

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \delta_p (R_{bt} x Z_{t-1}) + \varepsilon_{pt} \tag{8.3}$$

where:

α_p = the conditional estimate of risk-adjusted performance;

Z_{t-1} = the vector of public information variables lagged one period;

δ_p = measures the response coefficients of conditional beta with respect to lagged public information variables.

Ferson and Schadt (1996) measure conditional alpha for mutual funds (primarily funds invested in equity assets) using the following lagged public information variables – treasury note yield, dividend yield, term structure of interest rates, a corporate quality yield spread and a dummy variable for the month of January. Sawicki and Ong (2000) employ the Ferson and Schadt (1996) approach (excluding the corporate quality yield spread variable) to assess the conditional performance of active Australian equities and active balanced funds. There have been a number of empirical studies investigating factors that explain stock returns, for example, Chen *et al.* (1986) and Fama and French (1993). Elton *et al.* (1995) argue that the same factors explaining equity returns should also be important factors driving bond returns. In separate regressions (not reported), we evaluated empirically the extent to which the returns derived in the Australian bond market (proxied by the Warburg Dillon Read Composite Bond Index) were explained by the factors documented by Sawicki and Ong (2000). The model also accounted for the Australian equity market (proxied by the ASX All Ordinaries Accumulation Index) as a broader measure of economic activity. The results indicated that the equity return was the most important and significant determinant of bond returns.

Accordingly, this study estimates conditional alpha for active Australian bond funds employing two conditional models. First, the conditional model in (8.3) incorporates all lagged public information variables used by Sawicki and Ong (2000), namely dividend yield, treasury note yield, term structure of interest rates and a January conditional variable. Second, the conditional model in (8.3) estimated conditional performance using all variables in Sawicki and Ong (2000), with the exception of dividend yield, which was replaced by another conditional variable, namely the returns on the All Ordinaries Index, as a broader proxy for industrial production and corporate profitability.[107] This equity return variable, measuring domestic economic conditions, was empirically found to have significant explanatory power for bond returns in Australia whereas dividend yield was not as strong an explanatory variable. Therefore, the substitution of the economic conditions variable and the dividend yield variable was used to assess the variability in estimated conditional bond fund performance. While the January anomaly has been extensively documented in stock returns, a number of studies find supporting evidence of a January seasonal in the corporate bond market (Chang and Pinegar (1986), Chang and Huang (1990), Fama and French (1993) and Maxwell (1998)). Accordingly, a dummy variable for January is included within the models as a public information variable.

Equation (8.3) may be considered an unconditional multi-factor model, where the first factor is the market return in excess of the risk-free rate and the additional factors represent the product of the lagged public information variables and the excess market

[107] Ferson and Schadt (1996) measure corporate quality variable as the difference between high-yield or low-grade corporate bonds (BAA-rated by Moody's) and AAA rated bonds. Australia does not have an established high-yield market in corporate bonds, therefore the variable is excluded from the analysis. This is also consistent with Sawicki and Ong (2000).

return. Consistent with Ferson and Schadt (1996), heteroskedasticity-consistent *t*-statistics are calculated for analyses where market timing is considered. The conditional performance evaluation method incorporating market timing is an extension of (8.3) and is estimated as follows:

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \delta_p (R_{bt} x Z_{t-1}) + \gamma_p R_{bt}^2 + \varepsilon_{pt} \qquad (8.4)$$

8.2.3 Fund Flows and Performance

Fund flows and their influence on managed fund performance is an emerging area in the literature. Two important reasons behind the increasing focus of fund flow activity are (1) obtaining improved measures of active fund performance with respect to the liquidity service provided to clients of managed funds and (2) solving the puzzle of why a negative covariance exists between fund betas and market returns (see Ferson and Schadt (1996) and Sawicki and Ong (2000)). This negative covariance implies that investment managers reduce (increase) their market betas despite the available public information predicting high (low) expected returns.

In terms of the provision of client-driven liquidity, Edelen (1999) shows that active fund performance for open-end U.S. mutual funds is adversely affected due to the fact investment managers engage in uninformed, liquidity-motivated trading. Edelen (1999) further documents that perverse market timing ability derived from unconditional models can be attributed to the liquidity function these managers provide mutual fund investors. Edelen's (1999) argument follows from the analysis of Warther (1995), who demonstrates a strong positive correlation between monthly aggregate fund flow and market returns. Indeed, Edelen and Warner (2001) also document a strong positive relationship using daily data, providing further evidence of a negative market timing effect. Becker *et al.* (1999)

also postulates that the exogenous liquidity shocks experienced by funds may lead to inaccurate conclusions being made concerning a mutual fund's true market timing ability when the liquidity effect is not accounted for in performance models.

Ferson and Schadt (1996) hypothesise that the negative covariance between fund betas and market returns may be driven by new money flows into mutual funds. The hypothesis here is that new money flows occurs when managed fund investors expect future market returns to be high. Where the manager subsequently experiences a delay in investing the new inflow, the higher cash level within the portfolio causes a reduction in the fund's beta. The extent to which new money flows reduce fund betas depends on the size of the inflow relative to the fund's total assets. An alternative explanation cited by Ferson and Schadt (1996) may be due to the variability in asset betas from the underlying securities comprising the fund manager's portfolio or changes in the weights of the securities in the fund. Sawicki and Ong (2000) also proposition both of these possibilities.

This study considers the extent to which the liquidity service provided to retail investors influences the performance estimates. Fund flow data for the institutional sample were not available. Flow-adjusted performance for the retail sample is evaluated using both unconditional and conditional performance evaluation techniques. Edelen's (1999) analysis incorporates gross fund flows. This study employs net fund flows due to the unavailability of gross flow data. However, while gross flows capture the entirety of fund flow activity, the use of net flows may not be problematic, as inflows and outflows may be 'crossed' with unit holders either buying or redeeming their managed fund units, meaning that the manager is not required to engage in trading. Net flows will still provide important inferences in understanding how fund flow activity impacts on active bond fund managers. However, the potential for bias in the use of net flows is dependent on the frequency and magnitude of the flow relative to the total size of the fund. Therefore, there is a possibility that this study may understate the total effects of fund flow activity on investment performance.

An examination of net fund flows of retail bond funds reveals that such funds experience a significant volume of flow, measured as the absolute value of monthly net flow scaled by the funds' asset size at the beginning of each period (or normalised flow). After controlling for extreme flows (for example, those flows that occur around the early stages of a funds life), on average retail funds exhibit net flow volume per month equivalent to 6.58 percent of total fund assets. Considering that a fund's gross flows exceed net flows, flow volume would therefore be even more significant. Overall, the average fund, in net terms at least, experiences a material volume of flow in managing its active bond portfolios, and the extent to which flow impacts on performance is an empirical issue.

Net fund flows (NFF) are estimated from monthly bond fund asset values, where total fund assets (TFA) at period t minus total fund assets from the previous period $t-1$ (after the adjustment for the appreciation/depreciation in period t-1 due to fund performance). Net fund flows (NFF) can be expressed as follows:

$$NFF_{pt} = TFA_{pt} - [TFA_{pt-1}(1+R_{pt})] \tag{8.5}$$

Extending the unconditional model in (8.3) with an additional variable accounting for the link between fund flows and market timing, Edelen (1999) advocates the use of an interactive regressor to control for the effect of the volume of fund flow on market timing.

From (8.5), the volume of fund flows is scaled by the monthly fund size (SFF) and incorporated in unconditional and conditional models respectively:[108]

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \gamma_p R_{bt}^2 + \lambda_p (SFF_{pt}) R_{bt}^2 + \varepsilon_{pt} \qquad (8.6)$$

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \delta_p (R_{bt} x Z_{t-1}) + \gamma_p R_{bt}^2 + \lambda_p (SFF_{pt}) R_{bt}^2 + \varepsilon_{pt} \qquad (8.7)$$

The additional flow variable assists in differentiating an active fund's true market timing ability from the uninformed, liquidity-motivated trading function that funds are required to perform. Hence, if fund flow is adversely captured in the timing coefficient of (8.3) and (8.4), the expectation is that (8.6) and (8.7) would document an improved timing coefficient coupled with a negative coefficient on the interactive flow term. If this is the case, then the interactive regressor accounts for the negative timing induced on funds arising from the flow they experience.[109]

8.3 Data

8.3.1 Active Australian Bond Fund Data

This study incorporates monthly returns for 66 institutional and 77 retail Australian open-end active bond funds in existence within the 10-year period to 30 September 1999.

[108] At the beginning of a fund's life, usually within the period of the first six months, extreme or abnormal fund flows (as a proportion of the fund's total assets) may arise due to significantly rapid asset growth. We omitted fund flows that exceeded 75 percent of a bond fund's asset size to avoid potential bias in the analysis. In all, extreme values only affected 15 funds in the sample group and of these, only around 3% of fund observations required omission.

[109] In addition, this paper also accounts for the potential problem of reverse-causality bias by lagging flow one period. This adjustment accounts for the possibility that fund returns are correlated with flow. The results were consistent with those presented in Section 4. For further information, see Warther (1995) and Edelen (1999).

The study does not evaluate the performance of passively managed bond index funds. While index funds should earn returns in line with the underlying index, the number of index-oriented bond funds available to Australian investors is small and these funds do not have long performance histories, therefore this study focuses on active bond funds only. The average institutional and retail fund's age is 7.5 years and 6.1 years respectively.

The combined market value of assets of the sample of actively managed institutional and retail bond funds at 30 September 1999 was in excess of $A20 billion and $A1.6 billion respectively. Australian bond funds invest in Australian fixed interest securities including CGB, SGB and corporate bonds. The investment managers indicated to us that the WDRCBI is the most widely cited index referenced by domestic fixed interest portfolio managers and that this index is considered to be the most appropriate market proxy with which to evaluate active bond fund performance. This is confirmed in the single index model regressions (equation 8.1) showing high R^2 in Table 8.3a. Given this information, active bond managers would attempt to add value above the benchmark through active bets relative to the index, in terms of duration management and security selection (i.e. under or overweighting the component issues of the WDRCBI).

The institutional fund performance data were obtained from William M. Mercer Pty. Ltd. and Towers Perrin Australia. The retail fixed interest fund returns data were obtained from ASSIRT and include domestic bond funds classified as retail trusts, retail superannuation and allocated pension funds. Net fund flow data for retail funds are estimated using monthly data provided by ASSIRT. Fund flow data from Mercer and Towers Perrin was not available for the institutional bond fund sample; hence the fund flow analysis is limited to retail bond funds. Returns are calculated as the total return to investors arising from changes in capital value and income derived from portfolio assets.

Performance is reported before investment management fees for the institutional sample and post fees for the retail sample.[110] The study evaluates performance for all funds in existence within the 10-year period to 30 September 1999, including an evaluation of non-surviving funds for the wholesale bond fund sample. Funds were required to have a minimum of two years of performance data to help ensure estimates of risk-adjusted performance were not significantly influenced by the start-up phase of the fund as well as providing enough observations to incorporate in the individual fund regressions. The advantage of not applying strict limits on the basis of a fixed, long-term evaluation horizon (e.g. all funds requiring 10 years of data to be included in the sample) helps to ensure a broader cross-section of funds being captured in the performance evaluation period. Constraining the fund sample to only funds with sufficient longevity, as is the case in most managed fund performance studies, leaves the study open to potential selection biases. While the institutional bond fund dataset contains performance of funds that have closed, merged into other funds or ceased to exist entirely, the sample may contain a small, but unknown degree of survivorship bias.[111] The retail bond fund sample does not contain non-surviving funds. Studies including Brown *et al.* (1992), Elton *et al.* (1996b) and Carpenter and Lynch (1999) highlight the problems performance evaluation studies face where survivorship bias exists.

8.3.2 Measurement of Public Information Variables

Ferson and Schadt (1996) and Becker *et al.* (1999) advocate the use of conditional performance evaluation models to control for time variation in risk premia, the level of

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[110] The ASSIRT database reports performance data after investment management expenses but does not account for entry or exit charges in the net return reported.

[111] While William M. Mercer has an outstanding institutional database, there may exist slight possibility that one or more closed/terminated funds have been omitted from the database. While this is extremely unlikely, we cannot say with complete certainty that all non-surviving funds have been accounted for.

public information available to active managers, while also minimising the potential biases inherent in traditional methods. In this study, two conditional performance evaluation models incorporate three lagged (*t-1*) public information variables similar to those identified by Ferson and Schadt (1996) and consistent with Sawicki and Ong (2000). The first conditional model (A) employs a lagged 90-day Reserve Bank of Australia (RBA) Treasury note, adjusted to a monthly rate. Second, a lagged measure of the term structure of interest rates, expressed as the monthly difference in yield between the Commonwealth 10-year bond and 90-day RBA Treasury note. Third, the lagged monthly dividend yield of equity securities comprising the ASX All Ordinaries Index. Following Ferson and Schadt (1996) and Sawicki and Ong (2000), this study also incorporated a dummy variable for the month of January as a conditional variable. The second conditional model (B) evaluated in this study substituted an economic conditions variable – a proxy for industrial production, corporate profitability and general economic growth (measured as the lagged excess return on the ASX All Ordinaries Accumulation Index) as an alternative (and possibly broader) information variable to dividend yield. The remaining variables comprising conditional model A were also included in B. The study considered model B as an alternative model to A as a result of separate regressions (not reported) indicating the economic conditions variable to be a significant determinant of Australian bond returns, defined as the WDRCBI. Overall, both conditional models provided similar risk-adjusted excess returns and hence do not contradict the overall conclusion that active bond funds do not outperform passive indices.

8.4 Empirical Results

8.4.1 Overall Active Bond Fund Performance

Table 8.1 presents the summary results for the individual, actively managed Australian bond funds included in the study over the 10-year period to 30 September 1999. The table shows the number of funds in both the institutional and retail samples exhibiting either significantly positive, significantly negative or statistically insignificant performance estimates at the 95 percent confidence interval. An important point to consider in the evaluation of performance is investment management expenses. The retail sample of active bond fund returns provided by ASSIRT is reported net of expenses, however, the institutional database of William M. Mercer Pty. Ltd. reports returns before fees. In addition, given that investment managers levy higher fees for retail investors than is the case for institutional clients, *ceteris paribus*, actively managed retail funds will earn lower active returns after expenses. The main conclusion derived from the summary of individual fund performances at the total portfolio level from Table 8.1 is that the majority of funds do not exhibit superior risk-adjusted performance in the period. These conclusions are consistent with the use of either a conditional or unconditional methodology to adjust for fund returns for risk.

There are a number of active strategies that domestic fixed income managers may use in their attempts to add value, such as duration management, yield curve analysis, re-weighting their portfolio from benchmark index weighting across CGSs, SGSs or corporates, and issue selection with respect to credit risk. However, Table 8.1 clearly indicates that in overall portfolio performance, the majority of active managers were unable to employ active investment strategies in such a manner that earned their clients superior returns to the market index. In particular, the results strongly indicate that retail fund managers significantly underperform as a result of security selection. While we do not have pre-expenses data with which to report gross performance for retail funds, we do know that the average management expense ratio of the sample at 30 September 1999 was 163 basis points per annum (or 13.6 basis points per month).[112] While these reported fees are static at a single point in time, on the basis of the results presented in Table 8.1 (Panel B), it would appear that fees only account for around half of the average retail bond fund underperformance. However quantification of the exact component of underperformance attributable to fees in this sample is not possible due to data constraints. In terms of the inherent survivor bias that exists in the retail sample, the results presented are also likely to be more favourable than would be the case if closed and terminated funds were included in the sample. Overall, the study confirms the inability of active Australian fixed income funds to outperform passive indices, and this finding is consistent with the empirical evidence of Blake *et al.* (1993) for active U.S. mutual bond funds.

In terms of the performance of retail funds when fund flow is considered using both the unconditional and conditional models, Table 8.1 shows that around half of all funds exhibit negative λ coefficients, indicating that fund flow is negatively related to performance. However, only a small percentage of the sample generates significantly negative λ estimates, which seems to indicate that fund flow activity does not significantly impact on active fund performance across the majority of the sample. There is only a small percentage increase in the number of funds whose performance estimates for market timing improve where flow is evaluated.

[112] The standard deviation of annual expenses at 30 September 1999 was 35 basis points per annum, and the maximum and minimum fees in the sample were 227 and 71 basis points per annum.

Table 8.1 – Evaluation of Individual Active Australian Bond Funds in the 10-Year Period to September 1999

This table shows the number of individual active Australian bond funds in the 10-year period that exhibit performance estimates which are statistically significant at the 95 percent confidence interval. Panel A evaluates the performance of institutional funds on a before fees basis, whereas Panel B presents summary results for retail bond funds using fund returns data after expenses. Given that Panels A and B differ on the basis of gross and net of fees, respectively, direct comparisons between institutional and retail funds are not possible. Performance is evaluated using both unconditional (equations 8.1, 8.2 and 8.6) and conditional approaches (equations 8.3, 8.4 and 8.7). The conditional model (B) accounts for the variables economic conditions, term structure, treasury yield and January dummy. The results for conditional model (A) were similar and are not reported. Retail funds are also evaluated using fund flow data to assess the potential impact that flow causes on performance estimates. The columns labelled 'Total' refer to the portfolio's overall return that arises from an active manager's security selection and market timing strategies. Alpha (α) represents the active fund's stock selection skill; Gamma (γ) refers to the bond manager's market timing ability; Lambda (λ) denotes the fund flow variable's impact on performance for actively managed retail bond funds. Fund flow data for the institutional sample was not available. The *t*-statistics used to determine statistical significance are calculated using White (1980) heteroskedastic consistent standard errors for models (8.2), (8.4), (8.6), (8.7).

	Unconditional (ignoring flow)			**Unconditional (including flow)**			**Conditional (ignoring flow)**			**Conditional (including flow)**		
	Total (Eq. 1)	α **(Eq. 2)**	γ **(Eq. 2)**	α **(Eq. 6)**	γ **(Eq. 6)**	λ **(Eq. 6)**	**Total (Eq. 3)**	α **(Eq. 4)**	γ **(Eq. 4)**	α **(Eq. 7)**	γ **(Eq. 7)**	λ **(Eq.7)**
*Panel A: Institutional Bond Funds**												
Negative & Insignificant	22	18	41	-	-	-	25	21	39	-	-	-
Positive & Insignificant	35	35	19	-	-	-	30	31	21	-	-	-
Negative & Significant	2	2	6	-	-	-	2	2	5	-	-	-
Positive & Significant	7	11	0	-	-	-	9	12	1	-	-	-
Funds in Sample	66	66	66	-	-	-	66	66	66	-	-	-
*Panel B: Retail Bond Funds**												
Negative & Insignificant	19	21	39	25	28	21	27	35	42	35	38	34
Positive & Insignificant	1	4	32	1	35	35	3	4	30	2	36	23
Negative & Significant	57	52	1	51	4	16	47	38	3	40	2	10
Positive & Significant	0	0	5	0	10	5	0	0	2	0	1	10
Funds in Sample	77	77	77	77	77	77	77	77	77	77	77	77

* Significance level = 0.05

Table 8.2 indicates that institutional bond funds earn risk-adjusted excess returns comparable to an index fund before expenses, where the average alpha is insignificantly different from zero for both unconditional and conditional techniques. Retail funds on the other hand levy higher fees than institutional bond funds, and, *ceteris paribus*, will underperform to a greater extent than institutional funds where management expenses are deducted. The overwhelming majority of retail bond funds have negative alphas and the average retail fund exhibits significantly negative risk-adjusted excess returns after expenses, irrespective of whether an unconditional or conditional performance model is considered. Analysis of bond funds using the unconditional Sharpe Ratio (not directly reported) also supports the evidence that active bond funds do not outperform the market benchmark.

The high R^2 reported for both the conditional and unconditional models indicates that active bond fund returns are explained well by the independent variable(s). While there is a difference in the coefficient of determination reported for institutional and retail funds of approximately 20 percent, the most likely explanation for this is due to the higher variability in performance for retail funds arising from returns being reported post-fees. In other words, due to retail funds being evaluated after expenses (whereas institutional funds are analysed before fees) the different expense ratios charged by retail funds ensure a lower R^2. In addition, retail funds may have different portfolio allocations to fixed income assets compared with institutional funds. For example, retail bond funds may hold higher cash levels, allocations to other debt securities including mortgage securities (which are not accounted for in the WDRCBI) or prefer exhibiting a shorter duration relative to the index.

Table 8.2 – Overall Risk-Adjusted Performance of Active Australian Bond Funds

This table presents the cross-sectional descriptive statistics for 66 institutional and 77 retail actively managed Australian bond funds in the 10-year period to 30 September 1999. Alpha is expressed in percentage terms per month and represents the total active return (adjusted for risk) derived through the use of both security selection and market timing strategies. The table shows total portfolio risk-adjusted returns using both an unconditional (equation 8.1) and 2 conditional approaches (equation 8.3). The conditional model A incorporates the following public information variables – dividend yield, term structure, treasury note yield and a January conditional variable. The conditional model B uses the economic conditions variable in place of dividend yield, and all other remaining variables defined in conditional model A. The systematic risk of funds is measured as β. R^2 for the conditional model is reported as the adjusted R^2.

Model	Mean α	*t*-stat	SD α	Min α	Q1 α	Q2 α	Q3 α	Max α	Mean β	Mean R^2
Panel A: Institutional Bond Funds – Before Fees										
Unconditional	0.009	1.10	0.065	-0.365	-0.015	0.011	0.035	0.154	1.027	0.927
Conditional (A)	0.011	1.42	0.059	-0.238	-0.014	0.013	0.042	0.162	1.161	0.938
Conditional (B)	0.001	0.10	0.093	-0.567	-0.016	0.008	0.040	0.188	1.053	0.932
Panel B: Retail Bond Funds – After Fees										
Unconditional	-0.279	-11.46***	0.236	-0.926	-0.293	-0.179	-0.135	0.005	0.807	0.721
Conditional (A)	-0.307	-10.61***	0.253	-0.968	-0.578	-0.195	-0.130	0.026	0.954	0.705
Conditional (B)	-0.244	-10.50***	0.224	-0.971	-0.245	-0.168	-0.114	0.087	1.002	0.742

*** Significant at 0.01 level

An interesting point to note in Table 8.2 is the general improvement in the average alpha of funds when a conditional model is employed. With the exception of the conditional model A for retail funds, the conditional models shift the distribution of alphas to the right, however this shift is not large enough to change the general conclusion that active bond funds cannot significantly outperform the benchmark index. The shift in the distribution of fund alphas to the right is also supported in the literature, namely the empirical studies of Ferson and Schadt (1996), Becker *et al.* (1999) and to some extent the results of Sawicki and Ong (2000).

Table 8.3 – Cross-Sectional Averages of the Conditional Variable Coefficients for Active Institutional and Retail Australian Bond Funds

This table presents the cross-sectional averages of the coefficients of the conditional public information variables for conditional models A and B. The sample comprises 66 institutional and 77 retail actively managed Australian bond funds in the 10-year period to 30 September 1999. The number of funds in the sample with statistically significant conditional variable coefficients (at 0.05 level) is also documented.

	Institutional Bond Funds			**Retail Bond Funds**		
Variable	**Coefficient**	***t*-stat**	**No. Funds Significant****	**Coefficient**	***t*-stat**	**No. Funds Significant****
Panel A: Conditional Model A						
Dividend	-0.867	-3.45***	20	-0.799	-2.45**	8
Term	0.210	1.68*	20	-0.067	-0.43	12
Treasury Note	0.246	2.88***	25	-0.098	-0.81	12
January	-0.012	-0.97	8	-0.053	-2.54**	3
Panel B: Conditional Model B						
Economic	-0.002	-1.90*	7	-0.002	-0.99	7
Term	0.330	2.40**	25	0.194	1.35	12
Treasury Note	0.006	0.07	25	-0.020	-0.10	13
January	-0.019	-1.28	3	-0.152	-5.51***	13

* Significant at 0.10 level
** Significant at 0.05 level
*** Significant at 0.01 level

Table 8.3 presents the cross-sectional averages of the coefficients used as conditional variables for active institutional and retail bond funds. This study employs two conditional models applied specifically to active bond funds study. The difference between the models is that conditional model A (Panel A) evaluates performance conditioned on lagged public information variables consistent with Sawicki and Ong (2000) – dividend yield, term structure, treasury note yield and a January dummy. On the other hand, conditional model B (Panel B) substitutes an economic conditions variable for dividend yield. Sawicki and Ong (2000) report that the treasury note yield and term structure conditioning variables for tax-paying (PST) Australian share funds are statistically important in explaining equity fund returns. Sawicki and Ong (2000) also find dividend yield is an important determinant for their tax-paying (PST) balanced funds sample. The institutional bond fund results documented in Table 8.3 (Panel A) indicate that the coefficients on dividend yield, the term structure of interest rates and Treasury note yield are statistically significant. Panel B indicates that the economic conditions variable and the term structure of interest rates are also significant explanatory variables for institutional Australian bond fund returns. While the results for retail bond funds are not as strong as for the institutional sample, the average retail fund exhibits a significant coefficient for dividend yield (which is consistent with institutional bond funds), however the remaining variables are not significant. An important difference between institutional and retail funds is the presence of a significantly negative January coefficient for both conditional models A and B.

Sawicki and Ong (2000) find 48 percent of individual balanced and equity-oriented funds exhibit a significant coefficient for the dividend yield conditional variable, however the other variables were not found to be important. The results presented in Table 8.3 indicate that the dividend yield coefficient is significant for 30 percent of institutional funds and 10 percent of retail funds. The term structure of interest rates and Treasury note yield also appears reasonably important for around one-third of institutional funds. The results are not as strong for the retail sample at the individual fund level.

In light of the empirical evidence presented in the literature (for example, Elton *et al.* (1996b)), the inclusion of non-surviving funds in performance evaluation studies reduces the average alphas compared with survivorship-biased samples. In other words, survivor-biased samples will overstate the ‘true’ performance of managed funds. Elton *et al.* (1996b) argue that attrition rates for managed funds are high for those funds that perform poorly relative to their peers. In such cases, investment managers are likely to find the marketing of poor performing funds difficult, and as a result may choose to merge the underperforming fund into another fund or terminate the fund altogether. The institutional sample used in this study includes both surviving and non-surviving active Australian bond funds. While poor performance may be the single most important factor behind the closure of a fund, managed funds may also cease to operate due to merger or takeover activity by another competitor. In addition, takeover or merger activity may also arise due to poor performance.

The William M. Mercer institutional database does not include information explaining why funds cease, however subsequent analysis of performance prior to closure may assist in determining the proportion of funds that terminate. In terms of the institutional active bond fund sample employed in this study, 17 of the 66 bond funds (25.7 percent) do not have full performance histories to 30 September 1999. These 17 terminated funds are managed by 15 different managers, of which just under half the investment managers (7 managers, managing 7 defunct funds) remained as distinct and independent investment organisations at the end of September 1999. On the basis of this information, analysis was performed using the unconditional and conditional models to evaluate the performance of the funds in the period of survival. The results are presented in Table 8.4 and show that non-surviving funds underperform on average where an unconditional approach is employed. However the statistical power of the test is likely to be affected due to the small sample size. Panel B, which evaluates surviving and non-surviving funds using the conditional measure, shows no significant difference in the average performance of surviving and non-surviving funds. While not reported directly, analysis was also performed by partitioning the sample of non-surviving funds on the basis of (a) whether the investment manager ceased to exist after the fund was terminated and (b) whether the manager remained in existence until September 1999. While power of the statistical tests is weak, due to the small sample size, the results indicated that non-surviving managers, whose funds also ceased, underperformed the terminated funds offered by surviving managers.

Table 8.4 – Analysis of the Performance of Surviving and Non-Surviving Institutional Active Australian Bond Funds

This table presents the cross-sectional average returns for actively managed institutional bond funds that both survive and do not survive through until 30 September 1999. Alpha is expressed in percentage terms per month and represents the total active return (adjusted for risk) derived through the use of both security selection and market timing strategies. Panel A shows cross-sectional average risk-adjusted returns using the unconditional model (equation 8.1) and Panel B employs a conditional approach (B) employing conditional variables economic conditions, term structure, treasury yield and January dummy (equation 8.3). The results for conditional model (A) were largely consistent and are not reported.

Category	**No. Funds**	**Mean α**	***t*-stat**	**SD α**
Panel A: Unconditional Model				
Non-Surviving	17	-0.016	-0.66	0.103
Surviving	49	0.018	2.90***	0.042
Difference	-	0.034	1.32	-
Panel B: Conditional Model				
Non-Surviving	17	0.011	0.52	0.090
Surviving	49	-0.002	-0.18	0.095
Difference	-	0.013	0.54	-

*** Significant at 0.01 level

8.4.2 Market Timing and Selectivity for Active Bond Funds

Table 8.5 presents the performance attribution results for security selection and market timing for the institutional and retail bond fund samples. Panel A summarises the results for the institutional bond fund sample and shows the average active manager earned significantly positive returns attributable to the selection of bond securities before management fees. However, institutional funds exhibit significantly negative market timing ability, which indicates that macroeconomic forecasting on the part of active bond managers detracts from their ability to earn significantly positive risk-adjusted excess returns (see Table 8.2, Panel A). Panel B of Table 8.5, which controls for public information, indicates active returns attributable to security selection and market timing for institutional funds are consistent with an efficient capital market. In terms of both performance estimates, the average institutional fund exhibits improved selectivity and market timing estimates compared with the unconditional model. This is consistent with Ferson and Schadt (1996), who also document improved performance when conditional models are employed. However Ferson and Schadt (1996) indicate that this phenomenon is attributed to the negative covariance between fund betas and market returns, where information conditioning controls for this effect. Sawicki and Ong (2000) also highlight the perplexing nature of this result, because a negative covariance suggests irrationality on the part of active investment managers who increase (reduce) their exposure to the market when returns are low (high).

In terms of active retail bond funds, both the conditional and unconditional models show significantly negative risk-adjusted excess returns arising from bond selection. While retail funds on average exhibit negative market coefficients, both models evaluated are statistically insignificant at conventional levels, although the *p*-value derived using the conditional model is close to being statistically significant. Overall, the general findings that active bond funds are unable to earn significantly positive risk-adjusted excess returns confirm the U.S. evidence documented by Elton *et al.* (1993) using unconditional models.

Table 8.5 – Security Selection and Market Timing Performance of Active Institutional and Retail Australian Bond Funds

This table presents the cross-sectional descriptive statistics for 66 institutional and 77 retail actively managed Australian bond funds existing in the 10-year period to September 1999. Panels A and C employ the unconditional approach (equation 8.2) whereas Panels B and D evaluate active bond funds using the conditional model (B) (equation 8.4) incorporating conditional variables: economic conditions, term structure, treasury yield and January dummy (model B). The results for conditional model (A) were consistent and are not reported. Alpha is expressed in percentage terms per month (before fees) and represents the active return (adjusted for risk) derived through the use of security selection only. Market timing is denoted by γ, and superior ability is present when γ is significantly positive. The Pearson's correlation coefficient between selectivity and timing estimates is denoted ρ.

	Mean	***t*-stat**	**SD**	**Min**	**Q1**	**Q2**	**Q3**	**Max**
Panel A: Institutional Funds - Unconditional Model (ignoring fund flow)								
α	0.020 *	1.83	0.089	-0.500	-0.008	0.024	0.054	0.265
γ	-0.006 *	-1.92	0.027	-0.057	-0.015	-0.007	0.002	0.152
ρ (α,γ)	-0.588 ***	-	-	-	-	-	-	-
Panel B: Institutional Funds - Conditional Model (B) (ignoring fund flow)								
α	0.011	0.76	0.114	-0.566	-0.017	0.019	0.051	0.320
γ	-0.004	-1.36	0.025	-0.082	-0.014	-0.006	0.006	0.071
ρ (α,γ)	-0.540 ***	-	-	-	-	-	-	-
Panel C: Retail Funds - Unconditional Model (ignoring fund flow)								
α	-0.316 ***	-10.08	0.276	-0.907	-0.624	-0.196	-0.138	0.091
γ	0.006	0.98	0.051	-0.105	-0.019	-0.001	0.029	0.256
ρ (α,γ)	-0.480 ***	-	-	-	-	-	-	-
Panel D: Retail Funds - Conditional Model (B) (ignoring fund flow)								
α	-0.254 ***	-8.48	0.261	-0.914	-0.424	-0.156	-0.096	0.210
γ	-0.010 ^	-1.66	0.051	0.223	-0.028	-0.009	0.016	0.141
ρ (α,γ)	-0.379 ***	-	-	-	-	-	-	-

* Significant at 0.10 level
*** Significant at 0.01 level
^ *p*-value = 0.11

An interesting finding reported in Table 8.5 is the existence of strong negative correlation (cross-sectional) between selectivity and timing estimates where flow is not accounted for. Both the unconditional and conditional models derive significantly negative Pearson correlation coefficients. Other studies, including Henriksson (1984) and Coggin *et al.* (1993) also find evidence of a strong negative relationship between timing and selectivity, indicating that perceived skill in one component of portfolio management activity does not necessarily imply skill in the other. There have been a number of hypotheses concerning why this negative correlation phenomenon exists. Henriksson (1984) postulates that the existence of a negative relationship is due to the market proxy being misspecified or the model omitting relevant factors explaining the derivation of fund returns. Jagannathan and Korajczyk (1986) suggest the negative correlation between timing and selectivity may occur as a result of portfolio managers holding options or option-like securities such as listed securities with high leverage. Alternatively, Coggin *et al.* (1993) argue the negative relationship between timing and security selection is derived due to sampling errors of the two estimates being negatively correlated.

8.4.3 Fund Flow Effects on Active Bond Fund Performance

Ferson and Schadt (1996) and Sawicki and Ong (2000) speculate that new money flows into mutual funds may explain the existence of the negative covariance between fund betas and the market returns. Analysis by Warther (1995) indeed confirms the existence of a negative relationship between fund betas and new money flows for Ferson and Schadt's (1996) sample. Ferson and Warther (1996) document that money flows into mutual funds partly explain the changes in betas over time, and represent a plausible interpretation highlighting the negative impact on market timing that is attributable to fund flow. The results of Ferson and Schadt (1996), Warther (1995) and Ferson and Warther (1996) all contribute to Edelen's (1999) examination of the relationship between fund flow activity and a fund's market timing performance. Indeed, Edelen (1999) finds the source of negative market timing is attributable to the flow experienced by active mutual funds. Given the empirical evidence in the U.S., this study therefore attempts to explain the impact of fund flow activity on active bond fund performance with respect to market timing.

Table 8.6 presents the results for the retail bond fund sample using a similar approach to Edelen (1999) that accounts for the effect of fund flow on market timing through the use of an interactive regressor term (see equations 8.6 and 8.7). If the liquidity effect is detrimental to an active manager attempting to successfully time the market, then the coefficient on the interactive term (λ) should be negative and a corresponding improvement of the market timing coefficient should subsequently be reported. Panel A of Table 8.6 presents the cross-sectional performance results of active retail fixed interest funds that account for flows according to the unconditional model. Consistent with Edelen's (1999) results for U.S. mutual funds, the interactive term (accounting for both market timing and fund flow) is significantly negative, and the coefficient determining market timing ability is correspondingly significantly positive. At the individual fund level, the unconditional model indicates that 21 percent of retail funds have significantly negative interactive flow coefficients. When the cross-sectional results in Panel A of Table 8.6 are compared with the unconditional model that excludes flow for retail funds (Table 8.5, Panel C), market timing ability appears to be understated when flow is not considered. However, the conditional flow-control model (Panel B) does not (statistically) support the findings presented in Panel A. While the results indicate that flow for the sample is on average negative, the coefficient is not significant. While the market timing estimate has improved (marginally) compared with Table 8.5 (Panel C), the conditional model does not suggest retail bond fund managers are successful market timers.

Table 8.6 – Security Selection, Market Timing and Fund Flow for Active Retail Australian Bond Funds

This table presents the cross-sectional averages for 77 retail actively managed Australian bond funds in the 10-year period to September 1999. Panel A evaluates active bond funds employing the unconditional model that accounts for fund flows (equation 8.6). Panel B accounts for fund flows within the conditional model (B) (equation 8.7). Flows are incorporated into the models in concurrent terms with returns. The results are similar (but not directly reported) when flows are lagged one period. The conditional model (B) accounts for economic conditions, term structure, treasury yield and a conditional January dummy. The results for conditional model (A) were largely consistent and are not reported. Alpha is expressed in percentage terms per month (after fees) and represents the active return (adjusted for risk) derived through the use of security selection only. Market timing is denoted by γ, and superior ability is present when γ is significantly positive. The influence of fund flow on performance is represented by lambda (λ).

Coefficient	Mean	*t*-stat
Panel A: Retail Funds - Unconditional Model		
α	-0.296***	-9.96
γ	0.011*	1.70
λ	-0.008***	-4.19
Panel B: Retail Funds - Conditional Model(B)		
α	-0.266***	-8.77
γ	-0.008	-1.05
λ	-0.030	-0.99

* Significant at 0.10 level
*** Significant at 0.01 level

8.5 Conclusions and Suggestions for Future Research

This is the first study that evaluates the performance of actively managed Australian bond funds, using both unconditional and conditional performance evaluation techniques, as well as assessing the impact of flow on retail bond fund performance. The evidence presented in this study overwhelmingly indicates that the average active bond fund does not outperform the market index. These conclusions are independent of whether performance is (a) considered pre-or post-expenses and (b) whether an unconditional or conditional performance model is employed. These results indicate that performance is equivalent to an index fund before costs. Furthermore, conditional models improve the performance of active bond fund managers relative to traditional evaluation techniques. However, performance remains consistent with an efficient market.

The study also documents that retail fund flows negatively impact on market timing coefficients when flow is not accounted for in unconditional models. In other words, unconditional models ignoring flow activity may bias performance inferences – specifically, an active manager's market timing ability. In terms of the conditional model, while market timing estimates are improved with the flow variable, statistical significance is absent.

There are a number of avenues that future research in this area may follow. First, additional research is warranted concerning the effects of fund flow on performance. Second, further research should also consider whether other factors have explanatory power in determining bond fund returns. In particular, attention should be given to the apparent differences in performance between retail and institutionally managed bond funds and the preferences these two market segments exhibit for different types of fixed income securities. Third, an evaluation of active bond funds should also be considered in light of the specific investment strategies adopted by investment managers to determine whether particular groups of managers who emphasise specific strategies deliver a performance advantage to their competitors. An interesting consideration may include an analysis of bond fund strategy across different months of the year. Fourth, a decomposition of the sources of value added or lost from portfolio strategies adopted by fixed interest managers could also provide interesting findings of how these portfolios are managed. Fifth, the extent to which fund managers adjust their fixed income portfolios in anticipation of announcements concerning macroeconomic variables such as inflation and interest rates would also be an interesting area for research. And lastly, research should consider why active bond funds have been unable to beat passive benchmark indices. Potential explanations may be due to the structure of the market and the underlying benchmark indices, the degree of market efficiency that exists in the domestic bond market, the transaction costs incurred or size-related issues that may place constraints on active bond fund managers.

9

CHAPTER 9 – CONCLUSIONS & FUTURE RESEARCH DIRECTIONS

This dissertation is concerned with providing an examination into the performance of managed funds in light of the predominant investment strategies adopted by asset management firms. To this end, the evaluation of performance for both actively managed and index funds was considered, as well as documenting the ability of investment managers' across sector specific and sector-diversified fund types. Chapter 2 provided an extensive institutional review of the investment management industry in Australia, which gives context as to the importance of the topic area, size and structure of the industry, identification of the mainstream participants, documentation of the major asset classes available to investors, divergence in managed fund offerings and expenses charged, investment strategies adopted by fund managers, characteristics and compensation arrangements of individual asset managers, historical mergers and acquisition activity and future directions for the Australian investment industry. The institutional details component provided important background concerning the Australian investment industry and the various reasons why performance evaluation is fundamentally important. Chapter 3 provided a broad review of the performance evaluation literature. This section of the dissertation detailed the history and evolution of the literature around the world, theory, criticisms and refinement of performance evaluation techniques and methods, as well as documentary evidence related to the performance of managed investment products. The overwhelming finding concerning managed fund performance, even across different markets, is that active management has been unable, on average, to earn superior risk-adjusted excess returns to appropriate specified market indices.

The first essay was presented in Chapter 4. This essay empirically evaluated the performance of pooled superannuation funds, including the components of performance (market timing and security selection). Pooled superannuation funds invest across the broad spectrum of asset classes, namely Australian and international equities, Australian and international bonds, property and cash. Evaluation of both stock selection and market timing components of investment performance is surprisingly scarce in the Australian literature despite active investment managers engaging in both market timing and security selection. The essay also evaluated performance for the three largest asset classes within diversified superannuation funds and their contribution to overall portfolio return. The importance of an accurately specified market portfolio proxy in the measurement of investment performance was also demonstrated. The essay employed performance benchmarks that accounted for the multi-sector investment decisions of active investment managers in a manner that was consistent with their unique investment strategy. Consistent with the literature, the empirical results indicated that Australian pooled superannuation funds did not exhibit significantly positive security selection or market timing skill.

Given the empirical evidence concerning actively managed funds and the consistency of performance being in alignment with the fundamental tenets of capital market efficiency, index funds have experienced considerable growth in the last decade. Given the increased attention and use of these alternative investment strategies, it is surprising that an empirical examination of index fund performance has been largely neglected. The second essay presented in Chapter 5 provided an Australian perspective on index investment management, the challenges facing index managers, the magnitude of tracking error and the determinants of tracking error in performance. While index portfolio management is theoretically straightforward, in reality, index funds experience considerable difficulty in replicating the target index. This is largely due to the index representing a mathematical calculation that does not take into account market frictions. While Australian equity index funds are shown to meet their investment objectives over the long run (that is performance in line with the underlying index), tracking error was shown to be inherent in their portfolios. Further analysis documented that the magnitude of tracking error was related to fund cash flows, market volatility, and transaction costs. Investment managers implementing full replication strategies were found to have significantly lower tracking error than the non-replication strategies incorporating stratified sampling and optimisation techniques.

Chapter 6 formed the third essay of the dissertation, and provided an analysis of S&P 500 index fund tracking error as well as a direct performance comparison between actively managed U.S. mutual funds and index mutual funds benchmarked to the highly liquid S&P 500. The essay again highlighted the reasons why tracking error is inherent in index fund performance, empirically evaluated the magnitude of S&P 500 index fund tracking error and compared the performance of active funds relative to index mutual funds. Seasonality in S&P 500 index mutual fund tracking error was demonstrated, where tracking error was shown to be significantly higher in the months of January and May, together with a seasonal trough in the quarters ending March-June-September-December. Statistical evidence indicated tracking error was both positively and significantly correlated with the dividend payments arising from constituent S&P 500 securities. The results of the essay concerning the performance of active mutual funds were consistent with the evidence presented in the literature. Active funds on average significantly underperformed passive benchmarks. S&P 500 index mutual funds, on the basis of this research, earned higher risk-adjusted excess returns after expenses than large capitalisation-oriented active mutual funds in the period examined. One may therefore conclude the S&P 500 is consistent with capital market efficiency. These findings strongly suggest an absence of economic benefit accruing to the average investor utilising actively managed equity mutual funds.

The essay presented in Chapter 7 examined the performance of active Australian investment managers, the performance of senior investment personnel by tenure period, and the relationship between risk-adjusted returns and fund manager characteristics for institutional balanced (or diversified asset class) funds. In terms of investment manager attributes, performance of balanced funds was found to be negatively related to an institution's age and the loyalty of non-senior investment staff. Performance was also found to be significantly higher for managers that predominantly operate their portfolios using a bottom-up, stock selection approach. Interestingly, the human capital of managers, measured as the years of tertiary education undertaken, did not explain risk-adjusted excess returns. Systematic risk was positively related to an institution's age, while negatively related to both senior manager loyalty and the implementation of bottom-up portfolio management strategies. In terms of management expenses, fees were directly related to the benchmark allocation to Australian equities, the years of tertiary education, the number of years service (loyalty) for non-senior investment professionals and the total years experience of senior money managers. The essay also concluded that changes in top management have significant performance effects. In the 12-month period after a change in fixed income director or chief investment officer, performance is significantly lower and significantly higher, respectively. There is no significant difference in performance where top management changes occur for Australian equities. The years of service provided to asset management firms by equities directors was found to be inversely related to risk-adjusted performance. Perhaps the most perplexing issue identified in the study was the success of a large proportion of active Australian equity managers that earned superior risk-adjusted excess returns in the period. Future research is currently under way in terms of providing an explanation for this apparent contradiction to the majority of managed fund studies in the literature.

The concluding essay (Chapter 8) evaluated the performance of actively managed Australian bond funds. An important feature of this study is its originality in terms of Australian research, the use both unconditional and conditional performance evaluation techniques as well as providing an assessment of the impact of fund flow on retail bond fund performance. The evidence presented in this essay overwhelmingly indicated that the average active bond fund does not outperform the market index. These conclusions were independent of whether performance is (a) considered pre or post expenses and (b) whether an unconditional or conditional performance model was employed. In other words, active fixed income funds would appear comparable to an index fund before costs. Furthermore, conditional models that accounted for time variation in fund betas improved the performance of active bond fund managers relative to the traditional evaluation techniques, however performance remained consistent with an efficient market. The study also documented that retail fund flows negatively impact on market timing coefficients when flow is not accounted for in unconditional models. Hence, unconditional models that ignore flow activity may bias performance inferences – specifically, an active manager's market timing ability. In terms of the conditional model, while market timing estimates were improved with the flow variable, statistical significance remained absent.

A number of future research directions were highlighted and discussed in each of the essays presented in this dissertation. Chapter 4 further highlighted the negative correlation between timing and selectivity, and the literature should empirically examine the reasons for this phenomenon. For example, Edelen (1999) is one study highlighting the role of fund cash flows in causing perverse market timing. Ferson and Schadt (1996) and Ferson and Warther (1996) also highlight the problems in performance measurement for market timing attributable to fund cash flows.

Chapters 5 and 6 evaluated index equity funds, offered in both the U.S and Australia. Future research should evaluate the extent to which S&P 500 index fund tracking error can be empirically explained by cash flows, transaction costs, volatility of the benchmark, dividends and differences in replication strategies across funds. Further analysis should be performed using daily data as a means of understanding how index portfolios are managed, and the extent to which some index fund managers will allow tolerable levels of tracking error as a means of offsetting at least some of the funds' expenses.

Chapter 7 also identified the need for further analysis of investment performance in a manner that considers both qualitative and quantitative factors exhibited by asset management firms and their investment personnel. In particular, future examination should include an analysis of the additional factors beyond absolute or relative performance that influence the termination (or resignation) of top investment management staff. The Australian literature should also consider the influence of compensation arrangements and their role in rewarding performance and retaining staff. While all managers in this study exhibited various profit-sharing agreements and/or incentive structures (in addition to base-level remuneration), analysis of the structure of such agreements and their relation to investment performance and risk is an important research issue. These empirical issues are currently being examined.

The concluding essay (Chapter 8) highlighted the need for future research along six specific avenues. First, additional research is warranted concerning the effects of fund flow on performance. Second, further research should also consider whether other factors have explanatory power in understanding bond fund returns. In particular, attention should be given to the apparent differences in performance between retail and institutionally managed bond funds and the preferences these two market segments exhibit for different types of fixed income securities. Third, an evaluation of active bond funds should also be considered in light of the specific investment strategies adopted by investment managers to determine whether particular groups of managers who emphasise specific strategies delivers a performance advantage to their competitors. An interesting consideration may include an analysis of bond fund strategy across different months of the year. Fourth, a decomposition of the sources of value added or lost from portfolio strategies adopted by fixed interest managers may also provide interesting findings in terms of how these portfolios are managed. Fifth, the extent to which fund managers adjust their fixed income portfolios in anticipation of announcements concerning macroeconomic variables (such as inflation and interest rates) would also be a worthwhile avenue area for research. And finally, a rigorous investigation of why active bond funds have been unable to beat passive benchmark indices should be undertaken. Potential explanations may be due to the structure of the market and the underlying benchmark indices, the degree of market efficiency that exists in the domestic bond market, the transaction costs incurred or size-related issues that may place constraints on active bond fund managers.

APPENDIX 1: ACADEMIC JOURNAL ABBREVIATIONS

Abbreviation	Journal
AAAJ	Accounting, Auditing and Accountability Journal
A&F	Accounting and Finance
AEL	Applied Economic Letters
AJM	Australian Journal of Management
AER	American Economic Review
BP	Brooking Paper: Microeconomics
ECON	Econometrica
EFR	European Finance Review
EJOR	European Journal of Operational Research
FAJ	Financial Analysts Journal
GFJ	Global Finance Journal
HBR	Harvard Business Review
JAM	Journal of Asset Management
JBF	Journal of Banking and Finance
JBFA	Journal of Business Finance and Accounting
JB	Journal of Business
JEB	Journal of Economics and Business
JF	Journal of Finance
JFQA	Journal of Financial and Quantitative Analysis
JFE	Journal of Financial Economics
JFR	Journal of Financial Research
JFM	Journal of Futures Markets
JFSR	Journal of Financial Services Research
JMBC	Journal of Money, Banking and Credit
JPE	Journal of Political Economy
JPM	Journal of Portfolio Management
PBFJ	Pacific Basin Finance Journal
QJE	Quarterly Journal of Economics
RES	Review of Economics and Statistics
RFS	Review of Financial Studies
RQFA	Review of Quantitative Finance and Accounting

APPENDIX 2: UNIVERSITY DEGREE AND INDUSTRY QUALIFICATION LONG NAMES AND ABBREVIATIONS USED

Abbreviation	Qualification Name
Panel A: Bachelor Degrees	
B.Ec.	Bachelor of Economics
B.Com.	Bachelor of Commerce
B.B.A.	Bachelor of Business Administration
B.Bus.	Bachelor of Business
B.Sc.	Bachelor of Science
Panel B: Master Degrees	
M.Ec.	Master of Economics
M.Com.	Master of Commerce
M.B.A.	Master of Business Administration
M. App. Fin.	Master of Applied Finance
M.Bus.	Master of Business
M.Sc.	Master of Science
Panel C: Honours Degrees	
Hons.	Bachelor or Masters degree with Honours
Panel D: Doctorates	
Ph.D.	Doctor of Philosophy
Panel E: Industry Qualifications	
A.S.I.A.	Associate of the Securities Institute of Australia (requires award of graduate diploma in applied finance and investment)
A.I.A.A	Associate of the Institute of Actuaries of Australia (requires successful completion of actuarial examinations)
A.C.A.	Australian Chartered Accountant (requires successful completion of professional year qualification)
C.P.A	Certified Practising Accountant (requires successful completion of examinations)
C.F.A	Chartered Financial Analyst (requires successful completion of A.I.M.R.'s examinations)

APPENDIX 3: CORRELATION MATRIX FOR VARIABLES IN TABLE 7.11

	AST	INSAGE	AEQ	PORT	EDU	EXPS	EXPO	LOYS	LOYO
AST	1.00	-	-	-	-	-	-	-	-
INSAGE	0.13	1.00	-	-	-	-	-	-	-
AEQ	-0.03	-0.18	1.00	-	-	-	-	-	-
PORT	0.03	-0.05	-0.19	1.00	-	-	-	-	-
EDU	-0.19	-0.32	-0.02	0.08	1.00	-	-	-	-
EXPS	-0.06	-0.12	0.20	-0.28	-0.24	1.00	-	-	-
EXPO	-0.03	0.22	-0.31	-0.36	-0.45	-0.05	1.00	-	-
LOYS	0.24	0.21	0.36	-0.10	-0.58	0.46	-0.01	1.00	-
LOYO	0.13	0.45	-0.09	-0.09	-0.61	0.01	0.50	0.49	1.00

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