FACTSET 〉 SEE THE ADVANTAGE

〉 DEMYSTIFYING FIXED INCOME ATTRIBUTION, ONE STRATEGY AT A TIME

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〉 LET'S FRAME THIS AT A HIGH LEVEL FIRST: WHAT IS PERFORMANCE ATTRIBUTION?

Performance attribution is an integral part of the investment process that helps close the feedback loop by explaining the drivers of benchmark relative over- or underperformance.

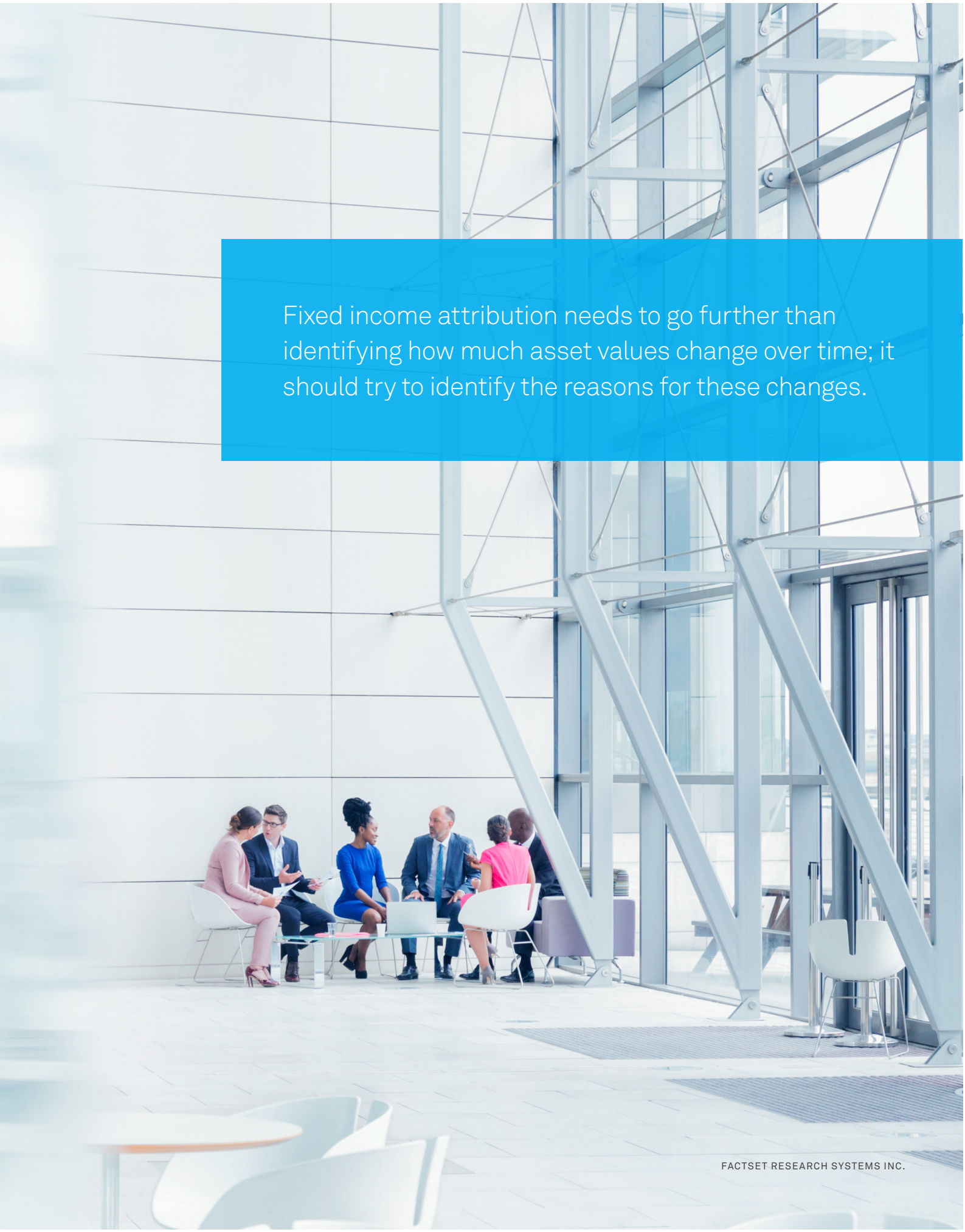
Drilling down a bit: Why is performance attribution important? This is not a trick question. Attribution analysis is used in a number of ways across firms and their clients. Portfolio managers use it in support/defense of their investment thesis. Sales and marketing teams use it in asset gathering and retention. Clients rely on it to determine how their investment selections are subscribing to given mandates and how they are performing against passive alternatives. These are just the common use cases.

Diving in even deeper: How should I use performance attribution for (insert asset class here)? This brings us to the crux of the matter. While attribution has a definite science behind it, it is also an art. One size does not fit all!

With equity portfolios, most of us are happy to run with a standard Brinson approach, viewing the performance return as the combined result of changes in the values of the portfolio's assets, grouped by sector, country, or some fundamental value (market cap, P/E quintile, etc.). Using this method, one could explain the portfolio's performance in terms of being overweight or underweight to each group or partition relative to the benchmark, and in terms of whether each group performed better in the portfolio or in the benchmark. This is intuitive and easy to understand.

Fixed income tends to be a different beast, though, where taking the same approach as equities doesn't work. This is because the drivers of total return for fixed income instruments are more complex than in the equity space. Fixed income attribution needs to go further than identifying how much asset values change over time; it should try to identify the reasons for these changes.

While fixed income attribution has evolved dramatically over the past decade or so, two commonly held perceptions remain: 1) it's hard to understand and 2) it's hard to implement. These perceptions are often cited to explain why fixed income attribution is a less successful technique relative to equity attribution. Let's address each of these in turn.



Fixed income attribution needs to go further than identifying how much asset values change over time; it should try to identify the reasons for these changes.

DIFFICULT TO UNDERSTAND

There is some truth to this, but it is becoming less of an issue. Not long ago, there was no generally accepted model or approach to fixed income attribution as is seen with equities. Fast forward to today. While nuances across providers persist, a general approach of looking at rate and curve exposure plus excess return has become a common starting point. Empirically, it is accepted that the level of duration and key rate exposure typically represent the lion's share of a fixed income instrument's total return.

Once accounted for, the excess return becomes an exercise in matching the attribution model components with the investment process. There is still not a "one size fits all" approach across providers or the industry, but we suggest that this demand for flexibility allows for more meaningful communication around the investment process and corresponding results.

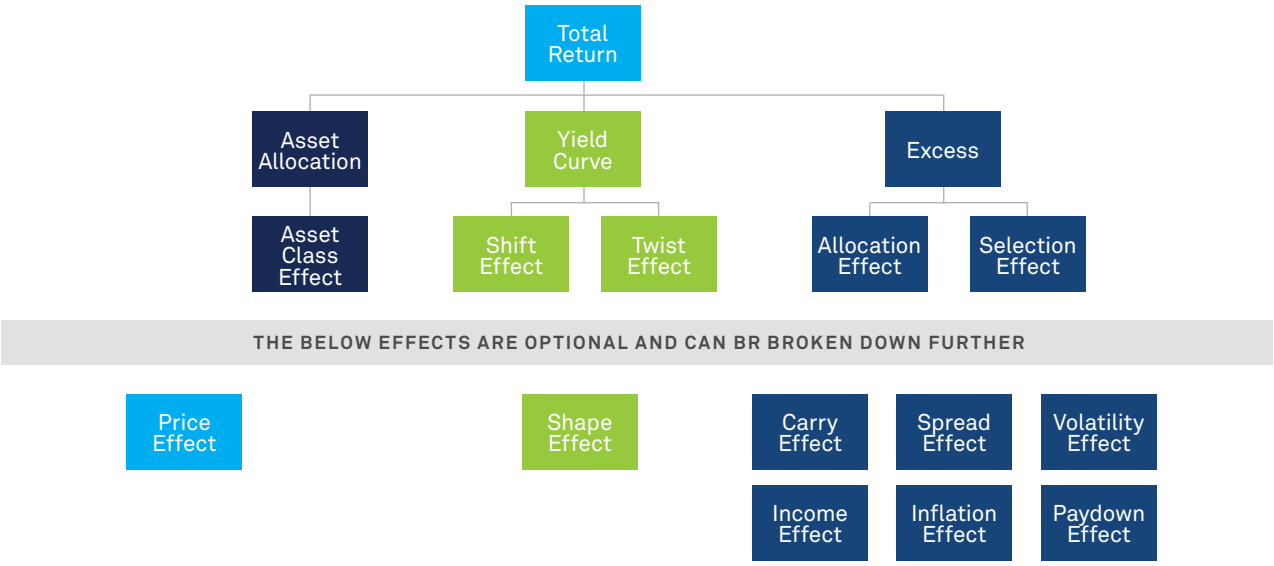
It's important not to overcomplicate the analysis or make the overriding assumption that every effect is necessary. In the case of the latter, take the application of inflation effects to a portfolio of nominal bonds.

Simplifying the vocabulary can make it easier to understand. For example, instead of talking about the roll-down effect, let's talk about how much of the change in the prices of the portfolio's bonds resulted from the fact that as bonds get closer to the date on which they will be repaid, their market price gets closer to the amount that will be repaid. Over a calendar quarter, the bonds in a portfolio move three months closer to their maturity date, so their market prices will move closer to the redemption amounts. This will contribute to the portfolio's performance over the measurement period. Conceptually that is much easier to understand than talking about a roll-down effect.

By aligning the attribution effects used with the investment process, we create an opportunity to facilitate a more compelling story between all parties in the investment process.

FIGURE 1: BALANCED PERFORMANCE ATTRIBUTION

Combination of top-down and bottom-up attribution to capture decisions both across and within asset classes



DIFFICULT TO IMPLEMENT

This is a bit of a misrepresentation. The models themselves should be readily applicable out of the box. The difficulty comes in tying together the requirements of broad asset types for use in a scalable solution. Holdings, transactions, analytics, and data management all present potential landmines, but it doesn't have to be this way.

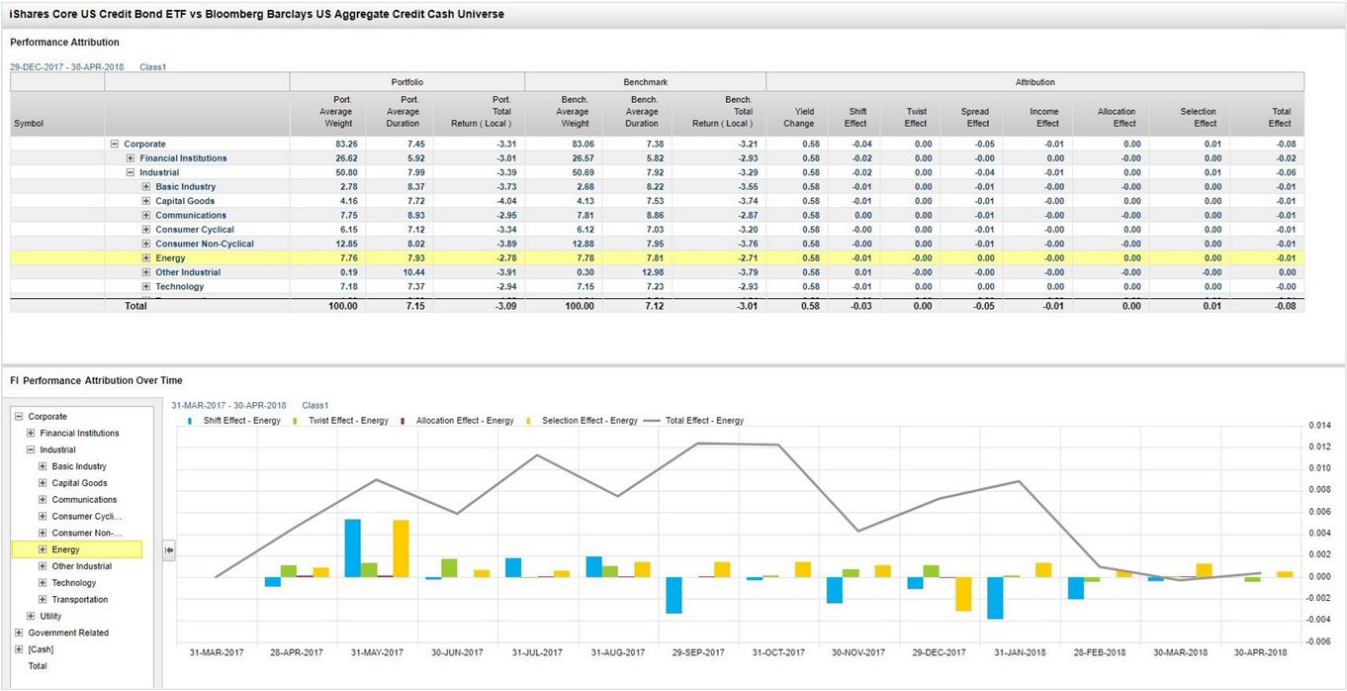
The difficulty arises from two main factors. First, accessing the raw data inputs surprisingly remains a challenge across firms of all sizes. Applying expertise in data integration across asset types is critical, especially in unconstrained and/or global mandates. If the correct format for path-dependent securities, like RMBS, CMBS, and ABS, is unavailable or if the price of a local conventional or inflation-linked security is misrepresented, downstream analytics, returns, and attributions will be incorrect. OTC derivatives increase the complexity here due to inconsistencies across inputs (i.e., Firm A may store security master data for an interest rate swap in a completely different fashion than Firm B, but both can be correct).

Second, fixed income attribution models rely on daily analytics to generate meaningful output. As data quality issues arise, the selected attribution model may be prone to distortion via blown-out effects that occur on a single day for a single security. Leveraging technology to proactively identify and correct security level inputs paves the way for a smoother implementation and interpretation. The level of integrity in the data input to fixed income attribution systems must be aligned with the level of complexity of the specific attribution model that is being implemented.

It is when these factors are not taken into consideration during implementation planning for fixed income attribution that the risk of project failure is highest.

As we take a deep dive into the intricacies of fixed income attribution across asset types, our goal is simple. By breaking out commonly used effects, sample reports, and tools for interpretation, we can improve the quality of our attribution analysis, regardless of the investment mandate. To do this, we will address a variety of fixed income strategies: core investment grade, high yield, emerging market, liability-driven investment (LDI), and multi-asset.

FIGURE 2: DETAILED ATTRIBUTION ANALYSIS



iShares Core US Credit Bond ETF vs Bloomberg Barclays US Aggregate Credit Cash Universe

Performance Attribution

29-DEC-2017 - 30-APR-2018 Class1

		Portfolio			Benchmark			Attribution								
Symbol		Port. Average Weight	Port. Average Duration	Port. Total Return (Local)	Bench. Average Weight	Bench. Average Duration	Bench. Total Return (Local)	Yield Change	Shift Effect	Twist Effect	Spread Effect	Income Effect	Allocation Effect	Selection Effect	Total Effect
	Corporate	83.26	7.45	-3.31	83.06	7.38	-3.21	0.58	-0.04	0.00	-0.05	-0.01	0.00	0.01	-0.08
	Financial Institutions	26.62	5.92	-3.01	26.57	5.82	-2.93	0.58	-0.02	0.00	-0.00	0.00	-0.00	0.00	-0.02
	Industrial	50.80	7.99	-3.39	50.69	7.92	-3.29	0.58	-0.02	0.00	-0.04	-0.01	0.00	0.01	-0.06
	Basic Industry	2.78	8.37	-3.73	2.68	8.22	-3.55	0.58	-0.01	0.00	-0.01	-0.00	-0.00	0.00	-0.01
	Capital Goods	4.16	7.72	-4.04	4.13	7.53	-3.74	0.58	-0.01	0.00	-0.01	-0.00	0.00	0.00	-0.01
	Communications	7.75	8.93	-2.95	7.81	8.86	-2.87	0.58	0.00	0.00	-0.01	-0.00	-0.00	0.00	-0.01
	Consumer Cyclical	6.15	7.12	-3.34	6.12	7.03	-3.20	0.58	-0.00	0.00	-0.01	-0.00	0.00	0.00	-0.01
	Consumer Non-Cyclical	12.85	8.02	-3.89	12.88	7.95	-3.76	0.58	-0.00	0.00	-0.01	-0.00	-0.00	0.00	-0.01
	Energy	7.76	7.93	-2.78	7.78	7.81	-2.71	0.58	-0.01	-0.00	0.00	-0.00	0.00	0.00	-0.01
	Other Industrial	0.19	10.44	-3.91	0.30	12.98	-3.79	0.58	0.01	-0.00	-0.00	-0.00	-0.00	-0.00	0.00
	Technology	7.18	7.37	-2.94	7.15	7.23	-2.93	0.58	-0.01	0.00	0.00	0.00	0.00	0.00	-0.00
	Total	100.00	7.15	-3.09	100.00	7.12	-3.01	0.58	-0.03	0.00	-0.05	-0.01	0.00	0.01	-0.08

FI Performance Attribution Over Time

FISHING FOR INVESTMENT GRADE BASIS POINTS

What is a core investment grade bond strategy anyway? Almost without fail, FactSet's clients define this as an attempt to outperform some broad industry benchmark while seeking current income and capital appreciation via primarily investment grade securities. Typically, duration tuning, sector allocation, and credit selection are used in these mandates.

This sounds simple enough. Yet in practice there are thousands of funds globally that fit the bill (the eVestment US Core Fixed Income Universe contains 505 alone). Surely not all of these products are managed the same way! With that in mind, how do we most effectively tell the portfolio management story for these assets?

Recall our starting point in Figure 1 above, where we break total return into yield curve and excess return components. This allows us to roughly gauge the impact of our duration, sector allocation, and security selection decisions. However, given the intricacies of portfolio construction and the sheer number of competing funds out there, we must adapt this model to fit our investment process to properly convey the value-add. Specifically, we want to enhance the story told by our interest rate exposure and winnow down the excess return through the addition of a few optional effects.

YIELD CURVE EFFECT = SHIFT EFFECT + TWIST EFFECT

Rates go up, bond prices go down. It's the fixed income equivalent of "buy low, sell high," a cornerstone of how the asset class works. And yet, relative to a benchmark, it says very little about our investment process. A portfolio with an effective duration of five is going to be less impacted by rising rates than a benchmark with an effective duration of six. The impact of a parallel interest rate move given the portfolio and benchmark sensitivities is a back-of-the-envelope calculation. That said, this initial view ignores portfolio construction techniques like bond laddering or a barbell approach, as well as the observation that yield curves don't only move in a parallel fashion.

The adjustment that we must consider is how to reflect this real-world view in the attribution model. This can be accomplished in two ways. We can adjust the twist point based on the mandate or we can expose key rate durations. Adjusting the twist point can make sense if we are running a variation of a core strategy (e.g., short or long duration) or seek to maintain a duration neutral approach (where the twist point becomes the benchmark's effective duration). Exposing key rate durations makes sense when the investment process considers relative attractiveness across the curve. For example, say that we dislike short rates because of Fed activity; however, we are neutral on the long end and are bullish on the belly of the curve. This allows us to more granularly identify how the portfolio's interest rate exposure differs from the benchmark—it's a more effective story.

Exposing key rate durations makes sense when the investment process considers relative attractiveness across the curve.

EXPANDING THE MODEL

The other half of our model is a residual consisting of allocation and selection. While there is a place for this in our analysis, it is often lacking that explanatory "wow" factor. As noted above, we have a host of optional attribution effects that can be added to tell the story with greater impact. The power of a model is not the sheer number of effects, but rather how easily the relevant effects can be incorporated into the analysis and the detail that they provide.

Adding carry, spread, and income provides for that extra explanatory power in the core investment grade space. By incorporating the carry effect, we get a sense of how the passage of time has helped or hurt the portfolio's relative performance. Carry is made up of accretion and roll-down components. In terms of accretion, what we mean is how any discounts or premiums on a security impact the price return over the measurement period. This is purely an accounting construct derived from the purchase of a security. By roll-down, we refer to the price impact of a security moving X periods closer to maturity or literally rolling down the curve. This is also an accounting construct. Both carry components are most meaningful in a low turnover environment.

The addition of the spread effect details our spread management ability. Did we see greater spread movement relative to the benchmark, where spread is defined here using the option adjusted spread for comparability across asset types? Or were we taking greater spread risk, represented here by spread duration? This addresses the capital appreciation aspect of the mandate and is a natural complement to any rich-cheap or relative value analysis that is being performed. We can also more clearly define the impact of a sector versus a security by expanding the spread effect to a sector spread and security spread component.

The final effect we want to add, income effect, is also the easiest to understand. Did the portfolio clip a higher coupon than the benchmark? If so, we would expect a positive income effect. Since accruals and coupons are observable, it is natural to break this out explicitly from any residual return.

Our investment grade model wraps up with inclusion of the allocation and selection effects. Here allocation is a function of the groups/partitions we choose to apply, while selection is a function of underwriting/avoidance.

HIGH YIELD: THE CREDIT QUALITY ROLLERCOASTER

Next, let's jump on the credit quality rollercoaster from core investment grade to high yield. Why does the rollercoaster metaphor work here? A few reasons. First, high yield bonds exhibit far greater return volatility than investment grade bonds; if a macro event causes investment grade to sneeze, high yield catches pneumonia. Second, credit events tend to unfold quickly (and sometimes unexpectedly) in the space, like a sudden drop or an unforeseen corkscrew. And finally, anecdotally across our global client base, high yield attribution tends to throw them for a loop!

What we mean with that last bit is that client by client, we do not see one specific approach to attribution. Some prefer a Brinson approach, only looking at allocation and selection while ignoring other drivers of fixed income total return. Others opt to apply the basic investment grade model to maintain continuity across the overall asset class. Still others have adopted more of a hybrid approach. The inclusion of a duration times spread, or DTS, methodology to the mix adds even more choice in trying to explain excess return in the asset class proportionally.

While there is a place for each of these in high yield attribution, we advocate a hybrid approach alongside a DTS model in terms of value-add and explanatory power. That said, as there is no overarching approach, it is worth running through the slate to determine which is the best fit given the investment process and mix of asset types in play.

KISS (KEEP IT SIMPLE, SUNSHINE)

One of the most common refrains we hear from high yield managers is something along the lines of "high yield is all a relative value play; interest rate exposure is a knock-on effect; sector allocation and security selection are all I care about." And, depending on the asset types involved, that can be true.

Case in point, utilizing CDS/CDX for a pure credit play, entering short treasury futures positions to neutralize duration, and investing in bank loans (which are generally accepted to have minimal interest rate risk because of their floating rate provisions) are all great examples where it makes sense to keep it simple and showcase the investment process through a basic Brinson approach. This tells the story of the investment process, is easy to implement, and is even easier to interpret.

But, as we will illustrate, even if relative value is the name of the game in high yield, these securities are still impacted by interest rates and, even more importantly, by spreads. With that in mind, why wouldn't our model take that into account?

INTRODUCING A HYBRID APPROACH

Tweaking the initial investment grade model allows us to tell the high yield story more impactfully while also taking fixed income return fundamentals into account. As we can see from our total return decomposition below (Figure 3), even high yield is sensitive to the level and movement of rates. While rates may not be a primary driver in the investment process, they remain actionable (we would argue that duration positioning in high yield is still very much an active management decision) and should be considered. The difference relative to investment grade, though, is that we may not need or desire the same level of detail.

FIGURE 3: TOTAL RETURN DECOMPOSITION

Extended Return Attribution

29-DEC-2017 - 29-JUN-2018 Class1

							"Price Subcomponents"						
	Port. Average Weight	Port. Fixed Income Price Return	Port. Fixed Income Coupon Return	Port. Fixed Income Paydown Return	Port. Contribution To Return	Port. Fixed Income Total Return	Port. Fixed Income Accretion Return	Port. Fixed Income Rolldown Return	Port. Fixed Income Shift Return	Port. Fixed Income Twist Return	Port. Fixed Income Shape Return	Port. Fixed Income Volatility Return	Port. Fixed Income Spread Change ...
Total	100.00	-3.03	3.14	-0.01	0.10	0.10	0.02	-0.00	-1.79	0.02	-0.26	-0.08	-0.93
⊟ Corporate	99.84	-3.03	3.14	-0.01	0.11	0.11	0.02	-0.00	-1.79	0.02	-0.26	-0.08	-0.93
⊞ Financial Instituti...	9.81	-3.92	2.93	0.00	-0.09	-0.99	-0.17	-0.02	-1.89	0.01	-0.18	-0.04	-1.63
⊟ Industrial	87.18	-2.93	3.17	-0.01	0.19	0.23	0.04	0.00	-1.78	0.02	-0.27	-0.09	-0.86
⊞ Basic Industry	7.43	-3.64	3.08	--	-0.04	-0.56	-0.08	-0.17	-1.94	0.04	-0.17	-0.07	-1.25
⊞ Capital Goods	8.56	-3.74	2.95	--	-0.07	-0.79	-0.16	-0.03	-1.59	0.01	-0.29	-0.12	-1.57
⊞ Communicati...	19.86	-2.50	3.35	-0.04	0.15	0.81	0.12	0.03	-1.87	0.02	-0.27	-0.09	-0.46
⊞ Consumer Cy...	13.90	-4.47	3.00	-0.00	-0.21	-1.47	0.03	0.01	-1.71	0.02	-0.27	-0.08	-2.46
⊞ Consumer No...	13.10	-2.00	3.18	--	0.16	1.18	0.15	0.06	-1.79	0.00	-0.29	-0.08	-0.05
⊞ Energy	14.66	-1.83	3.28	-0.00	0.21	1.45	0.10	0.05	-1.95	0.03	-0.24	-0.07	0.31
⊞ Other Industrial	1.26	-3.53	3.40	0.00	-0.00	-0.12	-0.10	0.02	-1.66	-0.00	-0.31	-0.09	-1.39
⊞ Technology	6.95	-3.14	2.99	0.00	-0.01	-0.15	-0.14	-0.08	-1.42	0.02	-0.30	-0.12	-1.09
⊞ Transportation	1.45	-3.59	3.44	0.00	-0.00	-0.15	0.12	0.07	-1.35	-0.01	-0.32	-0.05	-2.04
⊞ Utility	2.85	-2.79	3.10	-0.00	0.01	0.31	-0.04	-0.10	-1.72	-0.01	-0.21	-0.11	-0.60
⊞ Government Related	0.08	-4.02	2.54	--	-0.00	-1.48	0.04	0.12	-1.84	0.02	-0.32	-0.10	-1.93

The first tweak is simple: we will simply combine the shift and twist effects into an overall yield curve effect. The second tweak is to expose the spread effect to showcase our spread management acuity. The third tweak is to expose the income effect since, definitionally, we should want to understand how the yield component of security selection impacts our high yield relative performance. From here we maintain the allocation and selection effects or combine those into a single excess return component. Figure 4 below is a great sample view that is easy to use and explain. More importantly, it leverages an out-of-the-box approach and analytics.

FIGURE 4: BREAKING DOWN THE COMPONENTS FOR HIGH YIELD

Fixed Income Attribution

29-DEC-2017 - 29-JUN-2018 Class1

	ICE BofAML US High Yield Index			ICE BofAML U.S. Corporate Master			Fixed Income Attribution				
	Port. Average Weight	Port. Total Return	Port. Contrib. To Return	Bench. Average Weight	Bench. Total Return	Bench. Contrib. To Return	Yield Curve Effect	Spread Effect (Local)	Income Effect (Local)	Excess Return	Total Effect (Local)
Total	**100.00**	**0.10**	**0.10**	**100.00**	**-3.12**	**-3.12**	**1.00**	**1.79**	**1.19**	**-0.75**	**3.22**
Corporate	99.84	0.11	0.11	95.89	-3.14	-3.01	0.89	1.71	1.28	-0.76	3.12
Financial Institutions	9.81	-0.99	-0.09	32.32	-2.72	-0.87	0.63	0.59	-0.31	-0.07	0.83
Industrial	87.18	0.23	0.19	55.82	-3.28	-1.84	0.03	0.92	1.67	-0.65	1.96
Basic Industry	7.43	-0.56	-0.04	3.67	-3.53	-0.13	-0.04	0.04	0.15	-0.07	0.08
Capital Goods	8.56	-0.79	-0.07	4.72	-3.29	-0.15	-0.01	0.04	0.17	-0.11	0.08
Communications	19.86	0.81	0.15	7.84	-4.06	-0.32	-0.13	0.21	0.49	-0.11	0.45
Consumer Cyclical	13.90	-1.47	-0.21	6.84	-2.94	-0.20	-0.08	-0.17	0.30	-0.07	-0.02
Consumer Non-Cyclical	13.10	1.18	0.16	14.05	-3.42	-0.48	0.18	0.39	0.15	-0.08	0.64
Energy	14.66	1.45	0.21	8.88	-2.92	-0.26	-0.03	0.28	0.29	-0.08	0.46
Other Industrial	1.26	-0.12	-0.00	0.57	-2.19	-0.01	-0.00	-0.01	0.03	-0.00	0.01
Technology	6.95	-0.15	-0.01	7.03	-2.60	-0.18	0.10	0.10	0.09	-0.11	0.17
Transportation	1.45	-0.15	-0.00	2.21	-4.42	-0.10	0.05	0.05	0.01	-0.01	0.10
Utility	2.85	0.31	0.01	7.75	-3.89	-0.30	0.23	0.20	-0.07	-0.04	0.32

Over the years, we have also heard the desire to utilize sector curves in the credit space. Certainly there is pride of place for that in the relative value process. The issue with that in attribution is that creation, maintenance, and integration of sector curves in a standard model are difficult. Why? Simply put, not every credit quality, sector, and/or tenor has enough securities to construct reliable curves on an ongoing basis. We resolve that by expanding the spread effect to look at sector level as well as security level spreads. Formula 1 treats the benchmark as the investable universe, removing the sector curve requirement. Then, in Formula 2, the security spread effect explains how much of the overall spread effect is derived from additional OAS movements not explained by sector spread moves.

FORMULA 1: (Pwt * -1 * PSprddur * BOASgroupchng) – (Bwt * -1 * BSprddur * BOASgroupchng)

FORMULA 2: (Pwt * -1 * PSprddur * (POASchng – BOASgroupchng)) – (Bwt * -1 * BSprddur * (BOASchng – BOASgroupchng))

Where: **Pwt** = Portfolio Weight, **PSprddur** = Portfolio Spread Duration, **BOASgroupchng** = Benchmark Option Adjusted Spread group change, **Bwt** = Benchmark Weight, **BSprddur** = Benchmark Spread Duration, **POASchng** = Portfolio Option Adjusted Spread change, **BOASchng** = Benchmark Option Adjusted Spread change

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While this is an approach that is easy to use, maintain, and interpret across interested parties, we see a pivot toward an increasingly popular approach, duration times spread, or DTS.

WHAT CAN DTS DO FOR YOU?

Let's start with a basic definition. DTS is as simple as it sounds: spread duration times spread. This stems from feedback and observation that spreads tend to change on a relative basis rather than an absolute basis. Larger spreads widen at a faster rate than do tighter spreads. This introduces a level of comparability across the credit spectrum, where an easy example states that a security with a spread of 400 bps and a spread duration of one is directly comparable to a security with a spread of 100 bps and a spread duration of four.

In an attribution framework, shown in Figure 5, we can see how easy this approach is to implement and interpret. We still capture the impact of interest rate sensitivity, but we can isolate spread moves and relative value in a somewhat more intuitive way than by using the extended investment grade model.

High yield is a unique part of the fixed income world that tends to be viewed apart from more vanilla strategies. Volatility, optionality, and a demand for bespoke views have created fragmented approaches to attribution. By adapting our baseline fixed income attribution model to address these nuances while maintaining a laser-like focus on the investment process, we create an environment that dramatically simplifies understanding relative performance in the asset class.

FIGURE 5: FIXED INCOME ATTRIBUTION WITH DTS EFFECTS

Fixed Income Attribution

29-DEC-2017 - 29-JUN-2018 Class1

	ICE BofAML US High Yield Index			ICE BofAML U.S. Corporate Master			Fixed Income Attribution						
	Port. Average Weight	Port. Total Return	Port. Contrib. To Return	Bench. Average Weight	Bench. Total Return	Bench. Contrib. To Return	Yield Curve Effect	Carry Effect (Local)	DTS Allocation Effect (Local)	DTS Selection Effect (Local)	Income Effect (Local)	Excess Return	Total Effect (Local)
Total	**100.00**	**0.10**	**0.10**	**100.00**	**-3.12**	**-3.12**	**1.00**	**-0.04**	**-1.35**	**3.14**	**1.19**	**-0.73**	**3.22**
⊟ Corporate	99.84	0.11	0.11	95.89	-3.14	-3.01	0.89	-0.04	-1.42	3.14	1.28	-0.73	3.12
⊞ Financial Institutions	9.81	-0.99	-0.09	32.32	-2.72	-0.87	0.63	-0.05	0.36	0.23	-0.31	-0.03	0.83
⊟ Industrial	87.18	0.23	0.19	55.82	-3.28	-1.84	0.03	0.01	-1.72	2.64	1.67	-0.67	1.97
⊞ Basic Industry	7.43	-0.56	-0.04	3.67	-3.53	-0.13	-0.04	-0.01	-0.13	0.17	0.15	-0.05	0.08
⊞ Capital Goods	8.56	-0.79	-0.07	4.72	-3.29	-0.15	-0.01	-0.02	-0.14	0.18	0.17	-0.10	0.08
⊞ Communications	19.86	0.81	0.15	7.84	-4.06	-0.32	-0.13	0.03	-0.47	0.68	0.49	-0.15	0.45
⊞ Consumer Cyclical	13.90	-1.47	-0.21	6.84	-2.94	-0.20	-0.08	-0.00	-0.36	0.20	0.30	-0.07	-0.02
⊞ Consumer Non-Cyclical	13.10	1.18	0.16	14.05	-3.42	-0.48	0.18	0.01	-0.20	0.59	0.15	-0.09	0.64
⊞ Energy	14.66	1.45	0.21	8.88	-2.92	-0.26	-0.03	0.03	-0.31	0.59	0.29	-0.11	0.46
⊞ Other Industrial	1.26	-0.12	-0.00	0.57	-2.19	-0.01	-0.00	-0.00	-0.02	0.00	0.03	-0.00	0.01
⊞ Technology	6.95	-0.15	-0.01	7.03	-2.60	-0.18	0.10	-0.03	-0.04	0.14	0.09	-0.08	0.17
⊞ Transportation	1.45	-0.15	-0.00	2.21	-4.42	-0.10	0.05	0.00	0.01	0.03	0.01	-0.01	0.10
⊞ Utility	2.85	0.31	0.01	7.75	-3.89	-0.30	0.23	-0.00	0.11	0.10	-0.07	-0.03	0.32

TAKING THE EMERGING MARKET PLUNGE

On initial review, emerging markets (EM) should be simple to integrate into an attribution framework. The investable universe is a standard set of instrument types: vanilla government bonds, linkers, corporate bonds, money market instruments, etc. Sure, there are some local conventions in play, and in local currency debt, accessing terms and conditions can be an adventure depending on the market. But in general, there just aren't that many surprises left.

The main issue when it comes to emerging markets is confusion around what story to tell. This confusion stems primarily from combining hard currency with local currency across asset types (government, linker, corporate, etc.). Even just grouping or partitioning a simple contribution report lacks consistency for the same reasons.

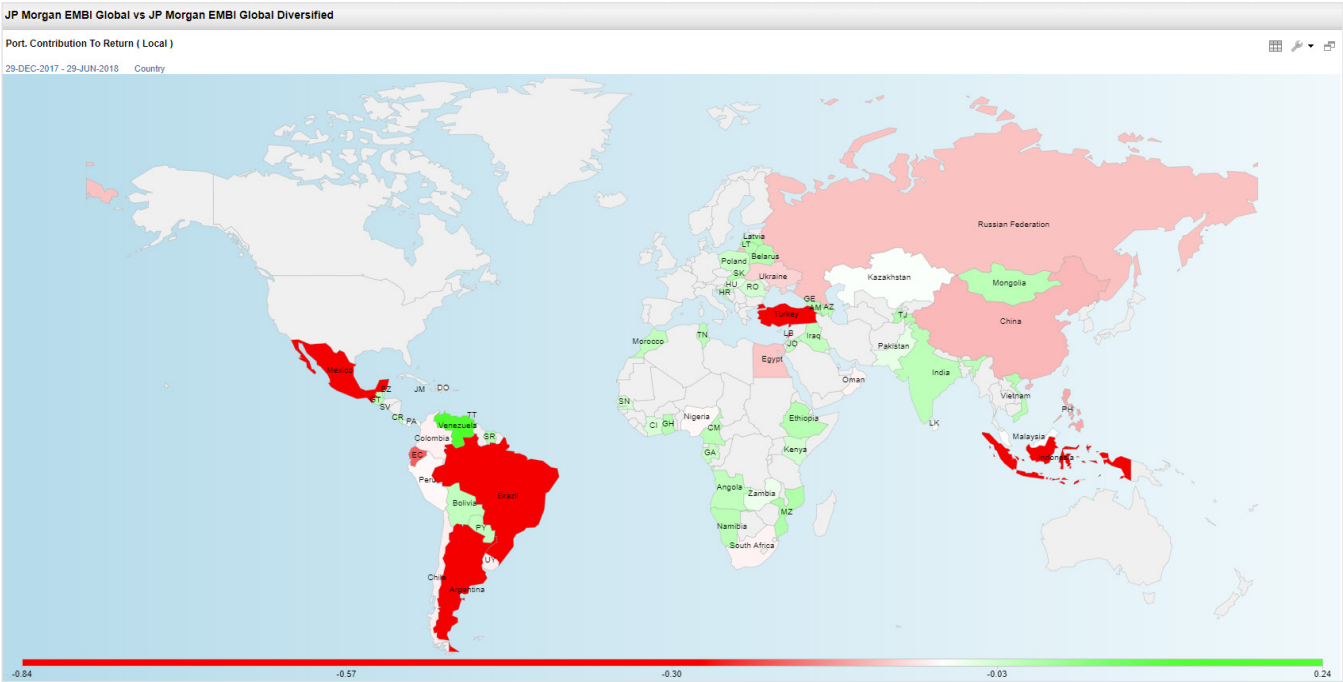
MAINTAINING NORMALCY WHILE INCORPORATING THE AVAILABLE STRATEGIES

Emerging market mandates are incredibly easy to run through either an absolute or benchmark relative attribution model. As we have shown above, we will start with our basic attribution framework and combine or add effects based on the investment process. The differentiator here is how we slice and dice the portfolio to most effectively tell the story.

Many clients initiate exposure to emerging markets through vanilla hard currency government bonds. Relative value to U.S. treasuries across countries is the play here, where underwriting is looking at spread levels, policy decisions, historical behavior, and macroeconomic indicators to determine creditworthiness (a.k.a. the "Four C's of Credit"—character, capacity, conditions, capital).

The basic model is more than enough to handle this. However, we can expand the twist effect to incorporate partial durations or add in optional effects like spread, income, and carry if we're so inclined. Applying a region or country grouping is standard practice, and it allows for some interesting visualization (Figure 6). That said, if we are being honest, there are more exciting strategies in the EM space to consider.

FIGURE 6: GEOGRAPHICAL HEAT MAP OF CONTRIBUTION TO RETURN



One of those strategies is incorporating hard or local currency corporate debt into the mix. When this occurs, we must rethink the entire approach. Depending on the turnover of the portfolio (buy and hold versus actively managed), the addition of the carry effect, income, and spread effect becomes more meaningful. If turnover is high, we may even want to try and capture the impact of our trades via the transaction effect. The complexity increases here when multiple currencies enter the fray.

The initial challenge revolves around how to group this type of report. This is where we see divergence across clients. Typically, country, sector, and currency are seen in some order, with a rating, spread, or coupon partition occurring at the most granular level (Figure 7). The difficulty is often purely data related—are country and sector defined internally or via the benchmark? How do you align the portfolio with the benchmark if these definitions are internal? How do you know that you are using analytics calculated off the appropriate local curve when multiple currencies are in play?

FIGURE 7: BASIC FIXED INCOME ATTRIBUTION MODEL WITH CURRENCY EFFECT

Bloomberg Barclays EM Local Currency Government Universal vs Bloomberg Barclays EM Local Currency Government: Intermediate

Fixed Income Attribution

30-MAR-2018 - 29-JUN-2018 Country

	Bloomberg Barclays EM Local Currency Government Un...			Bloomberg Barclays EM Local Currency Government: In...			Fixed Income Attribution						
	Port. Average Weight	Port. Total Return	Port. Contrib. To Return	Bench. Average Weight	Bench. Total Return	Bench. Contrib. To Return	Shift Effect (Local)	Twist Effect (Local)	Allocation Effect (Local)	Selection Effect (Local)	Total Effect (Local)	Total Currency Effect	Total Effect
Total	**100.00**	**-5.95**	**-5.95**	**100.00**	**-8.28**	**-8.28**	**0.64**	**0.29**	**-0.10**	**0.04**	**0.87**	**1.45**	**2.33**
China	31.59	-2.96	-0.98	--	--	--	0.16	0.21	-0.16	--	0.21	0.73	0.95
China Renminbi	31.39	-2.95	-0.97	--	--	--	0.16	0.21	-0.16	--	0.21	0.73	0.94
China Renminbi Offshore	0.19	-3.31	-0.01	--	--	--	0.00	0.00	-0.00	--	0.00	0.00	0.00
India	16.03	-5.91	-0.93	--	--	--	-0.53	0.02	0.11	--	-0.40	0.43	0.04
South Korea	13.36	-3.34	-0.44	27.64	-3.48	-0.99	-0.01	-0.00	0.11	-0.01	0.09	-0.42	-0.33
Brazil	5.96	-15.48	-0.96	16.55	-15.41	-2.63	0.50	-0.02	-0.13	0.00	0.35	0.69	1.04
Brazilian Real	5.96	-15.48	-0.96	16.55	-15.41	-2.63	0.50	-0.02	-0.13	0.00	0.35	0.69	1.04
Taiwan	3.97	-3.58	-0.14	--	--	--	0.00	0.01	-0.03	--	-0.02	0.12	0.10
Malaysia	3.36	-4.46	-0.15	7.10	-4.05	-0.28	0.02	-0.01	0.01	0.01	0.03	-0.12	-0.09
Mexico	3.18	-6.56	-0.21	6.24	-6.68	-0.40	0.02	0.02	-0.01	0.01	0.03	-0.02	0.01
Mexican Peso	3.18	-6.56	-0.21	6.24	-6.68	-0.40	0.02	0.02	-0.01	0.01	0.03	-0.02	0.01
Indonesia	3.06	-8.77	-0.27	4.86	-7.75	-0.39	0.03	0.03	-0.01	0.02	0.07	-0.06	0.01
Thailand	2.95	-6.66	-0.20	4.71	-6.06	-0.29	-0.01	0.02	0.01	-0.01	0.02	-0.03	-0.02
Poland	2.51	-8.27	-0.21	6.80	-8.30	-0.56	0.01	0.01	0.03	0.00	0.05	0.04	0.09
South Africa	2.43	-16.95	-0.43	2.05	-15.05	-0.32	-0.06	-0.01	0.00	0.00	-0.07	-0.02	-0.09
Russian Federation	1.57	-9.78	-0.16	3.67	-9.64	-0.35	0.05	0.01	-0.01	0.00	0.06	0.01	0.07

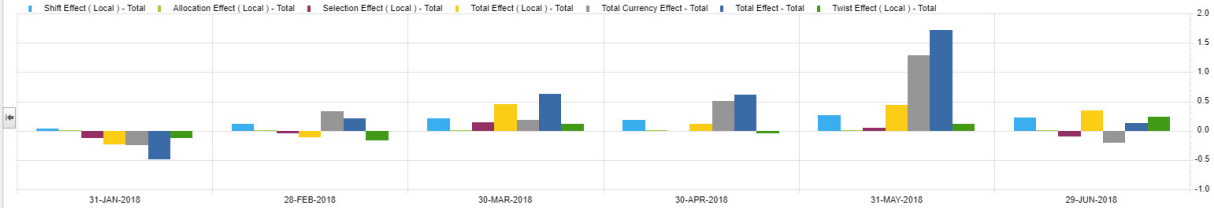
Footnotes

Effects Over Time

29-DEC-2017 - 29-JUN-2018 Class1

Total
Treasury

Shift Effect (Local) - Total | Allocation Effect (Local) - Total | Selection Effect (Local) - Total | Total Effect (Local) - Total | Total Currency Effect - Total | Total Effect - Total | Twist Effect (Local) - Total



Footnotes

With meta data like country and sector, it is common to attempt to align the portfolio with the benchmark, either via mapping or further upstream in a data warehouse. Currency, rating, spread, and coupon are easily accounted for. In terms of analytics and attribution, automating the analytics generation so that curve selection occurs automatically is ideal. Beyond the previously discussed effects, an attribution model that is designed to capture local effects as well as currency effects becomes a must-have.

What starts out as a complex problem is easily resolved, so it is easy to maintain some semblance of normalcy in the workflow while continuing to leverage out-of-the-box functionality.

THE CURRENCY LAZY RIVER

The other aspect that we need to think about as the product mix expands in emerging market strategies is how to handle currency. Is currency risk "naïve" in the sense that it is merely derived from the holdings? Or is it hedged entirely back to the portfolio base currency? Is some level of exposure acceptable based on the mandate or investor policy statement? Is currency exposure treated as a return-seeking asset?

These are all instrumental questions in determining the format and output of the analysis. Where currency risk is hedged out completely, it may tell a more effective story to group currency forwards within the asset currency buckets to determine hedge effectiveness. Alternatively, where active currency risk is taken, maintaining the flexibility to analyze the contribution of currency forwards independent of the cash assets is paramount.

The lazy river comparison fits here because, regardless of your approach to currency, it is possible to implement the desired view to complete the story seamlessly, allowing you to float on from emerging markets toward our next subject, liability-driven investments (LDI).

WHAT IS LIABILITY-DRIVEN INVESTMENT (LDI)?

In traditional benchmark-relative investing, the objective is simple: outperform the benchmark. But LDI tends to be a bit of a special cut. Certainly, the goal of outperforming the benchmark remains the same; however, the benchmark shifts from a passive, rules-based asset universe to one composed of projected liabilities. These liabilities can be either deterministic, as seen in defined benefit plans, or stochastic, as seen in more complex life insurance and annuity products.

The difficulties in LDI are varied: duration matching or constraints, the impact of inflation on real liabilities (and knock-on impacts on asset management decisions), cash flow matching in insurance products, and additional key risk and performance indicators to monitor, such as DV01, PV01, and IE01.

The challenge in viewing LDI in an attribution and analytics context is not specific to understanding an asset portfolio in a market standard model. The challenge is in the creation and maintenance of a liability benchmark and the application of this market standard model to the asset-liability benchmark combination.

The challenge in viewing LDI in an attribution and analytics context is not specific to understanding an asset portfolio in a market standard model.

PREPARATION IS EVERYTHING

With LDI, a list to define all the components for inputs and outputs is essential. Missing even a single item is a recipe for disaster. Asset portfolio? Projected benefit obligation? Custom yield curve? Calculation engine? Attribution model? Output mechanism? While these are all standard pieces of the LDI puzzle, every client and process varies.

Let us assume for a moment that our asset portfolio is easy to handle (because in our experience, it typically is). Coverage across treasuries, inflation-linked securities, and credits is high, and any terms and conditions required for derivatives like interest rate or inflation swaps, interest rate futures, or currency forwards are readily obtainable. The basic ingredients on the list are checked off out of the gate and life is beautiful. Now, on to the liabilities!

This is where difficulties tend to arise, but these can be avoided by breaking the overall task into three smaller steps:

First, start with the projected benefit obligation. This is merely a stream of projected cash flows required to meet the liability, either nominal or real, and is typically sourced from actuarial teams or third-party consultants. We most frequently see annual cash flows, but monthly and quarterly cash flows are common as well. When the cash flows are nominal, or not indexed to inflation, treat them as simple zero-coupon bonds, where the issue date is a valuation date and the maturity date is the date of each cash flow. Payment occurs at maturity. When the cash flows are real, or indexed to inflation, we treat them similarly; however, you can also incorporate the inflation index into the security modeling.

Second, the question of what curve to use to discount these cash flows must be addressed. There is not a one-size-fits-all approach here. Treasury curves and real curves are supported out of the box, but it is also quite common for clients to load a custom curve based on some sort of credit index or treasury plus assumption. Automation occurs under each of these, but it is important to note the extra level of complexity created when using a custom curve. Here we refer to ensuring the validity and completeness of data across all frequencies and tenors desired.

FIGURE 8: DETAILS FOR A SINGLE BOND

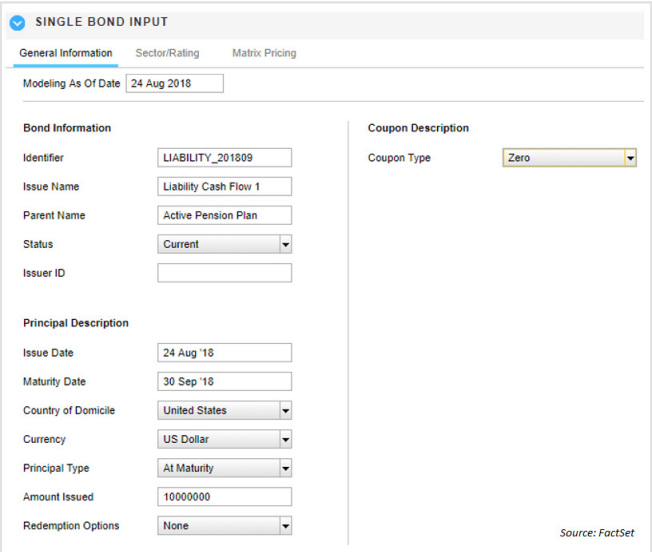
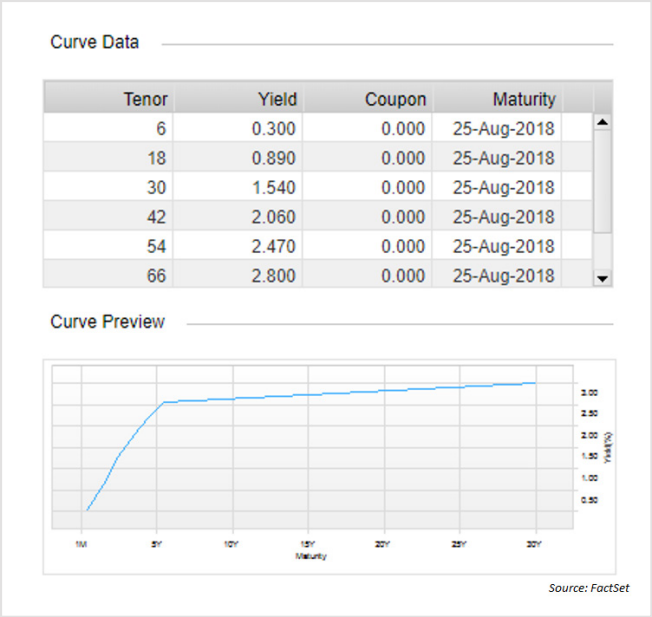


FIGURE 9: ANALYZING THE ENTIRE CURVE



Tenor	Yield	Coupon	Maturity
6	0.300	0.000	25-Aug-2018
18	0.890	0.000	25-Aug-2018
30	1.540	0.000	25-Aug-2018
42	2.060	0.000	25-Aug-2018
54	2.470	0.000	25-Aug-2018
66	2.800	0.000	25-Aug-2018

Third, streamline the calculation of underlying analytics used in performance attribution and risk analysis of the asset and liability to avoid mismatches and breakpoints like:

- Asset managers using one engine and methodology and actuarial teams using a different engine and underlying assumptions.
- Consultants manually piecing together manager-provided data with internally derived liability figures.
- Asset owners being left with a lot of disparate information that doesn't necessarily answer the question of whether their asset manager or fund of fund complex outperformed the corresponding liability.

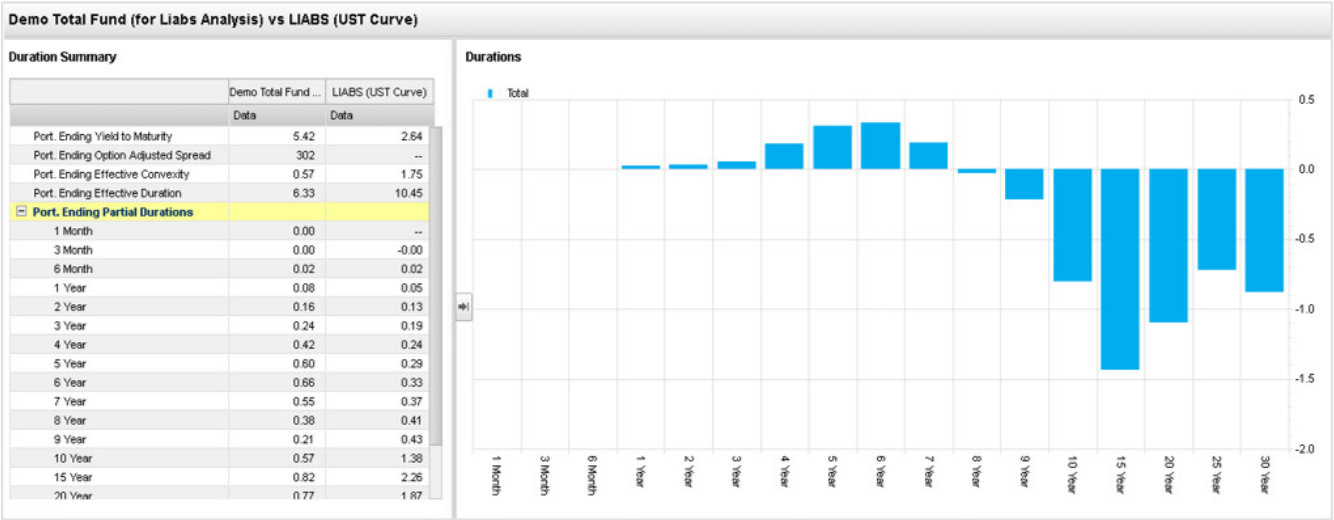
Once the liability is considered, extending the standard model to incorporate key rate durations, inflation impact, and any interest rate or currency overlays tells a meaningful story. It becomes possible to see how duration mismatches are headwinds or tailwinds in a given period, or how security selection and implementation can have a meaningful impact when real liabilities come into play.

THE DEVIL IS IN THE DETAILS

We can enhance the attribution story by adding basic visualization around point-in-time and time series analytics. As shown in Figure 10 below, it becomes easy to illustrate duration mismatches, intermediate and long-term cash flows, and core metrics like DV01 and IE01 alongside the performance attribution.

With LDI, there tend to be a lot more moving pieces than in traditional benchmark relative asset management. As we hope to have illustrated, though, these moving pieces, when properly managed, fit well into a standard fixed income attribution model. Understanding the goal for desired analysis up front, combined with taking all components into account during preparation, allows for the simplification and scalability of what can be a difficult concept.

FIGURE 10: DETAILED POINT-IN-TIME AND TIME SERIES ANALYTICS



	Demo Total Fund ...	LIABS (UST Curve)
	Data	Data
Port. Ending Yield to Maturity	5.42	2.64
Port. Ending Option Adjusted Spread	302	--
Port. Ending Effective Convexity	0.57	1.75
Port. Ending Effective Duration	6.33	10.45
Port. Ending Partial Durations		
1 Month	0.00	--
3 Month	0.00	-0.00
6 Month	0.02	0.02
1 Year	0.08	0.05
2 Year	0.16	0.13
3 Year	0.24	0.19
4 Year	0.42	0.24
5 Year	0.60	0.29
6 Year	0.66	0.33
7 Year	0.55	0.37
8 Year	0.38	0.41
9 Year	0.21	0.43
10 Year	0.57	1.38
15 Year	0.82	2.26
20 Year	0.77	1.87

BRINGING IT ALL TOGETHER: MULTI-ASSET ATTRIBUTION

We've looked at various attribution models for core fixed income strategies and liability-driven investing, but we'll now finish up with attribution for balanced portfolios, where new decisions come into play.

Multi-asset strategies tend to be managed as a combination of top-down and bottom-up decisions, where asset allocation teams determine the optimal asset class mix and individual teams run the fundamental analysis to construct sleeves within the asset classes. However, there are also approaches to multi-asset investing that consider all asset classes holistically when constructing the portfolio. We even see strategies, such as event-driven, that use multi-asset investing to exploit company-specific bets rather than tactical asset allocation plays. Depending on where the strategy lies on the spectrum, there are a couple of attribution models that may fit the bill to quantify the portfolio management decisions.

INCORPORATING ASSET ALLOCATION INTO THE FRAMEWORK

Let's review the decision-making process for traditional multi-asset portfolios that are constructed by bringing together individual asset class sleeves. Typically, portfolio management in the multi-asset world starts with a strategic or tactical asset allocation decision relative to a mandated benchmark allocation. From there, individual asset class teams, likely separate from the asset allocation teams, are tasked with specific mandates within the asset class. This multi-step process for multi-asset portfolio management can be captured from the perspective of an attribution framework in Figure 1 above.

The balanced attribution model acts as an extension of the fixed income performance attribution model to include asset-class effect, which incorporates asset allocation as the first step in the decision-making process for multi-asset portfolios. From there, we quantify benchmark-relative value-add within the individual asset classes across the remaining effects. The model is smart enough to apply the relevant effects to the proper asset classes and is also flexible by allowing for additional fixed income effects as deemed appropriate based on the fixed income sleeve mandate. After the asset allocation decision has been quantified, the value-add of the decisions for equities will be evaluated using Brinson-Fachler style effects—allocation and selection—and the value-add of the fixed income assets will leverage the fixed income performance attribution effects. The effects noted from Figure 1 are applied across asset classes as follows:

FIGURE 11: PERFORMANCE ATTRIBUTION BY ASSET CLASS

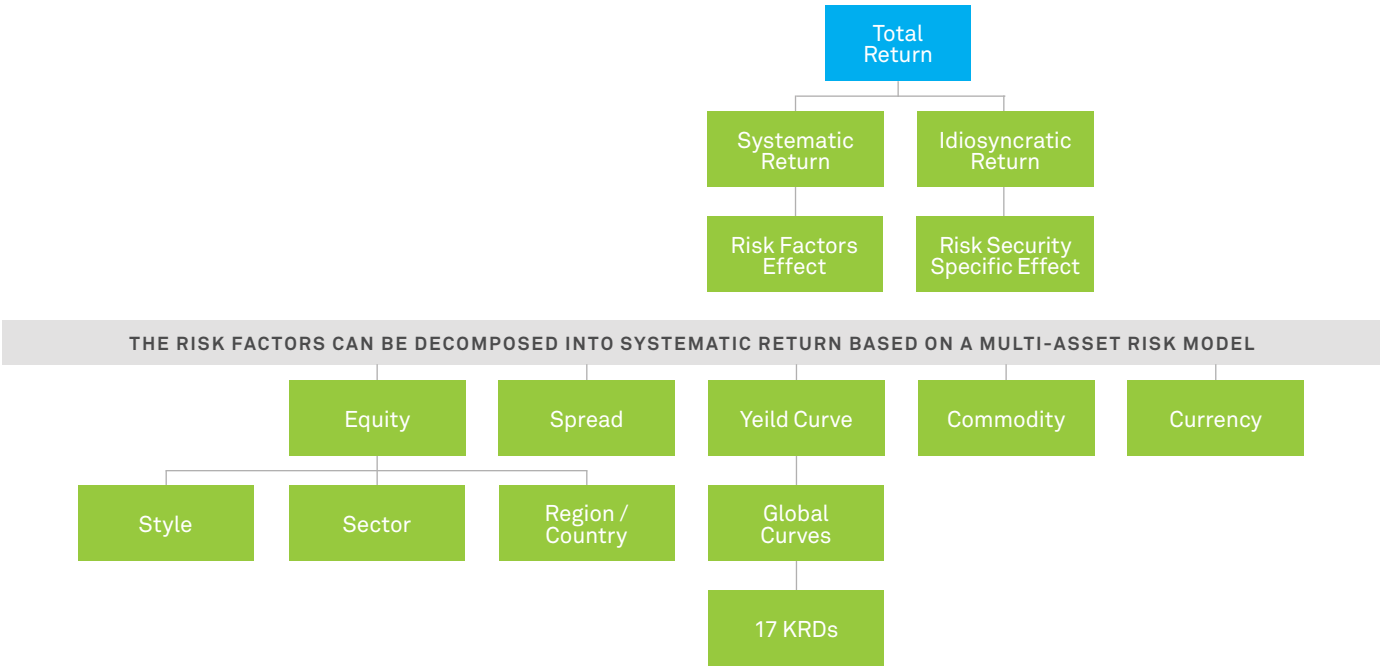
ASSET CLASS	RELEVANT ATTRIBUTION ANALYSIS
Equity	Allocation, Selection, Currency
Fixed Income	Shift, Twist, Carry, Spread, Volatility, Income, Inflation, Paydown, Allocation, Selection, Currency
Cash	Currency

LINKING ATTRIBUTION TO RISK MANAGEMENT

When the management of the portfolio does not explicitly incorporate asset allocation decisions, a risk-based performance attribution (RBPA) model can help quantify multi-asset portfolio management using pure systematic market factors, as defined by a risk model. Here, we break down performance into systematic risk model factor effects and idiosyncratic effects.

FIGURE 12: RISK-BASED PERFORMANCE ATTRIBUTION

Decompose Performance Using a Factor Model to Quantify Systematic Drivers of Return



Like the balanced attribution model, the RBPA model will apply relevant effects to the proper asset classes based on the exposures to the systematic risk model factors. At a high level, the risk model factors break down into equity, spread, yield curve, commodity, and currency factors, and each factor group can be decomposed further into more granular effects. For equities, these more granular factors encompass fundamental styles (i.e., value, growth, momentum, etc.), sectors, and countries; for fixed income, these factors break down into DTS- and duration-based factors and global curve factors; commodities can also be explicitly captured within this model using a set of momentum and market driver factors relevant in the commodity markets. Evaluating multi-asset portfolio performance through the lens of a risk model creates a direct link between the risk management process for understanding portfolio volatility and the attribution process for understanding realized portfolio performance.

COMPARING FRAMEWORKS

Using a global balanced portfolio compared to a global balanced benchmark, we can see how the two attribution models tell a story around the management and performance of this portfolio. There will be areas of overlap but also areas where each model provides unique insights.

Beginning with the balanced attribution framework shown in Figure 13, we can see that the portfolio underperformed the benchmark.

FIGURE 13: BALANCED ATTRIBUTION FRAMEWORK

Demo Global Balanced Portfolio vs Demo Global Balanced Benchmark

Balanced Attribution

29-DEC-2017 - 29-JUN-2018 Asset Class

	Portfolio			Benchmark			Balanced Attribution						
	Port. Average Weight	Port. Contribution To Return	Port. Total Return	Bench. Average Weight	Bench. Contribution To Return	Bench. Total Return	Asset Class Allocation Effect (Local)	Shift Effect (Local)	Twist Effect (Local)	Group Allocation Effect (Local)	Selection Effect (Local)	Total Currency Effect	Total Effect
Total	**100.00**	**-2.58**	**-2.58**	**100.00**	**-0.74**	**-0.74**	**-0.01**	**0.59**	**-0.00**	**-1.33**	**-0.14**	**-0.95**	**-1.84**
⊟ Equity	63.44	-1.93	-3.02	60.00	-0.12	-0.36	-0.01	--	--	-1.44	0.07	-0.35	-1.73
⊞ Consumer Discretionary	7.63	0.07	1.06	6.93	0.29	4.26	--	--	--	0.02	-0.02	0.00	-0.00
⊞ Consumer Staples	5.96	-0.39	-6.52	4.15	-0.35	-8.37	--	--	--	-0.11	0.21	-0.08	0.02
⊞ Energy	3.17	0.22	6.85	3.82	0.21	5.34	--	--	--	-0.05	0.03	0.03	0.01
⊞ Financials	13.93	-0.98	-6.82	10.61	-0.65	-6.11	--	--	--	-0.14	-0.11	-0.05	-0.30
⊞ Health Care	5.05	0.04	0.71	6.19	0.12	1.76	--	--	--	-0.02	0.10	-0.02	0.06
⊞ Industrials	4.30	-0.56	-12.65	5.07	-0.30	-6.11	--	--	--	0.07	-0.15	0.03	-0.05
⊞ Information Technology	12.16	0.57	5.04	15.56	0.91	5.94	--	--	--	-0.23	-0.13	-0.07	-0.42
⊞ Materials	2.49	-0.14	-5.85	2.55	-0.10	-4.26	--	--	--	0.01	0.05	-0.07	-0.01
⊞ Real Estate	1.84	-0.04	-2.02	1.62	-0.06	-3.92	--	--	--	-0.00	0.00	0.01	0.01
⊞ Telecommunication Services	5.39	-0.72	-12.61	1.66	-0.19	-10.72	--	--	--	-0.38	0.08	-0.12	-0.42
⊞ Utilities	1.16	-0.04	-3.49	1.58	-0.02	-1.38	--	--	--	0.00	0.02	-0.04	-0.01
⊟ Fixed Income	36.56	-0.65	-1.83	40.00	-0.62	-1.62	-0.01	0.59	-0.00	0.11	-0.21	-0.60	-0.12
⊞ Corporate	2.49	-0.10	-4.03	10.14	-0.33	-3.27	--	0.01	0.01	0.08	-0.00	-0.01	0.09
⊞ Government Related	9.85	-0.29	-2.98	2.73	-0.03	-1.31	--	0.29	-0.02	0.00	-0.14	-0.30	-0.16
⊞ Securitized	8.31	-0.08	-1.09	12.24	-0.11	-0.96	--	-0.02	0.01	-0.01	-0.00	-0.00	-0.03
⊞ Treasury	15.92	-0.18	-1.17	14.89	-0.14	-1.07	--	0.31	-0.01	0.01	-0.07	-0.26	-0.01

Source: FactSet

Luckily, the asset allocation choices are mostly off the hook here. The Asset Class Allocation Effect shows asset allocation decisions as an almost negligible driver of the underperformance. Looking at the equities in the portfolio, the attribution model highlights a poor skill in equity sector allocation. Overweights in telecommunication services, financials, and consumer staples, which were underperforming sectors, resulted in large drags on performance. An underweight in information technology, which was an outperforming sector, also resulted in underperformance. Within equities, the Selection Effect shows that stock picking was only a marginal help to performance and, while currency bets fared better than sector bets, the Currency Effect shows that currency management within equities remains a negative contributor to performance.

Fixed income weathered the storm relatively well compared to equities. Curve management contributed to outperformance, as shown by the combination of the Shift and Twist Effects. Unfortunately, after accounting for curve positioning, the fixed income story turns for the worst, with currency management as the main culprit.

Turning to the RBPA framework, instead of starting with quantifying an asset allocation decision, we instead break the active performance into the portion driven by systematic risk factor bets and the portion driven by security-specific impacts.

FIGURE 14: RISK-BASED PERFORMANCE ATTRIBUTION FRAMEWORK

Demo Global Balanced Portfolio vs Demo Global Balanced Benchmark

Risk Based Performance Attribution

29-DEC-2017 - 29-JUN-2018 Asset Class

	Portfolio			Benchmark			Risk Attribution							
											Spread	Yield Curve	Currency	Equity
	Port. Average Weight	Port. Contribution To Return	Port. Total Return	Bench. Average Weight	Bench. Contribution To Return	Bench. Total Return	Risk Factors Effect	Risk Security Specific ...	Risk Transaction Effect	Total Effect	Compounded Factor Impact	Compounded Factor Impact	Compounded Factor Impact	Compounded Factor Impact
Total	**100.00**	**-2.58**	**-2.58**	**100.00**	**-0.74**	**-0.74**	**-0.70**	**-1.08**	**-0.07**	**-1.84**	**-0.03**	**0.65**	**-0.76**	**-0.55**
⊟ **Equity**	63.44	-1.93	-3.02	60.00	-0.12	-0.36	-0.73	-1.00	-0.09	-1.82	--	--	-0.18	-0.55
⊞ **Consumer Discretionary**	7.63	0.07	1.06	6.93	0.29	4.26	-0.33	0.11	-0.00	-0.22	--	--	0.01	-0.34
⊞ **Consumer Staples**	5.96	-0.39	-6.52	4.15	-0.35	-8.37	0.25	-0.29	-0.01	-0.05	--	--	-0.10	0.35
⊞ **Energy**	3.17	0.22	6.85	3.82	0.21	5.34	-0.13	0.13	0.00	0.01	--	--	0.05	-0.17
⊞ **Financials**	13.93	-0.98	-6.82	10.61	-0.65	-6.11	0.51	-0.83	-0.01	-0.33	--	--	-0.10	0.61
⊞ **Health Care**	5.05	0.04	0.71	6.19	0.12	1.76	-0.06	-0.01	-0.01	-0.08	--	--	-0.01	-0.05
⊞ **Industrials**	4.30	-0.56	-12.65	5.07	-0.30	-6.11	-0.07	-0.19	-0.01	-0.27	--	--	0.04	-0.11
⊞ **Information Technology**	12.16	0.57	5.04	15.56	0.91	5.94	-0.96	0.68	-0.03	-0.32	--	--	-0.02	-0.94
⊞ **Materials**	2.49	-0.14	-5.85	2.55	-0.10	-4.26	-0.09	0.06	-0.00	-0.04	--	--	0.05	-0.14
⊞ **Real Estate**	1.84	-0.04	-2.02	1.62	-0.06	-3.92	0.11	-0.09	0.00	0.02	--	--	0.01	0.10
⊞ **Telecommunication Ser...**	5.39	-0.72	-12.61	1.66	-0.19	-10.72	0.13	-0.65	-0.00	-0.52	--	--	-0.08	0.22
⊞ **Utilities**	1.16	-0.04	-3.49	1.58	-0.02	-1.38	-0.10	0.08	0.00	-0.02	--	--	-0.03	-0.08
⊟ **Fixed Income**	36.56	-0.65	-1.83	40.00	-0.62	-1.62	0.03	-0.07	0.01	-0.03	-0.03	0.65	-0.58	--
⊞ **Corporate**	2.49	-0.10	-4.03	10.14	-0.33	-3.27	0.24	-0.01	-0.00	0.23	0.04	0.21	-0.01	--
⊞ **Government Related**	9.85	-0.29	-2.98	2.73	-0.03	-1.31	-0.26	-0.00	0.00	-0.26	-0.03	0.07	-0.30	--
⊞ **Securitized**	8.31	-0.08	-1.09	12.24	-0.11	-0.96	0.03	-0.01	0.01	0.03	-0.04	0.08	-0.00	--
⊞ **Treasury**	15.92	-0.18	-1.17	14.89	-0.14	-1.07	0.01	-0.05	0.00	-0.03	-0.00	0.28	-0.27	--

Source: FactSet

The Risk Factors Effect shows underperformance coming from our systematic factor bets. A breakdown of those factor bets (shown as "Compounded Factor Impact") shows that equity and currency bets detracted from performance. Similar to the balanced attribution model, curve management was a silver lining for us. However, converse to what the balanced attribution model told us, the choice of individual securities was the largest drag on performance.

A granular breakdown of the Risk Factors Effect, as shown in Figure 15, shows additional insights that the RBPA model affords.

Figure 15 again shows underperformance from equity factors, and in line with the balanced attribution results, we see poor skill coming from allocation to the systematic sector factors. However, we also see that the portfolio benefited from fundamental-style factor bets as well as the regional allocations. The last two insights are lost within the balanced attribution framework, which would be major shortcomings of the model for a portfolio whose equity mandate aims to create value-add through these types of factors.

Figure 16 highlights an additional advantage to the RBPA model, which is the granularity around yield curve positioning. Here, we dive deeper into the outperformance from the curve factors to see which curves and even how our positioning along each curve contributed to performance.

FIGURE 15: RBPA RISK FACTORS EFFECT BREAKDOWN

Demo Global Balanced Portfolio vs Demo Global Balanced Benchmark

Factor Attribution

29-DEC-2017 - 29-JUN-2018 Security Name

	Average Portfolio Exposure	Average Benchmark Exposure	Average Active Exposure	Compounded Factor Return	Compounded Factor Impact
⊟ Spread					-0.03
⊞ USD Corporate					0.05
⊞ EUR Corporate					-0.00
⊞ Euro-Sovereign					-0.00
⊞ CAD Corporate					-0.01
⊞ GBP Corporate					-0.01
⊞ SEK Corporate					0.00
⊞ Emerging Markets					0.03
⊞ Muni					-0.00
⊞ Quasi-Governmental					-0.04
⊞ MBS/ABS/CMBS					-0.04
⊟ Yield Curve					0.65
⊞ Australia Govn't Curve					0.00
⊞ Canada Govn't Curve					-0.00
⊞ Denmark Govn't Curve					0.01
⊞ Euro Govn't Curve					0.11
⊞ Sweden Govn't Curve					-0.00
⊞ UK Govn't Curve					-0.00
⊞ US Govn't Curve					0.53
⊞ Currency					-0.76
⊟ Equity					-0.55
⊟ Equity - Fundamental					0.44
⊞ Growth					0.04
⊞ Value					0.16
⊞ Liquidity					0.02
⊞ Short Momentum					0.27
⊞ Long Momentum					-0.05
⊞ Equity - Sector					-1.13
⊞ Equity - Regional					0.10
⊞ Equity - Economic					0.03
⊞ Equity - Statistical					0.01
Total					-0.70

Source: FactSet

FIGURE 16: RBPA YIELD CURVE BREAKDOWN

Demo Global Balanced Portfolio vs Demo Global Balanced Benchmark

Factor Attribution

29-DEC-2017 - 29-JUN-2018 Security Name

	Average Portfolio Exposure	Average Benchmark Exposure	Average Active Exposure	Compounded Factor Return	Compounded Factor Impact
⊟ Yield Curve					0.65
⊞ Australia Govn't Curve					0.00
⊞ Canada Govn't Curve					-0.00
⊞ Denmark Govn't Curve					0.01
⊞ Euro Govn't Curve					0.11
⊞ Sweden Govn't Curve					-0.00
⊞ UK Govn't Curve					-0.00
⊟ US Govn't Curve					0.53
US Government 1MO	0.00	0.00	-0.00	0.50	0.00
US Government 3MO	0.00	0.00	-0.00	0.53	0.00
US Government 6MO	0.01	0.01	0.00	0.58	0.00
US Government 12MO	0.03	0.05	-0.02	0.57	0.01
US Government 24MO	0.03	0.12	-0.09	0.64	0.05
US Government 36MO	0.06	0.14	-0.08	0.65	0.05
US Government 48MO	0.07	0.17	-0.10	0.58	0.05
US Government 60MO	0.04	0.16	-0.12	0.52	0.06
US Government 72MO	0.08	0.15	-0.08	0.49	0.04
US Government 84MO	0.12	0.14	-0.03	0.49	0.01
US Government 96MO	0.09	0.12	-0.03	0.47	0.02
US Government 108MO	0.11	0.13	-0.02	0.46	0.01
US Government 120MO	0.13	0.26	-0.14	0.43	0.05
US Government 180MO	0.08	0.21	-0.13	0.35	0.04
US Government 240MO	0.09	0.24	-0.15	0.28	0.04
US Government 300MO	0.11	0.30	-0.20	0.24	0.05
US Government 360MO	0.04	0.18	-0.14	0.21	0.03

Source: FactSet

WHICH MODEL IS RIGHT FOR MY MULTI-ASSET PORTFOLIO?

The differences in the results of the two attribution frameworks described above may lead you to ask: Which is the right attribution model for my portfolio? The great news about the two models described here is that they are not mutually exclusive and can be used very nicely as complements to one another depending on the mandate of the multi-asset portfolio and the manager's (or managers', as is often the case with multi-asset) skills.

IT'S TIME FOR A FRESH LOOK AT FIXED INCOME ATTRIBUTION

Fixed income attribution is still viewed as being hard to understand and hard to implement. However, increased client sophistication, an evolving investment process, and the creation/inclusion of additional asset types/mandates are all drivers for an increased demand of fixed income attribution. It's certainly not going the way of the dodo bird. Here we have tried to pull back the curtain and show that fixed income attribution is explainable and implementable, and deserves a place in your portfolio lifecycle toolkit.

We have addressed a variety of fixed income strategies, including core investment grade, high yield, emerging market, liability-driven investment (LDI), and multi-asset. While attribution analysis for each of these strategies is complex, technological innovation has yielded new and more powerful tools to enhance our analytical capabilities. With proper application and interpretation of these sophisticated tools, we can improve the quality of our attribution analysis, regardless of the investment mandate.

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