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Managing Risk in Taxable Fixed Income Portfolios

The corporate credit market often provides a wide range of attractive risk-return opportunities across qualities and maturities. Given continuously changing market dynamics, having a disciplined, repeatable security selection process is paramount, particularly as we seek to deliver consistent investment returns across market cycles.

Our security selection process is built on our F-V-T (fundamentals, valuation and tactics) framework. For the credit sector, our FVT process combines our fundamental overview of a credit, the relative value of an issuer's debt securities and a consideration of market conditions. Our risk-return framework has illustrated credit exhibits higher average excess returns but also higher return volatility relative to structured product sectors (see our whitepaper, "Optimizing Risk-Return Outcomes in Core Fixed Income").

OUR RISK-FOCUSED PROCESS IS A DEFINING CHARACTERISTIC OF OUR PORTFOLIO MANAGEMENT APPROACH AND HELPS US OPTIMIZE RETURN OUTCOMES FOR CLIENTS

As we build portfolios, we rely on two key measures to quantify risk: contribution to duration (CTD) and duration times spread (DTS). By using CTD and DTS, we can compare securities across sectors and industries using the common denominator of units of duration, a fundamental risk measure. We believe our risk-focused process is a defining characteristic of our portfolio management approach and helps us optimize return outcomes for clients.

Understanding Benchmark Composition — It's All Relative

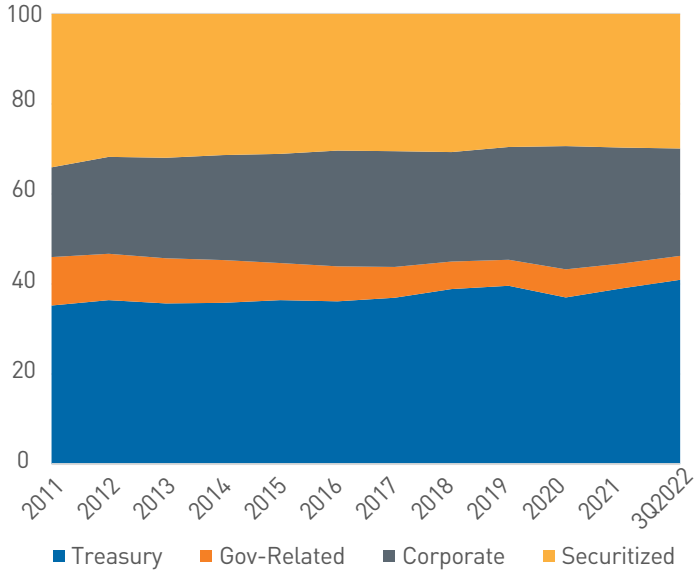
Our portfolio construction process begins with a thorough understanding of the benchmark characteristics and risk attributes for our clients' mandates. Benchmarks represent a broad cross-section of our investable universe and help define the baseline risk-return characteristics our clients expect us to deliver. Likewise, portfolio structure and security selection decisions that deviate from the benchmark are what define our view of the optimal risk-return profile for each client. The portfolio's active risk or tracking error measures these deviations.

Both Bloomberg and ICE BofA indices include corporate and non-corporate credit securities. While index composition varies slightly between the two, securities share some common elements:

- they must have a fixed coupon (no floating rate) and be U.S. dollar denominated;
- they must be investment-grade rated (Baa3/BBB- or higher); and,
- must have a minimum amount of each issue outstanding.

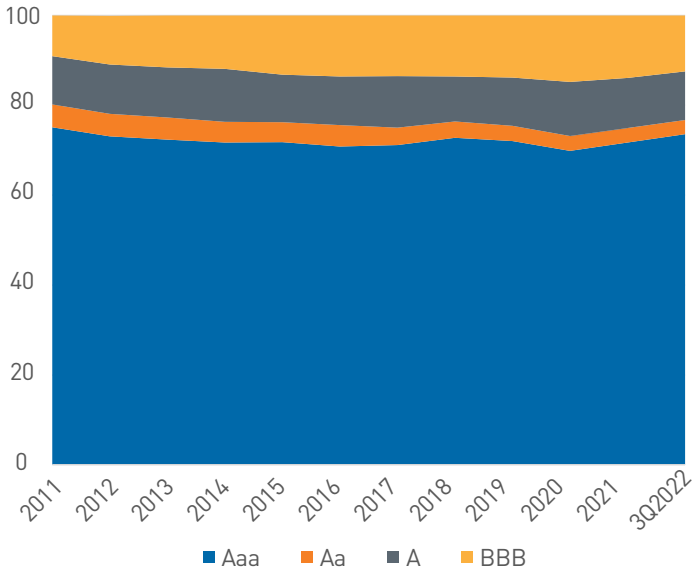
Corporate bond issuance has increased significantly since the Global Financial Crisis, exceeding $1 trillion on a gross basis in each of the last 10 years. Figures 1 and 2 (page 2) illustrate the evolution of the Bloomberg Bond U.S. Aggregate Bond Index (Bloomberg Aggregate) since 2011. Notably, corporate credit has increased at the expense of the securitized sector (i.e., mortgage- and

Figure 1. Bloomberg U.S. Aggregate Bond Index, Compositon by Sector (% of Market Value).



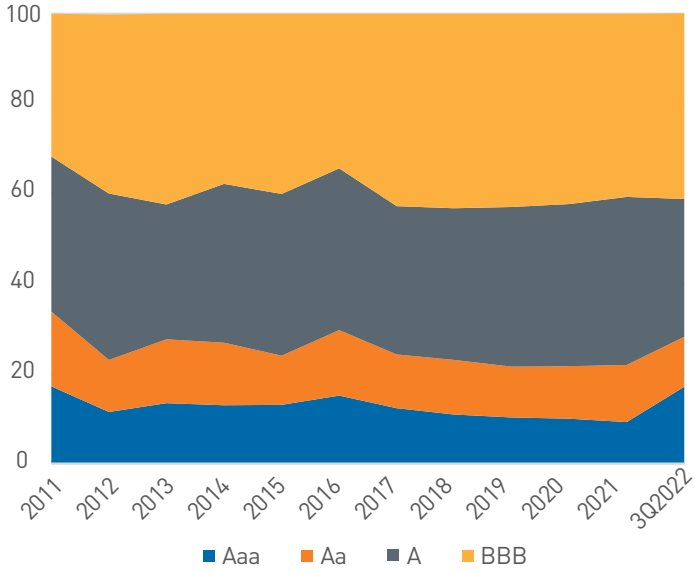
As of 9/30/2022. Source: Bloomberg, L.P.

Figure 2. Bloomberg U.S. Aggregate Bond Index, Composition by Quality (% of Market Value)



As of 9/30/2022. Source: Bloomberg, L.P.

Figure 3. Bloomberg U.S. Aggregate Bond Index, New Issuance by Quality (% of Market Value)



As of 9/30/2022. Source: Bloomberg, L.P.

asset-backed securities). In addition, as issuers have become more comfortable with increased leverage, BBB-rated issuance has increased. As shown in Figure 3. BBB-rated issuance has averaged approximately 40% of the total since the beginning of 2011. In fact, we would note the increased contribution from BBB-rated issuers in sectors such as Energy, Finance, Healthcare and Telecommunications. Also, after the Global Financial Crisis, rating agencies changed their methodologies for financial institutions, which led to lower credit ratings for most banks, both domestic and global. Increased capital buffers, stronger liquidity and improved earnings quality in the last several years have supported the migration of domestic Global Systematically Important Financial Institutions from the BBB-category to the single-A category. Our whitepaper, "Portfolio Construction Report Card — Don't Insist on Straight A's," discusses the dynamics of the BBB-sector in greater detail.

We view the evolving credit quality profile of benchmark credit securities as an opportunity to emphasize the rigor of our research process. While bond ratings set a baseline evaluation of an issuer's creditworthiness and comparative risks, we use the FVT framework to evaluate each issuer's characteristics independently. We have found that issuer ratings provide a useful means to stratify risk in the corporate bond sector. However, we believe the combination of this stratified credit assessment with our team-based, independent credit research creates a more effective process for managing credit risk.

Credit Selection: Fundamentals, Valuation and Tactics

Our team-based approach is the cornerstone of our credit selection process. It begins with an in depth review by the lead analyst dedicated to a particular industry, then ideas are further vetted by the broader credit team prior to initiating a position. This allows us to draw on the collective experience of each credit team member and reflect the broader team's macro and economic themes in sub-sector allocations across industry and quality.

Fundamentals

Our fundamental analysis determines whether we are comfortable with the issuer and the industry in which they operate. Our research focuses on several areas:

- the company's operating model and its position in the industry (*What is the competitive landscape?*);
- the overall strength of the industry (*What are the margin, growth and cyclical characteristics?*);
- earnings, cash flow and leverage (*Are the cash flows stable and are they sufficient for debt service and capital investment?*);
- the reputation of the company's management team (*How are the needs of equity and debt holders served?*); and,
- the company's capital structure (*Are there sufficient assets at each level of the capital structure to honor claims?*).

Valuation

While we could like the overall fundamentals of a business, the pricing of an issuer's securities might not be attractive. Valuation analysis compares the risk premia of an issuer's securities relative to others in its industry, as well as those outside its industry. We also consider issue amount outstanding, bond premium (or discount) to par, trading volume in the issue (liquidity) and where the security is positioned in the capital structure.

Tactics

Tactics focus on market conditions and how we implement our strategies. Through this step, we focus on best execution for our clients, and that relies heavily on the insights and experience of our corporate bond traders. We consider technical factors such as new-issue supply, market sentiment and liquidity. We prefer to be buyers when the market is better offered and sellers when the market is richly valued.

The FVT process highlights the steps we undertake to evaluate and invest, at the security level, in a corporate bond issuer. However, this process does not illustrate how we determine the amount to invest in an issuer or how we assess the riskiness of a position. We believe a disciplined portfolio construction process, and one that is predicated on assessing and managing credit risk, helps us protect our clients' capital and deliver attractive risk-adjusted returns. The rest of this paper will lay out the framework for how we allocate and manage risk in the credit market.

How We Define Risk: Contribution to Duration, Explained

When building portfolios, we seek to balance our clients' investment objectives and return expectations with their risk tolerance. To help accomplish this, we calculate each holding's contribution to the duration of the total portfolio. Each bond's CTD is calculated by multiplying its market-value weight by its duration; the sum of these individual weights equals the duration of the total portfolio.

This can be illustrated with a simple hypothetical two-bond portfolio:

	Market Value Weight	Duration	CTD
Bond A	50%	4	2
Bond B	50%	12	6
	100%		8

For illustration only.

FROM A CREDIT RISK PERSPECTIVE, CTD MATTERS MORE TO US THAN THE MARKET VALUE WEIGHT OF ISSUERS IN THE INDEX

While Bond A and Bond B have the same market value weights, the longer duration of Bond B contributes significantly more CTD to the portfolio duration. These relationships are critical to portfolio management because bonds with longer maturities (and hence duration) have different risk characteristics than shorter-duration bonds.

It is important to note, from a credit risk perspective, CTD matters more to us than the market value weight of issuers in the index. As the option-adjusted spreads (OASs) of higher CTD issuers change, they will have more relative impact on our portfolios than those with less CTD. The largest contributors to the duration of a portfolio or an index can often be quite different from the largest market value weights.

THE LARGEST CONTRIBUTORS TO THE DURATION OF A PORTFOLIO OR AN INDEX CAN OFTEN BE QUITE DIFFERENT FROM THE LARGEST MARKET VALUE WEIGHTS

We can observe this dynamic by looking at the composition of the Bloomberg Aggregate Index. In Figures 4 and 5, we see three of the top-five issuers by market value are different than the top-five issuers by contribution to duration.

Figure 4. Top Five Issuers (% Market Value)

Bloomberg Aggregate		Bloomberg Interm. Gov/Credit		ICE BofA 1-3yr Gov/Credit	
Bank of America	0.67%	Bank of America	1.04%	KFW	0.66%
JP Morgan	0.62%	JP Morgan	0.95%	Bank of America	0.64%
Goldman Sachs	0.43%	World Bank	0.70%	World Bak	0.59%
Citigroup Inc	0.42%	Morgan Stanley	0.68%	JP Morgan	0.57%
Morgan Stanley	0.42%	Citigroup Inc	0.67%	European Inv Bank	0.50%

Figure 5. Top Five Issuers by Contribution to Duration

Bloomberg Aggregate		Bloomberg Interm. Gov/Credit		ICE BofA 1-3yr Gov/Credit	
Bank of America	0.039	Bank of America	0.044	World Bank	0.013
JP Morgan	0.035	JP Morgan	0.040	KFW	0.013
AT&T	0.030	World Bank	0.028	Bank of America	0.012
Verizon	0.026	Morgan Stanley	0.028	JP Morgan	0.011
Apple Inc	0.026	Citigroup Inc	0.027	European Inv Bank	0.010

As of 9/30/22. Source: Bloomberg, L.P., ICE BofA Indices

On Managing Individual Issuer Concentrations

Our issuer selection and portfolio construction processes bring these concepts full circle as we consider the portfolio's appropriate risk exposure on a security-by-security basis. Target exposures are based on each issuer's CTD in the relevant benchmark plus a percentage of the overall portfolio's duration. We also calculate each issue's credit risk limit using a reference matrix that considers an issuer's credit rating and duration. Lower-rated, longer-duration securities have lower limits; higher-rated, shorter-duration securities have higher limits. Credit risk is inherently asymmetric and exposes portfolios to idiosyncratic risks that can be difficult to predict. For this reason, we use a market-value limit overlay regardless of duration that is most restrictive for issuers rated Baa3.

Issuer CTD in Benchmark + (portfolio duration x relative CTD maximum weight) = 0.05 yrs CTD + (6.0 yrs x 2% max) = 0.17 yrs CTD

For illustration only.

Using our prior two-bond portfolio example, Bond A's CTD in the Bloomberg Aggregate is 0.05 years and it has a BBB issuer rating. Our reference matrix for ratings allows for a 2% relative CTD weight in BBB issuers. For a hypothetical portfolio benchmarked to the Bloomberg Aggregate, which has a duration of roughly six years, we can set our maximum CTD in Bond A as follows:

With 0.17 CTD as our limit for Bond A exposure, we can translate that into market-value weights for the two bonds in our earlier example by simply dividing the maximum CTD calculated above by each bond's duration.

How We Refine the Analysis: Duration Times Spread, Explained

In general, all non-U.S. Treasury sectors offer incremental yield or spread, which introduces the opportunity for excess return in exchange for increased volatility. DTS is calculated by multiplying a bond's duration by its OAS. This measure helps describe a bond's potential risk or volatility. When analyzing the credit risk of a portfolio, DTS complements CTD and refines the analysis at both the issuer and sector level. Historically, DTS has been a good proxy for excess return volatility, particularly for relative exposures. [1]

Continuing with the prior example, the portfolio owns more credit CTD than the benchmark. However, the allocation is composed of issuers with lower volatility (spread) and, therefore, credit risk overall is similar to the benchmark in DTS terms. We incorporate DTS analysis at both the issuer and sector level to inform our view on expected volatility in our credit allocations.

	CTD	OAS	DTS
Credit - Portfolio	0.25	50	12.5
Credit - Benchmark	0.15	83	12.5
		DTS Ratio	1.0

For illustration only.

Measure Twice, Cut Once

The credit market has evolved considerably, growing in both size and contribution to the benchmarks, while at the same time shifting in quality. Therefore, evaluating opportunities and managing risks requires a rigorous process. Our risk management methods use the concepts outlined in this paper as a framework for monitoring and assessing the investment risk of credit exposure. This provides insights as we calculate and attribute returns at both the sector and security level.

It is important to emphasize these concepts are only part of our consideration during the portfolio construction process. Our market outlook, which incorporates a thorough understanding of monetary and fiscal policy, inflation expectations and volatility, drives our sector allocations as well as subsector decisions within credit broadly, along both industry and quality classifications. This provides a foundation for our consistent, repeatable investment process that has the potential to provide attractive risk-adjusted returns for clients.

1- Arik Ben Dor, Lev Dynkin, Jay Hyman, Patrick Houweling, Erik van Leeuwen and Olaf Penninga; "DTS;" The Journal of Portfolio Management Winter 2007; 33 (2) 77-100; DOI: https://doi.org/10.3905/jpm.2007.67479

For more information, please contact your PNC advisor.

Indices

Bloomberg U.S. Aggregate Bond Index measures the performance of investment grade, U.S. dollar-denominated, fixed rate taxable bond market, including Treasuries, government-related and corporate securities, MBS (agency fixed-rate and hybrid ARM pass-throughs), ABS, and CMBS. It rolls up into other flagship indices, such as the multi-currency Global Aggregate Index and the U.S. Universal Index, which includes high yield and emerging markets debt.

Bloomberg Intermediate Government/Credit Index measures the performance of the non-securitized component of the U.S. Aggregate Index with maturities of 1-10 years, including Treasuries, government-related issues, and corporates. It is a subset of the U.S. Aggregate Index.

ICE BofA U.S. Corporate & Government Index tracks the performance of U.S. dollar denominated investment grade debt publicly issued in the U.S. domestic market, including U.S. Treasury, U.S. agency, foreign government, supranational and corporate securities.

ICE BofA 1-3 Year U.S. Corporate & Government Index is a subset of ICE BofA U.S. Corporate & Government Index including all securities with a remaining term to final maturity less than 3 years.