THE RELEVANCE OF INVESTOR RISK CLASSES IN RANKING FUND PERFORMANCE: AN APPLICATION OF THE EXTENDED MEAN-GINI CAPM

*Karen Benson, Peter Pope * & Robert Faff ***

* Senior Lecturer, Department of Accounting and Finance, Monash University, Victoria, Australia, TEL 61 3 99032814 FAX 61 3 99032422
Email Peter.Pope@BusEco.monash.edu.au
** School of Economics and Finance, Royal melbourne Institute of Technology, GPO Box 2476V, Melbourne, VIC.

(not to be quoted without consent of authors)

Prepared/Compiled by:
Australasian Risk Management Unit, Department of Accounting and Finance, Faculty of Business and Economics, Monash University, PO Box 197, Caulfield East VIC 3145.

Printed by:
Monash Print Services,
Monash University,
Caulfield East, Victoria, Australia, 3145

First Published September 2001

ISBN 1-877064-02-5

Abstract

The primary focus of this paper is to investigate whether the introduction of investor risk classes to the fund performance model affects relative performance rankings. In other words, are investor risk classes relevant? This analysis is conducted in an Extended Mean Gini (EMG) CAPM framework. Our results support the conclusion that investor risk class is not relevant to the performance ranking of a fund. Thus, it would seem that fund managers are not developing portfolios which are suited to a particular class of risk averse investors. Furthermore, based on our results equity fund managers are unable to outperform the market portfolio. Finally, we find no relationship between performance and perceived level of activity - thus suggesting the irrelevance of perceived management style.

Introduction

In theory management style and investor risk classes should be relevant to the management of funds and to the investment decision. Managers, by implementing their management style, seek to attract particular classes of risk averse investors. The actions of fund managers and investors might imply a disbelief in the EMH since some of their activities indicate the aim to outperform the market. However, the evidence indicates that fund managers are unable to outperform the market. Other activities indicate a wish to tailor a product which will position the fund in a certain place in the market.

Of particular relevance to the current study is the work of Benson and Pope (1993) who reported results of a qualitative analysis (based on a survey questionnaire) in which the level of activity adopted by Australian equity trust managers was examined. Importantly, their analysis did not reveal any significant relationship between the level of activity of fund managers and the information sources they used; or the level of activity and the risk measures of fund managers. This indicates the possible irrelevance of the level of activity in market timing and/or allocation. One interpretation of these results is that equity fund managers are homogeneous with respect to their investment policies and management styles. If managers are not adopting different management styles then the relevance of investor risk classes may also be questionable.

Accordingly, the current paper extends upon the analysis presented in Benson and Pope (1993) to investigate two related research questions: (1) What is the relative performance of equity funds compared to the market portfolio, if risk classes of investors and timing abilities of the fund managers are ignored? and more importantly (2) How does the introduction of risk classes to the performance model affect relative performance and therefore what is the relevance of investor risk classes?

Perusal of the financial press and prospectuses issued by equity funds reveals various terms used to describe the funds. In selecting an equity fund, investors may choose from income, growth, balanced, income/growth, growth/income, index, or imputation funds. It is also relevant for the investor to consider the style adopted by the fund manager. The manager may be identified as 'active' or 'passive' or reference may be made to his/her ability in 'asset allocation', 'timing' or 'stock selectivity'. A manager who adopts a passive style follows a 'buy and hold' approach to investments. Alternatively the manager may be active in stock selection and/or active in asset allocation. When implementing an active stock selection strategy, managers attempt to identify under- and over-priced securities and invest accordingly. Active asset allocators or timers make predictions regarding market shifts. They then increase the percentage of funds invested in the share market when share prices, in general, are expected to increase (a bull market) and divert funds elsewhere when share prices, in general, are expected to decrease (a bear market). Application of these types of strategies is claimed to result in a risk return relationship that is superior to that of the market index.

The investors select a fund that suits their needs. In order to make a selection investors must consider their risk preferences. An investor who is very risk averse may prefer a passively managed index fund. The fund is not aggressive in that the manager does not aim to outperform the market. The less risk averse may be more inclined to select an actively managed growth fund where the fund manager seeks opportunities for higher returns with a higher risk. Therefore the fund manager's style and the investor's risk class may be relevant to the investment decision.

There is a substantial amount of literature, particularly on the US market, which concentrates on the analysis of performance of investment funds. Studies that examine the performance of the Australian Unit Trust industry from an academic perspective are less diverse. Examples include Bird, Chin

& McCrae (1983); Robson (1986); Okunev (1990); Sinclair (1990); and Hallahan and Faff (1999). However, research firms carefully monitor the Australian industry and performance is ranked by reference to risk adjusted performance measures. Publications of this nature in financial magazines are extensive.

Historically, assessment of fund performance reported in the academic literature involved the use of the traditional mean variance capital asset pricing model (MV CAPM). Under the MV CAPM framework each fund would reflect a single stationary risk measure (beta) for all investors over the time period examined. Of critical importance to the current study is the fact that the MV CAPM beta of any given fund is constant for all classes of risk averse investors. An interesting alternative is the Extended Mean Gini (EMG) CAPM which has been previously used in the assessment of portfolios [eg. Okunev (1990)]. This model does not assume the normal distribution of returns and allows for variation in risk classes of investors. Moreover, the EMG CAPM allows for different betas for varying risk classes of investors in the assessment of expected return. Accordingly, the EMG CAPM framework will be employed to explore the central issue of this paper, namely, how does the introduction of risk classes to the performance model affect relative performance and therefore what is the relevance of investor risk classes? A conclusion in favour of the relevance of investor risk classes will be supported by a finding that performance rankings vary considerably across the different EMG CAPM risk class categories. In contrast, a finding that such rankings are largely invariant will lead to the conclusion of risk class irrelevance.

The remainder of the paper is structured as follows. Section 2 outlines the empirical framework and the data set used in the study. Section 3 presents the results of the empirical analysis, while the final section provides a summary and conclusions.

1. Empirical Framework

1.1 Mean Variance Capital Asset Pricing Model and Performance Measures

The MV CAPM is expressed as:

$$E(R_i) = R_f + (E(R_m) - R_f)\beta_i \tag{1}$$

where

$$\beta_i = \frac{\operatorname{cov}(R_i, R_m)}{\sigma^2_m} \tag{2}$$

and

$E(R_i)$	=	expected return of security i
R_f	=	risk free rate
$E(R_m)$	=	expected rate of return on the market portfolio
σ_m^2	=	variance of the rate of return on the market portfolio

To allow an assessment of performance in the MV CAPM framework three measures are commonly used. These are (1) the Sharpe ratio (S_i); (2) the Treynor measure (T_i); and (3) Jensen's alpha (J_i):

$$S_i = \frac{\overline{R_{it}} - \overline{R_{ft}}}{\sigma_i} \tag{3}$$

$$T_i = \frac{\overline{R_{it}} - \overline{R_{ft}}}{\beta_i} \tag{4}$$

$$J_i = (\overline{R_{it}} - \overline{R_{ft}}) - \beta_i(\overline{R_{mt}} - \overline{R_{ft}}) \tag{5}$$

1.2 Extended Mean Gini Capital Asset Pricing Model

An alternative to the standard deviation as a measure of dispersion is Gini's mean difference. Gini's mean difference is based on the "absolute difference between every pair of realisations of the random variable" (Shalit & Yitzhaki, 1984). It may be written as in Okunev (1990):

$$\Gamma = \mu - a - \int_a^b (1 - F(x))^2 dx \tag{6}$$

where:

μ = expected return of x

x is a random variable that follows a continuous distribution over [a, b].

F(x) is the cumulative probability distribution of x.

Alternatively Shalit & Yitzhaki (1984) expressed the Gini coefficient in a form that is more readily estimated:

$$\Gamma = -2 \operatorname{cov} \{x, 1-F(x)\} \tag{7}$$

The efficient set may be obtained by discarding for each mean all prospects with a larger Gini coefficient. If, instead of holding MV efficient portfolios, investors use the Mean Gini method to hold stochastically dominant efficient portfolios, then investors minimise Gini's mean difference subject to the return on the asset.

Using the Mean Gini approach the CAPM can be expressed as:

$$E(R_i) = R_f + (E(R_m) - R_f) . 2 \operatorname{cov}[R_i, F_m(R_m)] / \Gamma_m \tag{8}$$

$$E(R_i) = R_f + (E(R_m) - R_f) \theta_{im} (\Gamma_i / \Gamma_m) \tag{9}$$

where

$F_m(R_m)$ = the cumulative distribution of R_m

Γ_m = Gini coefficient of R_m

Γ_i = Gini coefficient of R_i

$$\theta_{im} = \frac{\operatorname{cov}[R_i, F_m(R_m)]}{\operatorname{cov}[R_i, F_i(R_i)]} \tag{10}$$

$$\beta_i = \theta_{im} (\Gamma_i / \Gamma_m) \tag{11}$$

Shalit & Yitzhaki further demonstrate that Gini's mean difference can be extended to incorporate a degree of risk aversion such that:

$$\Gamma(v) = \mu - \alpha - \int_a^b [1 - F(x)]^v dx \tag{12}$$

or

$$\Gamma(\nu) = -\nu \operatorname{cov}\{x,[1-F(x)]^{\nu-1}\} \tag{13}$$

where:

ν = the degree of risk aversion and $1 < \nu < \infty$.

$\nu = 1$ represents the risk neutral investor and as $\nu \rightarrow \infty$ the investor becomes more risk averse. For a risk lover $0 \leq \nu < 1$.

The Mean Gini CAPM is extended to incorporate different risk classes of investors such that:

$$E(R_i) = R_f + (E(R_m) - R_f)\theta_{im}(\nu)\frac{\Gamma_i(\nu)}{\Gamma_m(\nu)} \tag{14}$$

where

$$\theta_{im}(\nu) = \frac{\operatorname{cov}\{[1-F_m(R_m)]^{\nu-1}, R_i\}}{\operatorname{cov}\{[1-F_i(R_i)]^{\nu-1}, R_i\}} \tag{15}$$

Furthermore, the EMG beta is represented as:

$$\beta_i(\nu) = \theta_{im}(\nu)\frac{\Gamma_i(\nu)}{\Gamma_m(\nu)} \tag{16}$$

and

$$\beta_i(\nu) = \frac{\operatorname{cov}(R_i, (1-F(R_m))^{\nu-1})}{\operatorname{cov}(R_m, 1-F(R_m))^{\nu-1})} \tag{17}$$

The EMG CAPM allows for varying expectations in the level of risk aversion. The model maintains some of the assumptions of the CAPM but does not assume normality of returns and assumes investors have different attitudes to risk and would therefore rank prospects in a different order.

1.3 EMG CAPM Performance Measures

The EMG CAPM has been applied to analysis of the investment fund industry in Okunev (1990). The performance of various types of funds, for varying levels of v, was assessed to determine if the risk class of investors was relevant in assessing the performance of the trust. Sharpe, Treynor and Jensen measures using the Mean Gini methodology are defined, respectively, as:

$$SMG_i(v) = \frac{\overline{R_i} - \overline{R_f}}{\Gamma_i(v)} \tag{18}$$

$$TMG_i(v) = \frac{\overline{R_i} - \overline{R_f}}{\beta_i(v)} \tag{19}$$

$$JMG_i(v) = (\overline{R_i} - \overline{R_f}) - \beta_i(v)(\overline{R_m} - \overline{R_f}) \tag{20}$$

This study will investigate the extent to which the Mean Gini method is preferable in a practical sense. That is, it will be determined if the Mean Gini method could feasibly result in different assessments in investment decision-making. These results allow an assessment of risk class relevance. Okunev's study is partially replicated in the context of equity trusts only. It is proposed that the risk class of investors in the EMG model relates directly to the risk class of the fund since the advertising campaigns and policy decisions of fund managers reflect an objective to attract a particular type of investor. The relevance of the EMG CAPM to investment fund analysis is twofold. The model will allow an assessment of performance theoretically superior to the traditional CAPM, on the grounds of stochastic dominance and with less restrictive assumptions of the distribution of returns. Moreover, it will allow an assessment of the relevance, or lack thereof, of risk classes in Australian equity trusts.

1.4 Hypotheses

The following null hypotheses are tested in the current paper:

- $H1_0$: The risk class of the investor is not relevant when assessing the performance of equity funds.
- $H2_0$: There is no relationship between perceived management style and relative fund performance.

$H3_0$: Equity fund managers are unable to outperform the market portfolio.

1.5 Data

The data analysed in the current study comprises the five-year period to December 31, 1991, of monthly prices of 54 unlisted equity funds sourced from ASSIRT Pty Ltd. To adjust the price data for distributions, bonus issues and repayments of capital, an index of units was introduced and set at 100 in the base year. The index was adjusted assuming distributions were reinvested. The market return was calculated from the All Ordinaries Accumulation Index since this index also reflects distributions.[1] The risk free rate was represented by the annual rate on 13-week treasury notes. This rate was obtained from the Reserve Bank Bulletin and converted to an effective monthly rate.

The unit trust returns represent a continuous random variable since there are an infinite number of returns between any interval. To estimate the cumulative density function (CDF) the method outlined in Okunev (1989) and Lerman & Yitzhaki (1984) was used.

The data set consisting of monthly returns for each fund was initially reviewed using descriptive statistics. Only one trust showed a normal distribution, thus justifying the use of a performance evaluation method which does not rely on a normal distribution.[2]

---

[1] The criticism by Roll (1978) is recognised as a limitation in using the index. However, others have discussed alternative benchmarks (e.g. Robson, 1986) and concluded that providing a similar benchmark is used for all funds a risk return relationship can be estimated.

[2] While the details are not reported to conserve space, they are available from the authors upon request.

2. Results

2.1 Mean Variance Capital Asset Pricing Model

Initially, ordinary least squares regression (OLS) was used to estimate excess returns market models for each of the 54 funds and the results are reported in Table 1. Betas are found to be significant at the 1 % level for all trusts except one. The alpha coefficient was significantly different from zero for five trusts only. A review of the summary statistics indicated that the normality assumption does not hold in most cases. However, the estimation results proved to be quite robust when applying an alternative method, nonparametric regression.[3]

Fund No	alpha	beta	t alpha	t beta	R^2	Adjusted R^2
1	0.00185	0.661043	0.4161451	10.91238 *	0.6725	0.6668
2	-0.03534	0.7352177	-2.38084 **	3.640006 *	0.186	0.1719
3	-0.00947	0.7498539	-0.6048937	3.521898 *	0.1762	0.162
4	0.00510	0.7622258	0.9755692	10.71483 *	0.6644	0.6586
5	-0.00652	0.749417	-0.895574	7.569472 *	0.497	0.4883
6	-0.01919	0.8373193	-1.665139	5.339013 *	0.3295	0.318
7	-0.01863	0.6760728	-1.251904	3.339287 *	0.1613	0.1468
8	-0.02036	0.9357711	-2.026304 **	6.84363 *	0.4468	0.4372
9	-0.02320	0.9101621	-1.976963	5.699995 *	0.359	0.348
10	-0.01852	0.9932892	-1.614895	6.365944 *	0.4113	0.4012
11	-0.00361	0.686167	-0.792435	11.0825 *	0.6792	0.6737
12	-0.00351	0.6654179	-0.8244338	11.49152 *	0.6948	0.6896
13	-0.00878	0.9586911	-1.149514	9.230064 *	0.595	0.588
14	-0.00774	1.026601	-0.9852801	9.599716 *	0.6137	0.6071
15	-0.00628	0.9621604	-1.05328	11.85595 *	0.7079	0.7029
16	0.00062	1.122694	0.091791	12.18561 *	0.7191	0.7143
17	-0.00946	0.866646	-1.465255	9.864194 *	0.6265	0.6201
18	-0.00810	0.8928216	-1.242426	10.07003 *	0.6361	0.6299
19	-0.00787	0.9757247	-1.400631	12.76405 *	0.7375	0.7329
20	-0.01001	1.05788	-1.70466	13.23216 *	0.7512	0.7469
21	-0.00618	0.9587308	-1.032326	11.77595 *	0.7051	0.7
22	0.00111	0.6678511	0.2237217	9.850641 *	0.6259	0.6194
23	0.00122	0.049132	0.1720569	0.5082801	0.0044	-0.0127
24	-0.00755	0.5822605	-1.731214	9.817574 *	0.6243	0.6178
25	0.00147	0.1582208	0.5714811	4.510941 *	0.2597	0.247
26	-0.01133	0.6352411	-0.724293	2.984778 *	0.1331	0.1182
27	0.00092	0.8163746	0.1918235	12.44295 *	0.7275	0.7228
28	-0.00567	0.8980106	-1.070426	12.45801 *	0.728	0.7233

[3] Further details are available from the authors upon request.

29	0.00048	0.7794016	0.1118479	13.47287 *	0.7578	0.7537
30	-0.00150	0.5839111	-0.1806168	5.169422 *	0.3154	0.3036
31	-0.01839	0.6348223	-2.521802 **	6.395724 *	0.4136	0.4035
32	-0.00235	0.7399502	-0.5266873	12.19751 *	0.7195	0.7147
33	-0.00984	0.8484092	-2.128702 **	13.49628 *	0.7585	0.7543
34	-0.00387	0.757247	-0.4541629	6.538276 *	0.4243	0.4144
35	0.00211	0.8501442	0.5073068	15.02619 *	0.7956	0.7921
36	0.00169	0.5102095	0.561031	12.47689 *	0.7286	0.7239
37	0.00011	1.037456	0.0200903	13.87386 *	0.7684	0.7645
38	0.00507	0.3127645	1.214764	5.505941 *	0.3433	0.3319
39	-0.00951	0.9080209	-1.806882	12.67156 *	0.7346	0.7301
40	-0.02383	1.061964	-2.375811 **	7.782807 *	0.5108	0.5024
41	-0.00578	1.008127	-0.7781133	9.976538 *	0.6318	0.6255
42	0.00125	0.86355	0.2797583	14.21914 *	0.7771	0.7732
43	-0.00467	0.4578185	-0.8999674	6.489181 *	0.4206	0.4106
44	-0.01189	0.8123557	-1.80408	9.058922 *	0.5859	0.5788
45	-0.00937	0.8858156	-1.015808	7.0604 *	0.4622	0.4529
46	-0.00290	0.442616	-0.5931867	6.652134 *	0.4328	0.423
47	-0.00613	0.9370101	-0.9723387	10.9183 *	0.6727	0.6671
48	-0.00512	0.6814278	-0.8090971	7.906873 *	0.5187	0.5104
49	-0.00075	0.7115351	-0.2309703	16.10182 *	0.8172	0.814
50	-0.01315	0.4940535	-1.678411	4.632242 *	0.2701	0.2575
51	-0.01030	0.5629881	-1.322212	5.314239 *	0.3275	0.3159
52	0.01289	0.8064516	0.7629321	3.508802 *	0.1751	0.1609
53	-0.00044	0.8017599	-0.1079726	14.36532 *	0.7806	0.7768
54	-0.00033	0.9510208	-0.05567455	11.94227 *	0.7109	0.7059

** significant at .05

* significant at .01

Table 1: Estimation of Excess Returns Market Models for Sample Funds

The Sharpe, Treynor and Jensen measures were calculated and funds were ranked in order of performance using each measure. Generally, the analysis indicates there is little difference between each of the MV performance measures. The top 10 funds were the same for each MV measure. However, the top fund varied between each measure. Fund number 38 and number 52 ranked in the top three for each measure indicating these funds are well diversified and relatively high performers. Fund number 23 ranks highest on the Treynor measure but fifth on the Sharpe and ninth on the Jensen measure. This fund has a high return for the level of risk but is perhaps less effectively diversified than others and earning a lower abnormal return.

The results using the Jensen measure have implications for market efficiency. In an efficient market abnormal returns are not expected. Fourteen funds exhibit positive abnormal returns.[4] However, reference to the t statistic indicates that none of these were significant at the 5 % level. Funds in this sample cannot outperform the market and this result provides support for the efficient market hypothesis. Thus the null hypothesis $H3_0$: equity funds are unable to outperform the market portfolio, cannot be rejected.

2.2 Extended Mean Gini Capital Asset Pricing Model

Gini's mean difference was calculated for each fund, for varying levels of v, using equation (13) (v was incremented by one for $1<v\leq10$ and by ten for $10<v\leq100$). A fund was determined to be second order stochastic dominant (SSD) in comparison to the market portfolio using the following criteria as outlined in Shalit & Yitzhaki (1984):

$$\mu_{fi} > \mu_m \text{ and}$$

$$\mu_{fi} - \Gamma_{fi}(v) \geq \mu_m - \Gamma_m(v)$$

where μ_{fi} = mean return of trust i (i = 1,...,54)

μ_m = mean return of the market portfolio

$\Gamma_{fi}(v)$ = Gini coefficient for fund i for the specified level of v

$\Gamma_m(v)$ = Gini coefficient of the market.

It was found that μ_{fi} is greater than μ_m for 15 trusts. Further, the outcome of the SSD analysis for our sample of 54 funds is reported in Table 2. There it can be seen that in the case where v=2 (and 3, 4, 5, 6, 7, 8 and 9), eleven trusts (20% of

[4] There is a difference in the calculation of the market returns and the fund returns. The trusts returns are net of transaction costs whereas the market returns are not. However, it is expected that rewards should be earned to cover additional outlays incurred. Therefore the difference between the two sets of returns is not relevant when considering the issue of market efficiency.

the sample) were found to dominate the market portfolio according to the criteria specified above. In the cases where ν = 10, 20, 30, 40, 50,60 and 70, 12 funds (22%) are second order stochastic dominant (SSD), while in the cases where ν= 80, 90 and 100, 13 funds or 24% of the funds are SSD. These results are consistent with Okunev who found 26% of funds to be SSD.

	Risk Aversion Parameter (ν)																	
	2	3	4	5	6	7	8	9	10	20	30	40	50	60	70	80	90	100
List of SSD Funds By Fund Number	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
	53	53	53	53	53	53	53	53	42	42	42	42	42	42	42	42	42	42
	-	-	-	-	-	-	-	-	53	53	53	53	53	53	53	52	52	52
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	53	53	53
Total Number of SSD Funds	11	11	11	11	11	11	11	11	12	12	12	12	12	12	12	13	13	13

Table 2: Listing of Funds that are Second Order Stochastic Dominant (SSD)

To rank funds using the Gini coefficient an adjusted Sharpe measure was calculated to incorporate the Gini coefficient as in equation (18). Funds were also ranked in order of performance using the EMG Treynor and Jensen measures (equations (19) and (20)). The results of the performance ranking indicate little variation across various levels of v. For example, the EMG analysis indicated that the highest performing trusts do not vary significantly between risk classes. Specifically, calculation of the Sharpe measure resulted in the same two funds being ranked as first and second for all levels of v. Further, calculation of the Jensen measure resulted in equivalent ranks for the top 6 trusts for all levels of v. This is indicative of an irrelevance of risk class when assessing the equity trusts and provides evidence in support of $H1_0$.

2.3 Variation in Performance Measures and Risk Class Levels

In order to more formally determine the extent of the variation in ranking for different performance measures and for differing levels of v, Kendall's Coefficient of Concordance (W) was used:

$$W = \frac{\Sigma(R_j - \frac{\Sigma R_j}{N})^2}{\frac{1}{12}k^2(N^3 - N)}$$

where

R_j= the sum of ranks for each trust across all k,

k = the number of sets of rankings,

N = the number of trusts.

The denominator represents the "maximum possible sum of the squared deviations", i.e. the value the numerator would equal if there were perfect agreement among k rankings. The coefficient range is $0<W\leq 1$. The closer the coefficient is to one the higher the level of agreement in ranks for the different measures. The test statistic is $k(N-1)W \approx \chi^2$ for N-1 degrees of freedom.

The central hypotheses of concern in the current paper is:

$H1_0$: The risk class of the investor is not relevant when assessing the performance of equity funds.

Generally, this hypothesis predicts that fund performance rankings within the EMG CAPM framework will be independent of the degree of risk aversion assumed. Accordingly, the following null hypotheses were tested using the Kendall coefficient of Concordance:

$H1_{0a}$ The rankings of fund performance for each of the CAPM Sharpe, Treynor and Jensen measures are unrelated.

$H1_{0b}$ The rankings of fund performance for each of the EMG CAPM Sharpe, Treynor and Jensen measures where $v = 2$ are unrelated.

$H1_{0c}$ The rankings of fund performance for all levels of v calculated using the EMG CAPM Sharpe measure are unrelated.

$H1_{0d}$ The rankings of fund performance for all levels of v calculated using the EMG CAPM Treynor measure are unrelated.

$H1_{0e}$ The rankings of fund performance for all levels of v calculated using the EMG CAPM Jensen measure are unrelated.

The W coefficients and χ^2 statistics are presented in Table 3. It was found that each of the null hypotheses were rejected at any conventional level of significance. All coefficients are very close to one indicating a very high level of agreement in rankings for each measure and each level of v. Accordingly, our evidence generally supports the null hypothesis, $H1_0$, namely that investor risk class is irrelevant to the performance evaluation of managed funds in our sample.

Null Hypothesis	W	χ^2
$H1_{0a}$	.979	155
$H1_{0b}$	.978	155
$H1_{0c}$	.987	941
$H1_{0d}$	.959	932
$H1_{0e}$	.998	952

Note:

$H1_{0a}$: The rankings of fund performance for each of the CAPM Sharpe, Treynor and Jensen measures are unrelated.

$H1_{0b}$: The rankings of fund performance for each of the EMG CAPM Sharpe, Treynor and Jensen measures where $v = 2$ are unrelated.

$H1_{0c}$: The rankings of fund performance for all levels of v calculated using the EMG CAPM Sharpe measure are unrelated.

$H1_{0d}$: The rankings of fund performance for all levels of v calculated using the EMG CAPM Treynor measure are unrelated.

$H1_{0e}$: The rankings of fund performance for all levels of v calculated using the EMG CAPM Jensen measure are unrelated.

Table 3: Kendall's Coefficients of Concordance Testing the Relationship between Alternative Performance Rankings of Australian Equity Funds

2.4 Consideration of Second Order Stochastic Dominance.

When interpreting results from the EMG CAPM it is necessary to also consider if the trust is SSD. With reference to the Jensen measures it is interesting to note that the trust which has the highest performance measure (trust number 52) is not SSD until v=80. Therefore this fund would not be an appropriate investment for investors who are less risk averse but it would be appropriate for investors who are more risk averse. Similarly the fund (number 42) which is ranked at nine for $2 \leq v \leq 10$ and eight for $20 \leq v \leq 100$, is only SSD at $v \geq 20$. All other funds in the top eleven dominate the market. Similar pattern changes are evident with regard to the Treynor measures.

2.5 Comparison of the MV CAPM and the EMG CAPM

The only advantage which is apparent in using the EMG CAPM as opposed to the MV CAPM for relative performance evaluation is that SSD funds may be identified and then ranked. Using the SSD criteria as expressed earlier and the Jensen performance measure, trust number 52 in our sample would not be selected for $v<80$ but would be considered as the best fund using MV analysis and EMG analysis for risk classes with $v\geq80$. The top 11 funds are all SSD for risk classes $v\geq80$. These are the same 11 which would be selected using the MV CAPM Jensen measure. Only two other funds are SSD outside this range and rank in the next five. For lower levels of risk class the results from the EMG analysis would imply the exclusion of fund number 52 and number 42 even though in actual performance measures they rank relatively high (in the top ten funds of our sample). Interestingly, all SSD funds have a positive MV Jensen measure except for two cases.

The MV CAPM Jensen measure rankings were very close to the EMG Jensen measure rankings for the high levels of risk class. This is shown in Table 4. As can be seen in the table, when choosing the top eight performers a very risk averse investor (where $v=100$) would not make a different choice whether they were using the MV CAPM or the EMG CAPM Jensen measures except if they considered the SSD criteria. This conclusion is the same for the Treynor measure (except for trust number 23). For the more risk averse investor the results of the MV analysis are the same as the EMG analysis. For the less risk averse investor only slight variations in decisions would be apparent.

Rank	MV CAPM	EMG CAPM v=100 (All SSD)	EMG CAPM v=2 (**not SSD)
1	52	52	**52
2	4	4	38
3	38	38	4
4	35	35	35
5	1	1	1
6	36	36	36
7	25	25	23
8	42	42	25
9	23	22	**42
10	22	27	22
11	27	23	27

Table 4: Top 11 ranked funds using the Jensen measure

Accordingly, on the basis of the forgoing analysis it seems that for practical purposes the EMG CAPM has little relevance and hence risk classes are not relevant in assessing an equity trust. However, the Mean Gini methodology may be useful in determining SSD. It would appear that the hypothesis $H1_0$: The risk class of the investor is not relevant when assessing the performance of equity funds, cannot be rejected. An alternative interpretation may be that risk classes do not exist. This result is consistent with a lack of variation in management style. Fund managers may be adopting homogeneous policies suitable for a general class of risk averse investors [consistent with the findings of Benson and Pope (1993) discussed earlier].

2.6 The Relationship between Performance Ranking and Active and Passive Management Styles

The importance of the fund managers' stated levels of activity were further considered. Performance rankings were correlated with the fund manager's responses to the questions on the Benson and Pope (1993) questionnaire which addressed their level of activity in allocation and timing. Given the lack of variation between the MV CAPM and the EMG CAPM performance measure this analysis proceeded with the MV CAPM only. The 39 funds which were classified as active or passive on allocation and timing from the questionnaire responses were ranked in order of relative performance using the MV CAPM Treynor and Jensen measures. These ranks were divided into two groups: the first group ranked 1 - 20 and the second group of funds ranked 21 - 39. These numbers are the same irrespective of whether the Jensen or Treynor measure is used.

Yule's Q statistic [see Reynolds (1977)] was calculated for each contingency table. Yule's Q varies between -1 and 1. A value of 1 will reflect a perfect positive relationship and -1 will reflect a perfect negative relationship. Zero implies statistical independence. However, the measure becomes undefined if there are any zero values in the table.

The correlation between the allocation classification and performance resulted in a Yule's Q of 0.54, thus giving some indication that activity in allocation will result in improved performance. In contrast, the correlation between the timing classification and performance resulted in a Yule's Q of 0.06, thus indicating that there is no relationship between timing activity and performance. The lack of relationship between timing and performance would indicate that selecting sectors within the share market is not beneficial or that managers are not successful in switching between sectors.

2.7 The Relationship Between the SSD Criteria and Management Style

The SSD funds were classified as active or passive on allocation and timing. Five (six) of the SSD funds were classified as active and four (five) as passive where v=2 (v=100). Three (four) were active in timing and six (seven) were passive where v=2 (v=100). A Yule's Q and confidence intervals indicate that there is no relationship between funds which are SSD and the managers' policies on allocation and timing. The results indicate that $H2_0$ cannot be rejected - that is, it is concluded that there is no relationship between perceived activity and level of performance.

3. Summary and Conclusion

The major focus of this paper has been to investigate whether the risk class of investors is relevant to the assessment of fund performance. We have also examined the subsidiary question of whether there is a relationship between perceived fund management style and relative fund performance. This analysis has been conducted in an Extended Mean Gini (EMG) CAPM framework.

From the results and discussion presented above it is concluded that investor risk class is not relevant to the performance ranking of a fund. Fund managers are not developing portfolios which are suited to a particular class of risk averse investors. One interpretation of this may be that equity fund managers are not successfully targeting risk classes of investors through their policies. This interpretation is consistent with the proposition that equity fund managers are a homogeneous group with respect to their investment policies and management style.

Furthermore, based on the results of analysing our sample, equity fund managers are unable to outperform the market portfolio. Additionally, no relationship was found between performance and perceived level of activity. The results of Benson and Pope (1993) indicated that perceived level of activity was not related to investment policies. The current analysis indicates that perceived level of activity is not related to performance and thus further supports the irrelevance of management style. These results are consistent with the proposition that fund managers are a homogeneous group with respect to management style.

Bibliography

Benson, K. and Pope, P. (1993), "Active or passive -what's the difference?", *JASSA*, December, 25-34.

Bird, R., Chin, H., & McCrae, M. (1983), "The performance of Australian superannuation funds", *Australian Journal of Management*, 8(1), 49-69.

Hallahan, T. and Faff, R. (1999), "An Examination of Australian Equity Trusts for Selectivity and Market Timing Performance", *Journal of Multinational Financial Management*, forthcoming.

Jensen, M. C. (1968), "The performance of mutual funds in the period 1945-1964", *Journal of Finance*, 23,389-419.

Lerman, R. I., & Yitzhaki, S. (1984), "A note on the calculation and interpretation of the gini index", *Economics Letters*, 15,363-368.

Okunev, J. (1989), "Mean Gini capital asset pricing model: Some empirical evidence", *Accounting and Finance*, 29 (1), 63- 72.

Okunev, J. (1990), "An alternative measure of mutual fund performance", *Journal of Business Finance & Accounting*, 17(2),247-264.

Reynolds, H. T. (1977). *Analysis of Nominal Data.* Sage University Paper series on Quantitative Applications in the Social Sciences, series no.07-007. Beverly Hills: Sage Publications.

Robson, G. N. (1986), "The investment performance of unit trusts and mutual funds in Australia for the period 1969 to 1978", *Accounting and Finance*, 26(2), 55-79.

Roll, R. (1978), "Ambiguity when performance is measured by the securities market line", *The Journal of Finance*, 33(4),1051-1067

Shalit, H. & Yitzhaki, S. (1984), "Mean-Gini, portfolio theory, and the pricing of risky assets", *Journal of Finance*, 39(5), 1449-1468.

Sharpe, W. F. (1966), "Mutual fund performance", *Journal of Business*, 39,119-138.

Sinclair, N. A. (1990), "Market timing ability of pooled superannuation funds January 1981 to December 1987", *Accounting and Finance*, 30(1),51-65.

Treynor, I. L. (1965), "How to rate management of investment funds", *Harvard Business Review*, January-February, 63-75.