Fixed Income Attribution Analysis: Fringe Science or Critical Application?

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Aug 2005

Reference # ViewPoint Issue 147

TowerGroup Take-Aways

- Attribution analysis is a valuable mathematical exercise that attempts to answer why a portfolio beat or fell short of its benchmark and thereby demonstrate the portfolio manager's skill and value.

- The disparate nature of fixed income portfolios and the specific securities held in them demand attribution analysis specific to the portfolio manager's approach, not a one-size-fits-all approach.

- In addition to the sometimes taxing math involved, attribution analysis requires expansive security-level reference data and benchmark data, which is costly to acquire, maintain, and warehouse.

- North American portfolio managers' increasing need for detailed client reporting and the expansion of foreign fixed income markets beyond sovereign and corporate debt has fueled and will continue to fuel demand for fixed income attribution tools.

- Although the complexities of attribution analysis and, in particular, fixed income attribution are too great ever to be standardized at the methodology level, we expect to see future guidance from governing bodies on disclosure specific to attribution.

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Report Coverage

Attribution analysis is a tool investment managers employ to gain insight into their portfolio management effectiveness. It decomposes a portfolio's excess return relative to its benchmark into individual effects that demonstrate the manager's skill as well as the performance of the components of the securities in the portfolio. Equity attribution has been used for over 20 years and is now in place almost unanimously by investment managers with fixed income portfolios. It is also a core offering in most vendor performance systems. However, fixed income attribution is still an emerging science and has gained real traction only over the past few years as portfolio managers have learned to exploit its benefits and vendors have sought to provide this level of information in their offerings. This TowerGroup ViewPoint introduces fixed income attribution and analyzes the demand for solutions that calculate it.

What Is Attribution Analysis?

Whereas performance measurement answers the basic question of how the portfolio performed, attribution analysis answers the more complex question of why. Attribution analysis is a mathematical exercise that attempts to explain why a portfolio beat its benchmark or fell short and thereby demonstrate the portfolio manager's skill and value. Although the groundwork for modern attribution analysis was laid in the 1970s, the ground-breaking research on the topic was published by Brinson, Hood, and Beebower in 1986 in *Financial Analysts Journal*. The group's research showed that one could divide a portfolio's excess return (the portfolio's return less the benchmark's return) into pieces that identified the effects of asset allocation (or timing), stock selection, and an

"other" effect, the residual that is now commonly referred to as the interaction effect. The math involved in this model isn't daunting, but the insight that this data provides into the skill and impact of the manager on the portfolio's performance is significant. This research formed the framework for modern equity attribution analysis and either directly or through one of its later variations (e.g., Brinson-Fachler model) is employed by many investment managers today.

In addition to the mathematical models involved, attribution analysis requires expansive security-level reference data and benchmark data. Security-level data, particularly for fixed income instruments, must be expansive and include data beyond the basics, including option details (put and call schedules) among other items. Attribution analysis is generally calculated at the sector level, which requires additional, more thorough benchmark data that can be difficult and expensive to acquire, maintain, and warehouse. Another primary challenge to attribution analysis as a whole is the "explainability" factor: Can the data and its meaning be easily explained to the client?

Why Is Fixed Income Attribution Analysis Different?
Fixed income attribution is entirely different from equity attribution. The underlying challenge is that fixed income instruments, portfolios, and portfolio management styles are not homogenous. Managers apply different techniques in the portfolio process, using factors like time to maturity, duration, credit rating, or sector allocation in their decision-making process. There's no correlation between the selection effects in equity attribution and fixed income portfolio management; theoretically, if a manager buys two bonds of identical characteristics (coupon, credit rating, maturity, etc.) and holds them until maturity, their returns should be identical regardless of the issuer. It's the attributes specific to bonds that need to be analyzed to make this a valuable exercise. For fixed income portfolios, these may include income, time to maturity, yield, duration, convexity, credit quality, and issue-specific detail.

This heterogeneous nature demands attribution analysis specific to the portfolio manager's investment approach, not a one-size-fits-all approach. Unfortunately, many firms have used, and continue to use, a Brinson-style equity model as described above to analyze fixed income portfolios, even though it's not appropriate to do so and it does not add the value that attribution analysis is capable of adding. Exhibit 1 shows that while 71% of investment managers are measuring fixed income attribution, 34% of those firms are currently using an equity model for fixed income portfolios.

Exhibit 1
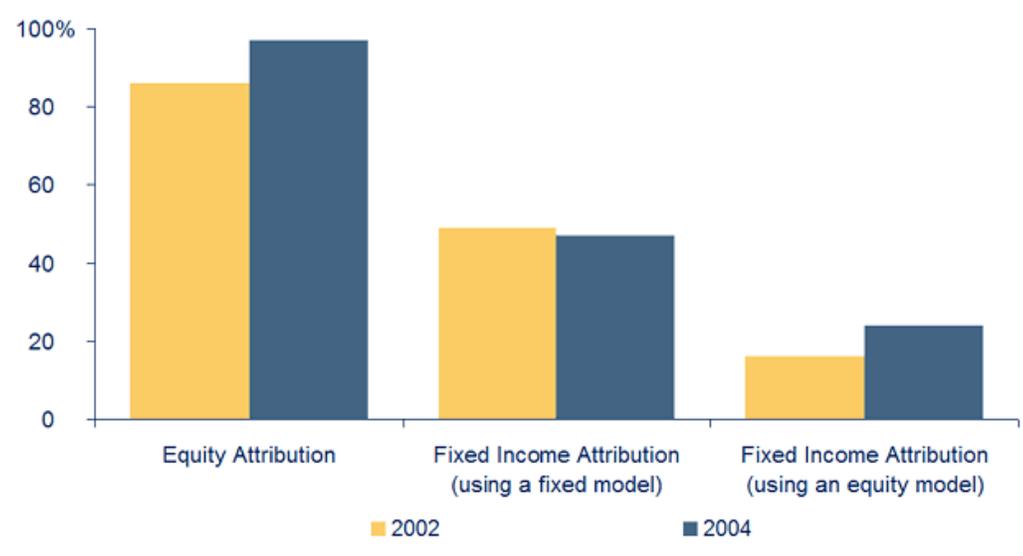US and European Firms Measuring Attribution Analysis by Type of Attribution (2002-04)
Source: The Spaulding Group

To address this need for an individualized approach, some portfolio managers and academics have constructed more complex models to decompose bond returns into more meaningful effects. One popular model (Campisi) decomposes a bond's return into income and price returns. In this model, the price return is determined by changes in the treasury curve, changes in the bonds' spread to the equivalent treasury, and the type of bond (e.g., investment grade, high yield). More complex models have also been proposed that further analyze specific parallel and nonparallel movements in the yield curve, duration, and issuer-specific impacts on the bond's performance.

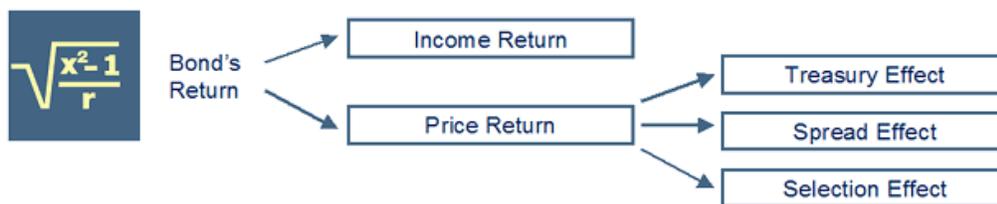Exhibit 2 represents the equity and fixed income attribution models described above.

Exhibit 2
The Complexity of Fixed Income Attribution Analysis (2005)
Source: Investment Performance Attribution, TowerGroup

What Is Driving Demand?
The demand for fixed income attribution has been led chiefly by investment managers in Europe, where the adoption of attribution analysis of all types has been faster. Specifically, the expansion of the European fixed income markets beyond basic sovereign debt has fueled the demand for fixed income attribution tools and will continue to do so. In North America, portfolio managers are being asked for more reporting and transparency in their performance data. This demand comes largely from institutional clients and pension consultants who are looking for more than a simple rate of return. These clients want to understand fully the value that the portfolio manager brings to the table, and attribution reports can clearly display that. Exhibit 3 compares the growth in European and US debt securities markets. From 2000 to 2004, the amount of outstanding debt in Europe increased at a compound annual growth rate (CAGR) of 15% compared with 6.6% in the United States.

US and European Debt Securities (1995–2004)

(USD in Trillions)
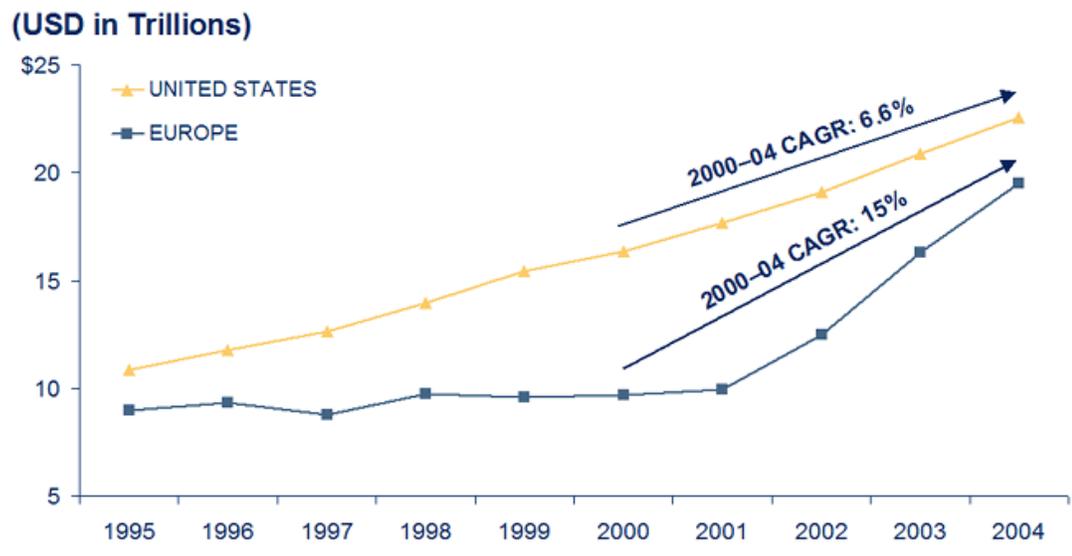
Note: Outstanding debt amounts include both domestic and International debt.

Exhibit #: ViewPoint Issue 147-E3
Source: Bank for International Settlements

Exhibit 3
US and European Debt Securities (1995-2004)
Source: Bank for International Settlements

Across all markets, the emergence of new security types and derivatives has further fueled the demand for better and faster reporting of performance and attribution. We need only look at the depth and breadth of the US fixed income markets (over 2.7 million issues spread across multiple sectors, representing US$24 trillion in outstanding debt) to forecast future global fixed income markets. The growth in the market for mortgage-backed securities (MBS) in Europe, already strong in certain European countries, predicates this trend (2004 issuance of MBS totaled 57% of aggregate European fixed income issuance of EUR244 billion). Continued global growth and innovation will keep global demand high for fixed income attribution and will keep vendors on their toes as they attempt to respond quickly to the dynamic needs of their clients.

What Are Investment Managers Using?
Top investment management firms informally surveyed by TowerGroup are using a mixture of models and technology for their fixed income attribution. Several top managers have developed proprietary attribution tools that are comprehensive in their scope and capabilities and that generally employ modified versions of the multifactored Campisi model. These firms have pursued this strategy because the vendor community has generally not offered the flexibility and capabilities they require. Also, top managers tend to manage fixed income portfolios in multiple sectors and/or styles, each of which requires a slightly different twist to attribution reporting. Building a proprietary system also allows firms to more tightly integrate with their portfolio accounting system and to implement transaction-based performance and attribution. This is in contrast to a traditional holdings-based vendor system, which would receive a periodic update of portfolio holdings.

Transaction-based systems yield more accurate performance data because they are influenced by the portfolio's specific activity rather than imply that activity from differences in holdings between periods or simply discount the activity altogether and base performance solely on the portfolio's holdings at a given point in time. For example, a holdings-based system run weekly would receive weekly imports of portfolio data. If the system received a record for 1,000 bonds of XYZ Corp. today but at last run had a record of 1,500, the system would infer that 500 bonds had been sold. However, the system wouldn't know when they were sold or at what price. A transaction-based system on the other hand, would receive a record for the specific sale in XYZ Corp. bonds and would know the specific date and price for that transaction.

What Are Software Vendors Providing?
Technology vendors in this market have taken internally developed models and the models developed in the practical arena and applied them in their products. Vendors will generally stress their systems' flexibility, which, although not addressed in this TowerGroup ViewPoint, is the crucial factor contributing to the success or failure of each of the systems on the market. Vendors are generally offering two types of fixed income attribution that parallel the models described above. Returns-based models are similar to the Brinson equity models and decompose returns into allocation, selection, and interaction effects. However, most vendors offering returns-based attribution have added capabilities allowing the user to drill down on segments of the portfolio. For example, a user may be able to look at a returns-based attribution analysis of a specific duration or maturity band or a range of quality ratings. While they fail to hit the mark in applicability, returns-based attribution reports are more easily explained to a client because the effects measured are far more intuitive.

The second type, *factor-based models*, decomposes the returns into multiple effects relating to yield curve movement, duration, convexity, sector or quality, and/or issue selection. Taken on their own, factor-based attribution reports will be far more difficult for the average viewer to comprehend. These reports are best used by the front office and/or by specific performance and attribution groups. This two-type approach addresses the explainability issue by providing both output that is comprehensible and easily explained to a client (returns based) and output that is more valuable to the portfolio manager and to more detail-oriented clients (factor based).

A small community of vendors provides fixed income attribution tools, including Capital Management Sciences (CMS), SS&C Technologies (Financial Models Company), StatPro, SunGard, and Wilshire Analytics. These products tend to be either a fixed income analytics and performance system like CMS BondEdge and Wilshire IQuantum or a stand-alone performance and attribution system like SS&C Sylvan, StatPro, and SunGard XAMIN. Generally, the analytics systems will provide holdings-based performance, while the stand-alone performance and attribution systems will provide transaction-based performance. In terms of methodologies, SS&C offers a returns-based model, CMS; SunGard and Wilshire offer both returns-based and factor-based models; and StatPro utilizes three models measuring up to 50 individual performance effects.

For more on information on specific performance and attribution vendors, see TowerGroup Research Note V37:32M, *Buy-Side Performance Measurement and Attribution Tools: Reviewing the Rulers*.

Will Attribution Be Standardized?
It's not likely that attribution analysis will ever be standardized the way that the CFA Institute's Global Investment Performance Standards (GIPS) have standardized performance measurement and presentation. The complexities of attribution analysis and, in particular, fixed income attribution are too great ever to be standardized in this fashion. Whereas plugging the prerequisite data for a performance calculation into two different vendor systems will yield identical or at least very similar results, the same cannot be said for attribution analysis. Standards would also impede managers'

and vendors' ability to build flexible products with models that can be easily adjusted as securities evolve and new instruments emerge. Imagine the time involved if a new fixed income instrument that requires an adjustment to the "standard model" comes to market and the committees and panels need to meet, document and agree on the change.

What's more likely is that a set of basic disclosure standards will be included in GIPS and its country-specific incarnations. In 2004, the European Investment Performance Committee (EIPC) released a paper on performance attribution presentation, which sets forth guidelines for disclosure that should accompany attribution presentations. The document clearly states that the committee is not attempting to address methodology; rather, it suggests that proper disclosure accompany attribution presentations to increase the understanding of the information. TowerGroup expects that this is as far as the EIPC or CFA Institute will proceed with attribution standards for the foreseeable future.

Summary

Fixed income attribution is a valuable tool for determining why a portfolio achieved its performance return. Various proprietary and vendor products on the market today employ often complex mathematical models that dissect performance returns into individual effects. These effects help the user to understand what factors of the securities held in the portfolio and of the portfolio management approach contributed to or detracted from the overall return. Unfortunately, this is not a one-size-fits-all market where a single solution or model will satisfy the needs of the client.

Over 70% of asset managers are currently measuring fixed income attribution, with top asset mangers unanimously doing so. As reporting demands increase in North America and foreign bond markets expand, TowerGroup expects this number to approach the 97% that are already measuring equity attribution. Several top asset managers are using proprietary systems today because they have not found a vendor system flexible enough to meet their needs. Many asset managers will get their feet wet by applying an equity model to their fixed income portfolios, but portfolio managers and institutional clients will push for these firms to apply a fixed income methodology, which they ultimately will.

To compete with proprietary systems, vendors need to offer flexibility in their product as well as novel methods of "slicing and dicing" performance attribution. Vendors that have built a variety of models into their system and have built their system with an underlying theme of flexibility are best positioned to succeed in the coming years.

Once reserved for portfolio managers and performance analysts, attribution is now a key piece of information used by institutional clients, pension consultants, and others interested in the intricate details of portfolio performance. Although many of us are fond of using the statement "it's not rocket science," fixed income attribution is one area that's fairly close. Make no mistake about it: Fixed income attribution is not a fringe science; it's a critical application.