ARE BENCHMARK ASSET ALLOCATIONS FOR AUSTRALIAN PRIVATE INVESTORS OPTIMAL?

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ABSTRACT

In this article we examine whether the benchmark asset allocations recommended by financial planning groups for Australian private investors are optimal when measured against the mean-variance criterion of Modern Portfolio Theory. Using historical data for the relevant indices, the mean-variance properties of the various asset classes are determined. Portfolios containing the various asset classes are formed according to the allocations or weightings recommended by financial planning groups. The return-risk characteristics of the portfolios formed on the basis of the recommended asset class allocations are determined and a simple method of iso-risk maximum return calculation using the Excel Solver command is utilised to determine whether portfolios could be formed that are characterised by the same levels of risk but higher levels of return. These are 'optimal portfolios' that yield the maximum return for a given level of risk. Applying this methodology, the portfolios resulting from the financial planning groups' benchmark asset allocations are found to be significantly sub-optimal. On each occasion, a better portfolio (yielding a higher expected return for the same risk) could be found by adjusting the allocations.

INTRODUCTION

Financial planning groups generate strategic asset allocations that are used to guide the allocation of client's funds. More than $300 billion is guided by these strategic asset allocations. The optimality of the recommended weightings to particular investment classes—cash, Australian fixed interest, international fixed interest, Australian shares, international shares and property—is of the utmost importance to the very large number of Australian investors whose savings are invested on the basis of these strategic asset allocations. We use one of the key criterions of modern portfolio theory, mean-variance efficiency, to examine the optimality of financial planning groups' strategic asset allocations. Our results, which reveal significant sub-optimality against this criterion, provide the basis for a careful reconsideration of the value of 'generic' recommended asset allocations. The recommended allocations do provide a basis upon which portfolios can be formed for investors with different levels of risk aversion. However, financial planners and their clients must be aware that these allocations may leave some money 'on the table' that may have been captured by a portfolio bearing no additional risk to one formed according the financial planning groups' strategic asset allocations.

This article is organised as follows. In the next section, the relevant literature is surveyed and the theoretical framework that forms the foundation for our investigation is outlined. In the third section, the research methodology is outlined. We follow an orthodox approach that is based upon Markowitz portfolio theory. This involves the calculation of the expected (mean) returns and variance (risk) of returns for portfolios formed on the basis of financial planning groups' strategic asset allocations.

Optimal portfolios are then computed that have higher expected (mean) returns than the financial planners' portfolios but without any additional risk. In the fourth section, the results of the analysis are presented. Using the methodology outlined in the previous section, the efficiency of the financial planners' portfolios is computed and compared with the returns generated by the corresponding optimal (mean-variance efficient) portfolios. The portfolios formed on the basis of financial planning groups' strategic asset allocations are found to be mean-variance inefficient. Alternative portfolios can be formed that are characterised by higher returns but no additional risk. The final section concludes the article. It is concluded that financial planning groups may consider the historical returns and variance of returns of particular asset classes as the sole criterion for asset class weight recommendations. This avoids any reliance upon commonly held subjective beliefs or perceptions about the returns and risks of alternative asset classes.

LITERATURE REVIEW AND RESEARCH THEORETICAL FRAMEWORK

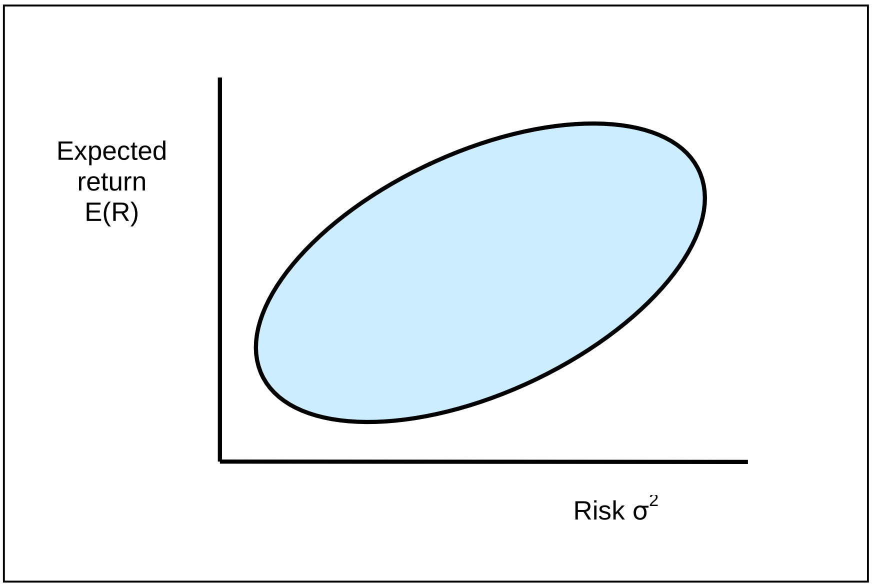
The objective of this article is to examine the optimality of Australian financial planning clients' strategic asset allocations. Financial planning clients are a good starting point in studying private investors because financial planners exercise considerable control over a substantial portion of the total private investment pool. The fifty largest financial planning groups have approximately $316 billion worth of funds under their advice [Wilkinson 2007] which is a significant portion of the total private investment pool estimated at $1.9 trillion [Headey, Warren & Harding 2006 and ABS 2005].

The article utilises the asset allocations recommended by financial planning groups to clients as a proxy for financial planning clients' strategic asset allocations. The common practice in personal financial planning is to assess a client's risk profile based on factors such as risk aversion, investment time frame and life cycle stage and recommend an appropriate strategic asset allocation [Taylor 2007]. Small deviations are allowed when establishing the investment account and regular rebalancing is carried out to keep the asset allocations in line. It is similar in other countries where personal financial planning is an established practice such as in the US [Kapoor, Dlabay & Hughes 2004] and in the UK [Harrison 2005]. The importance of this practice of strategic asset allocation has been established in research literature [Brinson, Singer & Beebower 1991; Ibbotson & Kaplan 2000]. Given the crucial role that asset allocation plays, this article has implications for personal investing as well as the practice of personal financial planning.

There appears to have been only one previous investigation into the optimality of the private investors' asset allocation on the basis of financial planners' recommendations [Huber & Kaiser 2003]. This study was undertaken in the US context and found that the advisor-recommended asset allocations achieve on average 80% to 98% of optimised portfolio returns. Like the study cited above, almost all the recent investigations of optimality of asset allocations utilise the mean-variance formulation of the Modern Portfolio Theory or MPT [Markowitz 1952] as the theoretical framework. This study utilises MPT as the theoretical framework for analysing the optimality of the asset allocation weightings recommended by the financial planning groups. Markowitz specified two variables relevant to the asset allocation decision namely expected or *ex ante* portfolio return and expected or *ex ante* portfolio risk (measured by computing the variance of returns). Markowitz showed how the combination of assets or asset classes in a portfolio could reduce total portfolio variance and, in so doing, provided the theoretical rationale for diversification.

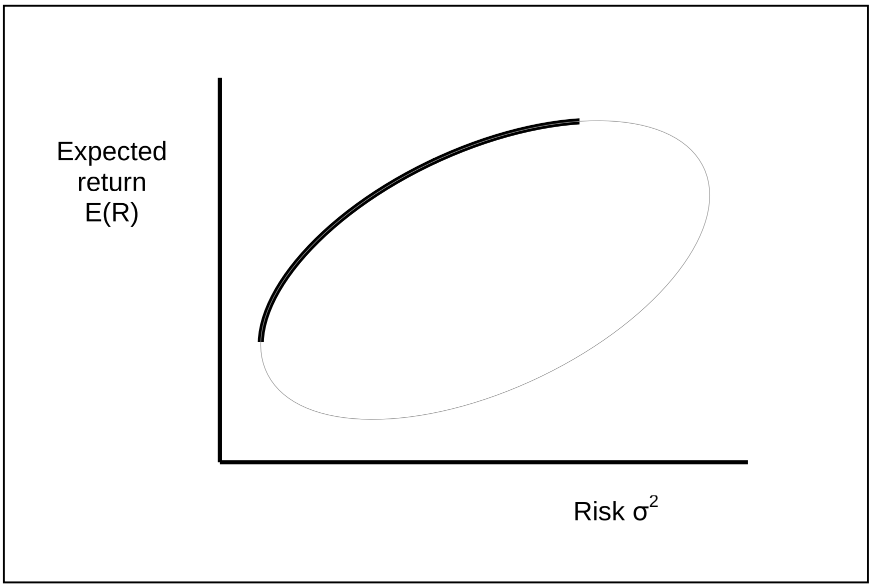
If investors are solely concerned with the expected return and risk of their portfolios, risk-averse investors will attempt to maximise a utility function where expected return and standard deviation (risk) of returns are the only factors that influence utility. Investors are assumed to favour additional expected returns and dislike additional standard deviation of actual returns from expected returns (risk). In practice, expected return and risk are estimated on the basis of historical asset mean returns, variances of returns and assumptions concerning the underlying probability distribution of returns. Investors will choose from among the portfolios available in the economic system on the basis of expected return and standard deviation of returns. The generation of the full set of portfolios from which investors may choose, involves the computation of the expected return and variance for each possible combination of risky assets in the economic system. When the expected return and variance calculations are done for all possible combinations of assets in the economic system, the result is a choice set from which investors select a portfolio:

Exhibit 1: The set of all portfolios from which an investor may choose



Some of the portfolios contained in the choice set are dominated by others. Portfolios that are located on the upper rim of the choice set have a higher expected return for each level of risk than portfolios contained in the interior of the set. Investors seeking to maximise utility as a function of return and risk will be interested in portfolios that are located as far to the northwest in expected return-risk space as possible. The upper rim of the choice set is the farthest to the northwest that is possible given the available assets in the economic system. Risk-averse investors seeking to maximise their utility will therefore be interested in the set of efficient portfolios that are located farther to the northwest than all other portfolios in the choice set:

Exhibit 2: The set of efficient portfolios or the efficient frontier



Therefore, stated in terms of MPT, the objective of this article is to determine whether the asset allocations recommended to Australian investors by financial planning groups result in portfolios that are located in the efficient frontier. If the portfolios formed on the basis of these allocations lie within the efficient frontier, then it will be possible to form alternative portfolios that yield a higher expected return with the same level of risk. The extent to which the portfolios formed on the basis of financial planning groups' allocations diverge from optimal portfolios that exhibit the same level of risk is a measure of the inefficiency of the financial planning groups' strategic asset allocations. It is important for financial planners and their clients to be aware of the possibility that portfolios that mirror the strategic asset allocations recommended by financial planning groups may generate returns that are lower than alternative portfolios with the same level of risk.

DATA AND RESEARCH METHODOLOGY

This article examines the benchmark asset allocations of ten of the thirty largest financial planning groups representing approximately $143 billion worth of funds under advice [Wilkinson 2007]. The financial planning groups, designated by letters A to J, have determined the following investor styles and associated asset allocations based on *ex ante* beliefs and expectations about the various asset classes.

Exhibit 3: Benchmark asset allocations of financial planning groups

Financial planning group	Investor risk profile	Recommended strategic asset allocation (%)					
		Cash	Australian Fixed Interest	Intl Fixed Interest	Property	Australian Shares	Intl Shares
A	Conservative	25	23	22	9	11	10
	Moderately conservative	10	20	20	9	21	20
	Balanced	5	13	12	9	31	30
	Moderately aggressive	0	8	7	9	38	38
	Aggressive	0	0	0	9	45	46
B	Capital secure	50	40	10	0	0	0
	Conservative	25	35	10	5	15	10
	Moderate	10	25	10	10	25	20
	Balanced	5	15	10	10	35	25
	Growth	5	10	5	10	40	30
	High growth	0	0	0	10	50	40
C	Cautious	21	43	21	2	7	6
	Conservative	21	26	23	8	12	10
	Moderately conservative	10	24	14	9	24	19
	Balanced	5	17	8	10	35	25
	Growth	2	9	3	10	45	31
	High growth	0	0	0	10	50	40
D	Defensive	20	30	20	8	14	8
	Moderately defensive	10	23	17	10	22	18
	Balanced	4	15	11	10	34	26
	Growth	2	8	5	10	43	32
	High growth	1	0	0	5	45	49
E, F, G	Preservation	90	5	5	0	0	0
	Conservative	20	25	25	5	15	10
	Moderately conservative	10	23	22	5	20	20
	Balanced	5	15	15	10	30	25
	Assertive	5	8	7	10	40	30
	Aggressive	0	0	0	10	45	45

Financial planning group	Investor risk profile	Recommended strategic asset allocation (%)					
		Cash	Australian Fixed Interest	Intl Fixed Interest	Property	Australian Shares	Intl Shares
H, I, J	Conservative	21	26	23	8	12	10
	Moderately conservative	10	24	14	9	24	19
	Balanced	5	17	8	10	35	25
	Growth	2	9	3	10	45	31
	High growth	0	0	0	10	50	40

Monthly total return or accumulation indices data were obtained for each of the asset classes listed in Exhibit 3, to be used in calculating historical returns. The indices are established industry investment performance benchmarks [Gallagher 2002] and are also used by fund managers. The use of indices to derive the asset class returns for the analysis is justified by the fact that financial planners generally recommend managed funds to clients and are the main distributors of managed funds [AXISS 2004]. The unavailability of some index data for certain periods constrained the analysis to the period from 31/01/1986 to the time of writing or around a 21-year period. The monthly returns are derived from the index data and are used as the basis for the mean-variance analysis of the portfolios. To provide a way of validating the result of the analysis, two sets of analysis are carried out: (1) based on last 21 years data; and (2) based on last 5 years data. The descriptive statistics for each asset class are presented in the following tables.

Exhibit 4: Descriptive statistics for last 21 years data

	Cash	Australian Fixed Interest	Intl Fixed Interest	Property	Australian Shares	Intl Shares
Mean	0.0067	0.0082	0.0060	0.0113	0.0113	0.0090
Std dev	0.00354	0.01586	0.03191	0.03328	0.04725	0.04326

Exhibit 5: Descriptive statistics for last 5-years data

	Cash	Australian Fixed Interest	Intl Fixed Interest	Property	Australian Shares	Intl Shares
Mean	0.0046	0.0043	-0.0020	0.0139	0.0157	0.0054
Std dev	0.00047	0.00907	0.02032	0.02777	0.02504	0.03201

It is noted that the mean-variance characteristics for the various asset classes are not consistent with common belief and expectations. For instance, Cash and Australian Fixed Interest both dominate International Fixed Interest and the same is true for Property and Australian Shares over International Shares. In addition to asset class returns and variances, the other inputs to the MPT model are the covariances between the asset class returns. These are summarised in the following tables.

Exhibit 6: Covariance matrix for last 21 years data

	Cash	Australian Fixed Interest	Intl Fixed Interest	Property	Australian Shares	Intl Shares
Cash	0.0000125	0.0000153	0.0000048	0.0000089	0.0000182	0.0000118
AFI	0.0000153	0.0002506	0.0000304	0.0002029	0.0002489	0.0000454
IFI	0.0000048	0.0000304	0.0010149	-0.0000882	-0.0005458	0.0005444
Property	0.0000089	0.0002029	-0.0000882	0.0011033	0.0009378	0.0004222
AS	0.0000182	0.0002489	-0.0005458	0.0009378	0.0022240	0.0007307
IS	0.0000118	0.0000454	0.0005444	0.0004222	0.0007307	0.0018645

Exhibit 7: Covariance matrix for last 5 years data

	Cash	Australian Fixed Interest	Intl Fixed Interest	Property	Australian Shares	Intl Shares
Cash	0.0000002	0.0000004	0.0000017	0.0000010	0.0000016	0.0000015
AFI	0.0000004	0.0000807	0.0001007	0.0000404	-0.0000577	-0.0000861
IFI	0.0000017	0.0001007	0.0004323	0.0000705	-0.0001604	-0.0000078
Property	0.0000010	0.0000404	0.0000705	0.0007617	0.0002599	0.0003101
AS	0.0000016	-0.0000577	-0.0001604	0.0002599	0.0006585	0.0005617
IS	0.0000015	-0.0000861	-0.0000078	0.0003101	0.0005617	0.0010506

Using these returns and covariances, we compute the expected (mean) return and variance for each of the portfolios defined by the weighting schedules presented in Exhibit 3. The variance is a measure of the risk associated with each investor style. As expected, the portfolios recommended for more conservative investor styles exhibit a lower variance of returns than those portfolios recommended for less risk-averse investors. Once we have the mean and variance associated with the portfolios formed on the basis of the weighting schedules presented in Exhibit 3, we can compute the set of corresponding 'optimal' portfolios. The optimal portfolios possess the highest level of mean return attainable by re-weighting the portfolios whilst maintaining the original level of risk. The optimal portfolios are computed by solving the following quadratic programming problem for each recommended portfolios in order to assess the efficiency or optimality of these portfolios:

Exhibit 8: The quadratic programming problem

$$\max E(R_P) = \sum_{i=1}^{n} w_i E(R_i)$$

Subject to a target level of variance:

$$\sigma_p^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \rho_{ij} \sigma_i \sigma_j = \sigma_p^{2^{**}}$$

And the constraints:

$$\sum_{i=1}^{n} w_i = 1$$

$$w_i \geq 0$$

This is a variation of the iso-return minimum variance method of deriving the efficient frontier discussed in most textbooks [Elton et al. 2003; Strong 2006]. The methodology deployed in this article is summarised step-by-step in the following table. For each portfolio formed using the financial planning groups' weighting schedules, the following steps were undertaken:

Exhibit 9: Methodology deployed

Step	Formula or procedure
1. Compute the expected monthly return and risk for each of the portfolios formed using the financial planning groups' weightings.	$E(R_P) = \sum_{i=1}^{n} w_i E(R_i)$ $\sigma_p^2 = \sum_{i=1}^{n} w_i^2 \sigma_i^2 + \sum_{i=1}^{n}\sum_{\substack{j=1 \\ i \neq j}}^{n} w_i w_j \rho_{ij} \sigma_i \sigma_j$
2. Solve the quadratic programming problem for each of the portfolios derived in the first step using Excel Solver. Solver is a command that utilises what-if analysis to find an optimal value for a variable subject to constraints (see Appendix). In this case, the output variable that will be optimised is E(Rp) subject to a certain risk value and the input variables that will be varied are the portfolio weightings.	$\max E(R_P) = \sum_{i=1}^{n} w_i E(R_i)$ subject to the risk computed in the first step
3. Record the expected returns generated by the optimal portfolios determined in the second step.	
4. Using the expected returns and variances of the optimal portfolios, plot the efficient set in expected return-risk space.	
5. Plot the expected returns and variances of the financial planning groups' portfolios relative to the efficient set to show (in)efficiency and calculate the percentage shortfall from the optimal return.	

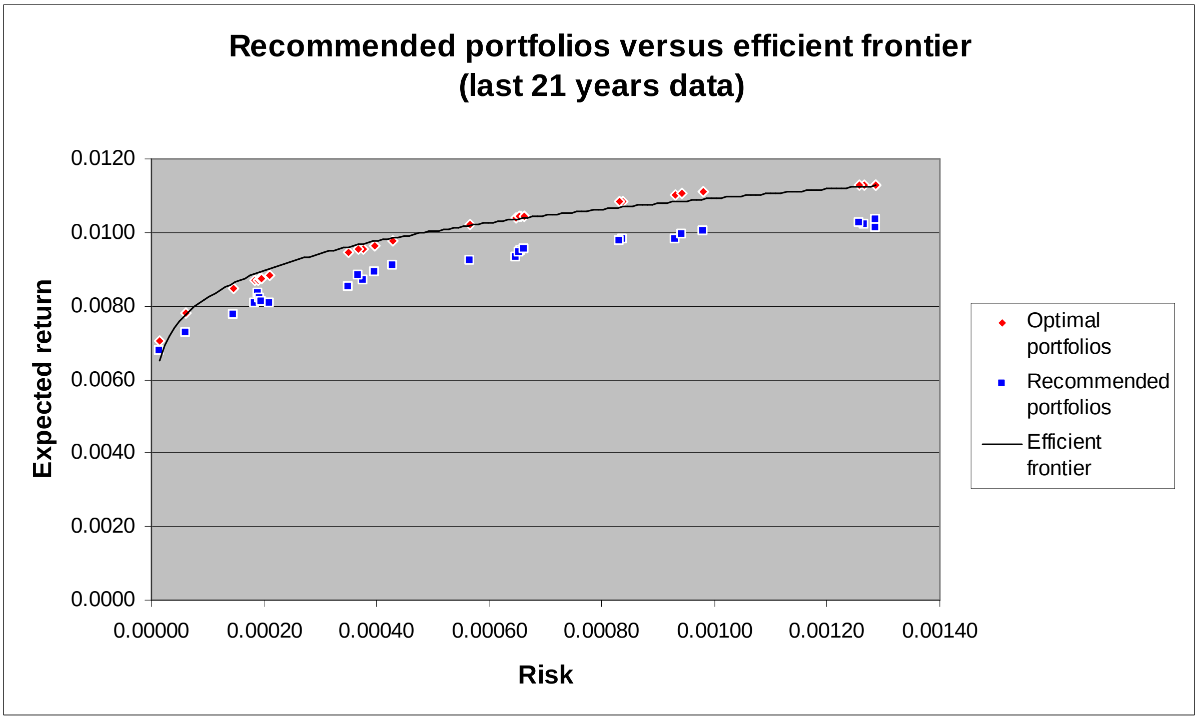
These steps were carried out for both sets of historical data: (1) the last 21-year period; and (2) last 5-year period. A similar application of the Excel Solver command was utilised in another asset allocation optimisation study [Grover & Lavin 2007] where they used instead a single index model.

The solution to the quadratic programming problem determines the existence and definition of a weighting schedule that produces a higher portfolio expected return with the same level of risk as the portfolio formed utilising a financial planning group's weighting schedule. Such portfolios, if they exist, represent a combination of the asset classes listed in Exhibit 3 that dominates the portfolios formed utilising the weightings suggested by the various financial planning groups. The portfolios derived from the solution of the quadratic programming problem will be located in the efficient set of portfolios. If such portfolios are shown to exist, the associated financial planning groups' portfolios will be shown to be located in the interior of the efficient set in inefficient positions. The results of the investigation are presented in the following section.

RESULTS

Using the last 21 years data, it was discovered that the recommended weighting schedules generated portfolios that lie in the interior of the mean-variance opportunity set and are, therefore, less than optimal when measured on the basis of the mean-variance efficiency criterion. The solution of the quadratic programming problem for each of the recommended portfolios generated a set of portfolios that lie in the efficient frontier. The existence of these efficient portfolios suggests that Australian financial planning clients' strategic asset allocations could have been improved by the selection of alternative weighting schedules. These alternative mean-variance efficient weighting schedules generate portfolios with the same level of risk as the recommended portfolios but produce higher expected (mean) returns. The results based on the last 21 years data are summarised in the following chart and table.

Exhibit 10: Results based on last 21 years data

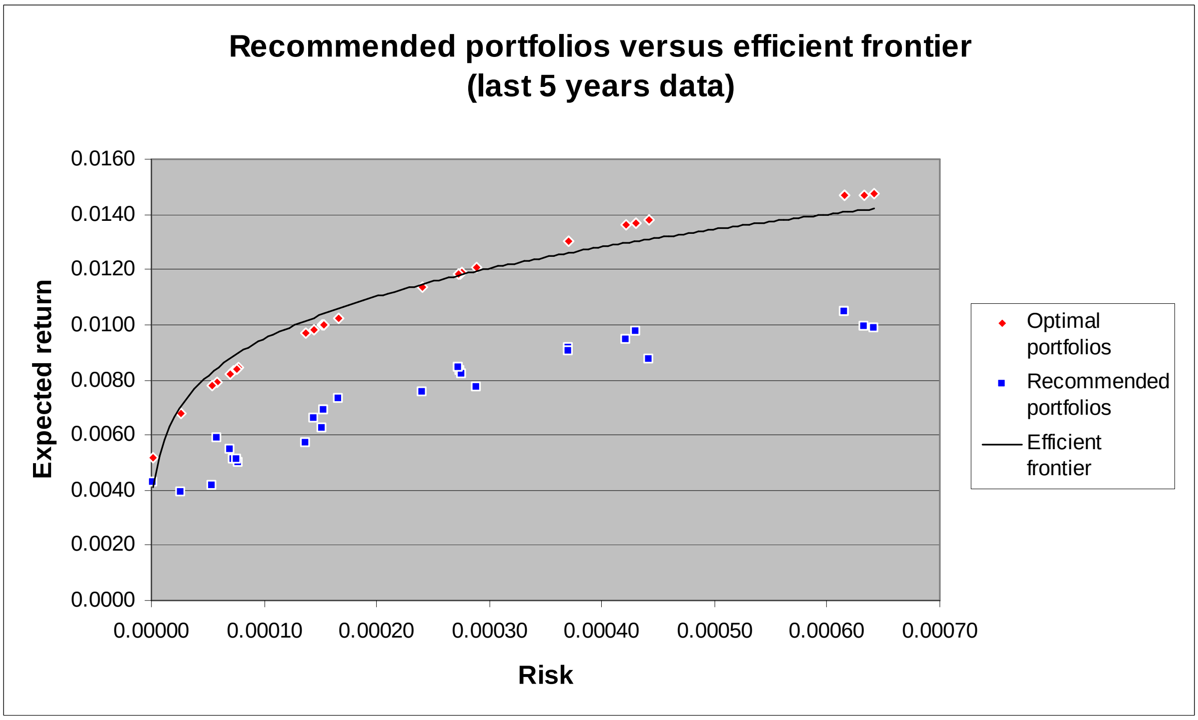


Financial planning group	Investor risk profile	Risk	Expected return		
			Recommended portfolio	Optimal portfolio	Shortfall
A	Conservative	0.00018	0.0081	0.0087	7.2%
	Moderately conservative	0.00038	0.0087	0.0096	8.8%
	Balanced	0.00065	0.0093	0.0104	10.3%
	Moderately aggressive	0.00093	0.0098	0.0110	11.2%
	Aggressive	0.00127	0.0102	0.0113	9.6%
B	Capital secure	0.00006	0.0073	0.0078	6.8%
	Conservative	0.00019	0.0083	0.0087	4.5%
	Moderate	0.00043	0.0091	0.0098	6.9%
	Balanced	0.00066	0.0095	0.0104	8.9%
	Growth	0.00084	0.0098	0.0108	9.6%
	High growth	0.00129	0.0104	0.0113	8.3%
C	Cautious	0.00015	0.0078	0.0085	8.1%
	Conservative	0.00020	0.0081	0.0088	7.5%
	Moderately conservative	0.00040	0.0089	0.0096	7.4%
	Balanced	0.00066	0.0095	0.0104	8.6%
	Growth	0.00098	0.0100	0.0111	9.7%
	High growth	0.00129	0.0104	0.0113	8.3%

D	Defensive	0.00019	0.0082	0.0087	5.8%
	Moderately defensive	0.00037	0.0088	0.0095	7.4%
	Balanced	0.00065	0.0095	0.0104	9.1%
	Growth	0.00094	0.0100	0.0111	10.0%
	High growth	0.00129	0.0101	0.0113	10.6%
E, F, G	Preservation	0.00002	0.0068	0.0070	3.6%
	Conservative	0.00021	0.0081	0.0088	8.5%
	Moderately conservative	0.00035	0.0085	0.0095	10.0%
	Balanced	0.00057	0.0092	0.0102	9.4%
	Assertive	0.00083	0.0098	0.0108	9.9%
	Aggressive	0.00126	0.0102	0.0113	9.4%
H, I, J	Conservative	0.00020	0.0081	0.0088	7.5%
	Moderately conservative	0.00040	0.0089	0.0096	7.4%
	Balanced	0.00066	0.0095	0.0104	8.6%
	Growth	0.00098	0.0100	0.0111	9.7%
	High growth	0.00129	0.0104	0.0113	8.3%
				Average shortfall	8.4%

When the same analysis is applied using the last 5 years data, the results are even more striking. The recommended portfolios were found to lie a considerable distance from the efficient frontier. The chart below indicates that a significantly higher expected monthly return could be generated by finding the efficient combination associated with each of the recommended portfolios and selecting alternative portfolio weighting schemes. The mean-variance inefficiency of the recommended portfolios based on the last 5 years data results in expected monthly returns that are on average about one-third below the expected monthly returns generated by the efficient portfolios.

Exhibit 11: Results based on last 5 years data



Financial planning group	Investor risk profile	Risk	Expected return		
			Recommended portfolio	Optimal portfolio	Shortfall
A	Conservative	0.00007	0.0051	0.0083	38.2%
	Moderately conservative	0.00015	0.0063	0.0100	37.4%
	Balanced	0.00029	0.0077	0.0120	35.8%
	Moderately aggressive	0.00044	0.0087	0.0138	36.7%
	Aggressive	0.00064	0.0099	0.0147	33.1%
B	Capital secure	0.00003	0.0039	0.0068	42.1%
	Conservative	0.00006	0.0059	0.0079	25.5%
	Moderate	0.00017	0.0073	0.0102	28.3%
	Balanced	0.00027	0.0084	0.0118	29.4%
	Growth	0.00037	0.0092	0.0130	29.7%
	High growth	0.00062	0.0105	0.0147	28.7%
C	Cautious	0.00005	0.0042	0.0078	46.8%
	Conservative	0.00008	0.0051	0.0084	39.3%
	Moderately conservative	0.00015	0.0069	0.0100	30.9%
	Balanced	0.00027	0.0085	0.0118	28.4%
	Growth	0.00043	0.0098	0.0137	28.5%
	High growth	0.00062	0.0105	0.0147	28.7%

D	Defensive	0.00007	0.0055	0.0082	33.6%
	Moderately defensive	0.00014	0.0066	0.0098	32.7%
	Balanced	0.00028	0.0082	0.0119	31.0%
	Growth	0.00042	0.0095	0.0136	30.4%
	High growth	0.00066	0.0095	0.0111	14.7%
E, F, G	Preservation	0.00000	0.0043	0.0052	17.3%
	Conservative	0.00008	0.0050	0.0084	40.6%
	Moderately conservative	0.00014	0.0057	0.0097	41.4%
	Balanced	0.00024	0.0076	0.0114	33.7%
	Assertive	0.00037	0.0090	0.0130	30.6%
	Aggressive	0.00063	0.0099	0.0147	32.4%
H, I, J	Conservative	0.00008	0.0051	0.0084	39.3%
	Moderately conservative	0.00015	0.0069	0.0100	30.9%
	Balanced	0.00027	0.0085	0.0118	28.4%
	Growth	0.00043	0.0098	0.0137	28.5%
	High growth	0.00062	0.0105	0.0147	28.7%
				Average shortfall	32.2%

The presence of taxes would not have a significant effect on the results. The results reported above are before-tax returns. Once taxes are taken into account, the returns actually obtained by investors will be lower for all portfolios and the relative efficiency of the portfolios may be affected to some degree. This may potentially reduce the ‘efficiency gap’ between the financial planners’ portfolios and the corresponding optimal portfolios. For example, whereas it might be optimal (pre-tax) for investors to invest a higher percentage of their portfolios in, say, fixed interest vis-à-vis shares, once the taxation advantages associated with the favourable taxation treatment of dividends (in the presence of an imputation taxation system) is considered, the excess returns generated by the optimal portfolio may be diminished. However, there are two factors that allow us to conclude that taxation effects are unlikely to dramatically alter the conclusions of our analysis. First, the re-weighting involved in the formation of the optimal portfolios rarely involves a shift to asset classes where the taxation treatment is different (or, to be precise) less favourable. In most cases, the re-weighting involved a switch from international fixed interest to Australian fixed interest for the more conservative portfolios and a switch from international shares to Australian shares and a switch from Australian shares to property for the less conservative portfolios. Second, the magnitude of the inefficiency of the financial planning groups’ portfolios far exceeds any disadvantages that may have been accorded to those portfolios or advantages that may have been accorded to the optimal portfolios that would see a reversal of the positions.

CONCLUSION

Australian financial planning clients following the financial planning groups' recommended asset allocation strategies would have found *ex post* that their shortfall in expected returns has been substantial, based on both the last 21 years and last 5 years data. These shortfalls are even more significant when one considers that the recommended asset allocations are supposed to be strategic and are maintained for a long investment horizon. To highlight the magnitude of the shortfalls we have identified that a $100,000 optimal portfolio earning 10% pa will compound to $1.74 million in 30 years but will only be $1.40 million if the return is 9.2% pa or 8% less as was the result for the analysis based on last 21 years data. It would be a lot less with the 32% sub-optimality result for the analysis based on last 5 years data. If the level of mean-variance inefficiency revealed by this analysis of the historical returns series is indicative of the future performance of the financial planning groups' portfolios vis-à-vis those portfolios formed on the basis of Markowitz portfolio methods and historical returns data, financial planning clients might find their terminal wealth to be substantially lower than that which could have been generated (without bearing any additional risk in the form of higher return variance).

It is likely that the benchmark asset allocations of financial planning groups are based on the commonly held beliefs or perceptions regarding the inherent return-risk characteristics of the various asset classes. These beliefs are not necessarily supported by historical data. For instance, it is not generally held to be the case that both Property and Australian Shares will dominate International Shares. However, this is what was revealed by the historical data for the last 21 years and even more so by the last 5 years of data. This raises the question whether analysts formulating asset allocation policies should focus solely actual historical performance rather than commonly held beliefs about the return-risk characteristics of particular asset classes. The fact that sub-optimality appears to be uniform across the financial planning groups seems to indicate a consensus among analysts as far as these beliefs are concerned. The *ex-post* approach based on actual historical performance is sometimes noted as a criticism of the Markowitz model but compared to *ex-ante* analysis could it be the more practical approach?

The investigation of strategic asset allocation holds many tantalising prospects for future research. One of the more interesting avenues for future research concerns the possibility of investigating the formulation of the financial planning groups' strategic asset allocations from the point of view of behavioural finance. Financial planning groups do not appear to base their recommendations solely upon the mean-variance criterion and instead rely upon analysis and judgement that takes into consideration a larger number of variables. To the extent that this wider analysis must include a subjective assessment of various aspects of the investment environment and context, behavioural finance provides a framework with which to analyse the decision-making process that is undertaken by financial planning groups. The focus of future research would be on the presence of various ‘biases’ in the decision-making processes of the financial planning groups during the formulation of strategic asset allocations. These biases—under-reaction, over-reaction, myopic loss aversion, over-confidence and the utilisation of heuristics or rules of thumb[1]—have been identified in the investment behaviour of both professional and non-professional investors in a variety of contexts. Given the importance of strategic asset allocation recommendations, it would certainly be worthwhile exploring the constructions of these recommendations from the viewpoint of behavioural finance.

[1] See, for an overview, Thaler (1999).

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