The use of only return and risk (commonly translated as standard deviation of returns) to analyse a manager's performance assumes that no other attributes of the return distribution are relevant. Essentially, this means that it is assumed all managers' returns are normally distributed.

Evolving from the risk/return analysis have been a series of indices (Sharpe, Jensen) to provide a single indicator of relative risk-adjusted performance. These indices therefore also assume that the higher moments of the return distribution are not relevant to the investor.

The accompanying graphs show the frequency distribution of managers' returns for their pooled superannuation funds over 60 or more months where data was available.

The graphs show on the horizontal axis the monthly rates of return and the number of times each monthly return occurred on the vertical axis.

A normal distribution has also been fitted to the data and is shown on each graph as a single bell-shaped line.

It is clear even from observation that the monthly rates of return are not normally distributed in most cases. Most managers' returns show a positive skewness (i.e., they are lopsided) and a greater concentration of results about the middle than a normal observation would suggest.

A Chi-squared test at the 5 per cent confidence level (i.e., only a 5 per cent chance of making the wrong conclusion) for the managers supports the view that, in general, managers' returns are not normally distributed, with the test indicating only four of the funds' returns could be considered normally distributed.

The graphs make it clear that if a normal distribution of returns is assumed (implicitly or explicitly) then this will suggest a range of expected returns quite different from that likely to occur. Thus, in using just risk/return analysis of pooled superannuation funds, results are likely to vary significantly from that implicitly expected, without the fund managers' return distribution having altered.

At a practical level, managers may be observed to move around the typical risk/return chart and the Sharpe and Jensen indices without, in reality, having changed their manners of operation. Managers selected on the basis of risk and return only may perform very differently from expectations; thus, the risk/return model will lead to shocks to investors.

Given that moments of return distributions greater than the standard deviation are then relevant, the issue becomes one of ascerta-

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ing a reasonable and reliable basis of assessment. Four or five-dimensional graphs are difficult to read so that is not a possible solution.

The answer is a methodology that most non-statisticians can understand and use to interpret the frequency-distribution graph. A graph showing the number of times a return has occurred shows all the moments of distribution in one simple picture.

The frequency distribution can be further summarised with the cumulative frequency distribution graph to identify ranges of relative superior performance.

**Interpreting frequency distributions**

The graphs are frequency distributions of monthly rates of return. They show:

- the extreme rates of return and the relatively small number of times these occurred (yet these extreme observations will significantly influence the risk/return chart);
- the "cluster" of returns, which is an indicator of manager consistency;
- the extent to which a manager’s returns vary on the downside of required return (which is an indicator of risk, not the standard deviation which includes upside variation as risk).

In essence, frequency distribution graphs allow reasonable analysis of the investor’s risk, which is simply the probability of not achieving a target return.

Risk-and-return analysis, even if the normal distribution were correct, cannot do this, as it assumes that all variation about the target is "risk".
SCOTBOND: distribution normal

SUNCORP: distribution normal

SUN PREM: distribution normal

WARDLEY: distribution normal

WESTPAC: distribution normal

ZURICH: distribution normal