Literature Review:

Investment Performance Evaluation

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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

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\(^{30}\) 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.

<table>
<thead>
<tr>
<th>Year</th>
<th>Author(s)</th>
<th>Journal</th>
<th>Sector</th>
<th>Period Evaluated</th>
<th>No. Funds</th>
<th>Data Freq</th>
<th>Returns Basis</th>
<th>Fund Type</th>
<th>Fund Structure</th>
<th>Survivor Biased?</th>
<th>Performance Approach/Model</th>
<th>Main Finding(s)</th>
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<tr>
<td>1983</td>
<td>Bird, Chin, McCrae</td>
<td>AJM</td>
<td>Diversified</td>
<td>1973-1981</td>
<td>104</td>
<td>Q</td>
<td>Net</td>
<td>Super</td>
<td>Open</td>
<td>Yes</td>
<td>Sharpe, Treynor, Jensen</td>
<td>Funds do not outperform</td>
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</table>
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.

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<thead>
<tr>
<th>Year</th>
<th>Author(s)</th>
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<th>Fund Structure</th>
<th>Survivor Biased?</th>
<th>Performance Approach/Model</th>
<th>Main Finding(s)</th>
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<tr>
<td>1933</td>
<td>Cowles III</td>
<td>ECON</td>
<td>Equities</td>
<td>1928-1932</td>
<td>45</td>
<td>W</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>Raw measure</td>
<td>Inability of investment companies to successfully predict market movements or specific stocks</td>
</tr>
<tr>
<td>1966</td>
<td>Sharpe</td>
<td>JB</td>
<td>Equities</td>
<td>1954-1963</td>
<td>34</td>
<td>Y</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Sharpe</td>
<td>Results consistent with capital market efficiency</td>
</tr>
<tr>
<td>1966</td>
<td>Treynor, Mazuy</td>
<td>HBR</td>
<td>Equities</td>
<td>1953-1962</td>
<td>57</td>
<td>N/A</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Treynor-Mazuy</td>
<td>No evidence of market timing ability by funds</td>
</tr>
<tr>
<td>1968</td>
<td>Jensen</td>
<td>JF</td>
<td>Equities</td>
<td>1945-1964</td>
<td>115</td>
<td>Y</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen</td>
<td>Inability of funds to outperform</td>
</tr>
<tr>
<td>1970</td>
<td>Carlson</td>
<td>JFQA</td>
<td>Equities</td>
<td>1948-1967</td>
<td>122</td>
<td>Y</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, Sharpe</td>
<td>Performance sensitive to benchmark used; past performance lacked predictive ability; Good performers experience high cash inflow; Size and expense ratio is unrelated to performance</td>
</tr>
<tr>
<td>1974</td>
<td>McDonald</td>
<td>JFQA</td>
<td>Equities and Bonds</td>
<td>1960-1969</td>
<td>123</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, Sharpe, Treynor</td>
<td>Overall, an inability of funds to earn significantly positive risk-adjusted returns. Systematic risk related to investment objectives</td>
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<td>1978</td>
<td>Kon, Jen</td>
<td>JF</td>
<td>Diversified</td>
<td>1960-1971</td>
<td>49</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen</td>
<td>Risk is not stationary through time</td>
</tr>
<tr>
<td>1979</td>
<td>Kon, Jen</td>
<td>JB</td>
<td>Equities</td>
<td>1960-1971</td>
<td>49</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, 2 &amp; 3 regime model specification (Quandt)</td>
<td>Mixed findings concerning performance and funds’ ability to outperform</td>
</tr>
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<td>1983</td>
<td>Kon</td>
<td>JB</td>
<td>Equities</td>
<td>1960-1976</td>
<td>37</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Kon-Jen approach based on switching regression model</td>
<td>Mutual fund managers have no market timing ability</td>
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<tr>
<td>1984</td>
<td>Chang, Llewellen</td>
<td>JB</td>
<td>Equities</td>
<td>1971-1979</td>
<td>67</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Henriksson-Merton</td>
<td>Funds overall did not outperform the market, indicating a lack of ability in timing and selectivity</td>
</tr>
<tr>
<td>Year</td>
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<tr>
<td>1987</td>
<td>Elton, Gruber, Rentzler</td>
<td>JB</td>
<td>Commodity /Futures</td>
<td>1979-1985</td>
<td>85</td>
<td>M</td>
<td>Net</td>
<td>Pool</td>
<td>Open</td>
<td>Yes</td>
<td>Sharpe</td>
<td>Commodity funds are not necessarily superior to mutual funds. Persistence in performance was weak</td>
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<td>1988</td>
<td>Edwards, Ma</td>
<td>JFM</td>
<td>Commodity /Futures</td>
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<td>55</td>
<td>M</td>
<td>Net</td>
<td>Pool</td>
<td>Open</td>
<td>Yes</td>
<td>Risk-adjusted metrics</td>
<td>Information disclosure in prospectuses are not good guides to future returns</td>
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<td>1988</td>
<td>Grinblatt, Titman</td>
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<td>Equities</td>
<td>1975-1984</td>
<td>274</td>
<td>M,Q</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes &amp; No</td>
<td>Raw Returns, Jensen</td>
<td>Aggressive growth funds earn superior returns pre costs but not after costs</td>
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<tr>
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<td>Ippolito</td>
<td>QJE</td>
<td>Equities</td>
<td>1965-1984</td>
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<td>M</td>
<td>Net</td>
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<td>Open</td>
<td>No</td>
<td>Jensen</td>
<td>Active funds earn risk-adjusted returns equivalent to fees and expenses</td>
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<td>1989</td>
<td>Cumby, Glen</td>
<td>JF</td>
<td>International Equities</td>
<td>1982-1988</td>
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<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, Positive Period Weighting Measure (PPW)</td>
<td>Inability to provide investors of funds with superior returns to an international index</td>
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<td>Elton, Gruber, Rentzler</td>
<td>FAJ</td>
<td>Commodity /Futures</td>
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<td>130</td>
<td>M</td>
<td>Net</td>
<td>Pool</td>
<td>Open</td>
<td>No</td>
<td>Raw Returns</td>
<td>Performance is not attractive and there are high risks; dissolution rates are high</td>
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<tr>
<td>1990</td>
<td>Lee, Rahman</td>
<td>JB</td>
<td>Equity-oriented</td>
<td>1977-1984</td>
<td>93</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Bhattacharya-Pfeiderer</td>
<td>Some funds earn abnormal returns, however in general, most funds do not outperform the market in either timing or selectivity</td>
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<td>1991</td>
<td>Cornell, Green</td>
<td>JF</td>
<td>Low-Grade Bonds</td>
<td>1960-1989 &gt;90</td>
<td>M</td>
<td>Net</td>
<td>Publicly traded</td>
<td>Closed</td>
<td>Yes</td>
<td>Raw Returns, Multifactor risk model</td>
<td>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</td>
<td></td>
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<td>1991</td>
<td>Brinson, Singer, Beebower</td>
<td>FAJ</td>
<td>Diversified</td>
<td>1977-1987</td>
<td>82</td>
<td>Q</td>
<td>Net</td>
<td>Pension</td>
<td>Open</td>
<td>Yes</td>
<td>Performance attribution approach</td>
<td>Inability to earn active returns above strategic benchmarks of funds</td>
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<td>1992</td>
<td>Chen, Lee, Rahman, Chan</td>
<td>JBFA</td>
<td>Equities, Diversified</td>
<td>1977-1984</td>
<td>93</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Treynor-Mazuy</td>
<td>Funds are poor market timers; minority of funds have positive selectivity</td>
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<td>1993</td>
<td>Blake, Elton, Gruber</td>
<td>JB</td>
<td>Bonds</td>
<td>1970-1988</td>
<td>46</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Jensen, Multiple index model</td>
<td>Bond funds underperform market indices after expenses</td>
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<td>1993</td>
<td>Coggin, Fabozzi, Rahman</td>
<td>JF</td>
<td>Equities</td>
<td>1983-1990</td>
<td>71</td>
<td>M</td>
<td>Gross</td>
<td>Pension</td>
<td>Open</td>
<td>Yes</td>
<td>Treynor-Mazuy, Bhattacharya-Pfeiderer</td>
<td>Security selection estimates are positive and market timing is negative on average. Negative correlation between timing and selectivity confirmed</td>
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<td>1993</td>
<td>Elton, Gruber, Das, Hlavka</td>
<td>RFS</td>
<td>Equities</td>
<td>1965-1984</td>
<td>143</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Jensen, 3 Factor model</td>
<td>Active funds perform in line with appropriate indices</td>
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<td>1993</td>
<td>Irwin, Krukemyer, Zulauf</td>
<td>JFM</td>
<td>Commodity/Futures</td>
<td>1979-1990</td>
<td>186</td>
<td>M</td>
<td>Net</td>
<td>Pool</td>
<td>Open</td>
<td>No</td>
<td>Raw Returns, Sharpe</td>
<td>Portfolio of commodity pools outperforms a passive buy and hold strategy after costs</td>
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Table 3.2 continued...

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<th>Year</th>
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<th>Journal</th>
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<th>Fund Type</th>
<th>Fund Structure</th>
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<th>Performance Approach/Model</th>
<th>Main Finding(s)</th>
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<td>1994</td>
<td>Grinblatt, Titman</td>
<td>JFQA</td>
<td>Equities</td>
<td>1975-1984</td>
<td>279</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, PPW, Treynor-Mazuy</td>
<td>Performance can be highly sensitive to benchmarks used; market timing ability absent from mutual funds.</td>
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<td>Year</td>
<td>Author(s)</td>
<td>Journal</td>
<td>Sector</td>
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<tr>
<td>1996</td>
<td>Chen, Knez</td>
<td>RFS</td>
<td>Equities</td>
<td>1968-1989</td>
<td>68</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Conditional and Unconditional measures independent of asset pricing models</td>
<td>Performance measurement can be arbitrary. The authors demonstrate the need for evaluation techniques to encompass four minimal conditions</td>
</tr>
<tr>
<td>1996</td>
<td>Elton, Gruber, Blake</td>
<td>JB</td>
<td>Equities</td>
<td>1977-1993</td>
<td>188</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Four index model</td>
<td>Performance persistence arises for mutual funds using 1 and 3 year evaluation periods</td>
</tr>
<tr>
<td>1996</td>
<td>Elton, Gruber, Blake</td>
<td>RFS</td>
<td>Equities</td>
<td>1977-1993</td>
<td>361</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Three index model</td>
<td>Demonstrates the importance of controlling for survivor bias in mutual fund studies – excluding non-survivors improves performance</td>
</tr>
<tr>
<td>1996</td>
<td>Ferson, Warther</td>
<td>FAJ</td>
<td>Equities</td>
<td>1968-1990</td>
<td>63</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, Treynor-Mazuy, Conditional model</td>
<td>Conditional models improve mutual fund performance, however, mutual funds do not outperform. Fund flows may explain why betas indicate perverse timing ability</td>
</tr>
<tr>
<td>1996</td>
<td>Gallo, Swanson</td>
<td>JBF</td>
<td>Foreign Equities</td>
<td>1985-1993</td>
<td>37</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Sharpe, Treynor-Mazuy, Multi-factor model</td>
<td>Performance was consistent with market index, however some conjecture exists from other models</td>
</tr>
<tr>
<td>1996</td>
<td>Gruber</td>
<td>JF</td>
<td>Equities</td>
<td>1985-1994</td>
<td>270</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open &amp; Closed</td>
<td>No</td>
<td>Raw Returns, Jensen, 4 index model</td>
<td>Active funds do earn superior returns to an index fund</td>
</tr>
<tr>
<td>1997</td>
<td>Bello, Janjigian</td>
<td>FAJ</td>
<td>Equities</td>
<td>1984-1994</td>
<td>633</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Treynor-Mazuy (including additional variables)</td>
<td>Negative correlation between timing and selectivity; evidence of superior timing and selection ability</td>
</tr>
<tr>
<td>1997</td>
<td>Carhart</td>
<td>JF</td>
<td>Equities</td>
<td>1962-1993</td>
<td>1892</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Jensen, Carhart 4-factor model</td>
<td>Persistence in performance is explained by common factors (e.g. momentum) in equities and mutual fund expenses. Persistence remains among poor performing funds</td>
</tr>
<tr>
<td>Year</td>
<td>Author(s)</td>
<td>Journal</td>
<td>Sector</td>
<td>Period Evaluated</td>
<td>No. Funds</td>
<td>Data Freq</td>
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<td>Performance Approach/Model</td>
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<tr>
<td>1997</td>
<td>Daniel, Grinblatt, Titman, Wermers</td>
<td>JF</td>
<td>Equities</td>
<td>1975-1994</td>
<td>&gt;2500</td>
<td>Q</td>
<td>Gross</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Characteristic-based measures, GT measure, Carhart, Jensen</td>
<td>Aggressive growth funds exhibit security selection skill, however no market timing ability exists for the sample of funds</td>
</tr>
<tr>
<td>1997</td>
<td>Detzler, Wiggins</td>
<td>RQFA</td>
<td>Internationally Equities</td>
<td>1985-1994</td>
<td>35</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, Positive Period Weighting Measure</td>
<td>International equity index found to be inefficient and outperformance arises. Performance persistence is also evident</td>
</tr>
<tr>
<td>1997</td>
<td>Fung, Hsieh</td>
<td>RFS</td>
<td>Hedge/Commodity</td>
<td>1991-1995</td>
<td>409</td>
<td>M</td>
<td>Net</td>
<td>Private vehicle</td>
<td>Open</td>
<td>Yes</td>
<td>Extended Sharpe (1992) style analysis</td>
<td>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</td>
</tr>
<tr>
<td>1998</td>
<td>Christopher, Ferson, Glassman</td>
<td>RFS</td>
<td>Equities</td>
<td>1979-1990</td>
<td>273</td>
<td>M</td>
<td>Gross</td>
<td>Pension</td>
<td>Open</td>
<td>Yes</td>
<td>Ferson-Schadt Conditional model, Jensen</td>
<td>Performance persistence is strongly evident, particularly for conditional models</td>
</tr>
<tr>
<td>1998</td>
<td>Horan</td>
<td>JFR</td>
<td>Equities</td>
<td>1979-1993</td>
<td>1273</td>
<td>Q</td>
<td>Gross</td>
<td>Pension &amp; Non-Pension</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, Fama-French</td>
<td>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</td>
</tr>
<tr>
<td>1998</td>
<td>Sirri, Tufano</td>
<td>JF</td>
<td>Equities</td>
<td>1971-1990</td>
<td>690</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Raw Returns, Total Returns, Jensen</td>
<td>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</td>
</tr>
<tr>
<td>1999</td>
<td>Ackermann, McEnally, Ravenscraft</td>
<td>JF</td>
<td>Hedge</td>
<td>1988-1995</td>
<td>906</td>
<td>M</td>
<td>Net</td>
<td>Private vehicle</td>
<td>Open</td>
<td>No</td>
<td>Raw Returns, Sharpe</td>
<td>Hedge funds outperform mutual funds but not market indices. Hedge funds exhibit higher risks than mutual funds</td>
</tr>
<tr>
<td>1999</td>
<td>Becker, Ferson, Myers, Schill</td>
<td>JFE</td>
<td>Equity, Balanced and Asset Allocation</td>
<td>1976-1994</td>
<td>&gt;400</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Conditional Jensen model, Conditional Treynor-Mazuy</td>
<td>Little evidence of market timing ability; performance closely aligned to appropriate benchmarks</td>
</tr>
<tr>
<td>Year</td>
<td>Author(s)</td>
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<tr>
<td>1999</td>
<td>Basse</td>
<td>RFS</td>
<td>Equities</td>
<td>1985-1995</td>
<td>230</td>
<td>D</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>3 and 4 index volatility timing models</td>
<td>Volatility timing demonstrated as another performance measure. Funds decrease their market exposure during periods of high volatility</td>
</tr>
<tr>
<td>1999</td>
<td>Chevalier, Ellison</td>
<td>JF</td>
<td>Equities</td>
<td>1988-1995</td>
<td>492</td>
<td>Y</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, Carhart</td>
<td>Manager age and educational background significantly affects performance outcomes</td>
</tr>
<tr>
<td>1999</td>
<td>Chevalier, Ellison</td>
<td>QJE</td>
<td>Equities</td>
<td>1992-1994</td>
<td>N/A</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen</td>
<td>Younger managers tend to avoid unsystematic risk more than older managers</td>
</tr>
<tr>
<td>1999</td>
<td>Detzler</td>
<td>JBF</td>
<td>Global Bonds</td>
<td>1988-1995</td>
<td>19</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, Positive Period Weighting Measure, Multiple index models</td>
<td>Active funds did not outperform the benchmark indices</td>
</tr>
<tr>
<td>1999</td>
<td>Edelen</td>
<td>JFE</td>
<td>Equities</td>
<td>1985-1990</td>
<td>166</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, Treynor- Mazuy, Henriksson-Merton, Edelen flow adjustment</td>
<td>Liquidity-motivated trading by mutual funds is equivalent to the underperformance of the index, flow explains negative market timing coefficients</td>
</tr>
<tr>
<td>1999</td>
<td>Edwards, Liew</td>
<td>JFM</td>
<td>Commodities/Futures</td>
<td>1982-1996</td>
<td>619</td>
<td>M</td>
<td>Net</td>
<td>Pools &amp; Public Funds</td>
<td>Open</td>
<td>No</td>
<td>Sharpe</td>
<td>Commodity funds have diversification benefits in portfolios comprising traditional assets; Extent to which skill exists in performance is open to empirical investigation</td>
</tr>
<tr>
<td>1999</td>
<td>Keim</td>
<td>JFE</td>
<td>Equities</td>
<td>1982-1995</td>
<td>1</td>
<td>M</td>
<td>Net</td>
<td>9-10 Mutual</td>
<td>Open</td>
<td>-</td>
<td>Fama-French</td>
<td>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.</td>
</tr>
<tr>
<td>1999</td>
<td>Liang</td>
<td>FAJ</td>
<td>Hedge</td>
<td>1992-1996</td>
<td>1162</td>
<td>M</td>
<td>Net</td>
<td>Private Vehicles</td>
<td>Open</td>
<td>No</td>
<td>Sharpe, multiple index Jensen</td>
<td>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</td>
</tr>
<tr>
<td>Year</td>
<td>Author(s)</td>
<td>Journal</td>
<td>Sector</td>
<td>Period Evaluated</td>
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<td>Performance Approach/Model</td>
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</tr>
<tr>
<td>1999</td>
<td>Lynch-Koski,Pontiff</td>
<td>JF</td>
<td>Equities</td>
<td>1992-1994</td>
<td>679</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Moments of distribution, Jensen, Henriksson-Merton</td>
<td>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</td>
</tr>
<tr>
<td>1999</td>
<td>Volkman</td>
<td>JFR</td>
<td>Equities</td>
<td>1980-1990</td>
<td>332</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, merged Carhart &amp; Bhattacharyya-Pfleiderer model</td>
<td>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</td>
</tr>
<tr>
<td>2000</td>
<td>Agarwal,Naik</td>
<td>JFQA</td>
<td>Hedge</td>
<td>1982-1998</td>
<td>746</td>
<td>Q</td>
<td>Net</td>
<td>Private vehicles</td>
<td>Open</td>
<td>No</td>
<td>Jensen, Appraisal ratio</td>
<td>Persistence among hedge funds exists, but only over short-term (quarterly) periods</td>
</tr>
<tr>
<td>2000</td>
<td>Bers,Madura</td>
<td>JFSR</td>
<td>Multiple sectors</td>
<td>1976-1996</td>
<td>506</td>
<td>M</td>
<td>Net</td>
<td>Listed</td>
<td>Closed</td>
<td>Yes</td>
<td>Multi-index Jensen approach</td>
<td>Performance persistence influenced by its expense ratio, history, part of a stable of funds and if traded on NYSE</td>
</tr>
<tr>
<td>2000</td>
<td>Blake,Morey</td>
<td>JFQA</td>
<td>Equities</td>
<td>1983-1997</td>
<td>635</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Sharpe, Jensen, 4-index model</td>
<td>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</td>
</tr>
<tr>
<td>2000</td>
<td>Chen,Jegadeesh,Wermers</td>
<td>JFQA</td>
<td>Equities</td>
<td>1975-1995</td>
<td>2424</td>
<td>Q</td>
<td>Gross</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Raw returns, DGTW model</td>
<td>Funds do not outperform the market; some evidence of superior stock selection; persistence attributable to momentum effect</td>
</tr>
<tr>
<td>2000</td>
<td>Davis</td>
<td>FAJ</td>
<td>Equities</td>
<td>1962-1998</td>
<td>4686</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Fama-French 3 factor model</td>
<td>Funds do not earn superior returns. Short-run performance persistence evident in growth funds and small-cap funds</td>
</tr>
<tr>
<td>2000</td>
<td>Fant,O’Neal</td>
<td>JFR</td>
<td>Equities</td>
<td>1976-1997</td>
<td>1423</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Raw Returns, Jensen</td>
<td>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</td>
</tr>
<tr>
<td>2000</td>
<td>Fung,Hsieh</td>
<td>JFQA</td>
<td>Hedge/Commodity</td>
<td>1989-1998</td>
<td>322</td>
<td>M</td>
<td>Net</td>
<td>Fund-of-Fund</td>
<td>Open</td>
<td>No</td>
<td>Raw Returns (annual)</td>
<td>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</td>
</tr>
<tr>
<td>Year</td>
<td>Author(s)</td>
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<td>Period Evaluated</td>
<td>No. Funds</td>
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<tr>
<td>2000</td>
<td>Jain, Wu</td>
<td>JF</td>
<td>Equities</td>
<td>1994-1996</td>
<td>294</td>
<td>M Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen, Carhart</td>
<td>Performance is superior to the market in the pre-advertised period but not superior in the post period</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Kallberg, Lui, Trzcinka</td>
<td>JFQA</td>
<td>Real Estate</td>
<td>1987-1998</td>
<td>68</td>
<td>M Net</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Jensen, 4-index model, 5-index model</td>
<td>REITs earn positive and statistically significant alphas, and perform best in down-markets. Fund performance is positively related to size and turnover</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Liang</td>
<td>JFQA</td>
<td>Hedge</td>
<td>1994-1998</td>
<td>1162 / 1627</td>
<td>M Net</td>
<td>Private vehicles</td>
<td>Open</td>
<td>No</td>
<td>Total Return</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Statman</td>
<td>FAJ</td>
<td>Socially Responsible Equities</td>
<td>1990-1998</td>
<td>31</td>
<td>M Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes</td>
<td>Raw Returns, Jensen</td>
<td>SRI Funds outperform other (conventional) funds but the difference is not statistically significant. SRI funds underperform the S&amp;P 500 index</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>Busse</td>
<td>JFQA</td>
<td>Equities</td>
<td>1995</td>
<td>230</td>
<td>D Net</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Single and Four factor models, Volatility ratios</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Author(s)</td>
<td>Journal</td>
<td>Sector</td>
<td>Period Evaluated</td>
<td>No. Funds</td>
<td>Data Freq</td>
<td>Returns Basis</td>
<td>Fund Type</td>
<td>Fund Structure</td>
<td>Survivor Biased?</td>
<td>Performance Approach/Model</td>
<td>Main Finding(s)</td>
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<tr>
<td>1977</td>
<td>Firth</td>
<td>JMCB</td>
<td>Equities</td>
<td>1965-1975</td>
<td>72</td>
<td>Y</td>
<td>Net</td>
<td>Unit Trust</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen</td>
<td>Funds do not outperform</td>
</tr>
<tr>
<td>1992</td>
<td>Black, Fraser, Power</td>
<td>JBF</td>
<td>Equity</td>
<td>1980-1989</td>
<td>30</td>
<td>M</td>
<td>Net</td>
<td>Unit Trust</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen</td>
<td>Majority of funds outperformed</td>
</tr>
<tr>
<td>1992</td>
<td>Luther, Matatko, Corner</td>
<td>AAAJ</td>
<td>Equities</td>
<td>1972-1990</td>
<td>15</td>
<td>M</td>
<td>Net</td>
<td>Unit Trust</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen</td>
<td>Weak evidence of some outperformance by funds</td>
</tr>
<tr>
<td>1997</td>
<td>Leger</td>
<td>AEL</td>
<td>Equities</td>
<td>1973-1993</td>
<td>72</td>
<td>M</td>
<td>Not Stated</td>
<td>Unit Trust</td>
<td>Open</td>
<td>Yes</td>
<td>Treynor-Mazuy, Pfleiderer-Bhattacharya</td>
<td>General absence of stock selection or market timing ability</td>
</tr>
<tr>
<td>1998</td>
<td>Blake, Timmernann</td>
<td>EFR</td>
<td>Multi-sector</td>
<td>1972-1995</td>
<td>2300</td>
<td>M</td>
<td>Gross</td>
<td>Unit Trust</td>
<td>Open</td>
<td>No</td>
<td>Conditional and Unconditional Jensen-type</td>
<td>Performance persistence and funds overall underperforming on average</td>
</tr>
<tr>
<td>1998</td>
<td>Klumpes</td>
<td>JBFA</td>
<td>Internationa l Equities</td>
<td>1982-1995</td>
<td>25</td>
<td>M</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>Yes &amp; No</td>
<td>Jensen</td>
<td>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</td>
</tr>
<tr>
<td>Year</td>
<td>Author(s)</td>
<td>Journal</td>
<td>Sector</td>
<td>Period Evaluated</td>
<td>No. Funds</td>
<td>Data Freq</td>
<td>Returns Basis</td>
<td>Fund Type</td>
<td>Fund Structure</td>
<td>Survivor Biased?</td>
<td>Performance Approach/Model</td>
<td>Main Finding(s)</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>---------</td>
<td>--------</td>
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<td>-----------</td>
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<td>-----------------</td>
<td>----------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>2000</td>
<td>Thomas, Tonks</td>
<td>JAM</td>
<td>Equities</td>
<td>1983-1997</td>
<td>2175</td>
<td>Q</td>
<td>Net</td>
<td>Pension</td>
<td>Open</td>
<td>No</td>
<td>Treynor-Mazuy, Henriksson-Merton</td>
<td>Funds unable to earn superior returns attributable to timing or stock selection</td>
</tr>
<tr>
<td>2000</td>
<td>Quigley, Sinquefield</td>
<td>JAM</td>
<td>Equities</td>
<td>1978-1997</td>
<td>752</td>
<td>M</td>
<td>Net</td>
<td>Unit Trusts</td>
<td>Open</td>
<td>No</td>
<td>Jensen, Fama-French</td>
<td>UK equity managers unable to outperform market indices. Poor performance appears to persist over time when using net returns data</td>
</tr>
<tr>
<td>Year</td>
<td>Author(s)</td>
<td>Journal</td>
<td>Sector</td>
<td>Period Evaluated</td>
<td>No. Funds</td>
<td>Data Freq</td>
<td>Returns Basis</td>
<td>Fund Type</td>
<td>Fund Structure</td>
<td>Survivor Biased?</td>
<td>Performance Approach/Model</td>
<td>Main Finding(s)</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
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<td>-----------</td>
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<td>----------------</td>
</tr>
<tr>
<td>1974</td>
<td>McDonald</td>
<td>JF</td>
<td>French</td>
<td>1964-1969</td>
<td>8</td>
<td>M</td>
<td>Net</td>
<td>SICAV</td>
<td>Open</td>
<td>Yes</td>
<td>Jensen</td>
<td>Funds earned superior risk-adjusted returns</td>
</tr>
<tr>
<td>2000</td>
<td>Dahlquist, Engstrom, Soderlind</td>
<td>JFQA</td>
<td>Swedish Equity, Bond and Diversified funds</td>
<td>1993-1997</td>
<td>210</td>
<td>W</td>
<td>Net</td>
<td>Mutual</td>
<td>Open</td>
<td>No</td>
<td>Jensen, Conditional models, Henriksson-Merton, Treynor-Mazuy</td>
<td>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</td>
</tr>
</tbody>
</table>
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 ($\beta$) 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:

$$
TreynorIndex_p = \frac{R_p - R_f}{\beta_p}
$$

where:

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

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.

$$
SharpeRatio_p = \frac{R_p - R_f}{\sigma_p}
$$
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.

\[
\bar{R}_p - \bar{R}_f = \alpha_p + \beta_p (\bar{R}_m - \bar{R}_f) + \varepsilon_p
\]  

(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 (\(\beta\)) 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


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 Llewelen (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 arbitragged 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). Grinold (1992) found that four out of the five international indices tested were not mean-
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
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

<table>
<thead>
<tr>
<th>Year</th>
<th>Author(s)</th>
<th>Main Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989b</td>
<td>Grinblatt, Titman</td>
<td>Aggressive growth funds and growth funds exhibit superior ability compared with other investment objective categories.</td>
</tr>
<tr>
<td>1993</td>
<td>Grinblatt, Titman</td>
<td>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.</td>
</tr>
<tr>
<td>1995</td>
<td>Grinblatt, Titman, Wermers</td>
<td>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.</td>
</tr>
<tr>
<td>2000</td>
<td>Davis</td>
<td>No investment style exhibited superior performance relative to the market. Evidence of performance persistence among some growth funds.</td>
</tr>
<tr>
<td>2000</td>
<td>Chen, Jegadeesh, Wermers</td>
<td>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.</td>
</tr>
</tbody>
</table>
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.


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C


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G


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K


M


P


Q


R

Rainmaker Information (1999), *Rainmaker Roundup*, December Quarter

Rainmaker Information (2000), *Rainmaker Roundup*, September Quarter

Rainmaker Information (2000), *Mandate Analysis*


SBC Warburg Australia, Technical Booklet, 2nd Edition


Towers Perrin *Pooled Funds Survey*, 30 March 1999


UBS Warburg Australia, Monthly Index Update, November 1999


W


Z