**European Real Estate Society Conference, Bordeaux, June 2000**

# Attribution of real estate portfolio returns and manager style: some empirical results

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# Attribution of real estate portfolio returns and manager style: some empirical results

**Abstract:**

*In Baum, Key, Matysiak and Franson, 1999, we were concerned with theoretical issues related to attribution systems in property portfolio performance measurement. In particular, we addressed and extended the debate concerning two and three-term attribution systems and the meaning of the third term or so-called cross-product. We noted that despite arguments to the contrary there was no correct attribution system, and that it may be that different attribution methods might be appropriate for different managers.*

*Burnie, Knowles and Tedder (1998) recommend different attribution arithmetic for portfolios constructed top-down against those constructed bottom-up. They propose that top-down attribution should weight selection by portfolio weights, which is the current IPD system for property portfolio measurement, while bottom-up managers should weight selection by benchmark weights. The correct attribution system depends first on method of portfolio construction and second, pragmatically, on what investment managers find intuitively in accordance with the way they think about their investment process. On top of the choice of method, the ideal attribution regime would also give managers a choice of segmentation, which uses the criteria on which they structure their portfolio against the benchmark.*

*However, little is known about the needs of manager and about different manager styles, as there appears to be a total absence of empirical material describing behaviour in property fund management organisations, the investment processes adopted and the uses made of attribution analysis in reward systems. All of these areas are potentially rich areas of further work.*

*In this paper we attempt to make a start in this area by discovering whether fund managers adopt different styles of investment management, and which styles are prevalent. We ask what we know about manager styles in order to compare the behaviour we would expect from these different styles and what can be observed. Finally, in what is work in progress, we set out the next stages of work required to connect our earlier theoretical work more fully with the observed behaviour of managers.*

Key words: performance measurement, attribution analysis, fund management, UK.

## 1. Introduction

In Baum, Key, Matysiak and Franson, 1999, we were concerned with theoretical issues related to attribution systems in property portfolio performance measurement. In particular, we addressed and extended the debate concerning two and three-term attribution systems and the meaning of the third term or so-called cross-product. We noted that despite arguments to the contrary there was no correct attribution system, and that it may be that different attribution methods might be appropriate for different managers.

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However, little is known about the needs of manager and about different manager styles, as there appears to be a total absence of empirical material describing behaviour in property fund management organisations, the investment processes adopted and the uses made of attribution analysis in reward systems. All of these areas are potentially rich areas of further work.

In this paper we attempt to make a start in this area by discovering whether fund managers adopt different styles of investment management. The research method centred upon a survey of UK property fund managers. We received responses from 37 managers, managing nearly 70 funds. For 61 of these funds we were able to produce a 5-year performance history. The managers responding managed £40bn of assets, which represents 45% of the IPD UK universe. The survey was carried out in May and June 2000.

The objectives of the research were: to estimate the managerôs self-perceived style; to compare observed manager behaviour with style; and to compares returns with style. In particular, we were concerned with the following issues.

1. What styles do managers adopt? To what extent can the sample be split into top-down and bottom-up styles of fund management?
2. What do managers think they are better at: structure or stock?
3. Is style related to fund size?
4. Is style related to lot size?
5. Is style related to returns?
6. Do attribution results justify the managerôs choice of style?
7. Is style related to activity levels?

## 2. Attribution analysis

Property investors, increasingly, use performance measurement - or 'benchmarking' - services. They exist, first and foremost, to show whether a portfolio has achieved a rate of return better or worse than the 'market' average, or met investment objectives specified in a more sophisticated fashion. After benchmarking has answered the question *by how much* did we out- (under-) perform the benchmark?, there is an inevitable demand for 'portfolio analysis' which addresses the question *why* did we out- (under-) perform the benchmark?

An ideal system of portfolio analysis would identify the contribution of all aspects of portfolio strategy and management to relative returns. It would separate, for example, profits earned on investments from returns on held properties. Those are two distinctly separate activities with different return and risk characteristics, and reflect different features of management 'skill'. Among held properties, relative return may be influenced by anything and everything from the broadest allocation of investment between sectors to skill in selecting tenants, negotiating rent reviews, and controlling operating expenses.

In practice, the heterogeneity of individual properties and complexity of property management mean that the contributions of different functions and skills to portfolio performance are hard to disentangle. This paper is concerned with the one tool - 'attribution analysis' - which is found in all performance measurement systems in a precisely quantified form.

Attribution analysis is of growing importance in property fund management - not just in terms of analysis, but also in the specification of investment objectives, the selection of managers, and setting performance-related rewards. Yet the academic and professional literature which deals with the attribution of relative returns in property fund management is very thin. The literature on portfolio analysis for equities - the original source of the attribution technique - is not only surprisingly scanty, but sets out several apparently conflicting methods of defining and calculating attribution components. Following that literature, suppliers of property performance measurement services are also adopting conflicting conventions.

In our 1999 paper we suggest that there is no single accepted or ócorrectô method for attributing real estate portfolio returns between contributory activities. Arguments can be found to defend economically or spatially coherent systems, but, while the importance of the topic to real estate investment seems profound, little debate of this type has been published.

In European real estate investment a two-term system which accounts for the impact on return of structure and stock is dominant. These are defined as follows.

*Structure: product of bets and relative return of sector against market*
*Stock: product of fund weight and relative fund return in each sector*

However, the maths of the IPD attribution process produces a stock term, a structure term and a cross-product. This is because stock breaks down further as follows.

*Pure stock: index weight and relative fund return in each sector*
*Cross-product: fund bet and relative fund return in each sector*

The cross-product is a mathematical inconvenience, but may be an economically powerful explanator of investment strategy. What is the relative importance of stock, structure and the cross-product? Is the cross-product correctly attributed? What is the cross-product really measuring?

In our 1999 this paper we presented evidence from the UK to demonstrate the relative importance of these three contributions to portfolio returns relative to a benchmark and discuss the possible implications for managers. We concluded that customised attribution systems might be appropriate, but that we needed to know more about manager behaviour: in particular, whether a summary of managers as driven primarily by structure (top-down) or driven primarily by stock (bottom-up) is justified.

## 3. Calculating attribution scores

In our 1999 work we concluded that no attribution system should be regarded as absolute. The choice of segmentation that 'structures' the whole of the analysis will often represent a compromise between

conflicting objectives. The use of a standardised segmentation across all investors will inevitably tend to be a baseline for the analysis of portfolio performance. But the existence of a standardised segmentation does not preclude the possibilities that alternative ways of dividing the market may offer a more powerful explanation of variation in portfolio returns, or that segmentations customised to the objectives or decision-making processes of individual investors may represent the ultimate ideal.

After the choice of segmentation, a second critical choice is the precise method of calculating the attribution scores. Here the literature not only offers a morass of varying terminology, calculation methods and mathematical notations, but also disagrees on how many attribution components there are, and how they should be interpreted.

The pioneers in the field are Brinson, Hood and Beebower. They identify three attribution components: timing (analogous to structure in our terminology), stock selection, and an 'other' or 'cross-product' term. Indeed, in their formulation of the attribution components, the cross-product term is effectively a residual component that, mathematically, reflects an additional *combined* contribution of timing and selection. Their interpretation of what they term timing and selection components broadly coincides with structure and stock selection components as defined in this paper. However, they do not offer an explanation of how the 'other' term relates to the objectives or management of the portfolio.

Subsequent authors, and suppliers of performance measurement services, divide into two camps. Liang, Hess, Bradford and McIntosh, Burnie, Knowles and Teder, and the main European performance measurement suppliers WM (all assets) and IPD (property) either follow a decomposition method which calculates structure and selection scores that account for the whole of relative returns without a cross-product component, or prefer to incorporate the cross-product term in either the structure or selection component.

According to Burnie, Knowles and Teder, the cross-product term:

> *...represents the interaction of two other attribution effects but which is not itself directly attributable to any one source of active management. It is therefore usually reallocated to another attribution effect or, if it remains isolated, is an ambiguous term whose value may exceed the measured effects of active management, thus rendering analysis results inconclusive.*

While Liang et al state that the use of a two-component method is recommended:

> *... on the basis of simplicity and ease of interpretation. Little is lost in terms of usable information, and much 'noise' is avoided in efforts to explain the results to persons unfamiliar with the nuances of the calculation.*

Hamilton and Hienkel, and the Property Council of Australia follow the three-component route, and go beyond Brinson et al in suggesting how the cross-product term may be related to management decisions. So, as put by Hamilton & Hienkel:

> *...Cross Product credits a manager for overweighting an asset class in which he or she outperforms the properties in that asset class in the RCPI (Russell Canadian Property Index).*

Similarly, the PCA view the cross-product as showing the potential gain from choosing to allocate to a segment on a prior view that manager selection skills in that segment are strong.

In our 1999 paper we examine whether the issue is of significance in attributing real estate returns, and found that over different measurement periods the structure, stock and cross-product scores all had a

significant impact on UK fund returns over different periods. The debate over the õbestô system is therefore worth continuing.

Burnie et al propose that if the portfolio is structured by 'top-down' decisions (that is target weights by segment set on the basis of expected average segment returns), a calculation method which in effect combines the stock selection and cross-product terms is appropriate. If the portfolio is structured 'bottom-up' (that is, selecting assets on the basis of their expected individual return, and letting those choices determine the segment weighting), a calculation method which combines the structure and cross-product terms is appropriate.

We need to know, therefore: are real estate portfolio managers typically top-down or bottom-up? Are these adequate descriptions of manager behaviour or style?

## 4. Attribution and portfolio management style

There is nothing in the mathematical construction of different attribution methods, nor (pending further tests) in the real-world portfolio results they produce, that dictates a preference for one attribution method over another. We therefore move on to consider whether the choice of attribution methods might depend upon the way in which a portfolio is managed, taking up Burnie et alôs suggestion that different attribution formulae might be applied to portfolios structured top-down from those assembled from the bottom-up. We would add the observation that the nature of that process is in some key respects different in property portfolios from equity and bond portfolios.

Property fund managers may adopt asset allocation positions which are different from the segment weighting of the benchmark for a variety of reasons. This may be the result of tactical asset allocation, so that views of likely market returns influence a manager to adopt an underweight or overweight position relative to the benchmark in an attempt to produce out-performance. It may be the result of strategic asset allocation or policy, where issues other than pricing ï for example, liability matching ï influence the asset allocation mix. It may also be the conscious or unconscious result of the style of the fund manager. Style may be associated with investment houses, with individuals or with funds. The following appear to be the most simple summaries of style.

*Top-down*

The two-component method embodies the classic top-down model of portfolio construction. Policy dictates a benchmark against which the portfolio is to be measured, specified in terms of a portfolio weighting by segment. An 'allocator', working with market analysis and forecasts, decides which segments are likely to out-perform or under-perform the overall benchmark return, and (perhaps taking into account relative risks) determines a target weighting for the portfolio. Other things being equal, segments expected to out-perform will be over-weighted, taking 'bets' against the market. The scale of the bet will depend on confidence in forecasts, perhaps on permitted deviations from the benchmark specific in policy, otherwise on the manager's willingness to accept tracking error against the benchmark.

Once the target weights have been set, the management task passes to 'selector'. Selector chooses the specific assets to be held in each segment, with the target of choosing assets which are expected to out-perform the benchmark average for that segment. In equities, the assets will (most likely) be shares in individual companies. In property, they will (most likely) be individual buildings.

*Bottom-up*

Passive structure, in its purest form, could be defined as the selection of properties expected to out-perform the all-property benchmark average irrespective of their type or location. It would be followed by an investor who either does not believe that there are any segmentations of the market which contain

meaningful information about individual property performance, or who has no ability to predict segment performance. Under this regime, all the relative performance of the portfolio is attributable to stock selection skills. Under either attribution method, the structure score could be interpreted as the 'cost' of eschewing a segment allocation strategy. If the structure score varies randomly over a run of years, the investor may be correct in sticking to a passive strategy. If it proves systematically negative, the investor might conclude that others are making better use of forecasting and allocation skills.

*Specialist*

A portfolio constructed by backing selection skills offers a more interesting, and probably more common, case. Here managers choose to hold high weights in segments where selection skills are believed to be strong (perhaps on the evidence of track record). Here the task of the allocator is redefined to take account of *both* the forecast performance of market segments and the skills of the selector when setting portfolio weights. In this case, the three component method of attribution (while its isolation also poses some difficult questions) offers a useful distinction between the relative inputs to portfolio performance. As before, structure score measures allocator's forecasting ability. The stock selection score measures selector's skills in the purest form, and the cross-product measures how far pre-judgements of selection skills have proved to be correct.

## 5. Rational behaviour

Given these different styles, a model of rational behaviour might be suggested. The top-down manager, who believes in his ability to forecast market segments, should take bets against the benchmark sector weight driven by those forecasts. The bottom-up manager who believes in his ability to buy out-performing assets should buy fewer assets than the top-down manager, as he has less incentive to reduce specific risk. The specialist manager should naturally be over-weight in those sectors where he has good stock selection skills. Figure 1 illustrates this classification.

**Figure 1: rational manager behaviour**

| **Forecasting strength** | Strong | Weak |
|---|---|---|
| **Stock selection skills** | | |
| Good | Take bets<br>Large properties | Benchmark<br>Large properties |
| Poor | Take bets<br>Small properties | Benchmark<br>Small properties |
| Specialist | Large properties<br>Weight specialist sector | Large properties<br>Weight specialist sector |

Source: Baum, 2000

The survey sets out to examine, among other things, whether fund manager behaviour has been rational or not. In the results, we are therefore looking for support for the following suggestions:

1. Top-down managers should take positions away from the benchmark by sector, while bottom-up managers should stay close to the benchmark.
2. Top-down managers should buy more buildings per portfolio than bottom-up managers.
3. Specialist managers should concentrate on their specialist sector and buy larger average lot sizes than the top-down manager.

## 6. The survey

In May and June 2000 we mailed a questionnaire survey of UK property fund managers to 50 managers. We achieved a response from 37 managers, managing 70 funds, for 61 of which we were able to measure their 5-year performance history for the period 1995 to 1999 using the IPD databank. The properties covered measured £40bn worth of assets, around 45% of the IPD UK universe.

The survey attempts to estimate the managerôs style, offering top-down, bottom-up and specialist as alternatives, and asking for alternative descriptions. It asks the manager to split his strength between structure and stock, summing 100%. We were then able to compare observed behaviour with the stated style, and to compare delivered returns with stated style.

## 7. Results

*7.1 What styles do managers adopt?*

80% of managers claimed to be bottom-up managers, or those which adopted a combined top-down/bottom-up style. Given that (according to Burnie, Knowles and Teder) a calculation method which combines the structure and cross-product terms is appropriate for portfolios structured 'bottom-up', this challenges the existing two-term attribution system common in property performance measurement which combine stock and cross-product and suggests that the cross-product might more fairly be associated with structure for a significant number of managers.

**Table 1: style frequency**

| Style | Frequency | Percentage |
|---|---|---|
| Top-down | 10 | 16% |
| Bottom-up | 27 | 44% |
| Both | 22 | 36% |
| Specialist | 2 | 3% |

*7.2 What do managers think they are better at: structure or stock?*

As Table 1 shows, more managers regarded themselves to be good at stock selection than those who thought structure was a strength. The average split of strengths is 70:30 in favour of stock (see Table 2). No manager thought that they had no skills in stock selection, but some managers thought that structuring was not an area of expertise.

**Table 2: manager strengths**

| | Stock | Structure |
|---|---|---|
| Max | 100 | 70 |
| Min | 30 | 0 |
| Average | 70 | 30 |

*7.3 Is style related to fund size?*

Table 3 shows that the larger managers tended to adopt a top-down style, which is wholly in line with expectations. For them, consistently successful stock selection is difficult to achieve, and the overhead represented by a research department is easier to justify. Top-down managers had average assets of nearly £1bn, while bottom-up managers had average portfolios of £350m.

**Table 3: style and fund size**

| Fund size (£m) | Average | Max | Min | Count |
|---|---|---|---|---|
| Top-down | 964 | 5160 | 50 | 10 |
| Bottom-up | 350 | 1124 | 5 | 27 |
| Both | 445 | 2766 | 21 | 22 |
| Specialist | 465 | .. | .. | 2 |

*7.4 Is style related to lot size?*

Rational behaviour would suggest that the bottom-up manager would hold smaller numbers of assets per £1 of fund size than the top-down managers, as he should be less concerned about minimising specific risk. This is evidenced by table 4, which shows that bottom-up managers have assets which represents 3 times the property proportion of fund size as top-down managers.

**Table 4: style and lot size**

| Style | Lot size |
|---|---|
| Top-down | 0.55% |
| Bottom-up | 1.49% |
| Both | 1.10% |

*7.5 Is style related to the size of sector bets taken?*

The sum of squared structure bets against the benchmark is positively correlated (18%) with the percentage stock preference summarised in Table 2. This suggests that bottom-up managers are taking larger bets against the benchmark than top-down managers.

There are three possible explanations for this unexpected result. First, top-down managers have larger portfolios and find it more difficult and risky, given the time taken to change portfolio shape, to take significant positions against the benchmark. Second, bottom-up managers do not concern themselves with portfolio structure, which is simply the result of uncontrolled stock selection decisions. Third, the indivisibility of property investments forces smaller funds to assemble lumpy portfolios whose shape relative to a benchmark is hard to control. There may be some truth in all of these possible explanations.

Whatever the explanation, it is suggested in 7.7 below that greater control of the sector structure would be beneficial for bottom-up managers.

*7.6 Is style related to returns?*

Table 5 shows that bottom-up managers have been more successful over the last 5 years, with average returns exceeding those of top-down managers by nearly 1.5 per cent each year. Unfortunately, while specialist managers appeared to out-perform, we do not have enough data to report on this manager type without more analysis.

**Table 5: style and returns**

| | Avg TR | MaxTR | Min TR |
|---|---|---|---|
| Top-down | 10.7 | 13.7 | 8.7 |
| Bottom-up | 12.0 | 14.9 | 8.2 |
| Both | 11.2 | 13.2 | 8.9 |
| Specialist | 12.3 | .. | .. |
| Total | 11.5 | .. | .. |

*7.7 Do attribution results justify the manager's choice of style?*

We compared the stock selection and structure scores of bottom-up and top-down managers, with some clear expectations. We would expect top-down managers to have better structure scores, and bottom-up managers to have achieved better stock selection scores. Table 6 shows exactly this to be the case.

Top-down managers have achieved a positive structure score; bottom-up managers have been unsuccessful in this area. Bottom-up managers have achieved positive stock selection results, but top-down managers have seriously under-performed in this area.

It is possible that awareness of these results has coloured the managersô hindsight assessment of his style; if not, these are strong results.

**Table 6: style and attribution**

| | **Struct ave** | **Struct max** | **Struct min** | **Prop ave** | **Prop max** | **Prop min** |
|---|---|---|---|---|---|---|
| top-down | 0.07 | 0.47 | -0.31 | -0.97 | 0.92 | -3.16 |
| bottom-up | -0.11 | 1.34 | -1.90 | 0.28 | 3.56 | -2.27 |
| both | -0.28 | 0.53 | -1.13 | -0.29 | 1.69 | -2.98 |

It is less obvious whether top-down managers would be expected to take bigger or smaller bets at the segment level. This would depend to some extent on the forecasts, and how far apart the sectors are expected to perform. It would be rational for bottom-up managers to adopt benchmark weights, to minimize the structure risk, but this would challenge the bottom-up nature of portfolio construction.

The results are interesting. Bottom-up managers have taken bigger sector bets, but this has been damaging to their performance. There has therefore been a price for the bottom-up system, suggesting that a level of structure control may have been useful.

*7.8 Is style related with activity levels?*

Top-down managers have spent less money on purchases, which is rational because they have made less money from transactions. Top-down managers have also sold fewer properties, which is again rational. It has been suggested that recent increases in stamp duty, which produce higher transaction costs, are likely to reduce further the value of transaction activity purely for re-structuring purposes, and this may hinder the top-down manager in future.

## 8. Conclusions and further work

*8.1 Conclusions*

Attribution analysis of property portfolios is a tool, not a theorem. We do not believe there are grounds for a definitive choice between attribution methods which lie in either the mathematics of their construction, or the character of the results they will produce. Like any tool, attribution analysis may need to be adapted to different tasks and circumstances, and should be employed only with clear understanding of its function.

In the ideal, an attribution analysis which was ócarried out within a framework that mirrors the investment policy and decision making process particular to the fund under examinationô might be flexible in terms of the attribution method used in that analysis. To progress towards this, we need more information about investment policy and decision-making processes, or style as we have called it in this

paper. The survey described herein is a small contribution, effectively a trial run for what we hope will be a fuller and regular analysis of fund manager behaviour.

The clear results for the period 1995-1999 are that bottom-up managers have out-performed. As expected, bottom-up managers have better stock selection and top-down managers have better fund structure skills.

In the results, we were looking in particular for support for the following suggestions:

1. Top-down managers should take positions away from the benchmark by sector, while bottom-up managers should stay close to the benchmark.

We found no support for this. Instead, we found that bottom-up managers took larger bets against the benchmark than top-down managers. Whether this is because in the survey top-down managers had larger portfolios and find it more difficult and risky, given the time taken to change portfolio shape, to take significant positions against the benchmark or because bottom-up managers do not concern themselves with portfolio structure, which is simply the result of uncontrolled stock selection decisions, is worthy of further consideration.

2. Top-down managers should buy more buildings per portfolio than bottom-up managers.

The results fully support his suggestion, as we found that bottom-up managers have assets which on average represent 1.5% of fund size, three times as large as top-down managers. This finding may, however, be the result of the high correlation between larger fund sizes and those funds describing themselves as top-down managers.

3. Specialist managers should concentrate on their specialist sector and buy larger average lot sizes than the top-down manager.

We did not find enough managers who declared themselves to be specialist to examine this point. It is possible that a more formal behaviour-based definition of specialisation, based on managersô professed preferences for certain sectors, would produce the data needed.

*8.2 Limitations*

The close correlation between fund size and fund style is a cause for some concern in this work. Whether behaviour and results are the result primarily of style or size requires further examination.

Post-hoc rationalization by managers is also a danger. The performance data is available to the managers who completed the questionnnaire, so it is possible for them to use the results to define their style. Given the strong correlation between size and style, however, this seems unlikely to be a large problem.

We surveyed 37 managers and 70 funds. One manager completed 6 forms for 6 funds, each with different styles; one manager completed one form for all funds. Distinguishing between managers and funds may provide information which challenges some if the results herein, and may be interesting per se: to what extent is style associated with hoses, to what extent is it associated with fund managers? What type of investment process permits these differences?

*8.3 Further work*

In our 1999 paper, we concentrate on the significance of the cross-product, concluding that it may have some relevance to the specialization of the manager. As a result of limitations in the sample, we have not yet explored this, but will be able to make further progress by using an objective measure of specialisation. We will then be able to compare stock selection scores at the sector level, and compare

this with the managerôs perceived strength in that area. We can also compare the stock selection strengths by sector with the size and sign of bets taken in those sectors. Finally, we will also be able to relate the size and sign of the cross-product to these variables and to manager style.

The survey produced many clarifications of investment style and process to set alongside the simple top-down or bottom-up descriptor. A full analysis of these comments will enable a more sensitive survey to be undertaken as part of the next stage of work.

There is a general need for more empirical data about investment processes and how fund styles are put into operation. What objectives are managers charged with delivering? What tools do they use and need to achieve those objectives, and to what extent is current real estate research relevant to these managers?

How are segment allocation decisions made? Are they driven by segment forecasts, or by the stock selection skills of sector teams? How are sector bets controlled by bottom-up managers? We encourage other researchers to add to our understanding of these component parts of fund manager behaviour.

Armed with more data of this type, we may be able to recommend different attribution systems for different manager types, in order to permit a more flexible use of attribution analysis by informed managers. This work is continuing.

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**Technical appendix**

The dominant method of performance measurement expresses the performance of the portfolio against a benchmark as a relative return, based on the ratio of the two rates rather than the simple difference:
Relative Return = ((1 + Portfolio Return) / (1 + Benchmark Return) - 1)

So a portfolio return of 10% against a benchmark return of 5% gives a relative return of 4.8%:

Relative Return = 1.10 / 1.05 - 1 = 4.8%

This formula ensures that components of return and returns annualised over a run of years maintain consistent relative results, which is not possible if simple differences are used to compare returns. Attribution scores are built up from comparisons of weights and returns in each segment of the market. Separate structure and selection scores in each segment are summed across the portfolio, to produce the portfolio level structure and selection scores which account for relative return.

The two and three component methods of attribution calculate structure scores in exactly the same way. In each segment:

Segment Structure Score
= (Portfolio Weight - Benchmark Weight) x Benchmark Return

The alternative ways of calculating stock selection scores are:

Two component attribution method segment selection score
= Portfolio Weight x ((1 + Portfolio Segment Return)/(1 + Benchmark Segment Return) - 1)

Three component attribution calculates the segment selection score as:
= Benchmark Weight x ((1 + Portfolio Segment Return) /(1 + Benchmark Segment Return) - 1)

The difference lies in a single term. The three component multiplies segment relative returns by the benchmark weight, while the IPD method multiplies by the portfolio weight. When calculated on the IPD methods, the structure score and IPD selection score in each segment add up to the weighted contribution to relative return. Summed across segments, the structure score and IPD selection score add up to the portfolio's relative return.

In the Three Term Method, the structure and selection scores do not add up in this way, leaving a 'residual' term, the cross product, which is calculated as:

Cross Product = Relative Return - ((1 + Structure Score) x (1 + Selection Score) -1) x 100