White Paper
Fixed Income

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Fixed Income Indexing: Additive in a Global Multi-Asset Portfolio

Michele Barlow
Head of Investment Strategy and Research
Asia Pacific

Yichan Shu
Senior Investment Strategist
Investment Strategy and Research

STATE STREET GLOBAL ADVISORS

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Executive Summary

Fixed income investors have historically been less inclined to introduce an indexed approach to their portfolios, something that we believe is mainly due to the healthy outperformance versus the benchmark (alpha) that active fixed income managers have been able to generate. However, these returns have come with a price tag for investors of higher risk, which typically means less diversification to equities.

Our analysis suggests that much of the risk that active fixed income managers are taking is typically via allocations to credit, which tends to be pro-cyclical in nature. As a result, excess returns generally increase during periods of market upswings and fall during market sell-offs. This is not an ideal situation for asset owners looking to their fixed income portfolio for risk mitigation, liquidity or rebalancing purposes, as they can end up locking in losses at potentially the worst possible time.

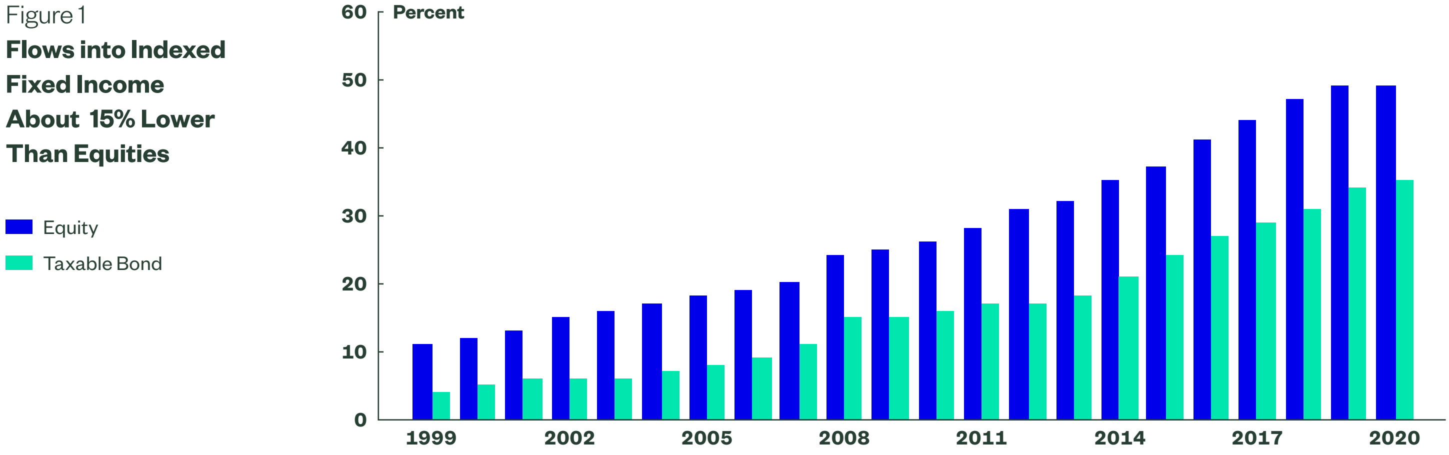
Incorporating some indexing elements into an active fixed income program may reduce risk in a multi-asset portfolio, but the real benefit is when rebalancing is taken into consideration. Utilizing indexing to rebalance a portfolio can help to provide annualized returns that are similar to holding only active fixed income, on a net of fee basis, while also improving the return/risk ratio. Same returns, lower risk.

Fixed Income: A Slower Shift to Indexing

- **The shift from active to indexing is one of the more enduring investment trends over recent decades, but this move has been slower to gain traction in the fixed income arena.**
- **Better performance by active managers versus their respective benchmarks, particularly in multi-sector active strategies, such as investment grade short, intermediate and global income funds, is likely behind the slower shift to indexing.**
- **Active global aggregate managers have generated excess returns of 48 basis points (net of fees) per annum over the last 20 years, but performance typically lags during market selloffs and rallies in market recoveries.**

One of the more enduring trends we've seen across markets has been the shift from active managers into passive — this is a phenomenon that has been relentless across both equities and fixed income (see Figure 1). At the end of 2020, passive investment accounted for about 50% of total equity investment (based on the US fund universe), but only about 35% of total fixed income. The shift to fixed income indexing has lagged equities historically, and that continues to be the case, with slower adoption being something that can be partly attributed to it being generally harder to replicate fixed income indices given the large number of securities. However, we believe that relative performance (after fee considerations) has been the main reason for the comparatively slower move to indexing in fixed income.

Figure 1
Flows into Indexed Fixed Income About 15% Lower Than Equities



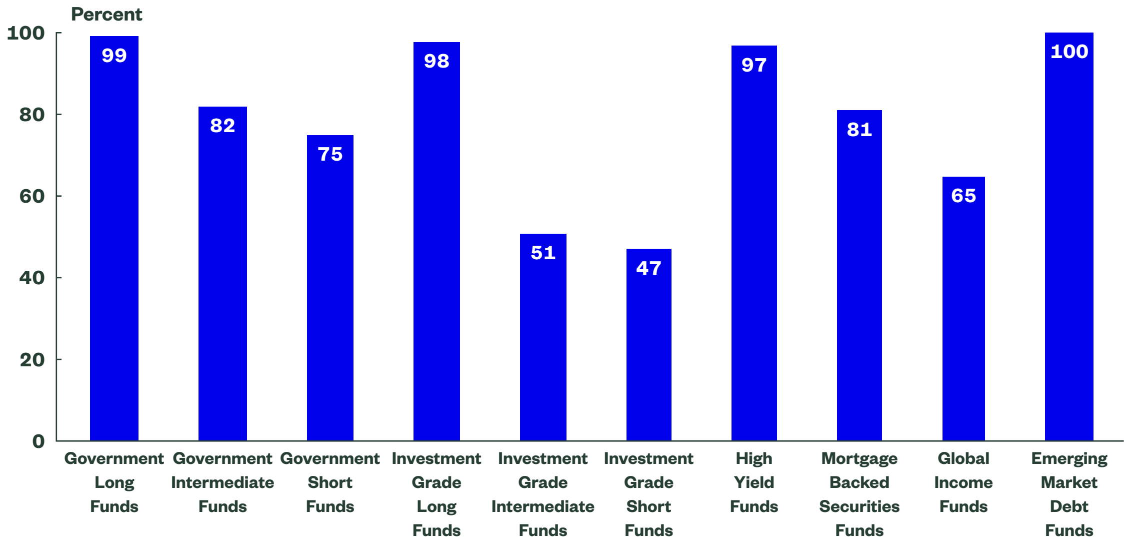
Source: Morningstar, as of December 31, 2020. The data shows the proportion of assets in passive investments versus universe of all ETFs, Open-ended Funds and Mutual Funds ex FoFs domiciled in the US.

Performance Slows Shift to Indexing

In the equity space, 85% of active domestic equity funds trailed the S&P Composite 1500 index return in a 10-year period and 82% of large-cap and 75% of mid-cap and small-cap funds lagged their benchmarks, according to S&P calculations.[1] Overall, less than 20% of active US equity funds outperformed their benchmarks (net of fees) in the review period. This type of disappointing outcome has helped drive the drift by equity investors towards indexing.

On the fixed income side though, the performance backdrop has been more mixed (see Figure 2). The single sector fixed income strategies, such as long duration government/investment grade corporate bonds, high yield and emerging markets, have struggled to beat or match their benchmark indices. This widespread underperformance undercuts the argument that certain markets, such as high yield and emerging market debt, are less efficient and thus present ample opportunity for active managers to generate alpha. Instead, higher transaction costs have contributed to active managers tending to position either conservatively or aggressively, with resultant uneven performance in periods of high idiosyncratic or geopolitical risk.

Figure 2
% of US Fixed Income Funds Underperforming the Index (June 2010–June 2020)

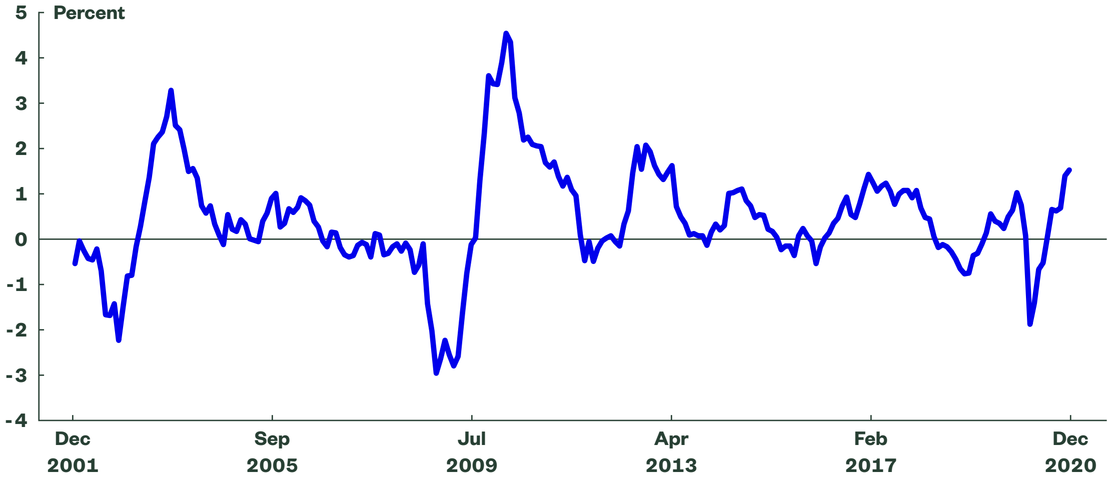


Source: S&P Dow Jones Indices LLC, CRSP. Data as of 30 June 2020. Underperformance is based upon equal weighted fund counts. Fund percentages are Net of Fees. All index returns used are total returns. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results.

However, there has been better performance in multi-sector fixed income active strategies, such as investment grade short, intermediate and global income funds — more of the actively managed funds in this space outperformed their respective benchmarks. These strategies generally have relatively more flexibility to take overweight and underweight positions across sectors, which has helped make them more resilient in terms of alpha generation.

As international investors tend to focus on the global bond universe, we have taken a closer look at the performance of global aggregate active managers relative to their benchmark. In Figure 3, we examine the historical alpha generated by the active global aggregate manager universe (on a 12-month rolling basis) based on eVestment data.[2] Excess returns have ranged from -3% during the global financial crisis (GFC) to almost +5% in the post-GFC recovery period, with an average per annum excess return of 48bps (net of fees) over the last 20 years.

Figure 3
Strong Returns for Active Managers Outside of Market Sell-offs



Source: State Street Global Advisors, eVestment, as of December 31, 2020. Active Global Aggregate eVestment universe: active managers with the Bloomberg Barclays Global Aggregate (USD hedged) index as the benchmark and at least 3 years of track record. Fee assumption: 25bps. Past performance is no guarantee of future results.

This outcome reflects a solidly positive performance, but it's worth highlighting that active management performance has tended to lag during market sell-offs and rally during market recoveries. This is something we'll explore further as it is key to understanding why investors should consider incorporating indexing into their active fixed income programs. But in our next section, we will take a broader look at the arguments underpinning the active versus indexing debate.

Active Fixed Income: Higher Risk and More Correlation to Equities

- **Active managers generate higher returns than an indexed approach, but with higher risk and correlation to credit and equities resulting in less diversification in a portfolio.**

- **Higher risk generated by active managers is due to greater exposure to spread assets, although interest rate risk is also a likely factor.**

- **By replicating historical active manager returns (net of fee) with a mix of 88% global aggregate index and 12% global high yield index, we see that return correlations are high, verifying that credit risk is the main source of excess returns.**

In Figure 4 we compare returns, risk and drawdown data for median active global aggregate managers against the relative index.[3] On a net of fee basis,[4] the active manager universe generated higher returns compared to the index over a 20-year period. However, they achieved this by taking on more risk, which also resulted in larger drawdowns during sell-off bouts. In this table, we compare the risk and return against investment grade and high yield corporate bonds for context. While active global aggregate manager returns have fallen short of investment grade and high yield corporate returns, their risk/return ratio is much higher.

Figure 4
Return and Risk Comparison Across Active and Index Strategies

12/31/2000–12/31/2020	Global Aggregate — Active Hedged — Median	Global Aggregate Index Hedged	Global Aggregate Corporate Index Hedged	Global High Yield Index Hedged
Annualized Return (Net of fee) (%)	5.07	4.59	5.40	8.08
Annualized Risk (%)	2.97	2.73	4.47	9.40
Return/Risk Ratio	1.70	1.67	1.20	0.86
Maximum Drawdown (%)	-3.45	-2.82	-11.42	-31.60

Source: State Street Global Advisors, eVestment, Bloomberg, as of December 31, 2020. Active Global Aggregate eVestment universe: active managers with the Bloomberg Barclays Global Aggregate (USD hedged) index as the benchmark and at least 3 years of track record. Global Aggregate Index Hedged = Bloomberg Barclays Global Aggregate total return index (USD hedged); Global Aggregate Corporate Index Hedged = Bloomberg Barclays Global Aggregate Corporate total return index (USD hedged); Global High Yield Index Hedged = Bloomberg Barclays Global High Yield total return index (USD hedged). Fee assumptions: Global Aggregate Active Strategy 25bps; Global Aggregate Index 10bps; Global Aggregate Corporate Index 10bps; Global High Yield Index 15bps. Past performance is no guarantee of future results.
Index returns reflect all items of income, gain and loss and the reinvestment of dividends and other income as applicable.

As active global aggregate managers have higher risk compared to the index, it should come as no surprise that their performance is more highly correlated to equities than to the benchmark fixed income index (0.16 vs. -0.06), as reflected in Figure 5. As a consequence, investors with an active bond portfolio would see less diversification benefits compared to holding the index within a multi-asset portfolio. We also note that active global aggregate managers have a higher correlation to corporate indices (the highlighted figures in the table) than the index. So, we know that active managers are taking on more risk, which in turn is resulting in less diversification benefits relative to equities compared to the global aggregate index — but where is this risk coming from?

Figure 5
The Higher the Risk, the Higher the Correlation to Equities

Back-tested Performance 12/31/2000–12/31/2020	MSCI ACWI Index Unhedged	Global Aggregate — Active Hedged — Median	Global Aggregate Index Hedged	Global Aggregate Corporate Index Hedged	Global HY Index Hedged
MSCI ACWI Index Unhedged	1.00	–	–	–	–
Global Aggregate — Active Hedged — Median	0.16	1.00	–	–	–
Global Aggregate Index Hedged	-0.06	0.94	1.00	–	–
Global Aggregate Corporate Index Hedged	0.38	**0.90**	**0.78**	1.00	–
Global HY Index Hedged	0.75	**0.42**	**0.18**	0.64	1.00

Source: State Street Global Advisors, eVestment, as of December 31, 2020. Active Global Aggregate eVestment universe: active managers with the Bloomberg Barclays Global Aggregate (USD hedged) index as the benchmark and at least 3 years of track record. Global Aggregate Index Hedged = Bloomberg Barclays Global Aggregate total return index (USD hedged); Global Aggregate Corporate Index Hedged = Bloomberg Barclays Global Aggregate Corporate total return index (USD hedged); Global High Yield Index Hedged = Bloomberg Barclays Global High Yield total return index (USD hedged). **The data displayed for historical data is a hypothetical example of Back-Tested Performance for illustrative purposes only and is not indicative of the past or future performance of any SSGA product**. Back-Tested Performance does not represent the results of actual trading but is achieved by means of the retroactive application of a model designed with the benefit of hindsight. Actual performance results could differ substantially, and there is the potential for loss as well as profit. The Back-Tested Performance may not take into account material economic and market factors that would impact the adviser's actual decision-making. The performance reflects management fees, transaction costs, and other fees and expenses a client would have to pay, which reduce returns. Please reference Back-tested Methodology Disclosure in the Appendix for a description of the model methodology as well as an important discussion of the inherent limitations of back-tested results.

Let's look at a simplistic sector breakdown of the global aggregate index compared to some of the largest active managers by assets under management (see Figure 6). What we find is that, on average, the four active managers have much less treasury exposure relative to the index (-19%), along with a much larger weighting of corporate bonds (+15%) and a little more exposure to securitized assets (+4% relative to the index). This suggests that a considerable proportion of the risk that active managers are taking is attributable to credit (which is likely why they have higher correlation levels relative to corporate indices).

Figure 6
Sector Weights of Active Managers Relative to Global Aggregate Index

As at 31 Dec 2020	Global Aggregate	Active Manager A	Active Manager B	Active Manager C	Active Manager D
Treasury & Government-related (%)	68	51	39	51	54
Corporate (%)	19	35	29	25	46
Securitized (%)	13	13	32	24	0

Sector Weights are as of the date indicated, are subject to change, and should not be relied upon as current thereafter. Source: State Street Global Advisors, eVestment (Top AUM active managers chosen for comparison), as of December 31, 2020.

This analysis doesn't provide details on active manager holdings, but we know that, in general, active managers can invest in out-of-benchmark exposures such as high yield credit, bank loans, new issues (before index inclusion), and global inflation-linked bonds. All of which would by themselves result in higher risk, even aside from the sheer amount of additional corporate/securitized asset exposure they're taking on. Comparing the 20-year correlation between median active manager alpha and excess credit returns,[5] we find that the correlation is high at about 0.75 — this means that a large portion of active managers' excess returns can be explained by credit beta, which is a function of their portfolios being overweight credit.

By virtue of holding a large corporate exposure, there is a tendency for active managers to have a short duration bias, reflecting the fact that credit securities typically have shorter durations than government bonds. (We've also found this to be the case with client portfolios that have a bias towards credit.) On this basis, active managers are also likely to be taking on some interest rate risk, although the level of that risk cannot be ascertained from broad segment breakdowns. However, the higher exposure to credit risk and the potential for a short-duration bias would help to explain the pro-cyclicality we've seen in returns. The higher risk taken by active managers dilutes the diversification potential in a portfolio during periods of market volatility.

Replicating Active Manager Returns

So, if credit (and some interest rate) risk is the main driver of active manager returns, we thought it would be interesting to see if we can replicate active manager returns using index strategies. What we found was that a simple 88% Global Aggregate Index/12% Global High Yield mix would have generated similar returns to the active Global Aggregate eVestment universe (all net of fees) with lower risk (albeit with a larger drawdown) over the last 20 years, as shown in Figure 7.

Figure 7
Replicating Active Global Fixed Income Performance With Indexing — Back-tested
(Jan 2000–Dec 2020)

Back-tested Performance 12/31/2000–12/31/2020	100% Global Agg Active Hedged	88% Global Agg Index Hedged + 12% Global High Yield Hedged
Annualized Return (Net of fee) (%)	5.07	5.07
Annualized Risk (%)	2.97	2.83
Return/Risk Ratio	1.70	1.79
Maximum Drawdown (%)	-3.45	-4.46

Source: State Street Global Advisors, eVestment, as of December 31, 2020. Active Global Aggregate eVestment universe: active managers with the Bloomberg Barclays Global Aggregate (USD hedged) index as the benchmark and at least 3 years of track record. Global Aggregate Index Hedged = Bloomberg Barclays Global Aggregate total return index (USD hedged); Global High Yield Index Hedged = Bloomberg Barclays Global High Yield total return index (USD hedged). Fee assumptions: Global Aggregate Active Strategy 25bps; Global Aggregate Index 10bps; Global High Yield Index 15bps.
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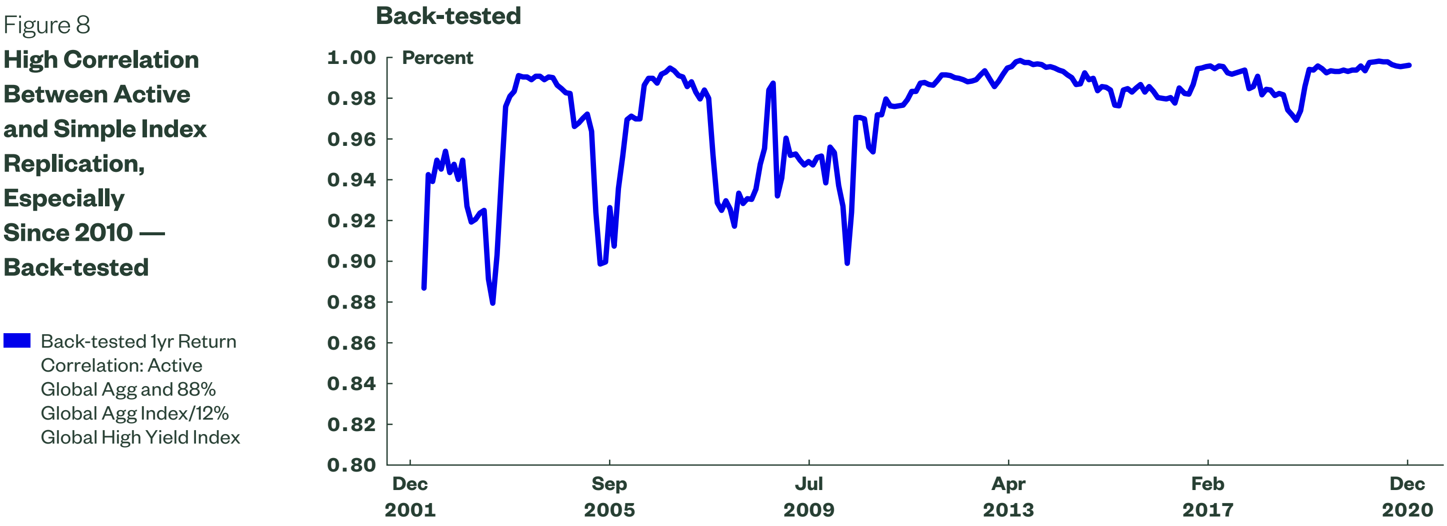
Reviewing the back-tested rolling return correlations shown in Figure 8, we find that there was more volatility between the active and simple index mix prior to 2009, but since 2010 the correlation range has become extremely tight and high. This is likely due to the need of active managers to reach for yield in the prevailing low rate environment and this corroborates that credit beta exposures are where they are taking risk.

Figure 8

High Correlation Between Active and Simple Index Replication, Especially Since 2010 — Back-tested



Source: State Street Global Advisors, eVestment, as of December 31, 2020. Active Global Aggregate eVestment universe: active managers with the Bloomberg Barclays Global Aggregate (USD hedged) index as the benchmark and at least 3 years of track record. Global Aggregate Index Hedged = Bloomberg Barclays Global Aggregate total return index (USD hedged); Global High Yield Index Hedged = Bloomberg Barclays Global High Yield total return index (USD hedged). Fee assumptions: Global Aggregate Active Strategy 25bps; Global Aggregate Index 10bps; Global High Yield Index 15bps.

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Indexing Improves Risk and Drawdown in a Global Portfolio

- **Adding indexing to an active fixed income program can modestly improve the overall risk and maximum drawdown levels in a 60/40 multi-asset portfolio while maintaining return/risk metrics.**
- **Investors with an eye on risk may want to consider adding indexing to their multi-asset portfolios, while acknowledging that there will be some impact on returns.**

Having established that active global aggregate strategies are higher risk and are more highly correlated to equities than index strategies, we can now consider what kind of benefits could investors get from replacing active exposure with that of index. In Figure 9, we show the potential impact on a simple 60/40 asset mix using MSCI ACWI index equities, global aggregate active strategies and global aggregate index strategies (net of fees). What we find is that a modest improvement in the overall risk and maximum drawdown levels can be achieved while still maintaining return/risk metrics. However, this comes at a cost given the strong performance of active managers. There is no free lunch to be had, but it is worth some consideration for those investors with a keen eye on risk.

Figure 9
Allocating from Active to Index Fixed Income in a Multi-Asset Context — Back-tested

Back-tested Performance 12/31/2000–12/31/2020	60% ACWI + 40% Global Agg Active Hedged	60% ACWI + 35% Global Agg Active Hedged + 5% Global Agg Index Hedged	60% ACWI + 30% Global Agg Active Hedged + 10% Global Agg Index Hedged	60% ACWI + 25% Global Agg Active Hedged + 15% Global Agg Index Hedged	60% ACWI + 20% Global Agg Active Hedged + 20% Global Agg Index Hedged
Annualized Return (Net of fee) (%)	6.43	6.41	6.39	6.37	6.35
Annualized Risk (%)	9.73	9.69	9.66	9.63	9.59
Return/Risk Ratio	0.66	0.66	0.66	0.66	0.66
Max Drawdown (%)	-35.76	-35.66	-35.56	-35.46	-35.36

Source: State Street Global Advisors, eVestment, as of December 31, 2020. Active Global Aggregate eVestment universe: active managers with the Bloomberg Barclays Global Aggregate (USD hedged) index as the benchmark and at least 3 years of track record. Global Aggregate Index Hedged = Bloomberg Barclays Global Aggregate total return index (USD hedged); Global Aggregate Corporate Index Hedged = Bloomberg Barclays Global Aggregate Corporate total return index (USD hedged); Global High Yield Index Hedged = Bloomberg Barclays Global High Yield total return index (USD hedged); ACWI = MSCI All Country World net total return index. Fee assumptions: Global Aggregate Active Strategy 25bps; Global Aggregate Index 10bps; Global Aggregate Corporate Index 10bps; Global High Yield Index 15bps; ACWI 5bps.
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Utilizing Indexing To Rebalance During Market Sell-offs

- **The pro-cyclicality of active manager performance can become problematic in market sell-offs when investors are looking to their fixed income portfolio for risk mitigation, liquidity or for rebalancing purposes, as they may end up locking in losses at the worst possible time.**

- **Utilizing indexing to rebalance a multi-asset portfolio may deliver similar annualized returns to holding only active fixed income, while improving the return/risk ratio. Same returns, lower risk.**

Based on our earlier analysis, we found that active manager alpha typically fell during market sell-offs and recovered during market rallies, something that appears to be largely due to their higher-than-benchmark exposure to credit.[6] In fact, we can closely replicate historical active manager returns (net of fee) with a mix of 88% global aggregate index and 12% global high yield index. We also know that adding indexing can help to reduce risk in a multi-asset portfolio (as a stronger portfolio diversifier), albeit with some impact on returns. But what happens if we take portfolio rebalancing into consideration?

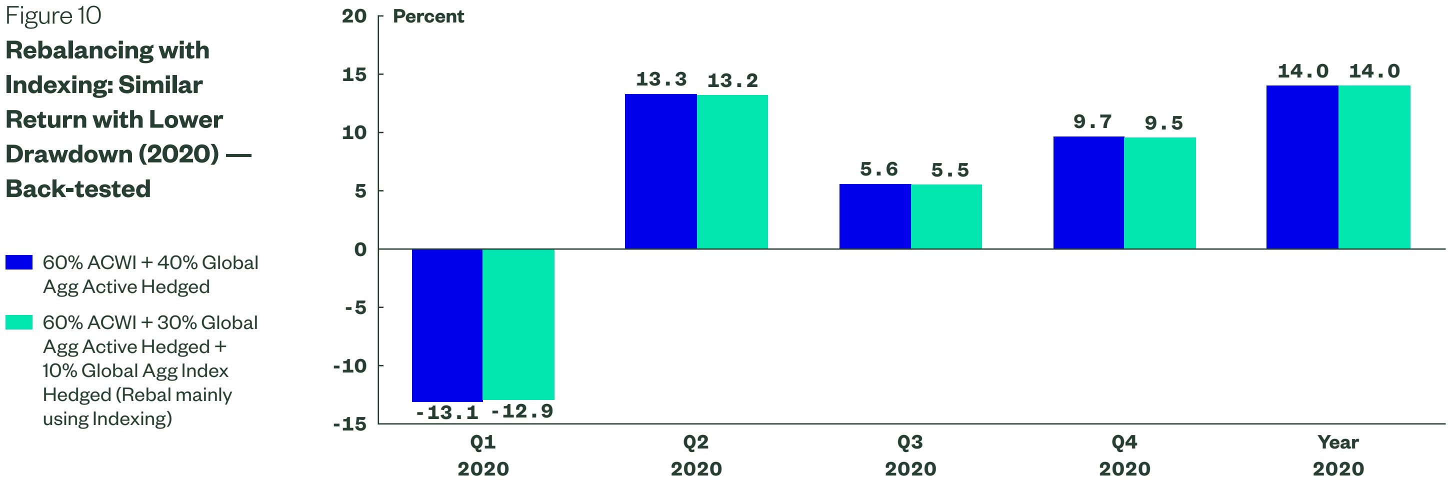
Asset owners often look to fixed income exposure as a risk mitigator, for liquidity or rebalancing purposes in their portfolios during major market corrections when other risk assets, like equities, are selling off. The higher correlation to risk of active managers' strategies can become problematic during these periods. Tapping active investments for liquidity or rebalancing purposes can result in losses being locked in at the worst possible time (when managers are underperforming the index).

This is where having some indexing to complement the global active fixed income strategy can help. To show the benefits of holding some index exposure, we can look at a simple rebalancing comparison using a 60/40 portfolio. We compare a portfolio with only active fixed income to one which replaces some of the active strategy with an indexed exposure. We utilize indexing for rebalancing — our rebalancing rule takes from index first with a band of 0–20%; if the band is exceeded, then actively managed assets will be used for rebalancing.

As can be seen in Figure 10, we demonstrate how rebalancing with the use of indexing can help during periods with large sell-offs, such as that seen in 2020. As highlighted earlier, active managers tend to underperform during such periods, and so we rebalance the portfolio using indexed assets instead. This allows the active manager allocation to remain undisturbed, thus positioning them to take advantage of the market rebound to generate alpha. Adding indexing and then using it for rebalancing purposes can result in similar returns as an active-only portfolio (on a net of fee basis), with a more contained drawdown and lower overall portfolio risk.

Figure 10

Rebalancing with Indexing: Similar Return with Lower Drawdown (2020) — Back-tested



Source: State Street Global Advisors, eVestment, as of December 31, 2020. Active Global Aggregate eVestment universe: active managers with the Bloomberg Barclays Global Aggregate (USD hedged) index as the benchmark and at least 3 years of track record. Global Aggregate Index Hedged = Bloomberg Barclays Global Aggregate total return index (USD hedged); ACWI = MSCI All Country World net total return index. Fee assumptions: Global Aggregate Active Strategy 25bps; Global Aggregate Index 10bps; ACWI 5bps. Rebalancing mainly using indexing: We balance the portfolio on a quarterly basis. Our rebalancing rule uses the Global Aggregate index first to rebalance with a band of 0–20%. If the band is exceeded then active Global Aggregate strategies will be used for rebalancing.
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Rebalancing Over the Long Term

It is reasonable to question whether the approach works over the long term, but the results prove to be similar to our 2020 example. Over a 20-year period, we have seen at least three large market sell-offs — the tech wreck in 2002, the GFC in 2008/09 and the more recent COVID market shutdown. We find that using indexing to rebalance the portfolio can provide similar annualized returns to that achieved by holding only active fixed income (on a net of fee basis), but with a better return/risk ratio (see Figure 11). What this shows is that investors don't need to give up returns to reduce overall portfolio risk.

Figure 11

Rebalancing with Indexing: Supportive of Portfolio Risk-Return

Back-tested Performance 12/31/2000–12/31/2020	60% ACWI + 40% Global Agg Active Hedged	60% ACWI + 30% Global Agg Active Hedged + 10% Global Agg Index Hedged (Rebal mainly using Indexing)
Annualized Return (Net of fee) (%)	6.43	6.41
Annualized Risk (%)	9.73	9.65
Return/Risk Ratio	0.661	0.664

Source: State Street Global Advisors, eVestment, as of December 31, 2020. Active Global Aggregate eVestment universe: active managers with the Bloomberg Barclays Global Aggregate (USD hedged) index as the benchmark and at least 3 years of track record. Global Aggregate Index Hedged = Bloomberg Barclays Global Aggregate total return index (USD hedged); ACWI = MSCI All Country World net total return index. Fee assumptions: Global Aggregate Active Strategy 25bps; Global Aggregate Index 10bps; ACWI 5bps. Rebalancing mainly using indexing: We balance the portfolio on a quarterly basis. Our rebalancing rule uses the Global Aggregate index first to rebalance with a band of 0–20%. If the band is exceeded then active Global Aggregate strategies will be used for rebalancing.
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Conclusion

Fixed income investors have been less inclined than equity investors to add indexing to their portfolios, which we believe is mainly due to the attractive alpha that active managers have traditionally been able to generate. However, these returns have come with a cost — because of the higher risk attached, this means less diversification to equities.

Our analysis suggests that much of the risk that active managers are taking is in credit, which tends to be pro-cyclical in nature. As a result, excess returns tend to increase in market upturns and fall during market sell-offs. This is not ideal for asset owners looking for their fixed income portfolio to offer risk mitigation, liquidity or for rebalancing purposes, as they can end up locking in losses at the worst possible time.

Incorporating some indexing into an active fixed income program can reduce risk in a multi-asset portfolio, but the real benefit is when rebalancing is taken into consideration. Our findings show that utilizing indexing to rebalance a multi-asset portfolio can provide similar annualized returns to holding only active fixed income (on a net of fee basis), while improving the return/risk ratio. Same returns, lower risk.

Endnotes

1 Based on SPIVA U.S. Scorecard Mid-Year 2020.

2 We use eVestment data our institutional clients primarily use unregistered vehicles (e.g. separate accounts and commingled trusts), instead of Morningstar data which focuses on registered vehicles (e.g. mutual funds).

3 We focus on hedged vs. unhedged given that many international investors tend to hedge currency risk. However, while the numbers will differ between hedged and unhedged, the overall results will be similar.

4 Fee assumptions: Global Aggregate Active Strategy 25bps; Global Aggregate Index 10bps; Global Aggregate Corporate Index 10bps; Global High Yield Index 15bps.

5 This is calculated by taking the total returns of the Global Aggregate Corporate and High Yield indices minus the total returns of the Global Aggregate index.

6 This result is in line with what our SSGA fixed income strategy team found for US aggregate active managers. For more, see their paper “The Role of Active and Indexing in Fixed Income Portfolios: A Focus on Crisis Periods”.

Appendix
Back-tested Performance Methodology

The back-tested performance shown on figures 5, 7, 8, 9, 10, 11 was created by the Strategy and Research Team. Returns, risks and correlations are backtested from 31 December 2000 to 31 December 2020 based on the following universe: Active Global Aggregate eVestment universe = active managers with the Bloomberg Barclays Global Aggregate (USD hedged) index as the benchmark and at least 3 years of track record; Global Aggregate Index Hedged = Bloomberg Barclays Global Aggregate total return index (USD hedged); Global High Yield Index Hedged = Bloomberg Barclays Global High Yield total return index (USD hedged). The backtested returns are net of management fees with the following fee assumptions: Global Aggregate Active Strategy 25bps; Global Aggregate Index 10bps; Global High Yield Index 15bps. The performance includes the reinvestment of dividends and other corporate earnings and is calculated in US dollars.

The results shown do not represent the results of actual trading using client assets but were achieved by means of the retroactive application of an investment process that was designed with the benefit of hindsight. Thus, the performance results noted above should not be considered indicative of the skill of the advisor or its investment professionals. The back-tested performance was compiled after the end of the period depicted and does not represent the actual investment decisions of the advisor. These results do not reflect the effect of material economic and market factors on decision-making. In addition, back-tested performance results do not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risks associated with actual investing.

The back-tested performance shown is not necessarily indicative of future performance, which could differ substantially.

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* This figure is presented as of December 31, 2020 and includes approximately $75.17 billion of assets with respect to SPDR products for which State Street Global Advisors Funds Distributors, LLC (SSGA FD) acts solely as the marketing agent. SSGA FD and State Street Global Advisors are affiliated.

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