Published in *Journal of Asset Management*, Vol. 2(4): pp303-324, 2002

THE EVALUATION OF ACTIVE MANAGER RETURNS IN A NON-SYMMETRICAL ENVIRONMENT*

Ron Bird [a]

David R. Gallagher [b, **]

[a] School of Finance and Economics, University of Technology, Sydney, NSW 2007
[b] School of Business, The University of Sydney, Sydney, NSW 2006

Abstract

This paper examines the moments of the active return distributions of investment managers. While Modern Portfolio Theory (MPT) assumes asset return distributions are Gaussian Normal, the empirical evidence overwhelmingly documents asset returns to be leptokurtic and fat-tailed. In addition, the evaluation of investment manager performance has relied almost exclusively on the CAPM, which assumes investors are only concerned with the interaction between the first and second moments of a return distribution – mean and variance. However, little empirical work exists evaluating the implications for performance measurement methods of taking into account the higher moments of active return distributions - namely skewness and kurtosis. This paper takes up this issue with respect to the performance of funds invested in domestic equities, domestic fixed interest and international equities sectors on behalf of investors in Australia, Canada, Japan, the U.K. and the U.S. First, the paper documents active fund returns distributions to be inconsistent with a Gaussian normal distribution, confirming previous studies examining asset returns. Second, the paper demonstrates the usefulness of the higher moments of fund active return distributions in evaluating portfolio performance and risk. Third, the paper further extends the performance measures to take account of the investors differential preference between added value in rising and falling markets. We conclude that more work needs to be done in all of these areas but that this paper provides a very useful step along the way.

JEL classification: G10, G23

Keywords: Investment Performance; Moments of Distributions, Normality, Performance

Rankings

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* Research funding by the WM Mercer Global Investment Forum is gratefully acknowledged. We thank Russell Clarke, David Hartley and Bill Muysken at WM Mercer, and Peter Swan at The University of Sydney for helpful comments.
** Corresponding author. Mail: Securities Industry Research Centre of Asia-Pacific (SIRCA), P.O. Box H58 Australia Square, Sydney, NSW 1215, Australia. Telephone: (+61 2) 8296 7841, Facsimile: (+61 2) 9299 1830, E-mail: david@sirca.org.au

1 INTRODUCTION

The most critical foundation of modern portfolio theory centres on the relationship between risk and return. Numerous authors beginning with Markowitz (1952) and particularly extending to Sharpe (1964) and Lintner (1965) with the Capital Asset Pricing Model (CAPM) have contributed to our understanding as to how risky assets are priced in the market. However, the theoretical CAPM has been the subject of many criticisms over time. In particular, Leland (1999) identifies two problems concerning the CAPM assumptions. First, asset returns are assumed to follow a *Gaussian* (or normal) distribution. Second, from a performance evaluation perspective, the CAPM assumes investors only price assets in terms of mean and variance of returns, assuming that the higher moments of a return distribution are irrelevant.[1] This paper provides analysis of active manager return distributions in a manner that accounts for non-symmetries, such that improved inferences can be made concerning the performance and risk attributes of investment managers.

In terms of the empirical evidence, the normality assumption of the CAPM breaks down and the literature has widely documented asset returns as being inconsistent with a normality-based 'bell-shaped' distribution (for example, see Campbell *et al.* (1997)). Indeed, asset return distributions are shown to exhibit leptokurtic tendencies and 'fat-tails'.[2] Normality is also violated when skewness is present in the distribution. It follows that the use of non-normal return distributions within CAPM-based performance evaluation techniques can lead to inaccurate performance inferences.

A second problem with the CAPM is the over-simplified assertion that a two-parameter model of portfolio selection, namely mean and variance of asset returns, accurately reflects investor preferences. However investors are highly likely to be concerned with the higher moments of return distributions, especially skewness and

probably kurtosis. Kraus and Litzenberger (1976) when extending the CAPM to take account of the effect of skewness in a three-parameter model that investors are not only averse to variance but also exhibit a preference for positive skewness. Further, the CAPM assumes investors are invariant to market conditions, however it is unlikely that this proposition holds in reality (e.g. see Sortino and Forsey (1996)). The work in the area of behavioural finance concludes that investors much more dislike losses than they like gains (see De Bondt and Thaler (1994)) suggesting that outperformance in a down market is valued much more highly than outperformance in an up market.

This paper examines the active return distributions of active investment managers and based upon our findings extends the traditional performance evaluation techniques to the higher moments of the return distributions. The paper evaluates the first four moments of active returns (differential fund returns from the benchmark return) of investment managers across 5 countries (Australia, Canada, Japan, the United Kingdom and United States), where analysis is performed across three asset classes - domestic equities, international equities and domestic fixed interest. Our findings are significant in providing a better understanding of the risks associated with professional management across a wide range of portfolios as well as providing new insights in how to best measure from an investor's perspective, the performance of the managers of these portfolios.

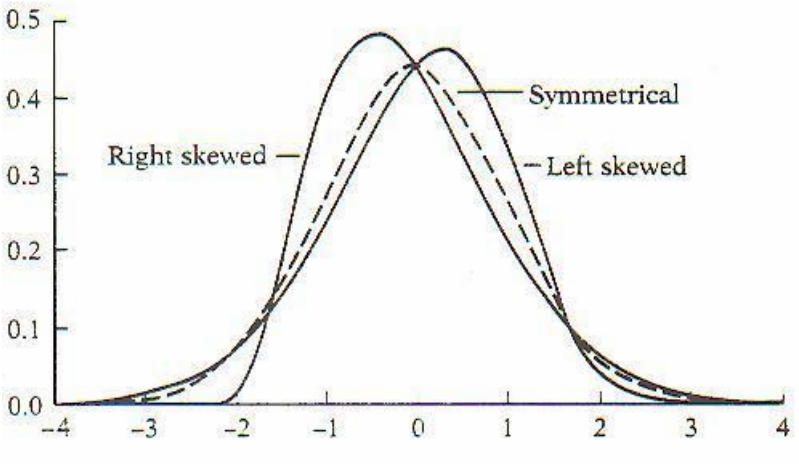
The remainder of this paper is structured as follows. Section 2 describes the preferences of the moments of active return distributions expected by investors from their active managers. Section 3 outlines the data and the methodology employed in the study. Section 4 provides a discussion of the empirical results and the final section concludes the paper and makes suggestions for future research.

2 DISTRIBUTIONAL PROPERTIES OF ACTIVE RETURNS AND THE PREFERENCES OF INDIVIDUAL INVESTORS

The Gaussian Normal distribution is the best known of all theoretical probability distributions in statistics and its citation in various asset pricing models in finance, including the CAPM, is well documented. Indeed, the performance evaluation literature has relied heavily on the assumptions of the CAPM, namely (1) that asset returns are normally distributed and (2) investors should only be concerned with mean and variance (the first and second moments of a return distribution). The pioneering portfolio evaluation techniques of Sharpe (1966), Jensen (1968, 1969) and Treynor (1965) are all firmly grounded in MPT theory and the underpinnings of the CAPM. However, the literature has widely confirmed the distributional properties of asset returns are inconsistent with a Normal distribution. If the CAPM does not accurately capture or measure portfolio risk (β), then the risk-adjusted performance measure (α) will provide analysts with incorrect inferences concerning investment performance. An extension of the performance evaluation techniques beyond the two-parameter model of mean and variance to allow for additional distributional properties provides us with the opportunity to quantify both portfolio risk and performance in a way that is more consistent with the preferences of the end investor.

Additional metrics which include the higher moments of a return distribution, namely skewness and kurtosis, provides performance analysts with an improved understanding of the risk characteristics exhibited by investment portfolio. Skewness measures the symmetry or lack thereof of a distribution. Perfect symmetry is consistent with a Gaussian Normal distribution, where the mean, median and mode all exhibit the same value. The direction of skewness can be ascertained with reference to the location of the distribution's tail (see figure 1). If skewness is present in the distribution, either positive or negative, the assumptions of normality are violated.[3]

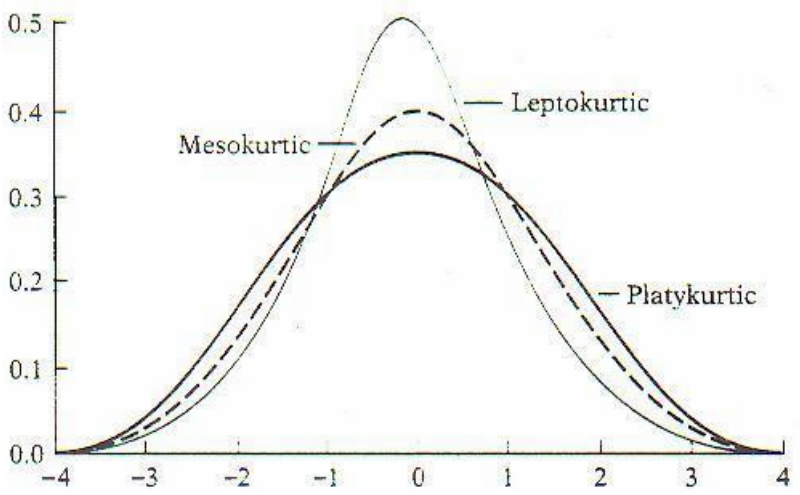
Figure 1 – Skewness of the Distribution



Source: Gujarati (1995), p770

Kurtosis on the other hand is the fourth moment of the distribution about the mean and measures whether the data or more peaked or flat relative to the Normal. Figure 2 shows distributions relative to the Normal which are either leptokurtic (positive kurtosis) or platykurtic (negative kurtosis). Data sets with a high kurtosis tend to have a distinct peak near the mean and decline rather rapidly. On the other hand, data sets with low kurtosis tend to have a flat top near the mean rather than a sharp peak. If kurtosis differs from the Normal distribution, assumptions of normality cannot be made. To assess whether the distribution exhibits heavier tails than the Normal, analysis of potential outliers is required (both graphical and computational).

Figure 2 – Kurtosis of the Distribution



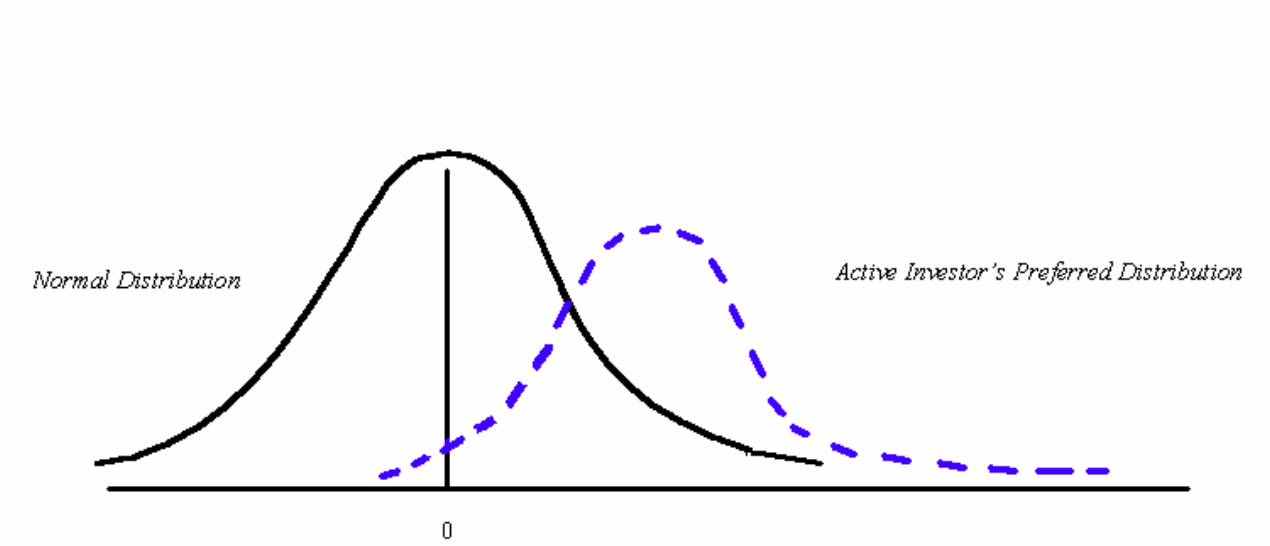
Source: Gujarati (1995), p770

2.1 Evaluating Active Return Distributions and Performance Measurement

While there exists small differences in the risk-adjustment metrics proposed by Treynor (1965), Sharpe (1966), Jensen (1968, 1969), the common ground shared by all of them is a reliance on only the first and second moments of the return distribution. While the performance evaluation models have been further developed since the 1960's, principally using an extension of the Jensen's alpha approach, the academic literature has largely ignored other dimensions of portfolio performance. Leland (1999) strongly advocates the use of additional risk measures embodied in the higher moments of return distributions. These higher moments (including skewness and kurtosis) capture additional elements of portfolio risk as well as more accurate information content in order to critique the active management ability of professional investors. Indeed, Cotton (2000) argues that skewness and kurtosis can be observed as 'surprises' from what may be considered as either 'normal' or 'expected'. In the case of active return distributions of investment managers, skewness is related to the

direction of surprises and kurtosis to the frequency of surprises. In understanding how performance should be assessed, the properties of active return distributions desired by investors require explicit definitions. Figure 3 provides our perspective of the distributional properties preferred by investors employing the services of active investment managers.[4]

Figure 3 – Active Investor's Preferred Performance Distribution Relative to the Normal Distribution



In general wealth maximising, risk-averse investors, engaging the services of an active investment manager would be expected to hold the following *a priori* preferences of the active return distribution as follows:

Mean – investors should expect active managers to deliver fund returns exceeding the benchmark index over the long-term. A positive mean is therefore important as this measure conveys the 'central tendency' of an active manager's performance over time. Investors using the services of active managers assume capital markets have imperfections, where inefficiencies can be exploited through the accumulation and synthesis of price-sensitive information. Active managers earning

positive active returns, on average, satisfy the first prerequisite for satisfactory performance. However the way that this satisfactory performance has been provides is also important to investors and this is captured by the next three moments of the active return distribution.

Standard Deviation – Risk-averse, return maximising investors are assumed to be willing to trade-off higher return against increased volatility as is reflected in the often-used Sharpe reward-to-variability. In other words, investors are assumed to dislike variability in returns and to require compensation from those managers who deliver highly volatile performance. This perception is reflected in the ever popular information ratio, defined as a fund's active return divided by the standard deviation of its active returns, which is consistent with investors requiring a higher level of outperformance of a benchmark to compensate for tracking error relative to that benchmark.

Skewness – return maximising investors, satisfying the preferences of the first and second moments have been found to strongly prefer (dislike) positive (negative) skewness where positive (negative) skewness reflects a small probability of experiencing extremely high (low) returns (Kraus and Litzenberger (1976)). With a positively skewed distribution, the majority of active return observations should be 'clumped' at left-hand side of the distribution resulting in the mean active return exceeding the median active return. The main problem associated with determining the ability of a manager to deliver positive skewness to its clients is that this assessment will necessarily be based on very few observations.

Kurtosis – provides information concerning the peakedness of a fund's active return distribution. The higher (lower) the distribution's peak, the greater (lower) the proportion of returns clustered around the mean and so the greater (lesser) the predictability of performance. Roll (1992) argues that investors would prefer active

investment managers delivering a fixed level of return above the benchmark, which is consistent with zero tracking error (measured as the standard deviation of differential returns earned by the fund relative to the benchmark index). If zero tracking error existed in this case, kurtosis exhibited by the distribution of active returns would be extremely peaked beyond the Normal. However kurtosis also provides a measure of the influence of extremal returns on the distribution's shape. Higher kurtosis or more peaked distributions than the Normal suggests fat-tails, or more observations falling in the extremes of the distribution. The fourth moment therefore represents another measure of risk, in terms of understanding the influence of extreme observations in the delivery of performance. Finance theory suggests risk-averse investors prefer less risk to more risk, for given levels of utility. Therefore, investors engaging the services of active managers should view kurtosis as an indication of risk inherent in the manager's performance, where high kurtosis suggests a high probability of fat-tails (or extreme returns). Kurtosis, however, should not be viewed in isolation from the other moments, but also be considered with direct reference to the mean, standard deviation and skewness of the active return distribution.

2.2 Comparing Active Return Distributions in Rising and Falling Markets

Investors would prefer the performance of active fund managers to exhibit particular characteristics, which can be assessed by examining the moments of the manager's active return distribution. However, it is not obvious they would value each of these characteristics the same way under different market conditions. In the previous discussion, outperformance of a benchmark index in a falling market may be more highly valued than active returns achieved in rising markets. Further, the return distributions of active managers may take on different characteristics under rising and falling market conditions. This all suggests a need to examine the distribution of

active manager's returns under both rising and falling markets with the possibility that the findings may suggest a need to differentiate between the performance of a manager under the two different market conditions.

2.3 The Influence of Extreme Observations in Performance Measures

The Gaussian Normal distribution discussed in section 2.1 exhibits the properties of a symmetrical distribution and where almost all observations fall within 4 standard deviations of the mean. However where active return distributions of investment managers contain extreme observations (observations exceeding 4 standard deviations from the mean), the measures of skewness and kurtosis may be biased and lead to inappropriate inferences concerning performance. The extent of the bias will be directly related to the frequency and magnitude of extreme observations comprising the distribution. One method to account for extreme returns may be to constrain observations to the bound of 4 standard deviations from the mean. This technique allows for relatively extreme observations to remain within the overall analysis while also minimising the possibility of the higher moment measures being compromised. Empirically, the frequency of active returns that may be considered 'extreme' appears to be small.

2.4 Fund Flow Response to Past Performance

Research by Gruber (1996), Sirri and Tufano (1998), Zheng (1999) and Sawicki (2000) have also evaluated the response of investor fund flows with respect to past performance. These studies report evidence consistent with a 'smart money' effect, where investors allocate capital ex-ante on the basis of past performance. However, the measures used for past performance are restricted to the first two moments of the return distribution and do not take account of the higher moments. By extending the

analysis to the higher moments, we can provide an insight into investor preferences for these moments.

3 DATA AND METHODOLOGY

3.1 Global Institutional Performance Data

The institutional performance of investment managers is evaluated across the three major asset classes, namely domestic equities, domestic fixed interest and international equity investments using data contained in the William M. Mercer Global Manager Performance Analytics (MPA) database. This provided monthly returns for Australia, Canada, and Japan and quarterly returns for the U.K and U.S. The investment returns are measured in local currency terms on a before management fees and tax basis and are inclusive of dividends and capital changes. The fund types include sector pools (or unitised 'trusts') and individually managed accounts. The Global MPA database retains the performance records of defunct funds and so this study is not subject to explicit survivorship bias but may suffer from some selection bias as the entire universe of funds are not represented.

3.2 Period of Evaluation

The 15-year period from January 1985 to December 1999 is used for Australia and Canada (monthly data), the 10-year period to December 1999 is employed for Japan (monthly data), and the 19-year period to December 1999 for both the U.K. and U.S (quarterly data). Overall, funds were required to have at least 36 observations of performance data to be included in the sample for the purposes of having a minimum number of observations that would allow for reasonable inferences to be made concerning distributional properties.

This paper primarily measures active portfolio risk in terms of each fund manager's active portfolio performance relative to the appropriate market index for each respective asset class evaluated. The indices used for the various asset classes in each of the countries are reported in Tables 1a and 1b.

Table 1a – Accumulation Indices for Countries across Domestic Equities, International Shares and Domestic Fixed Interest Sectors

	Sector Accumulation Indices		
Country	**Domestic Equities**	**International Equities**	**Domestic Fixed Interest**
Australia	ASX All Ordinaries	MSCI World (ex-Australia)	WDR Composite Bond
Canada	TSE 300	MSCI World	SCM Bond Universe
Japan	TOPIX	MSCI World ex-Japan (Kokusai)	Nomura-BPI
United Kingdom	FTSE All Share*	-	-
United States	See Table 1b Below**	MSCI World / MSCI EAFE***	Lehman Aggregate

* Small Cap Universe benchmarked to FTSE Small Cap index

** U.S. domestic equities was evaluated according to market capitalisation and value-growth biases.

*** The benchmark for U.S. Global Equities is the MSCI World and the benchmark for U.S. International Equities (ex-U.S.) is the MSCI EAFE.

Table 1b – U.S. Equity Benchmarks Dichotomised by Market Capitalisation and Style Bias

	Sector Indices		
United States	**Large-Capitalisation**	**Mid-Capitalisation**	**Small-Capitalisation**
Core	Russell 1000	Russell Midcap	Russell 2000
Value	Russell 1000 Value	Russell Midcap Value	Russell 2000 Value
Growth	Russell 1000 Growth	Russell Midcap Growth	Russell 2000 Growth

3.3 Statistical Analysis

This paper evaluates active returns in terms of the fund's differential return from the benchmark index (i.e. fund return less benchmark return). Numerous studies

employing asset returns data document the existence of leptokurtic distributions, where returns generally have higher peaks and exhibit fatter tails than is the case for a normal distribution. The higher moments of the active returns distributions may also provide information concerning the active portfolio performance of investment managers.

The first and second moments of active or excess returns, where active returns (x_p) are defined as the performance of fund p (r_p) less the return of the market (or benchmark index) (r_m) for each period ($x_p = r_p - r_m$). The standard deviation (SD) of active fund returns is measured as follows:

$$SD = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}\left[x_p - \bar{x}\right]^2} \tag{1}$$

The third and fourth moments of active fund returns may also be used in determining the shape of the probability distribution and can therefore be used as a test for normality. Skewness evaluates the symmetry of the active returns distribution for funds around the mean, where a skewness measure greater (less) than zero indicate the distribution is positively (negatively) skewed – also known as right (left) skewed. Skewness is computed as follows:

$$S = \sum_{i=1}^{N}\frac{z_i^3 N}{(N-1)(N-2)} \tag{2}$$

where $z_i = \dfrac{(x_i - \bar{x})}{\sigma}$ (3)

Kurtosis measures the frequency distribution of active fund returns to determine the 'peakedness' and the relative 'heaviness' of the distribution's tails. Distributions that are known as *Gaussian*, bell-shaped or 'normal', derive kurtosis values equal to zero and are also referred to as mesokurtic distributions. Where kurtosis values are positive (negative), this generally indicates the distribution

exhibits sharper (lower) peaks and thinner (fatter) shoulders. The nature of the tails of the distribution (either fat or thin) requires graphical and/or computational analysis with respect to the distribution's mean and standard deviation. However, in general terms, kurtosis values exceeding (less than) zero may also be called leptokurtic (platykurtic) distributions. Kurtosis (K) is measured as:[5]

$$K = \left[\sum_{i=1}^{N} \frac{z_i^4 N(N+1)}{(N-1)(N-2)(N-3)} - \frac{3(N-1)^2}{(N-2)(N-3)} \right] \tag{4}$$

For active returns following a Normal distribution, the kurtosis measure would have a zero value in accordance with equation (4).

Statistical tests are performed to evaluate how well the active return distributions reflect a Normal distribution. Statistical tests for normality can be performed using the Jarque-Bera test (a large sample test) and the Shapiro-Wilk test (for sample sizes less than 2,000).

3.4 Evaluating the Active Performance of Investment Managers

Given the assumptions of active return distributions preferred by investors, a performance score can be calculated with direct reference to the moments of active returns. The ultimate objective being to provide a basis for ranking managers that reflects investor utility across all four moments of the distribution. A number of examples of such scoring systems are given below:

(a) An equally weighted scoring system across each of the 4 moments of the distribution. The scoring system upper and lower bounds were +4 and -4 points. To combine the moments of active returns into one performance metric, we ascribe a score of –1, 0, or +1 for each component of the distribution, where a score of +1 (–1) is recorded when the moment being evaluated is consistent

(inconsistent) with an active investor's preferences. A zero score is applied if the active manager's performance, across each of the respective moments, is indifferent from the Gaussian or normal distribution. In the case of standard deviation, managers' returns greater than the average of the group scored –1 and standard deviations less than average scored +1.

(b) A weighted scoring system across all four moments and relative to other funds in the group. Preference is given to the mean and standard deviation. Funds are arranged into quintiles and then provided with the quintile rank across each of the four moments. The rank for the best (worst) quintile for each moment is 5 (1). The weights applied to each moment assumes decreasing importance for higher moments of the distribution – mean = 8, standard deviation = 4, skewness = 2, kurtosis = 1. The overall score that is highest represents the best overall fund in the group.

(c) A variation on system (b) above, where funds are classified into quintiles on the basis of their information ratios, skewness and kurtosis. The weights applying to each of the three categories are 8, 2, and 1 respectively. The overall score that is highest represents the best overall fund in the group.

Method (a) differs from (b) and (c) in that it regards all four moments as being of equal importance when it comes to measuring manager performance. In reality, investors are likely to be more concerned with the *earlier* (lower) moments than the *latter* (higher) moments and this is reflected in methods (b) and (c). In addition, investors are likely to attach decreasing weights in importance terms with respect to the moments. Obviously the proposed methods are somewhat *ad hoc* and will be the

subject of further analysis. However, we do obtain some insight into the preference of investors when we investigate the relationship between fund flows and the first four moments of the return distribution.

The various scoring systems may also be applied to investment manager active returns according to up and down markets. For example, investors may attach greater value to the properties of active return distributions derived in down markets than is the case for rising markets. By computing a single score we are giving equal weight to performance generated in both up and down markets which is clearly inappropriate if investors are more concerned with manager's performance in a down market than an up market. One way to account for this is to separately calculate a manager's performance score in up and down markets, apply a double weighting to the score obtained in the down market and then combine the two scores.

3.5 Analysis of Fund Flows and the Moments of Active Performance

To determine the sensitivity of investors to each of the moments of a return distribution, a methodology is required to which directly links the way that investors value each of the moments. The theoretical discussion suggests risk-averse, return maximising investors exhibit preferences which are positively related to the information ratio, combining both the first and second moments (mean divided by standard deviation in the period), positively related to the third moment (skewness) and negatively related to the fourth moment (kurtosis).

A cross-sectional regression is applied to determine investor's sensitivity to the average normalised net fund flow activity (or rate of increase/decrease in fund size). Normalised fund flows are important, as the analysis needs to be performed independently to the absolute size of fund assets. The paper assumes investors evaluate investment performance using the past three-year horizon, where cash flows

in the following 12-month period (or out-of-sample period) are hypothesised to indicate an investor's sensitivity to, and preference for, past performance. The moments of fund performance are measured using calendar year-end periods. The assumption inherent in the analysis is that a three-year horizon represents an acceptable time-period for the evaluation of investment performance. In addition, three years of monthly data is an appropriate minimum number of data observations performance analysts should use in computing meaningful higher moments.

The sample data employed evaluates 68 active institutional Australian equity funds in the 11-year period to December 1999. Morningstar provided the returns and fund size data for both surviving and non-surviving institutional funds, where funds are broad equity funds. Large and small-capitalization equity funds were excluded. The appropriate benchmark for performance purposes for the sample is the ASX All Ordinaries Accumulation Index. The Morningstar database reports performance after expenses for the sample of funds evaluated. The cross-sectional regression is estimated as follows:

$$CF_{pt+1} = \alpha + \beta_{IR} IR_{pt} + \beta_{Sk} SKEW_{pt} + \beta_{Ku} KURT_{pt} + \varepsilon_{pt} \quad (5)$$

where

CF_{pt+1} = the average normalised cash flow of fund p in the twelve month period post the 3-year performance horizon;

IR_{pt} = the information ratio (mean divided by standard deviation) of fund p in the three-year period;

$SKEW_{pt}$ = the skewness of fund p in the three-year period;

$KURT_{pt}$ = the kurtosis of fund p in the three-year period;

ε_{pt} = a random error term.

4 EMPIRICAL RESULTS

4.1 Cross-sectional Inferences Concerning the Moments of Active Returns

The cross-sectional results concerning the moments (mean, standard deviation, skewness and kurtosis) of active fund returns in Australia, Canada, Japan, U.K. and U.S. are presented in Table 2 for Domestic Equities (Panel A), International Equities (Panel B) and Domestic Bonds (Panel C). The results indicate that the majority of the funds within most of the sub-groups exhibit distributional properties that are inconsistent with a Gaussian (normal) distribution. In particular, Normal distributions require the mean and median to be equal, and the computational values derived for skewness and kurtosis to be zero.

In general, funds have leptokurtic distributions (or more peaked) around the mean than is the case for the standard normal distribution, with the majority of funds displaying kurtosis values exceeding zero. In addition, the majority of funds are shown to have active return distributions that are positively skewed, with the exception of those in the fixed interest sector. Not surprisingly given these results, our analysis (not reported in this study) found that the majority of funds failed the Normality test (at the 95 percent confidence level).

An interesting finding for US Equities can be gleamed from the sample of 'value' or 'growth' funds across the entire market capitalisation spectrum. The results show that a greater proportion of growth funds have average and median returns greater than zero than is the case for value funds (see Panel B). This reflects that the growth stocks are a less homogeneous group than the value stocks, which is a finding entirely consistent with how the groups are formed. The universe of value managers are typically chosen on the basis that the manager takes a contrarian approach to choosing stocks usually based on one or more value criteria (e.g. book-to-market, price-to-

sales). In contrast, growth managers are chosen on the basis that they are not value managers and so represent a vast array of management styles.

4.2 Cross-Sectional Differences in Moments According to Market Conditions

Table 3 presents the results on the different distributional properties of managers in rising and falling markets and therefore provides an examination of whether managers display different performance characteristics according to market conditions. The most striking result is the significantly higher mean active returns earned by fund managers in 'down' markets compared with 'rising' markets in most markets (witnessed by the negative sign as reported in Panel A).

The findings for the other moments (standard deviation, skewness and kurtosis) are less conclusive in a statistical sense between rising and falling markets. However there appears to be some tendency for managers in down markets to exhibit:

- lower standard deviations in domestic equities and higher standard deviations in international equities and domestic fixed interest;
- distributions being more right skewed than is the case for rising markets; and
- distributions that are generally less peaked than is the case with rising markets.

The overall result is that managers realise higher added value in down markets than up markets, however the findings for the other moments are less strong and mixed. This finding is indicative that managers as a group are in tune with the needs of clients who favour added value in down markets significantly more than they do in up markets. As this is a relatively important finding, we chose to investigate it further by examining the extent to which it is merely a reflection of the cash holdings of managers. In order to investigate this, we repeated the analysis by assuming each fund held 5 percent of the fund's assets in cash.[6] Our results (not reported) indicated that the 5 percent cash holdings explain most of the better "down market" performance of

managers in the domestic markets but not in the global equities market where they still remain strong.

4.3 Active Return Distributions and the Ranking of Active Investment Manager Performance

Traditional performance evaluation metrics applied to investment manager returns consider only the first two moments of a manager's time-series of returns. For example, the information ratio (referred to as IR) is widely used throughout the investment management industry to quantify the average active return per unit of risk exhibited by the fund over the period. However, such measures ignore the higher moments of a fund's return distribution, which can provide additional information concerning the delivery of performance to investors. Indeed, the need to consider these higher moments (skewness and kurtosis) when evaluating a manager's performance is further enhanced given our findings that they typically take on non-zero values for most managers.

In order to evaluate the impact of incorporating the higher moments in evaluating a manager's performance, we applied each of the three methods outlined in Section 3.4 as well the fund's information ratio and our findings are reported in Tables 4a, 4b and 4c for each of our sub-groups.

Using the rankings derived from the IR as a benchmark, we compared the rankings under each of the three expanded methods with those using the IR by calculating the Spearman's Rank Correlation Coefficient (SRCC) between each set of rankings. The results presented in Table 4d provide an indication of the stability of the rankings under each of the methods for each of the Australian sub-groups. All performance measures provide statistical evidence of strong positive correlation in rankings, with the exception of performance method (a) when applied to Australian

equities and Australian fixed interest. These results suggest that the traditional measures used in ranking the performance of investment managers (i.e. annualised returns and information ratio) are strongly correlated with the preferred performance measures (methods (a), (b) and (c)) which account for the higher moments of active return distributions.

Tests were also performed (but are not reported) to determine the sensitivity of our results to (1) applying different weights to each of the moments when calculating a manager's score, and (2) alternative ways of handling extreme observations (measured as greater than 4 standard deviations from the mean). In both cases, we found that the stability of the rankings were basically unchanged from those reported in Tables 4(d) provided a sliding scale was maintained in the weights applied to each of the four moments (as in methods (a), (b) and (c)).

Evaluation of the performance methods across rising and falling markets was also performed to determine whether the rankings change under different market conditions. We report in Tables 5a, 5b and 5c the performance of the managers with each sub-group in both rising and falling markets applying the four performance measurement methods. As a measure of the stability of performance rankings of investment managers under the different market conditions, Table 5d presents the Spearman correlations for Australian equities, international equities and Australian fixed income sectors. The clear inference that can be drawn from our findings is that, with the possible exception of Australian equities, there is no consistency in the rankings of managers over rising and falling markets. This evidence of the lack of consistency of manager performance across differing market conditions when combined with previously discussed evidence that investors strongly prefer a manager to outperform during falling markets suggests that higher weighting should be given

to the scores (regardless of the method used) obtained in falling markets than in rising markets.

4.4 Fund Flow Response to the Moments of Active Investment Performance

Based upon previous discussion in the paper, it would be highly desirable to obtain empirical evidence of investors' preferences across the first four moments of a fund's active return distribution. Ideally, establishing the association between the market's support (or preference) for a fund and its characteristics would provide this evidence. The variable that we have chosen to use to provide a measure investor support is the flow of funds into each fund. We used this measure as the independent variable in Equation 5 to obtain insights into investor preferences across a fund's information ratio, skewness and kurtosis and our findings are reported in Table 6. Our findings support that investor preferences are significantly aligned with the magnitude of a fund's information ratio. Further, they provide weak support that investors prefer positive skewness and negative kurtosis in the return distribution. We would argue that one reason the analysis is unable to provide strong evidence to support the importance of skewness and kurtosis is that (i) the flow of funds into the investments products provides a weak proxy for investor preferences and (ii) the limited data available to estimate the relationships. The *F*-statistic does not allow for rejection of the null hypothesis that at least one of the variables is zero. Future research should be performed with a larger sample of data and/or an improved proxy for investor preferences in order to obtain better measures of the true importance of these higher moments.

5 SUMMARY & SUGGESTIONS FOR FUTURE RESEARCH

The objective of this study is to evaluate the distributional properties of active returns of investment managers across the different asset classes in Australia, Canada, Japan, the U.K. and U.S. We established that for most funds the distribution of active returns is non-normal, typically displaying both positive skewness and leptokurtosis (i.e. peakedness). The results also show that managers earn significantly higher active returns in falling markets with it being demonstrated that this finding can be partly explained by the cash holdings in investment manager portfolios.

The paper also proposed a number of performance ranking methods that attempt to take account of an investor's preferences for the higher moments of an investment manager's active return. While there is a high degree of consistency in the performance rankings determined using the proposed and more traditional evaluation methods, the methods proposed in this paper may be regarded as embryonic. Although we have taken an initial step to try and better understand the investor preference for the higher moments of the return distribution, we suggest that much more needs to be done in this area to enable us to better weight the higher moments within a performance measurement method.

We also evaluated in this paper the implications of the preferences of investors for added value in down markets as compared to up markets. We clearly established that there is little relationship between a manager's performance during each of these market conditions. This suggests a need for performance evaluation techniques to account differently for a manager's performance in rising and falling markets as this may well prove significant in determining their overall ability to manage funds.

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TABLE 2 – Cross-Sectional Summary Statistics of the Moments of Active Return Distributions: Domestic Equities, Global Equities, Domestic Bonds. The table shows the proportion of funds in the sample according to distribution properties.

Country	Sample Size	Mean>0	Median>0	Mean> Median	Skew<0	Kurtosis >0
Panel A: Domestic Equities						
Australia	33	81.8	81.8	57.6	48.5	87.9
Canada	69	43.5	49.3	43.5	55.1	94.2
Japan	116	65.5	62.9	62.9	44.8	94.8
UK – Large Cap	59	50.8	35.6	71.2	27.1	89.8
UK – Small Cap	16	56.3	50.0	81.3	31.2	100.0
US – Large Core	108	66.7	62.0	55.6	39.8	75.9
US – Large Value	160	42.5	43.8	56.9	41.9	79.4
US – Large Growth	166	51.2	47.6	65.7	47.0	78.9
US – Mid-Cap Core	12	75.0	66.7	41.7	66.7	83.3
US – Mid-Cap Value	26	46.2	46.2	57.7	46.2	80.8
US – Mid-Cap Growth	47	72.3	80.9	57.4	42.6	85.1
US – Small-Cap Core	22	86.4	95.5	54.5	50.0	95.5
US – Small-Cap Value	50	82.0	72.0	52.0	50.0	78.0
US – Small-Cap Growth	82	95.1	96.3	56.1	43.9	81.7
Panel B: Global Equities						
Australia (ex Aus)	43	44.7	46.8	48.9	53.2	85.1
Canada (ex Can)	35	34.3	37.1	54.3	51.4	82.9
Japan (ex Jap)	56	25.0	26.8	39.3	35.7	94.6
US – All Funds (ex US)	101	95.0	86.1	60.4	15.8	92.1
US – Core (ex US)	26	96.2	96.2	53.8	15.4	92.3
US – Value (ex US)	26	88.5	76.9	65.4	15.4	92.3
US – Growth (ex US)	49	98.0	85.7	61.2	16.3	91.8
US - Global	38	81.6	68.4	73.7	23.7	81.6
Panel C: Domestic Bonds						
Australia	27	88.5	96.2	50.0	61.5	96.2
Canada	62	43.5	43.5	50.0	67.7	95.2
Japan	64	21.9	26.6	32.8	67.2	100.0
US	167	74.3	70.7	60.5	46.1	94.0

TABLE 3 – Cross-Sectional Average Differences in Market Conditions: Up-Markets versus Down Markets (Rising Market minus Falling Market) for Domestic Equities, Global Equities, Domestic Bonds

This analysis was performed by partitioning manager's active returns on the basis of whether the market index was positive or negative across months or quarters (depending on the frequency of the data available). Descriptive statistics for each manager was then performed for both up and down-market time-series. At the sector level across managers, statistical tests were performed to determine whether there existed a significant difference in the averages of the four moments – mean, standard deviation, skewness and kurtosis.

Country	**Mean**	***t*-stat**	**SD**	***t*-stat**	**Skew**	***t*-stat**	**Kurt**	***t*-stat**
Panel A: Domestic Equities								
Australia	-0.209	-1.94 *	0.076	0.76	-0.249	-0.94	-0.729	-0.79
Canada	-0.848	-10.61 ***	0.380	2.99 ***	-0.136	-0.65	2.283	1.64
Japan	-0.664	-8.90 ***	-0.214	-1.25	-0.755	-4.92 ***	-0.471	-0.79
UK – Large Cap	-0.604	-4.30 ***	-0.080	-0.26	-1.030	-3.05 ***	1.189	0.89
UK – Small Cap	0.437	1.13	1.168	1.63	0.252	0.42	5.220	2.47 **
US – Large Core	-0.798	-5.52 ***	0.073	0.37	-0.176	-1.17	0.593	1.39
US – Large Value	-0.677	-5.10 ***	-0.137	-1.10	0.083	0.82	0.489	1.99 **
US – Large Growth	-1.260	-8.63 ***	0.248	1.55	-0.148	-1.46	1.659	5.63 ***
US – Mid-Cap Core	-0.113	-0.21	0.012	0.03	0.360	0.95	1.378	1.57
US – Mid-Cap Value	-1.423	-5.12 ***	-0.283	-1.09	-0.090	-0.40	1.469	2.35 **
US – Mid-Cap Growth	0.171	0.44	1.005	2.48 **	-0.399	-1.70 *	3.461	4.48 ***
US – Small-Cap Core	-0.545	-0.97	0.123	0.17	-0.556	-1.45	0.257	0.24
US – Small-Cap Value	-0.237	-0.95	0.696	2.72 ***	-0.282	-1.68 *	0.968	2.28 **
US – Small-Cap Growth	-0.534	-2.09 **	0.645	2.40 **	-0.049	-0.30	0.797	1.75 *
Panel B: Global Equities								
Australia (ex Aus)	-0.870	-8.27 ***	-0.175	-1.37	-0.278	-1.52	-0.385	-0.63
Canada (ex Can)	-1.203	-7.78 ***	-0.164	-0.84	-0.440	-2.82 ***	0.628	1.75 *
Japan (ex Jap)	-0.285	-3.90 ***	-0.062	-0.37	-0.105	-0.56	-0.113	-0.17
US – All Funds (ex US)	-3.185	-16.97 ***	-0.682	-2.66 ***	-0.272	-2.54 **	0.483	1.70 *
US – Core (ex US)	-3.090	-8.31 ***	-0.989	-1.98 *	-0.892	-4.61 ***	-0.273	-0.51
US – Value (ex US)	-3.679	-9.33 ***	-0.824	-1.64	-0.638	-3.34 ***	-0.155	-0.41
US – Growth (ex US)	-2.973	-11.47 ***	-0.444	-1.26	0.253	1.68 *	1.222	2.66 ***
US - Global	-1.658	-6.87 ***	-0.783	-2.28 **	-0.240	-1.13	2.328	2.78 ***
Panel C: Domestic Bonds								
Australia	0.033	1.11	-0.105	-1.60	0.349	0.74	1.460	0.77

Canada	-0.178	-5.50***	-0.049	-0.94	-0.595	-2.14 **	2.627	1.53
Japan	-0.176	-7.98***	-0.021	-0.52	-0.498	-1.80 *	0.520	0.57
US	0.097	1.53	-0.074	-0.92	-0.356	-2.34 **	1.568	3.91 ***

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

TABLE 4a – PERFORMANCE RANKINGS BASED ON HIGHER MOMENTS OF ACTIVE RETURN DISTRIBUTIONS

5-Year Australian Equities Performance to December 1999

Manager Code	**(%pa)**	**Rank**	**IR (pm)**	**Rank**	**System (a)**	***Rank (a)***	**System (b)**	***Rank (b)***	**System (c)**	***Rank (c)***
AMP	15.3	*10*	0.06	*9*	0	*6*	46	*9*	34	*8*
AXAA	15.9	*8*	0.10	*7*	2	*2*	48	*7*	36	*7*
BNP	22.0	*2*	0.52	*1*	0	*6*	62	*2*	54	*1*
CSAM	17.7	*5*	0.28	*4*	2	*2*	60	*4*	44	*5*
DFA	19.1	*4*	0.17	*6*	0	*6*	55	*5*	43	*6*
FSFM	22.9	*1*	0.47	*2*	-2	*12*	53	*6*	49	*3*
GIO	14.6	*13*	-0.02	*13*	-2	*12*	41	*12*	21	*12*
MACQ	12.5	*16*	-0.11	*15*	-4	*15*	17	*15*	13	*14*
MLCSF	15.3	*11*	0.05	*12*	2	*2*	45	*10*	25	*11*
MML1	19.3	*3*	0.31	*3*	0	*6*	61	*3*	53	*2*
NAAM1	15.9	*7*	0.10	*8*	0	*6*	39	*13*	27	*9*
ROTH1	15.4	*9*	0.05	*11*	0	*6*	44	*11*	20	*13*
SCHR1	17.4	*6*	0.26	*5*	4	*1*	67	*1*	47	*4*
SMF	12.8	*15*	-0.15	*16*	-4	*15*	16	*16*	12	*16*
UBS	14.0	*14*	-0.08	*14*	-2	*12*	21	*14*	13	*14*
WEST1	15.2	*12*	0.05	*10*	2	*2*	47	*8*	27	*9*
Average	16.6	-	0.1	-	-0.1	-	45.1	-	32.4	-
Maximum	22.9	-	0.5	-	4	-	67	-	54	-
Minimum	12.5	-	-0.2	-	-4	-	16	-	12	-

TABLE 4b – PERFORMANCE RANKINGS BASED ON HIGHER MOMENTS OF ACTIVE RETURN DISTRIBUTIONS

5-Year Australian-based International Equities Performance to December 1999

Manager Code	**(%pa)**	**Rank**	**IR (pm)**	**Rank**	**System (a)**	***Rank (a)***	**System (b)**	***Rank (b)***	**System (c)**	***Rank (c)***
ABNAM	29.5	*4*	0.28	*3*	2	*1*	63	*1*	51	*2*
AMP	21.5	*19*	-0.20	*21*	-2	*12*	39	*18*	19	*19*
AXAA	22.2	*17*	-0.15	*17*	0	*3*	45	*14*	25	*18*
BT	23.2	*10*	-0.02	*8*	-4	*19*	46	*12*	38	*9*
BTS	25.1	*6*	0.05	*6*	-2	*12*	51	*8*	47	*6*
COMM	22.8	*15*	-0.06	*12*	-4	*19*	41	*17*	29	*13*
CSAM	31.2	*3*	0.32	*2*	0	*3*	60	*2*	52	*1*
FIDAG	34.2	*2*	0.27	*4*	0	*3*	55	*6*	51	*2*
GMO	21.0	*21*	-0.20	*23*	-2	*12*	27	*22*	11	*23*
HSBC1	23.1	*12*	-0.06	*11*	0	*3*	47	*10*	35	*11*
LAZF	22.9	*14*	-0.06	*14*	-4	*19*	32	*20*	28	*16*
MACL	20.2	*23*	-0.14	*16*	-2	*12*	25	*23*	29	*13*
MAM1	23.3	*9*	-0.03	*9*	-2	*12*	48	*9*	44	*7*
MLC-DF	23.4	*8*	-0.04	*10*	0	*3*	58	*3*	42	*8*
MLC-SF	22.9	*13*	-0.06	*13*	0	*3*	46	*12*	34	*12*
OPPEN	25.3	*5*	0.05	*5*	0	*3*	58	*3*	50	*5*
PICTET	22.4	*16*	-0.16	*18*	0	*3*	47	*10*	27	*17*
ROTH1	22.1	*18*	-0.20	*20*	-2	*12*	44	*16*	16	*21*
RTHPUT	34.8	*1*	0.35	*1*	0	*3*	55	*6*	51	*2*
SCHR1	21.5	*20*	-0.18	*19*	-4	*19*	33	*19*	17	*20*
SCUD	24.2	*7*	0.00	*7*	-2	*12*	45	*14*	37	*10*
SMF	20.6	*22*	-0.20	*22*	-4	*19*	31	*21*	15	*22*
SSB1	23.1	*11*	-0.09	*15*	2	*1*	57	*5*	29	*13*
Average	24.4	-	0.0	-	-1.3	-	45.8	-	33.8	-
Maximum	34.8	-	0.4	-	2	-	63	-	52	-
Minimum	20.2	-	-0.2	-	-4	-	25	-	11	-

TABLE 4c – PERFORMANCE RANKINGS BASED ON HIGHER MOMENTS OF ACTIVE RETURN DISTRIBUTIONS

5-Year Australian Fixed Interest Performance to December 1999

Manager Code	**(%pa)**	**Rank**	**IR (pm)**	**Rank**	**System (a)**	***Rank (a)***	**System (b)**	***Rank (b)***	**System (c)**	***Rank (c)***
AMP	10.1	*11*	0.10	*9*	0	*4*	39	*11*	19	*12*
AXAA	10.4	*8*	0.19	*4*	2	*1*	52	*7*	52	*4*
BNP	11.0	*1*	0.18	*6*	0	*4*	53	*5*	41	*6*
BT	10.6	*4*	0.19	*5*	0	*4*	53	*5*	53	*1*
CNTY1	10.3	*9*	0.09	*10*	-2	*10*	43	*9*	27	*9*
CSAM	10.4	*7*	0.40	*2*	2	*1*	57	*2*	53	*1*
GIO	10.5	*6*	0.14	*7*	0	*4*	55	*3*	39	*7*
JBW	10.1	*12*	0.06	*11*	0	*4*	36	*12*	20	*11*
MLC1	9.7	*14*	-0.10	*14*	-4	*14*	23	*14*	11	*14*
MML1	10.2	*10*	0.06	*12*	-2	*10*	34	*13*	22	*10*
ROTH1	11.0	*2*	0.19	*3*	-2	*10*	54	*4*	50	*5*
RSA	10.6	*5*	0.13	*8*	-2	*10*	46	*8*	34	*8*
SMF	10.7	*3*	0.45	*1*	2	*1*	73	*1*	53	*1*
UBS	10.1	*13*	0.04	*13*	0	*4*	42	*10*	14	*13*
Average	10.4	-	0.2	-	-0.4	-	47.1	-	34.9	-
Maximum	11.0	-	0.5	-	2	-	73	-	53	-
Minimum	9.7	-	-0.1	-	-4	-	23	-	11	-

TABLE 4d – STABILITY OF PERFORMANCE RANKINGS – SPEARMAN'S RANK CORRELATION TEST

	(%pa)	**IR (pm)**	**System (a)**	**System (b)**	**System (c)**
Panel A: Australian Equities					
% pa	1.000	-	-	-	-
IR (pm)	0.974***	1.000	-	-	-
System (a)	0.283	0.164	1.000	-	-
System (b)	0.841***	0.889***	0.58***	1.000	-
System (c)	0.924***	0.975***	0.49***	0.937***	1.000
Panel B: International Equities					
% pa	1.000	-	-	-	-
IR (pm)	0.947***	1.000	-	-	-
System (a)	0.502**	0.383*	1.000	-	-
System (b)	0.859***	0.749***	0.754***	1.000	-
System (c)	0.932***	0.971***	0.480**	0.820***	1.000
Panel C: Australian Fixed Interest					
% pa	1.000	-	-	-	-
IR (pm)	0.777***	1.000	-	-	-
System (a)	0.206	0.636**	1.000	-	-
System (b)	0.794***	0.903***	0.582**	1.000	-
System (c)	0.783***	0.959***	0.580**	0.869***	1.000

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

TABLE 5a –PERFORMANCE RANKINGS ACCORDING TO MARKET CONDITIONS

5-Year Australian Equities Performance to December 1999

Manager Code	**IR**	***Rank***	**(b)**	***Rank (b)***	**(c)**	***Rank (c)***	**IR**	***Rank***	**(b)**	***Rank (b)***	**(c)**	***Rank (c)***	**IR**	***Rank***	**(b)**	***Rank (b)***	**(c)**	***Rank (c)***
	Rising Market (43 Months)						***Falling Market (17 Months)***						***Overall Market Conditions***					
AMP	0.09	*10*	56	*6*	36	*9*	-0.02	*11*	42	*11*	22	*12*	0.05	*11*	140	*9*	80	*11*
AXAA	0.21	*6*	60	*4*	44	*5*	-0.25	*15*	31	*14*	15	*15*	-0.29	*13*	122	*13*	74	*13*
BNP	0.40	*2*	61	*2*	53	*2*	0.97	*1*	65	*2*	53	*1*	2.34	*1*	191	*2*	159	*1*
CSAM	0.34	*3*	54	*7*	50	*3*	0.10	*9*	59	*4*	39	*7*	0.54	*7*	172	*3*	128	*5*
DFA	0.18	*7*	51	*9*	39	*7*	0.16	*8*	57	*5*	37	*8*	0.5	*8*	165	*5*	113	*7*
FSFM	0.44	*1*	54	*7*	50	*3*	0.54	*4*	51	*8*	43	*5*	1.52	*2*	156	*7*	136	*4*
GIO	-0.15	*14*	35	*12*	19	*13*	0.25	*7*	52	*7*	44	*4*	0.35	*9*	139	*10*	107	*8*
MACQ	-0.13	*13*	18	*16*	22	*11*	-0.09	*14*	17	*16*	13	*16*	-0.31	*14*	52	*16*	48	*16*
MLCSF	-0.15	*15*	48	*10*	20	*12*	0.68	*2*	62	*3*	50	*3*	1.21	*4*	172	*3*	120	*6*
MML1	0.32	*4*	63	*1*	55	*1*	0.31	*6*	47	*9*	43	*5*	0.94	*5*	157	*6*	141	*3*
NAAM1	0.10	*9*	43	*11*	27	*10*	0.08	*10*	44	*10*	36	*9*	0.26	*10*	131	*11*	99	*9*
ROTH1	-0.04	*11*	31	*13*	19	*13*	0.38	*5*	56	*6*	36	*9*	0.72	*6*	143	*8*	91	*10*
SCHR1	0.13	*8*	59	*5*	39	*7*	0.68	*3*	69	*1*	53	*1*	1.49	*3*	197	*1*	145	*2*
SMF	-0.17	*16*	21	*15*	13	*16*	-0.09	*13*	24	*15*	20	*13*	-0.35	*15*	69	*15*	53	*15*
UBS	-0.08	*12*	31	*13*	19	*13*	-0.05	*12*	35	*12*	23	*11*	-0.18	*12*	101	*14*	65	*14*
WEST1	0.22	*5*	61	*2*	41	*6*	-0.30	*16*	35	*12*	19	*14*	-0.38	*16*	131	*11*	79	*12*
Average	0.11	-	46.6	-	34.1	-	0.21	-	46.6	-	34.1	-	0.53	-	140	-	102	-
Maximum	0.44	-	63	-	55	-	0.97	-	69	-	53	-	2.34	-	197	-	159	-
Minimum	-0.17	-	18	-	13	-	-0.30	-	17	-	13	-	-0.38	-	52	-	48	-

TABLE 5b –PERFORMANCE RANKINGS ACCORDING TO MARKET CONDITIONS

5-Year Australian-based International Equities Performance to December 1999

Manager Code	**IR**	***Rank***	**(b)**	***Rank (b)***	**(c)**	***Rank (c)***	**IR**	***Rank***	**(b)**	***Rank (b)***	**(c)**	***Rank (c)***	**IR**	***Rank***	**(b)**	***Rank (b)***	**(c)**	***Rank (c)***
	Rising Market (41 Months)						***Falling Market (19 Months)***						***Overall Market Conditions***					
ABNAM	0.25	*3*	63	*1*	51	1	0.37	*4*	55	*4*	51	3	0.99	*2*	173	*2*	153	*2*
AMP	-0.32	*20*	43	*15*	15	22	0.02	*16*	45	*12*	29	14	-0.28	*19*	133	*15*	73	*18*
AXAA	-0.12	*13*	50	*11*	30	13	-0.23	*21*	36	*17*	16	20	-0.58	*20*	122	*17*	62	*21*
BT	0.02	*7*	49	*12*	41	8	-0.09	*19*	16	*22*	12	22	-0.16	*17*	81	*23*	65	*20*
BTS	0.11	*5*	52	*9*	48	5	-0.08	*18*	16	*22*	20	19	-0.05	*14*	84	*22*	88	*14*
COMM	0.10	*6*	52	*9*	40	9	-0.47	*23*	27	*21*	11	23	-0.84	*23*	106	*18*	62	*21*
CSAM	0.25	*4*	58	*2*	50	4	0.45	*2*	61	*2*	53	1	1.15	*1*	180	*1*	156	*1*
FIDAG	0.30	*2*	55	*5*	51	1	0.19	*8*	54	*6*	42	8	0.68	*5*	163	*3*	135	*5*
GMO	-0.34	*21*	27	*21*	11	23	0.14	*11*	54	*6*	38	10	-0.06	*15*	135	*13*	87	*15*
HSBC1	-0.21	*18*	45	*14*	29	15	0.15	*9*	49	*10*	41	9	0.09	*9*	143	*8*	111	*8*
LAZF	-0.17	*15*	32	*19*	20	18	0.15	*10*	35	*18*	27	15	0.13	*8*	102	*20*	74	*17*
MACL	-0.48	*23*	24	*22*	16	21	0.23	*7*	55	*4*	43	7	-0.02	*13*	134	*14*	102	*10*
MAM1	-0.05	*9*	39	*16*	43	6	0.03	*15*	33	*20*	25	17	0.01	*11*	105	*19*	93	*13*
MLC-DF	-0.10	*10*	53	*8*	37	10	0.07	*12*	45	*12*	33	11	0.04	*10*	143	*8*	103	*9*
MLC-SF	-0.11	*12*	39	*16*	35	12	0.05	*14*	45	*12*	33	11	-0.01	*12*	129	*16*	101	*11*
OPPEN	-0.04	*8*	47	*13*	43	6	0.28	*6*	48	*11*	48	5	0.52	*6*	143	*8*	139	*4*
PICTET	-0.10	*11*	58	*2*	30	13	-0.29	*22*	43	*15*	23	18	-0.68	*22*	144	*7*	76	*16*
ROTH1	-0.19	*17*	54	*7*	26	16	-0.20	*20*	42	*16*	14	21	-0.59	*21*	138	*12*	54	*23*
RTHPUT	0.38	*1*	55	*5*	51	1	0.28	*5*	54	*6*	50	4	0.94	*3*	163	*3*	151	*3*
SCHR1	-0.34	*22*	33	*18*	17	19	0.37	*3*	65	*1*	53	1	0.4	*7*	163	*3*	123	*6*
SCUD	-0.18	*16*	21	*23*	21	17	0.49	*1*	59	*3*	47	6	0.8	*4*	139	*11*	115	*7*
SMF	-0.31	*19*	29	*20*	17	19	0.05	*13*	35	*18*	27	15	-0.21	*18*	99	*21*	71	*19*
SSB1	-0.14	*14*	57	*4*	37	10	0.00	*17*	50	*9*	30	13	-0.14	*16*	157	*6*	97	*12*
Average	-0.08	-	45.0	-	33.0	-	0.09	-	44.4	-	33.3	-	0.09	-	134	-	100	-
Maximum	0.38	-	63	-	51	-	0.49	-	65	-	53	-	1.15	-	180	-	156	-
Minimum	-0.48	-	21	-	11	-	-0.47	-	16	-	11	-	-0.84	-	81	-	54	-

TABLE 5c –PERFORMANCE RANKINGS ACCORDING TO MARKET CONDITIONS

5-Year Australian Fixed Interest Performance to December 1999

Manager Code	**IR**	***Rank***	**(b)**	***Rank (b)***	**(c)**	***Rank (c)***	**IR**	***Rank***	**(b)**	***Rank (b)***	**(c)**	***Rank (c)***	**IR**	***Rank***	**(b)**	***Rank (b)***	**(c)**	***Rank (c)***
	Rising Market (42 Months)						***Falling Market (18 Months)***						***Overall Market Conditions***					
AMP	0.02	*9*	39	*10*	19	*11*	0.44	*5*	40	*9*	36	*5*	0.90	*5*	119	*12*	91	*10*
AXAA	0.38	*3*	70	*2*	54	*1*	-0.38	*14*	39	*10*	19	*12*	-0.38	*14*	148	*4*	92	*9*
BNP	0.10	*7*	50	*6*	30	*8*	0.32	*8*	55	*3*	35	*7*	0.74	*8*	160	*2*	100	*6*
BT	0.23	*4*	65	*3*	45	*4*	0.10	*11*	35	*12*	27	*10*	0.43	*9*	135	*7*	99	*7*
CNTY1	0.12	*6*	51	*5*	43	*5*	-0.01	*12*	29	*14*	17	*14*	0.10	*12*	109	*14*	77	*12*
CSAM	0.40	*1*	65	*3*	53	*2*	0.41	*6*	42	*8*	38	*4*	1.22	*3*	149	*3*	129	*2*
GIO	0.03	*8*	42	*9*	38	*6*	0.41	*7*	52	*4*	36	*5*	0.85	*7*	146	*5*	110	*4*
JBW	-0.12	*12*	27	*12*	11	*13*	0.54	*3*	58	*2*	50	*2*	0.97	*4*	143	*6*	111	*3*
MLC1	-0.23	*14*	23	*13*	11	*13*	0.23	*9*	49	*6*	29	*9*	0.23	*11*	121	*10*	69	*13*
MML1	0.02	*10*	44	*8*	24	*10*	0.16	*10*	35	*12*	19	*12*	0.34	*10*	114	*13*	62	*14*
ROTH1	-0.14	*13*	21	*14*	17	*12*	0.97	*1*	50	*5*	46	*3*	1.81	*1*	121	*10*	109	*5*
RSA	-0.04	*11*	37	*11*	29	*9*	0.46	*4*	47	*7*	35	*7*	0.87	*6*	131	*8*	99	*7*
SMF	0.39	*2*	73	*1*	53	*2*	0.58	*2*	61	*1*	53	*1*	1.55	*2*	195	*1*	159	*1*
UBS	0.16	*5*	49	*7*	37	7	-0.14	*13*	38	*11*	22	*11*	-0.11	*13*	125	*9*	81	*11*
Average	0.09	-	46.9	-	33.1	-	0.29	-	45.0	-	33.0	-	0.68	-	136.9	-	99.1	-
Maximum	0.40	-	73	-	54	-	0.97	-	61	-	53	-	1.81	-	195	-	159	-
Minimum	-0.23	-	21	-	11	-	-0.38	-	29	-	17	-	-0.38	-	109	-	62	-

TABLE 5d – STABILITY OF PERFORMANCE RANKINGS BETWEEN UP AND DOWN MARKETS – SPEARMAN'S RANK CORRELATION TEST

IR (pm)	**System (b)**	**System (c)**
Panel A: Australian Equities		
0.221	0.307	0.278
Panel B: International Equities		
0.018	0.011	0.121
Panel C: Australian Bonds		
-0.372	-0.241	-0.200

TABLE 6 – CROSS-SECTIONAL REGRESSION OF NET FUND FLOW AND THE MOMENTS OF ACTIVE RETURNS

Variable	Coefficient	*t*-statistic	p-value
Intercept	-0.17	-1.13	0.26
IR	1.26	1.70	0.09
Skew	0.09	0.38	0.71
Kurt	-0.06	-0.84	0.40
R^2 (adj)	0.005	-	-
F-statistic	-	1.47	0.22

ENDNOTES

[1] Another classic financial model assuming log-normality is the Black-Scholes (1973) model, used in the pricing of option securities.

[2] Non-normality also extends to returns from exchange rates (see de Vries (1994)).

[3] See also Kritzman (1994) for another discussion concerning higher moments.

[4] An exception to Figure 3 would exist in situations where an active manager exhibited a risk-controlled strategy that did not allow for a high degree of variability from the benchmark index. In this case, the active manager would then be expected to exhibit the same moments represented in Figure 3, however, the fourth moment of kurtosis would become more 'peaked'. Higher kurtosis in terms of a risk-controlled strategy could be interpreted as providing investors with a higher degree of certainty surrounding the manager's expected performance outcome.

[5] An alternative measure for kurtosis is: $K = \frac{1}{N}\sum_{i=1}^{N}\left[\frac{x_i - \bar{x}}{\sigma^2}\right]^4$

This measure of kurtosis does not have 3 subtracted, as is the case for equation (4). In such cases, distributions satisfying the normality assumptions would be expected to generate kurtosis values equal to 3. The analysis performed in this paper evaluates kurtosis relative to zero and therefore according to equation (4).

[6] It is most unlikely that funds would hold a fixed level of cash in their portfolio, however the purpose of the analysis is to determine whether cash could change the inferences concerning the moments of active returns in changing economic conditions.