# ARE THEY MODELS OF EFFICIENCY?

## THE CASE FOR *GOOD* MATHEMATICAL ANALYSIS

*by JOHN R. EVANS*

***For a time, a good sales pitch was the fund manager's best weapon. Now, he has to understand the importance of appropriate analytical models.***

In the beginning there was stock selection. Then came the research indicating that in a diversified portfolio it was the asset allocation across sectors that was important. So most Australian managers became "asset allocaters" and the trustees of the superannuation funds were led to believe that all managers were good at both asset allocation and security selection. The choice between managers became heavily influenced by their sales ability.

Most consultants who were inexperienced in the fund management process were similarly influenced by the sales stories and implicitly made decisions based on a mixture of belief (or lack thereof) in the sales pitch and historical performance.

It is probably true that most trustees and consultants did not communicate their investment needs to the fund managers in a coherent and decisive manner.

The lack of communication and success of sales undoubtedly influenced managers to believe that provided they could point to an average return that was in the median to upper quartile of performance of their peers, they could continue to operate without being questioned. Then came the view that investors should see whether their manager was "adding value" – but the question should have been "over what target?" Of course, most superannuation fund trustees had not communicated any target, and it seems a bit unfair to impose a target retrospectively.

Notwithstanding this unfairness, various attempts have been made recently to try to determine whether managers are adding value, with the objective of differentiating between successful and unsuccessful managers.

Even if historical differentiation can be achieved, the value of this information as a predictive tool needs to be examined.

The table indicates, for large managers of pooled superannuation funds over the period from March 1985 to March 1988, the proportion of their total return for the quarter that was accounted for by timing and security selection decisions, assuming that the average asset allocation over the period was a reasonable gauge of the target or benchmark allocation.

It can be argued, validly, that such an analysis does not show the correct or even near-correct value added through timing or selectivity allocations. The problem faced by performance analysts external to an organisation is that they do not know the reason for the acquisition of a security – was it part of an asset allocation or a security selection?

Nonetheless, the effect on fund managers of this new style of analysis has been to significantly change their investment style. Fund managers now need not only to show credible average historical performance, but also to learn to produce credible performances in terms of the new analytical techniques.

The reaction has generally been

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to engage, with various levels of enthusiasm, mathematical techniques designed to produce satisfactory performances in terms of new measures – valid or not.

Generally, the mathematical models are based on historical analysis to derive inter-relationships between securities. The objective is to assist managers to avoid making errors in portfolio construction. The result should be, or is at least expected to be, that the negative aspects of the performance will be substantially reduced.

Looking at the results in the table, it is obvious that if mathematical models could reduce the negative attributes, then overall return would be improved and, as well, volatility would be reduced with an apparent improvement in management skills.

There is no doubt that mathematical models are changing the way in which Australian funds are managed. The models are used to analyse the "best guess" views of the analysts to see if any further insights can be gained into the likely portfolio performance. Risk/return optimisers will tell managers if they have the best asset mix; econometric models will indicate the effect of economic factor inter-relationships; option pricing models will indicate the optimum combination of physical and derivative securities for risk exposures; and arbitrage pricing theory models will indicate capital sub-market exposures.

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All of these models need to be understood in terms of their mathematical assumptions in relation to the workings of the capital markets.

It is also of paramount importance that users of these systems use inputs that relate to the results being sought. If estimates are being made of portfolio asset allocation over a short period, then using long-term historical data is unlikely to produce any helpful result – the output will look reasonable, but it is not relevant to the decision being made.

What these models really aim to do is remove illogicalities by analysing deep inter-relationships in the capital markets. It may be that fund managers can get a good idea of a reasonable portfolio asset allocation from looking at expected returns and ranges of outcomes, but most of us cannot then take into account inter-relationships other than in trivial cases. When the analysis is extended to an arbitrage pricing theory or economic model with 100 or more inter-relationships, it is obviously impossible to analyse the end result in your head.

But will these models produce "better" results?

Almost all of the models require user inputs. If these are inconsistent or contain illogicalities, then most of the current models will fail to point out the errors. Some systems now becoming available will attempt to detect errors, but they are restricted to only a few situations.

In the end, managers will be forced to do something that many people do not like to do: face interrogation by their peers about the reasons for their views. By bringing into the open the implicit and explicit assumptions, inconsistencies between analysts' views can be eliminated. Logical inputs to the models can then be used to assist with understandings of portfolio construction inefficiencies.

The few managers who currently use this peer interrogation approach successfully, including the use of quantitative analysis, have shown superior performance. Mathematical models with logical inputs and consistent assumptions for the required decisions will further refine the efficiency of portfolios – but the models will not *per se* improve efficiency. □

**POOLED SUPERANNUATION FUNDS**

| | Average return (March 1985 to March 1988) from | | |
|---|---|---|---|
| **Fund Manager** | **Long-term asset allocation** | **Market timing** | **Security selection** |
| AETNA | 0.592406 | 0.279280 | 0.128312 |
| AMP Bal | 1.207449 | 0.020642 | - 0.22809 |
| AMP M/E | 1.013839 | 0.517642 | - 0.53148 |
| AMP M/L | 0.915556 | 0.224359 | - 0.13991 |
| ANZCAP | 11.47742 | 1.589052 | - 12.0664 |
| BARCLAYS | - 17.9241 | - 45.2742 | 64.19846 |
| BTA | 0.884489 | 0.013982 | 0.101527 |
| CAPITA | 1.020163 | 0.062828 | - 0.08299 |
| CML | 0.763498 | 0.019327 | 0.217173 |
| COUNTY | 0.663253 | 0.148024 | 0.188722 |
| DELFIN | 1.510383 | 0.222844 | - 0.73322 |
| EQUITILINK | 0.726163 | 0.132045 | 0.141791 |
| GUARDIAN | 0.471913 | 0.566241 | - 0.03815 |
| HAMBROS | 0.659188 | 0.160604 | 0.180206 |
| JP MORGAN | 0.797259 | 0.034220 | 0.168520 |
| L7G | 0.703777 | - 0.01002 | 0.306246 |
| MML | 0.362263 | 0.683875 | - 0.04613 |
| MLC | 0.871497 | 0.206302 | - 0.07780 |
| NML Bal | 0.985725 | 0.005539 | 0.008734 |
| NML Cap | 0.925780 | 0.020176 | 0.054042 |
| NMPM | 1.814134 | - 0.05943 | - 0.75470 |
| PRUDENTIAL | 0.960087 | 0.089458 | - 0.04954 |
| ROTHSCHILD | 1.025348 | - 0.05164 | 0.026297 |
| SCHRODER | 1.004990 | 0.108763 | - 0.11375 |
| SCOTT A | 1.292407 | - 0.07769 | - 0.21471 |
| SUN ALLIANCE | 1.009533 | - 0.06446 | 0.054933 |
| WARDLEY | 0.646949 | - 0.01613 | 0.369184 |
| WESTPAC | 1.101242 | 0.028277 | - 0.12952 |
| ZURICH | 1.244353 | - 0.04475 | - 0.19959 |