Judgments, Forecasts and Decisions: An Analysis of Fund Managers over time

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Abstract

Decision theory is the study of models of judgement involved in, and leading to, deliberate and (usually) rational choice. In real estate investment there are normative models for the allocation of assets. These asset allocation models suggest an optimum allocation between the respective asset classes based on the investors' judgements of performance and risk. Real estate is selected, as other assets, on the basis of some criteria, e.g. commonly its marginal contribution to the production of a mean-variance efficient multi-asset portfolio, subject to the investor's objectives and capital rationing constraints. However, decisions are made relative to current expectations and current business constraints. Whilst a decision maker may believe in the required optimum exposure levels as dictated by an asset allocation model, the final decision may/will be influenced by factors outside the parameters of the mathematical model.

This paper discusses investors' perceptions and attitudes toward real estate and highlights the important difference between theoretical exposure levels and pragmatic business considerations. It develops a model to identify "soft" parameters in decision making which will influence the optimal allocation for that asset class. This "soft" information may relate to behavioural issues such as the tendency to mirror competitors; a desire to meet weight of money objectives; a desire to retain the status quo and many other non-financial considerations.

The paper aims to establish the place of property in multi-asset portfolios in the UK and examine the asset allocation process in practice, with a view to understanding the decision making process and to look at investors' perceptions based on an historic analysis of market expectation; a comparison with historic data and an analysis of actual performance.

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Introduction

Investment fund managers are decision makers; their role is to decide upon the asset allocation by sector on a year-to-year basis to maximise expected returns within the predetermined investment criteria of the particular fund. Their decisions should a deliberate, and usually rational, choice. The fund manager normally uses an asset allocation model as part of the process of deciding investment strategy. This will determine the required optimum exposure levels of each asset class to maximise the total annual return for the fund.

In this paper, we analyse the thought process that determines the inputs into the asset allocation model and discuss how the final asset allocation is influenced by factors outside the parameters captured in the asset allocation model.

Decision Models

There is a strong body of evidence (see French, S. 1986) that the predicted rational models such as asset allocation models are rarely observable in practice. What people should do in theory is often very different from the final decision. This might be because the original predictive model was erroneous or that it failed to encompass the whole thought process which influenced the final decision. For example, in property, a portfolio maximisation model might predict that a particular allocation should be obtained to gain optimum performance relative to investment risk, yet this might conflict with business risk considerations such as 'what are the competitors doing?'

Decision models can be used in *descriptive, normative* or *prescriptive* analysis.

Descriptive analysis - models which purport to describe how we do decide.

Normative analysis - models which suggest how we should decide.

Prescriptive analysis - models which uses normative models to guide the decision maker within other limiting parameters.

Normative theory suggests that rational decision-making is transitive. That is to say, if the decision maker has three options, x, y and z, then if they prefer x to y and y to z, then logically they must prefer x to z. However, research has shown that decision-making can be intransitive (French, 1986 and Tversky, 1969). Normative models tend to suggest that a transitive thought process will apply in all circumstances, but that fails to recognise that there are externalities that will affect the decision when certain conditions are met.

The overriding debate in decision theory has therefore been whether decision makers are making mistakes in their decisions or whether the normative models are inadequate. The role of prescriptive models is therefore to recognise and identify intransitives and reflect them in the decision making model.

The Appropriateness of Asset Allocation Models

Portfolio theory suggests that there are advantages for investors in holding a spread of assets. The principal requirement is to minimise risk at any given required level of return. In this context, it has been normal practice for institutional investors, such as the large pension funds and insurance companies, to create investment portfolios that include the three main asset classes of property, equities and gilts. The percentage holdings of each of these respective classes varying over time according to the relative performance of each asset.

In his development of modern portfolio theory (MPT), Markowitz, using the basic premises that investors want higher rather than lower returns, and prefer lower risk to higher risk, showed that assets can be combined to produce an "efficient" portfolio that will give the highest level of portfolio return for any level of portfolio risk, as measured by the variance or standard deviation. Thus, MPT is used to determine the mixed portfolio of assets that achieves the highest level of return for a given level of risk. Such a portfolio is described as "efficient" in that a rational investor would choose this portfolio above all others. These portfolios can then be connected to generate what is termed an "efficient frontier". The efficient frontier represents the boundary of the risk/return set of asset combinations because by combining assets with low correlations it provides an opportunity to diversify risk. Thus, an understanding of portfolio risk is essential if portfolios are to be constructed efficiently.

Portfolio theory assumes that an investor is both rational and risk adverse. By defining a portfolio of assets in terms of their risk, return and covariance Markowitz developed a model that identifies the optimal proportion of funds (the weight) to be invested in each asset in each asset. For a given level of risk the resulting portfolio was considered because it offered the maximum expected return. The alternative approach was to minimise risk for a given rate of return.

However, this model, as with all asset allocation models, is normative in nature. Yet the decision making structure of portfolios lead to intransitives which results in decisions being made contrary to the normative model. A prescriptive approach therefore needs to be developed to help identify a strategy for decision making to reflect the behavioural influences pervading in the market. In other words the asset allocation model provides the 'ideal of transitive' behaviour and thus suggest what should be decided. The purpose of this research is to place this normative model in the context of other heuristic rules that can lead to intransitive behaviour.

One of the critical variables in any asset allocation model is an analysis of risk/return profiles for each asset class over time. In other words, the models rely upon historic data to proffer advice on asset allocations in the future. Whilst, past performance is obviously and important influence on the decision, it is a short coming of the model that it fails to encompass investors current perceptions of the relative merits of each asset class.

Risk and the Decision Maker

One of the principal factors in the different models being considered is the shape of the decision maker's preference and uncertainty functions. In other words, different models assume different interpretations of risk. However, the concept of risk is ill defined. Risk means different things to different people. Most commonly, risk is defined as the 'possibility of loss, injury, disadvantage or destruction'. People talk about risk because they worry that something bad may happen. These 'bad' things are events that cannot be controlled or known in advance. In more detail, people need to deal with what the loss is, the seriousness of the loss and how likely it is to happen. Since people find it difficult to quantify the seriousness of an event, they tend to emphasise the question of 'possibility'. In other words the nearest concept to risk is 'uncertainty'. Risk is therefore the same as probability in this situation, and risk assessment is the same as probability evaluation.

The second situation is to consider the 'risk of taking a decision' rather than 'the risk of an undesired consequence'. In this case people have tended to emphasise both the uncertainty of the situation and the desirability or otherwise of the outcome. Here risk means both the uncertainty and the consequences. There are three main approaches of decision making under uncertainty, (subjective) expected utility theory (EU), mean variance analysis (MV) and stochastic dominance (SD), which deal with quantitative assessments of risk.

Expected utility theory is considered as the basic principle of economic behaviour under uncertainty. However, the EU approach does not attempt to measure the riskiness of decision alternatives as an objective concept but rather to describe the decision maker's attitude toward risk, i.e. a subjective concept. Mean variance analysis was initially developed for the problem of portfolio selection in security markets by Markowitz (1952). Since then a number of extensions have been made to the basic concept such as the capital asset pricing model (CAPM), which further distinguishes the portfolio risk by reference to market (systematic) risk and specific (non-market) risk. Stochastic dominance relates to the presumption that decisions follow a certain path through time but this concept is not discussed within this paper (Brown, 1991).

Problems with Asset Allocation Models

Modern Portfolio Theory attempts to minimise the portfolio variance for a particular level of portfolio return. The MPT model requires 'forecast' values of expected returns and volatility for the future investment period. These values are typically estimated by reference to historic values, although econometric forecasting techniques (Matysiak 1993, MacGregor & Nanthakurmaran 1992) or forecasts from survey (French 1996) can also be used.

A number of papers have discussed the suitability of applying MPT to property (Lee 1989, Sweeny 1988) whilst others have questioned the reliability of inputting appraisal based smoothed real estate data along side market based data from the other asset classes (MacGregor and Nanthamakumaran 1992). The principal criticism is that appraisal based data significantly underestimates the risk characteristics of property and as such will distort the asset allocations within the 'efficient' portfolio. As a result, it is argued that 'de-smoothed' data should be preferred (Byrne and Lee 1995). However, even when the data is reworked to include more realistic assessments of property's risk characteristics, the MPT model still relies on historic data. In other words, the efficient portfolio indicates the level of the respective allocation in each asset class, based on the assumption that each asset continues to perform (for any given time period) in the same way as it has performed in the previous corresponding period.

By using the 'predictive correlations' from this survey it is possible to compare how the allocation between asset classes (at any given level of risk) would differ from that suggested by applying MPT to historic data for a corresponding time period. Asset allocation models such as Markowitz can be viewed as decision-making models that;

1) are normative in nature - they assume a consistency of expected utility with a specific shape to the utility function (e.g. the mean variance criterion of Markowitz are essentially equivalent to a quadratic utility function)

2) assume that the entire preferences are based upon financial outcomes only. Thus if the decision maker either has a shape to their preferences which is non quadratic (e.g. different risk attitudes) and/or if they value other factors (e.g. ethical portfolios), their preferences will depart from the model's predictions. Even if neither of these reasons for departure from this normative model is applicable, the cognitive limitations and biases of decision makes as discovered in descriptive studies may lead to departures from the normative model.

Prescriptive decision analysis for asset allocators should therefore select an appropriate normative model that reflects the shape of the decision maker's preferences and the criteria they would consider. It should then be mindful of the cognitive limitations of the decision makers and guide them toward consistency within this model.

There are a number of well-recognised problems relating to asset allocation models regardless of the whether real estate is included in the portfolio mix. Michaud (1989) argued that the optimisers were "estimation-error maximisers" as the risk and return variables are subject to estimation error. MPT optimisers overweight assets with large estimated returns; negative correlations and small variances and underweight those with reverse characteristics. This problem increases as the number of assets increases. As a result the expected return form the efficient portfolio is overstated, whilst risk in under estimated. Secondly, and more importantly, this mis-estimation will lead to the elimination of potential better portfolio mixes.

When using Real Estate data the problems are exacerbated by the reliance on either historic appraisal based return estimates or forecasts that have been influenced by the perceived risk/return profile from those indices. These smooth measures will overstate the case for property. A number of commentators have suggested modifications to the model to try to overcome or limit these problems (for example see Blundel & Ward 1987, Lee, 1989, Frost & Savarino 1988 and Sutcliffe and Board, 1988) and but issues relating to the appropriateness and rigour of the model remain.

The use of data determined from forecasts made via survey techniques overcomes the issue of replicating previous market conditions that are unlikely to apply subsequently. However the other issues relating to the appropriateness of the model remain. In addition, the MPT model will now rely upon accuracy of the market forecasts derived from the market survey. Section C will cast doubt upon the ability of the market to predict future returns.

Lastly, it must be recognised that investment decisions are not made in isolation and that the decision of asset allocation mix will itself influence the returns available. This is particularly true in the real estate market which is particularly sensitive to market sentiment. A decision by a major fund to invest in (say) retail will result in a flurry of activity for that asset type. This in turn will influence market price (and values); the increased demand increasing the exchange price and ultimately the level of return.

Forecasts and Decisions

In 1994/5, 1995/6 and 1996/7 , a survey was undertaken of professional and academic expectations regarding the performance of real estate as asset class within a multi-asset portfolio. The survey was sent to individuals representing a broad cross section of institutions and their advisers who are actively engaged in the UK property markets. The questionnaire format was similar in each of the three years although the 'universe' was modified over the survey period to try to be more targeted.

The initial results of this survey are presented in paper, however a comprehensive review of the three years study is being prepared and the asset allocations suggested from the respective three years of results will be presented and contrasted with the observed performances for the corresponding periods.

In each of the years, the questions in the survey asked for respondents' opinions and expectations regarding inflation, real estate returns and risks, and correlations with other asset classes. The questions relating to correlations were designed to gauge the respondents' attitude to real estate as investment within a multi-asset portfolio. By using the correlation coefficient provided by the

respondents it will be possible to determine the optimal allocation of real estate within a fund's portfolio based on expectations rather than historic correlations (this analysis is not included in this paper).

Other questions in the surveys were less quantitative in nature and asked respondents to identify and comment upon what they consider to be the important factors that affect real estate returns in the respective time period. The surveys deliberately discussed property as one broad asset class and did not attempt to desegregate the various sectors (or geographical areas) of the property market. As such, any conclusions that can be drawn from the responses can only be applied to the overall class.

Summary Of Results from Questionnaires 1995 -97

In each of the years the highest percentage return rate with in the universe was from surveying firms (1995 - 23%, 1996 - 28%, 1997 - 35%), in addition of those replying from non-surveying sectors the majority in each year were qualified chartered Surveyors (1995 - 60%, 1996 - 54%, 1997 - 47%). The percentage response rate by sector is shown in Table 1.

YEAR	SECTOR %					
	Pension Funds	Life Funds	Property Researchers	Investment Advisers	General Insurance	Surveyors
1994/95	30	24	7	11	14	23
1995/96	24	18	4	10	16	28
1996/97	20	12	8	12	13	35

Table 1: Breakdown of Respondents

The average size of fund under management was £ 800 million. Although it should be noted that within the range, the smallest fund was £ 65 million against the largest of £ 8,000 million. 77% of the funds were Pension Funds; 20% were Life Funds and 3% General Insurance.

The respondents were asked to provide an estimate of the total return over a one year, three year and five (or ten in the 1995 survey) year period. In addition they were asked to indicate a possible range for the long-term total return figure. Here the respondents were distinctly divided. About half the respondents (on average) thought the returns would be between + 1% and - 1% of their predicted figure, whilst the remaining respondents suggested a much greater divergence. The average plus figure of these was + 4% and the downside was -2%. However, those who suggested a greater range generally predicted a lower total return. Table 2 below shows the forecasted total return figures for the one-year predictions each year side by side with the actual figures for each of the years.

REAL ESTATE TOTAL RETURNS		
	ACTUAL	*FORECAST*
1994/95	12.4%	16.5%
1995/96	4.5%	10%
1996/97	10.8%	8%

Source: IPD Annual Index & IPF Survey

Table 2: Real Estate Total Returns

The responses for predicted returns from equities were generally less uniform across the sub-groups. Nearly all the sub-groups suggested that income returns would remain low and constant at 4% to

4.5%. However, the divergence in predictions related to the capital return. Table 3 below shows the forecasted total return figures for each year side by side with the actual figures for each of the years.

EQUITY/STOCK TOTAL RETURNS		
	ACTUAL	FORECAST
1994/95	-5.6%	9.3%
1995/96	23.8%	14%
1996/97	16.8%	8%

Source: IPD Annual Index & IPF Survey

Table 3: Equity/Stock Total Returns

As would be expected there was very little variation in the predicted returns for gilts over the three years. There is a perception that there will be no capital return in the one to three year period (many respondents indicated negative capital returns over that time period) rising to a small capital return in the long term. Table 4 below shows the forecasted total return figures for each year side by side with the actual figures for each of the years.

GILT/BOND TOTAL RETURNS		
	ACTUAL	FORECAST
1994/95	-8.4%	10.3%
1995/96	17.6%	10%
1996/97	7.6%	7%

Source: IPD Annual Index & IPF Survey

Table 4: Gilt/Bond Total Returns

The correlation of real estate returns against the other principal asset classes will have implications upon the allocation of the various assets within a balance, optimised portfolio. The respondents indicated that they expected the following correlations to apply over the next one year, three year and five year periods.

	REAL ESTATE/ EQUITIES			REAL ESTATE/ GILTS			EQUITIES/GILTS		
Year ending	1995	1996	1997	1995	1996	1997	1995	1996	1997
OVER 1 YEAR	n/a	+0.2	+0.4	n/a	+0.6	+0.1	n/a	-0.4	+0.4
OVER 3 YEARS	+0.1	+0.3	+0.3	+0.1	+0.4	+0.1	n/a	-0.2	+0.6
OVER 5 YEARS (1995 survey = 10 years)	+0.3	-0.2	+0.5	+0.2	-0.2	-0.1	n/a	+0.2	+0.5

(Note -negative correlation: as equity returns increase, property returns would decrease and vice versa. positive correlation: as equity returns increase so will property returns and vice versa.)

Table 5: All Asset Forecasted Correlations

The results indicated that market sentiment is extremely volatile from year to year. There is little pattern of consistency of thought regarding correlations between the assets.

Asset Allocation – Forecasted and Actual

In addition to the annual return predictions, the respondents were also asked to provide a possible range for the five-year total return figure for all three asset classes. As a measure of risk, they were For Real Estate, the average plus figure of these was + 4% and the downside was -2%; for Equities, the average plus figure of these was + 8% and the downside was –10% and for Gilts, the corresponding figures were 3% and 2% respectively. The average responses for each asset class are shown in Table 6 below.

	Equity Returns OVER NEXT 5 YEARS (% per year)	***Gilt Returns OVER NEXT 5 YEARS (% per year)***	***Real Estate Returns OVER NEXT 5 YEARS (% per year)***
INCOME RETURN (A)	4.5%	7%	7%
CAPITAL RETURN (B)	7.5%	1%	3%
TOTAL RETURN (A+B)	12%	8%	10%

Source: IPF Survey

Table 6: All Asset Forecasted 5-year Returns (1997 -2001)

Using these forecast returns and the forecast correlation coefficients and standard deviation (see Table 4) it is possible to use an asset allocation model to determine the optimum allocation for the investment period commencing in 1997. This can then be compared with the actual allocation for UK funds for the corresponding period. To determine the appropriate allocation along the efficient frontier created by our Markowitz, we calculated the weighted average return for the actual allocation (HMSO, 2003) based on the IPD data for 1997. This gave us an weighted average return for the actual allocation of 15.25% and we compared the forecast allocation at the same return level.

	Equity %	***Gilt %***	***Real Estate %***
FORECAST ALLOCATION	47.6%	23.2%	29.2%
ACTUAL ALLOCATION	64.07%	32.98%	2.95%

Source for Actual Allocation: HMSO 2003

Table 6: All Asset Forecasted and Actual Allocations

Conclusions

It can be seen that the forecast figures vary greatly from actual returns. Likewise there is little consistency in the markets interpretation of correlations between the asset classes. If these forecast based figures were integrated in to an asset allocation model they would produce optimum allocations at variance with those observed. The utility of these forecast models must be doubted due to the extreme differences that can be observed between the actual and forecasted figures. An analysis could be undertaken to see how the allocation from historic figure differs from (a) that suggested by these forecasted results and (b) from the allocation observed in the market. Ultimately it must be recognised that asset allocation decisions are not purely based upon the allocation suggestion from

maximiser models but often relate to assessments of risk outside the normal variance/SD criteria of these models.

This paper has tried to identify the principal requirements of a viable decision-making model and relate this to the models currently used in real estate investment decisions. The research has shown that there is an apparent difference between what decision makers in real estate asset allocation say that they will do, and the final observed outcome. This emphasises the distinction between normative and descriptive model. In using descriptive models one seeks to understand how others do make decisions. Normative models allow one to explore the implications of certain norms or ideals of behaviour. What this paper proffers is the development of a prescriptive model that can seek to explore the judgements, beliefs and preferences of decision makers in relation to the issues before them. The purpose of such a prescriptive analysis is to provide the decision makers understanding and insights to inform their decision-making. Ultimately, a decision cannot be judged on the risk of a single outcome. The decision maker must be judged on the process followed in coming to the decision and judged upon whether that process demonstrates a rational consistency and that 'on average' the results are good.

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