

The Sum *and* the Parts: The Effects of Fixed Income Composition in Various Asset Allocations

INVESTMENT PERSPECTIVE

While many decisions go into structuring an equity allocation, from an asset allocation perspective the goal for any equity allocation is growth. Fixed-income securities, on the other hand, can serve many objectives, from inflation-protected securities that help provide a hedge against unexpected inflation runs to municipal securities that allow for tax benefits to taxable investors. This variety of characteristics often raises the question about the optimal fixed-income allocation for asset allocations with high and low equity exposure.

Within fixed income, we have observable characteristics that provide information about differences in expected returns. For example, fixed-income securities with lower credit worthiness present an expected return premium over higher-quality securities, which can be considered when attempting to capture higher expected returns in well-diversified portfolios. An interesting development in fixed income markets is the reduction of corporate issuers with the highest credit quality rating (Aaa/Aa) in the investment-grade universe.

This limitation in the universe of top-quality issuers presents a challenge for investors looking for low-risk portfolios, because constraining the universe to top-quality issuers can expose them to more idiosyncratic risk versus investing in full investment-grade portfolios. Full investment-grade portfolios include those top issuers, but at lower weights, reducing the issuer-specific risks through broad diversification.

Along the maturity spectrum, there are also observable premiums. At first glance, longer-term securities tend to have higher expected returns than shorter-term securities. While this is generally the case, the picture is more complex since information in the term structure of bonds can be used to identify the durations with higher expected returns. The term structure is not unique for all bonds. Different bonds in different sectors with different credit qualities have different term structures. A careful analysis of bonds, using relevant yield curves and considering their coupon (or lack of coupon) structure, allows for better estimation of expected returns.

In this article, we review how composition differences in a fixed-income portfolio impact the overall allocation, including a simple framework for how to think about each component's contribution to volatility.



PHIL MCINNIS
 Vice President
 Director of Investments



OLIVIAN PITIS, CFA
 Vice President
 Relationship Director &
 Investment Specialist

High Equity Asset Allocations

In portfolios with a high proportion of equities, the volatility of the overall asset allocation is driven mainly by the equity component. The type of fixed income selected (within reason) to complement the equity allocation produces only a second-order effect on returns.

A high equity allocation portfolio satisfies high risk tolerance investors' desire to maximize returns. In these portfolios, it may make sense to take a bit more risk in fixed income in the search for higher expected returns given that it does not have a significant effect on the expected volatility of the portfolio but is expected to add to performance. The math on why this makes sense is simple:¹

$$\begin{aligned} \mu_{\text{portfolio}} &= W_{\text{equity}} \mu_{\text{equity}} + W_{\text{fixed income}} \mu_{\text{fixed income}} \\ \sigma_{\text{portfolio}}^2 &= W_{\text{equity}}^2 \sigma_{\text{equity}}^2 + W_{\text{fixed income}}^2 \sigma_{\text{fixed income}}^2 \end{aligned}$$

The expected return of the portfolio, $\mu_{\text{portfolio}}$, is the weighted average of the expected returns of the equity, μ_{equity} , and the fixed income, $\mu_{\text{fixed income}}$, components. A higher fixed income expected return contributes linearly to the expected returns of the portfolio.

The expected volatility of the portfolio, $\sigma_{\text{portfolio}}$, is driven by the combination of the variances of the equity and fixed-income components, σ_{equity}^2 and $\sigma_{\text{fixed income}}^2$. In well-diversified equity and fixed-income components, due to the squares in the formulas the variance of the equities dominates the variance of the fixed income which, when added to the squared weights, makes the contribution of the fixed income to the overall volatility second order. For example, assuming a 75% equity/25% fixed-income portfolio, if the $\sigma_{\text{equity}} = 16\%$ and $\sigma_{\text{fixed income}} = 3.5\%$, we can compute the volatility of the portfolio, $\sigma_{\text{portfolio}} = 12.03\%$ (square root of 0.01447).

$$\begin{aligned} \sigma_{\text{portfolio}}^2 &= W_{\text{equity}}^2 \sigma_{\text{equity}}^2 + W_{\text{fixed income}}^2 \sigma_{\text{fixed income}}^2 \\ &= (0.75^2 \times 0.16^2) + (0.25^2 \times 0.035^2) \\ &= 0.0144 + 0.000077 \\ &= 0.014477 \end{aligned}$$

It is worth noticing that we could have approximated the volatility of the portfolio by assuming $\sigma_{\text{fixed income}} = 0$ and the result would have been very similar, approximated $\sigma_{\text{portfolio}} = 12.00\%$, which emphasizes its second-order effect.

Empirical data corroborates these findings. Using historical data going back to 1996, we computed the average returns and volatilities of two fixed-income indices (Bloomberg Barclays US Aggregate Index and Bloomberg Barclays Government/Credit 1-5 Year Index) and a global equity allocation (70% Russell 3000 Index and 30% MSCI World ex USA Index). For reference, the Bloomberg Barclays US Aggregate Index had an effective duration of 6.45 years, and the Bloomberg Barclays Government/Credit 1-5 Year Index had an effective duration of 2.79 years as of March 31, 2021. We also computed the average returns and volatilities of two asset allocations, both with 75% in equities, but used the different fixed-income indices.

FIGURE 1 High Equity Allocations Historically Tolerated More Aggressive Fixed Income

	Bloomberg Barclays US Aggregate Index	Bloomberg Barclays Government/Credit 1-5 Year Index	Equities	Allocation 1	Allocation 2
Allocation 1	25%		75%		
Allocation 2		25%	75%		
Avg. Ret.	4.97%	3.91%	9.26%	8.19%	7.92%
Comp Ret.	5.02%	3.96%	8.36%	7.77%	7.50%
Std. Dev.	3.43%	1.96%	15.42%	11.58%	11.53%

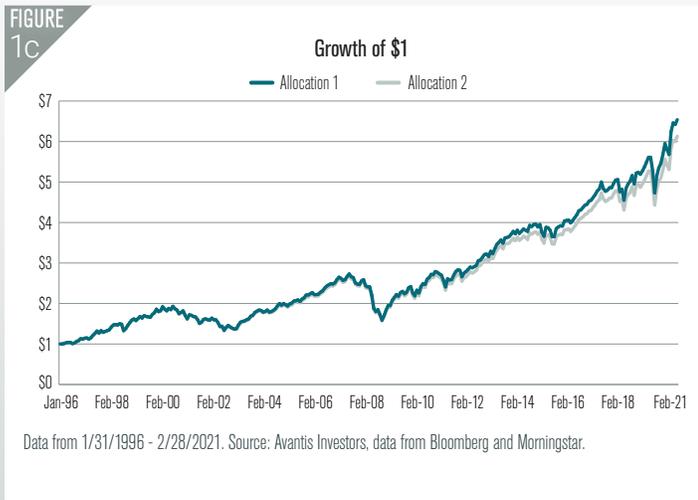
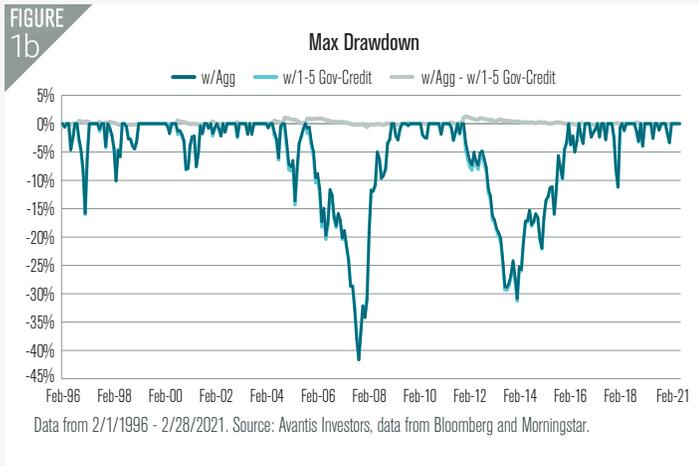
Data from 2/1/1996 - 2/28/2021. Source: Avantis Investors, data from Bloomberg and Morningstar.

Immediately, we can see both allocations give up some returns but reduce volatility relative to the 100% equity allocation. We can also observe that both sets of volatilities are very similar (11.58% vs. 11.53%), while Allocation 1 delivered higher returns than Allocation 2 (7.77% vs. 7.50%) due to the higher returns from the fixed-income component.

¹We ignored covariances to make the exposition simpler, but the logic holds if we include covariances.

To complement this analysis, **Figure 1a** shows rolling three-year returns for both allocations and their difference, while **Figure 1b** shows the maximum drawdown of both strategies and difference between them through time. **Figure 1c** shows the similarities in the growth of \$1 between Allocation 1 and Allocation 2 and the compounded effect of the small advantage of Allocation 1.

The Impact of Fixed Income on High Equity Allocations



Low Equity Asset Allocations

When the allocation to equities is low, differences between fixed-income portfolios become noticeable. The effect of selecting fixed-income components with different characteristics stops being second order and starts to matter for investors looking for conservative asset allocations.

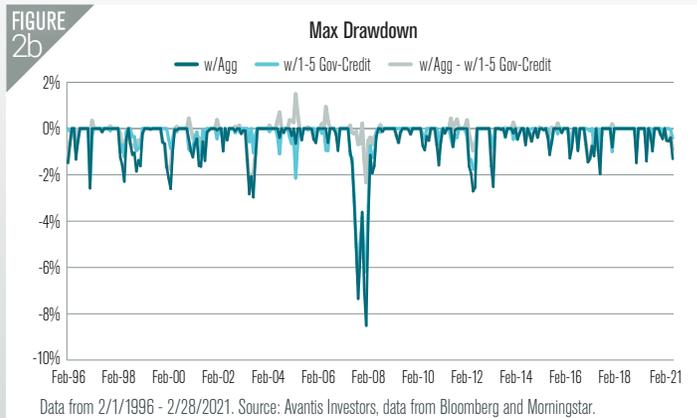
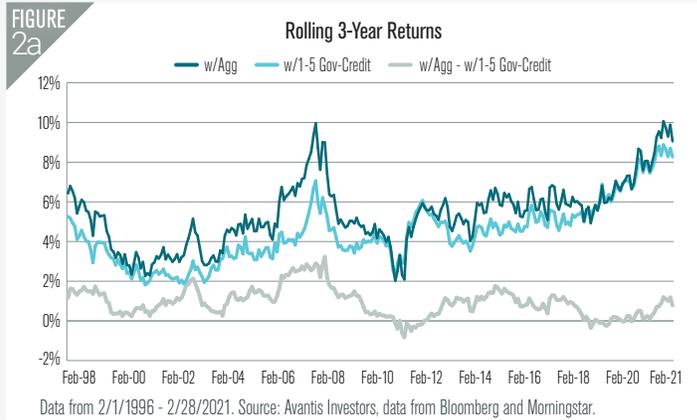
FIGURE 2 In Fixed Income Dominant Allocations, the Type of Fixed Income Matters More

	Bloomberg Barclays US Aggregate Index	Bloomberg Barclays Government/ Credit 1-5 Year Index	Equities	Allocation 1	Allocation 2
Allocation 1	85%		15%		
Allocation 2		85%	15%		
Avg. Ret.	4.97%	3.91%	9.26%	5.61%	4.71%
Comp Ret.	5.02%	3.96%	8.36%	5.68%	4.78%
Std. Dev.	3.43%	1.96%	15.42%	3.69%	2.71%

Data from 2/1/1996 - 2/28/2021. Source: Avantis Investors, data from Bloomberg and Morningstar.

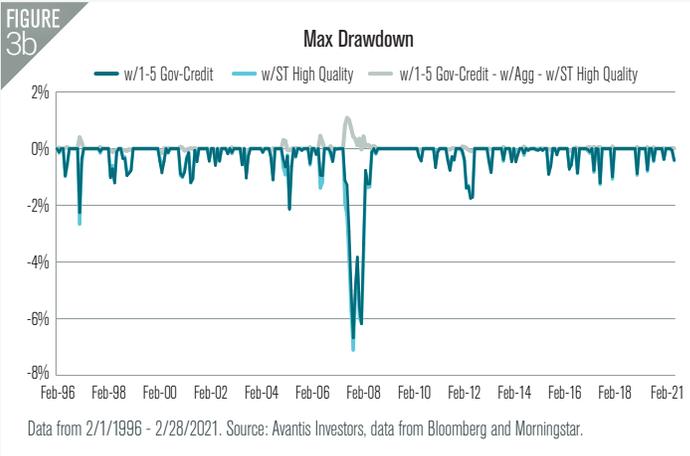
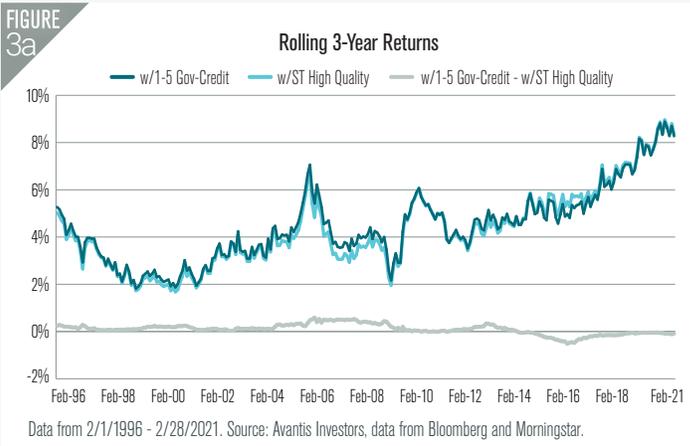
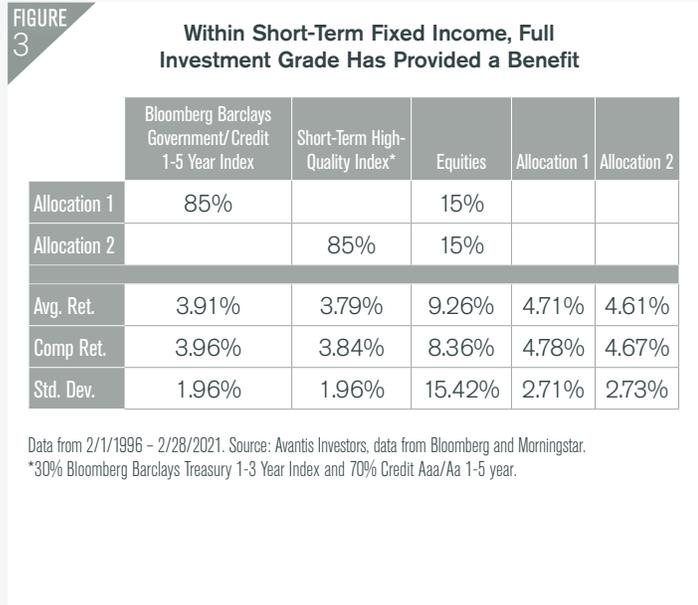
The volatility of Allocation 1 with its more aggressive fixed income is over 35% higher than the volatility of Allocation 2, 3.69% vs. 2.71%. **Figures 2a** and **2b** show the difference in rolling three-year returns and maximum drawdowns.

Low Equity Allocations



Past performance is no guarantee of future results.

As we evaluate allocations dominated by fixed income, we can also return to the question about whether to use top credit quality corporates, instead of full investment grade in the short-term fixed-income allocation. **Figure 3** compares the performance of the Government/Credit 1-5 fixed income index vs. an index that holds only Aaa/Aa-rated credit securities. The results suggest having a fully diversified investment-grade portfolio may provide more attractive outcomes than an allocation constrained to only the highest quality credits.



Past performance is no guarantee of future results.

Summary

Fixed income can serve a variety of roles in an asset allocation. As a ballast to equities in equity-dominated allocations, the exact type of fixed income is probably less important to the overall volatility contribution, meaning allocators may be able to take on more risk in search of added performance. In more fixed-income-dominated allocations, composition of the fixed-income allocation is more impactful on the overall volatility profile.

While many investors have balanced allocations (some mix of equities and fixed income), if they are constructed in isolation it is more akin to having two portfolios—one that is 100% equity and one that is 100% fixed income. We believe an integrated approach that considers the appropriate fixed-income allocation for each investor's risk tolerance can help add value and help manage risk in accordance with each investor's expectations.

Past performance is no guarantee of future results.

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