

Rethinking Investment Performance Attribution

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Proprietary information and data-processing systems have become key competitive differentiators for investors; better systems provide better data, which in turn drive better investment decisions and performance. But while the best systems are multifaceted and touch all aspects of the investment organization, one component of such systems is increasingly important: the measurement and attribution of investment performance. Performance attribution should do more than just explain the past; it should also be a tool to make better future investment decisions. This article describes the Alberta Investment Management Corporation's journey to develop a performance attribution system as an investment management tool, in the hope of contributing to the institutional investor debate on how to best address this important topic.

Keywords: Decision Trees, Pension Fund, Performance Attribution, Performance Benchmarks, Performance Measurement

Rebuilding AIMCo's Information Architecture

The Alberta Investment Management Corporation (AIMCo) was established in 2008 as the arm's-length investment manager of public-sector financial assets in province of Alberta, Canada.¹ Today AIMCo manages approximately CAD\$70 billion on behalf of 26 pension, endowment, and government reserve fund clients. The fund's overarching objective is to earn incremental return on risk above what its clients could achieve by passively implementing their policy asset mixes with equity and fixed-income index funds.

At its inception, AIMCo had business, risk, and information systems that were either obsolete or lacking critical components; information was held together with spreadsheets. There was also little consistency in how data flowed into and out of the organization. The various best-of-breed business system components adopted did not speak the same data language, and thus needed translators. AIMCo began addressing these problems in 2009; rebuilding the fund's information architecture took four years.

One of the main components of the new architecture is a

centralized data warehouse that stores information and shares it across the firm via an information bus, a tool that transfers data between software programs, thus reducing the number of redundant systems that previously captured what was ultimately the same information and minimizing the reconciliation efforts required to keep all information in sync. The data structure was designed to store more detailed, granular data that would support in-depth queries in real time, thus allowing investment professionals to select various views of portfolios to gain unique insights. While maintaining alignment with industry standards for data preservation and integrity has been utmost primary concern, AIMCo has also focused on building mechanisms that allow for enrichment of our data in ways specific to portfolio managers' own views and investment beliefs.

Thus, the new data infrastructure supports strong internal audit and compliance processes for data while also allowing AIMCo to be competitive through enriched analytics that cannot be purchased from outside vendors. With these more reliable systems in place, AIMCo has been able to take better data and make them flow smoothly through new and powerful systems, and thus to develop a performance attribution capability that is robust and grounded in objective data.

Benchmarks

AIMCo has a client-centric benchmark philosophy, which largely follows the CFA Institute’s guidelines that benchmarks have to be “investable” (CFA Institute 2013), but they also have to motivate us to meet the organization’s central objective, which is to earn a higher long-term risk-adjusted return net of costs than AIMCo’s clients could achieve by passively investing in equity and fixed-income market indices. Market returns are a logical starting point for measuring the effectiveness of a manager’s attempts to do better: incremental returns can come from asset allocation; from security selection within market bond and stock universes; and from investment in illiquid asset classes such as real estate, infrastructure, timberland, and private equity.

Most disagreements about benchmarks are related to private illiquid assets, whose various unique and idiosyncratic characteristics often make benchmarking difficult. Indeed, the theoretical rationale for investing in private assets is the existence of an illiquidity premium over the nearest listed proxy from a return-on-risk perspective. For example, private equity should have a higher return than listed equity, because with good management and hard work, the transformational activity (as opposed to pure financial engineering) of private equity management should be rewarded in the long run. Similarly, the return and risk profile of investments in infrastructure and timberland lies somewhere between those of index-linked bonds and equities, so active management should earn an illiquidity

premium over the nearest liquid proxy. Managers should compare listed and unlisted opportunities and should invest in private assets only if the expected return warrants it.

There are two problems with this rationale, however. First, because what should be true in the long run is not necessarily true in the short run, judging long-term strategies by short-term outcomes is problematic, and no choice of market-based benchmark can get around this issue. Second, because clients often assume that the illiquidity premium is a given, it should be part of the benchmark instead of viewed as part of the value-add return on the asset management.

In our experience, aspirational return expectations are of little use in motivating responsible manager behavior. Simply stating that “we need at least liquid returns plus $x\%$ ” does not make it possible to produce that result. A variant of this approach is a benchmark tied to the aggregate return expectation of “CPI+Y over an n -year horizon,” which appears in many investment policies.

Bearing in mind the importance of being thoughtful and focused in selecting benchmarks, AIMCo started a broad review in 2008. This review found that AIMCo’s predecessor organization had been operating with 94 different benchmarks.² Many client benchmarks had fixed add-ons to CPI or other indices, in some cases as high as +8% (Table 1). Today, AIMCo judges its managers by market-based benchmarks,³ and many clients are now doing the same.

Table 1: Benchmark Changes Following AIMCo’s Review*

Asset Class	AIMCo Benchmark	Client Benchmark	
		Jan. 2008–Sep. 2010	Aug. 2011–Present
Private Income	50% DEX RRB Index + 50% MSCI World Index (hedged CAD\$)	CPI + 6%	S&P Global Infrastructure (hedged CAD\$) + 1.0%
Timberland	50% DEX RRB Index + 50% MSCI World Index (hedged CAD\$)	CPI + 4%	50% DEX RRB Index + 50% MSCI World (hedged CAD\$) + 1.5%
Real Estate	IPD Canadian All Property Index	IPD Large Institutional Property	IPD Large Institutional Property
Canadian Equity	S&P/TSX Composite Total Return Index	73% S&P/TSX Capped Composite + 27% BMO Small Cap	70% S&P/TSX Capped Composite + 30% S&P/TSX Small Cap
Foreign Equity	MSCI All Country World Index	14% S&P 500 + 16% Russell 2500 + 70% MSCI EAFE	90% MSCI World + 10% MSCI Emerging Markets
Private Equity	MSCI All Country World Index	CPI + 8%	MSCI World (hedged CAD\$) + 3.0%

*Selected asset class benchmarks for an undisclosed client.
Note: All indices are property of their respective owners.

Illiquid Banking

AIMCo's large and rising target allocation to illiquid assets cannot be achieved immediately, which makes calculating an "allocation effect"⁴ for these assets meaningless. For example, a client's policy allocation to real estate may be \$5 billion, while the portfolio may contain \$3 billion in these assets. While investment organizations can grow their real estate investments over time toward the clients' targets, they cannot "close the underweight" quickly. Suppose the real-estate benchmark outperforms the fund's aggregate benchmark by 2% in a quarter. In that case, the Brinson–Fachler decomposition formula, as provided below (Brinson and Fachler 1985), would indicate that \$40 million in value was lost to allocation effect – allocating less than the target to a benchmark with above-average performance. But the "underweight" was not anyone's decision, and the manager cannot fix it.

Our solution to this problem is "illiquid banking." We set the benchmark weights for illiquid assets relative to actual weights, then invest the deviation from policy for a given asset class in stock and bond markets that represent its closest proxy. Except for frictional noise, this eliminates the allocation effect, while still keeping all assets within the total fund attribution analysis. The challenge is in the initial review and approval of such a policy, as well as in setting it up and maintaining it.

Basic Attribution

How can we most usefully attribute a fund's investment return? Where active management is successful, it creates value-added performance for an investment organization beyond what passive allocations to public markets can achieve (see de Bever et al. 2013). Outperformance can be achieved through asset allocation, security selection, or some combination of the two. An investment organization can typically determine relatively easily whether active management is, in fact, adding value to the portfolio; the challenge lies in identifying the sources of those excess returns and in assessing precisely *how* they were created. We refer to this process as *performance attribution*.

To better determine whether and how managers are adding value, many organizations turn to the well-known Brinson–Fachler daily decomposition of asset class return (Brinson and Fachler 1985), a version of which can be written as follows:

Selection effect = Portfolio weight × (Portfolio return – Benchmark return)

Allocation effect = (Portfolio weight – Benchmark weight) × (Benchmark return – Fund benchmark return)

While this decomposition is useful, we find it somewhat flawed, as it decomposes growth rates, which are not additive, leading to residual terms that can sometimes be significant. It also assumes fixed asset-class weights, which is problematic for illiquid asset classes. Finally, it does not fit with those investment strategies that require managers must use their skill to evaluate opportunities across components of asset classes. In other words, the Brinson–Fachler protocol is based on a set of investment beliefs that are underpinned by silos – a mindset that investment organizations should try to overcome. For all these reasons, AIMCo believed there had to be a better way.

Decision-Based Attribution: A Better Way

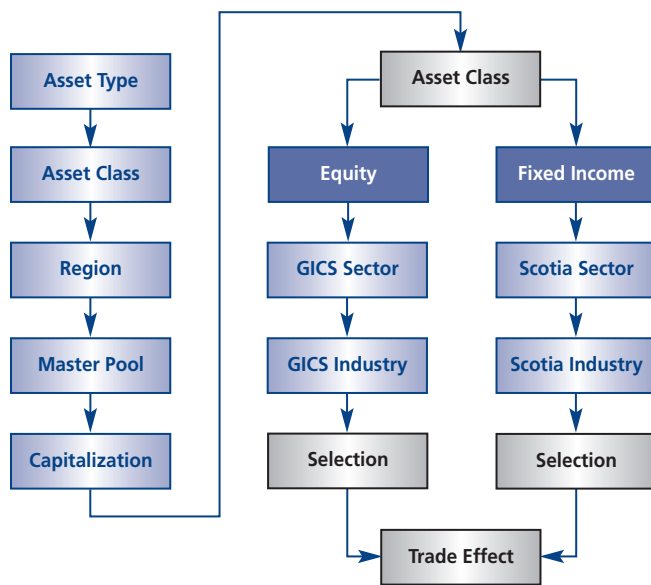
We decided to step back and determine what it would take to structure attribution so that it mirrors the way AIMCo actually makes investment decisions. In the process of doing this, we realized that four factors are important in attribution: system and data quality; selecting proper benchmarks; properly treating allocation effects in illiquid asset classes; and integrating the actual way we make investment decisions into the process of attribution. The result of this work is a process we call "decision-based attribution."

Decision-based attribution reflects the way in which the organization actually makes investment decisions. Active management consists of various decisions to allocate funds to asset categories (i.e., *asset allocation* decisions), the lowest-level step being the *security selection* decision. Investment performance can depend on decisions made at many levels and by many groups within the organization. For example, the CIO and an investment strategy group typically determined the allocation between equities and fixed income; the heads of equity and fixed income asset classes and their strategy teams make decisions about allocation among various markets within each asset class; and, finally, portfolio managers (supported by their analysts) make decisions to buy specific stocks and bonds.

Identifying which agents in this ecosystem are truly adding value can be quite challenging. But if an organization, on behalf of its asset owners, can understand how much value each decision (and the respective team) contributes to the overall active performance, great opportunities open up for investors to capitalize on their competitive advantages, thus optimizing and improving investment performance. And, in our view, this is where decision-based attribution can play an important role.

If the attribution is to be meaningful, however, the structure and order of decisions in the attribution (the “decision tree”) must also accurately reflect how the organization actually makes investment decisions. Developing the decision tree requires collaboration between various investment groups within the organization; it is an iterative process that takes some time. [Figure 1](#) offers an example of what such a tree might look like. For example, AIMCo makes decisions to allocate between asset classes (e.g., between public equities and fixed income) relative to the aggregate client benchmark before making decisions to allocate among regions. After all decisions have been enumerated, the organization can explain its achieved return and risk relative to chosen benchmarks without invoking economically meaningless “interaction effects” or “temporal smoothing.”

Figure 1: The Decision Tree – an Example



Performance Attribution System Implementation

AIMCo uses global tactical allocation across asset classes as one way to add value (de Bever et al. 2013). However, teams can also make opportunistic decisions that do not neatly fit within asset classifications. For example, the decision rule might be *if you find an attractive asset of type X, take the allocation out of asset class Y, and you will be evaluated on whether that decision added return*. The simple allocation-selection decomposition described above could not accurately reflect several AIMCo decision rules. The organization’s

previous mechanical computation of allocation effects did not always reflect the underlying decision process, which created frustration for managers.

After scanning the vendor marketplace, AIMCo quickly learned that few vendors of performance attribution systems were able to build the advanced calculation engine and data-integration capabilities required for decision-based attribution. After examining vendor capabilities and evaluating the alternative solutions available, the organization implemented the chosen system in September 2011. The system’s data-integration allowed for a speedy, minimally disruptive (“low-footprint”) implementation and even helped to identify weaknesses in the underlying data. To be sure of having the right starting point, AIMCo asked that this flexible second performance attribution system mimic the old methodology, then added the investment data details (e.g., fully described index constituents and a proper sector and industry classification system) to move to decision-based attribution. This transition was completed by August 2012; [Table 2](#) illustrates the result.

Better Information Systems Lead to Better Investment Performance

Before AIMCo implemented the decision-based attribution model, performance “attribution” was simply a decomposition of the total value added in the prescribed “allocation” and “selection” buckets, which took no account of how managers made their investment decisions. The introduction of the new decision-based attribution system has materially improved AIMCo’s ability to understand the relationship between investment decisions and investment results.

A prerequisite for strong investment performance is providing good people with regular performance evaluation feedback from effective information systems. In turn, this feedback should lead to more informed investment decision making and better performance. While there is always room for improvement, it is already clear that better data, systems, benchmarks, and decision-based attribution are having a measurable impact on AIMCo’s ability to meet its clients’ expectations.

Table 2: AIMCo 2012 Value-Added Report for Balanced Clients*

Composite	Market Value (CAD\$M)	Exposure (CAD\$M)	Return (%)	Value Added (CAD\$M)					
				Total Value Added	Asset Type Allocation	Asset Class Allocation	Region Allocation	Master Pool Allocation	Selection Effect
Total AIMCo balanced clients	58,064		12.03	1,200.3	5.4	-89.5	-12.0	291.4	1,005.1
Liquid Asset Classes	43,790	87	12.18		7.7	-91.2	-12.0	291.4	1,080.9
Money market and fixed income	16,947	-135	5.83			-55.3	-11.0	-2.3	347.5
Non-discretionary	632	601	9.24				-10.8		
Discretionary	16,315	-736	5.67				-0.2		
Public equity	26,590	222	15.99			-35.9	-1.0	293.6	592.7
Canadian equity	6,480	-34	11.59				-5.3		
Global equity	19,447	276	17.74				2.4		
Global small cap equity	662	-19	1.51				1.9		7.8
Overlays composite	254	0	729.85			0.0			140.7
Illiquid Asset Classes	14,273	-87	11.57		-2.3	1.7			-75.8
Private equities	2,543	-121	9.91			-2.9			-83.5
Real estate	7,483	154	15.39			1.4			100.4
Income	3,523	-63	7.95			0.9			-42.4
Timberlands	723	-57	-0.40			2.2			-70.8
AIMCo strategic opportunities	161	161	17.61						20.5

*Value added relative to AIMCo benchmarks (net of fees).

Endnotes

- 1 We thank Albert Yong and Andre Mirabelli for their contributions of material and editorial assistance to this article.
- 2 In AIMCo's multi-client framework, clients set their own asset class (product) benchmarks. For example, for global equities, some clients may use the MSCI World index while others use MSCI ACWI and yet others use certain percentage allocations to regional components: the S&P 500, S&P Europe 350 (or MSCI Europe), and MSCI EAFE. In addition, some clients prescribe certain percentage allocations to large-caps and small- or mid-caps within Canadian and global equities. Taking into account all the different asset class / benchmark combinations, AIMCo found that it was managing to a set of 94 benchmarks – a clearly inefficient situation that significantly increased the operational burden on managers instead of giving them clear performance targets.
- 3 The exception here is benchmarks for real estate, which – because real estate as an asset class has a long and well-documented performance history – do not require proxies to the nearest listed asset class.
- 4 Recall that an allocation effect measures the effect of the manager's decision to allocate funds to an asset category relative to benchmark allocation (or weight) to that category; it is not affected by portfolio performance.

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ISSN 1916-9833 (Print) – C\$50.00
ISSN 1916-9841 (Online) – no charge