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Asset Allocation at Official Institutions: Taking the Three Critical Steps

In a previous paper, we looked at optimized hypothetical portfolios for an illustrative Reserves Fund, Sovereign Wealth Fund and Public Pension Fund. The resulting model portfolios preserved the same asset volatility, duration and fixed income credit rating as their illustrative starting portfolios, with some additional investor-specific constraints.

We identified "Three Critical Steps" from those optimizations: embracing less-liquid asset classes; extending credit portfolios; and going global. In terms of asset classes, the common theme was reweighting allocations in favor of private markets and various forms of securitized credit at the expense of core government bonds and equities.

In this paper, we take a closer look at those favored asset classes and discuss how investors might take those three critical steps. Would larger allocations, based on intermediate-term capital market assumptions, align with our current views on potential performance over the nearer term? And are there segments within these asset classes that we find particularly attractive?

Executive Summary

- Portfolio optimizations in our previous paper revealed three common themes for all types of Official Institution: more private equity and debt, more securitized credit, a more global approach to fixed income.
- In our view, the biggest opportunity in private equity continues to be for those willing and able to address the shortage of equity capital and exit liquidity in the current environment, via allocations to secondaries and co-investments.
- In an environment of tight corporate credit spreads, we see more value opportunity in securitized credit, where there is slightly less liquidity and where the fundamental stories are complex and often more mixed.
- As regional interest-rate policies and growth profiles diverge, the existing diversification to be had from markets with often very different credit profiles is further enhanced.
- To a lesser extent, the optimizations also favored developed ex-U.S. equity and emerging markets debt: this globalization of portfolios aligns not only with our views on best practice for Official Institutions, but also with our views on the global economy following recent stimulus announcements in China; in any move away from U.S. equity, we would currently favor less exposure to large caps but sustained exposure to U.S. small caps, value stocks and cyclical sectors.

As a reminder, the optimizations identified "three critical steps" that Official Institutions could take to enhance their risk-adjusted estimated returns:

- For Reserves Funds: Consider a more meaningful role for slightly less-liquid but high-quality, high-yielding, cash-generative asset classes—if necessary, by creating separate "Liquidity" and "Investment" portfolios
- For Sovereign Wealth Funds: Lean into the attractive estimated returns now on offer from credit spread products: liquid, semiliquid and illiquid
- For Public Pension Funds: Domestic duration is needed for liability matching, but more exposure to less-liquid, more creditoriented and more global assets appears favorable

The optimizations themselves suggested reallocations from the illustrative starting portfolios, which are shown in figures 1, 2 and 3.¹

¹ Jahangir Aka, Tully Cheng and Niall O'Sullivan, "Asset Allocation at Official Institutions: Three Critical Steps" (September 2023), at https://www.nb.com/ handlers/documents.ashx?id=b4926f10-e95b-4e3f-b232-823a47569e90.



0%

-2% -4%

-6% -8%

FIGURE 1. RESERVES FUND OPTIMIZATION: ADDING LIQUIDITY RISK

2.40%

3yrs

AA+

Asset Volatility

Asset Duration

Fixed Income Rating

2.40%

3.2yrs

AA+

Source: Bloomberg, JP Morgan, Cambridge Associates, Credit Suisse, Neuberger Berman. Data as of October 2024.

IMPORTANT: The performance and risk projections/estimates are hypothetical in nature and are derived from the Neuberger Berman's Capital Market Assumptions. The projections are presented for illustrative purposes only to demonstrate the concepts discussed and are not, and are not intended to be, representative of the performance of any Neuberger Berman investment product or portfolio. This material is for educational purposes only and nothing herein constitutes investment advice or an investment recommendation. Asset classes are represented by benchmarks. Estimates are shown gross of fees which do not reflect the fees and expenses associated with managing a portfolio. If such fees and expenses were reflected, estimates shown would be lower. Please see disclosures at the end of this material for additional information regarding Neuberger Berman's Capital Market Assumptions.

Private Equity

CLO IG

U.S. Agency RMBS

Private Debt

SD EMD

U.S. Equity

Global Treasuries

AAA CMBS WAL 1-5 yrs

USD Cash

Gold



FIGURE 2. SOVEREIGN WEALTH FUND OPTIMIZATION: ADDING CREDIT AND EMERGING MARKETS EQUITIES

Source: Bloomberg, JP Morgan, MSCI, NAREIT, NCREIF, HFRI, Cambridge Associates, Credit Suisse, Neuberger Berman. Data as of October 2024.

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FIGURE 3. PUBLIC PENSION FUND OPTIMIZATION: GOING GLOBAL AND ALTERNATIVE

Source: Bloomberg, JP Morgan, MSCI, NAREIT, NCREIF, HFRI, Cambridge Associates, Credit Suisse, Neuberger Berman. Data as of October 2024. **IMPORTANT:** The performance and risk projections/estimates are hypothetical in nature and reflect the Neuberger Berman's Capital Market Assumptions. The projections are presented for illustrative purposes only to demonstrate the concepts discussed and are not, and are not intended to be, representative of the performance of any Neuberger Berman investment product or portfolio. This material is for educational purposes only and nothing herein constitutes investment advice or an investment recommendation. Asset classes are represented by benchmarks. Estimates are shown gross of fees which do not reflect the fees and expenses associated with managing a portfolio. If such fees and expenses were reflected, estimates shown would be lower. Please see disclosures at the end of this material for additional information regarding Neuberger Berman's Capital Market Assumptions.

The common themes are evident: more private equity and debt, together with securitized products such as asset-backed securities (ABS), agency mortgage-backed securities (MBS) and investment-grade tranches of collateralized debt obligations (CLOs).

The fact that the quantitative optimizations favored these asset classes indicates that we assigned them attractive five- to 10-year capital market assumptions. Here, we explain why our current views on nearer-term performance potential back these optimizations, and offer our thoughts as to which underlying segments offer the most attractive opportunities.

Private Equity: Being a Liquidity Provider via Secondaries and Co-investments

While declining rates are likely to thaw out the dealmaking environment, improving the outlook for private equity exits and subsequent new fundraising, we still think the industry's recent indigestion is a key source of opportunity.

Both Limited Partners (LPs) and General Partners (GPs) have been using the private equity secondaries market to find liquidity during a dearth of M&A and IPOs. But those secondary markets—especially the GP-led market—are themselves still undercapitalized, creating opportunity for those prepared to provide liquidity. In addition to attractive valuations, GP-led secondaries, in which specific assets are sold into a "continuation fund" negotiated with secondary investors, often include some of the most successful companies from mature portfolios.

Demand for co-investment capital—including for "mid-life" co-investments, which, like GP-led secondaries, involve new capital for mature assets—has also increased notably over the past two years. The lower availability and higher cost of debt has meant that deals have required more equity financing. At the same time, a more difficult fundraising environment has resulted in smaller average fund sizes. Against this backdrop, GPs have sought to maintain portfolio diversification by sustaining the number of deals they are doing with the aid of more co-investment equity capital from outside their funds. But this rising demand has met shrinking supply: when investors feel they have become over-allocated to private equity in their portfolios, limiting co-investments is the easiest way to do less private equity while maintaining GP relationships. Again, this mismatch has been providing opportunity for liquidity providers.

Despite the undercapitalization of the co-investment environment, however, we have seen some larger sovereign wealth funds face deployment challenges when attempting to establish co-investment programs directly via their own GP relationships. In response, some have reduced their return expectations. Others are trying to engage more closely with the wider GP community to avoid the adverse selection associated with a smaller source of deal flow.

Securitized Credit: Beyond Corporate Bonds and Private Debt

One of the key differences between where we were when we carried out these optimizations and where we are now is that interest rates are declining. So, would we still agree with a reallocation toward asset classes with floating rates, like securitized credit?

The answer is yes. One reason is that we think the U.S. economy is experiencing a soft landing. In our view, that is likely to result in only modest declines in yields, toward a neutral rate that is meaningfully higher than before the pandemic. It would also suggest that declining rates can coexist with resilient economic growth.

That would be a very favorable environment for credit, in general, with resilient growth lending support to spreads and moderate rate cuts helping to sustain attractive all-in yields. But whereas that upbeat story is relatively clear in public market corporate credit, resulting in tight credit spreads, the story in securitized credit is more mixed and less widely understood.

For example, there is a lot more end-consumer exposure here, from credit cards and auto loans to timeshares and cellphone contracts. U.S. retail sales have been strong as household balance sheets benefitted from a booming labor market, excess pandemic savings and record homeowners' equity—but savings are now depleted and job insecurity has risen. The mix of fixed- and floating-rate securitizations also creates a channel for the big macro debates to affect relative value in the sector.

The most visible debates are arguably in MBS. The big question is where commercial real estate valuations and interest-rate cost assumptions will reset. This is creating some opportunity within offices, in particular, but we also see it opening up value in the 70% of commercial mortgage-backed securities (CMBS) that are not secured by offices. In residential mortgages, the question is whether declining rates will accelerate remortgaging and therefore prepayments. An additional question is whether this would be negative for lenders, as usual, or positive in today's environment where so many recently originated MBS are trading at discounts to par. In the meantime, the slow pace of remortgaging has led to low supply of first-lien loans and a corresponding rise in securitizations containing second-lien mortgages.

Finally, securitized credit markets are undergoing major technical evolutions. New technology is rapidly multiplying the number of disintermediated buy-now-pay-later financing options for consumers, for example, increasing and diversifying the supply of loans for ABS and asset-based lending structures. In addition, the mini banking crisis of early 2023 took a lot of banks, historically the main holders of MBS, in particular, out of the market; while tens of billions of dollars of securitized products, taken over from SVB and Signature Bank by the Federal Deposit Insurance Corporation, were sold back into the open market later in the year. We think this could mark a longer-term shift in the buyer base for MBS and ABS, from buy-and-hold banks to more market-sensitive asset managers.

All of these dynamics create scope for additional yield, spread and credit-selection alpha, in our view.





Source: FactSet. Data as of October 11, 2024.

While the stories behind the assets contained in securitizations are mixed, the fact is that these tranched structures provide additional credit enhancement relative to their underlying assets.

Note that many Official Institutions already have some exposure to private debt, and the optimizations favored additional allocations. These loans are generally more senior in capital structures than bonds, more likely to be secured against assets or cash flows, and more likely to come with investor-friendly protections and covenants.

In addition to helping diversify private fixed income exposure away from the corporate sector, securitized credit can also bring its additional layer of credit enhancement. Even the riskiest, BB rated tranche of a typical CLO will have 8% of subordination in the form of first-loss equity below it, for example. An investment-grade, BBB rated tranche will typically have 12% of BB and equity capital below it. That is why, according to Standard & Poor's, the cumulative, full-lifecycle default rate on BB CLO tranches has been just over one percent, which is only four basis points, annualized. And despite this credit enhancement, JPMorgan data suggests that CLO mezzanine tranches have tended to trade at a 200- to 300-basis-point premium to equivalently rated bonds.

Global Credit: The Advantages of "Go-Anywhere" Fixed Income

We think that principle of diversifying one's private fixed income exposure applies just as well to one's fixed income exposure in general. That is why we would tend to endorse the optimization's reallocation of assets to global credit for Sovereign Wealth Funds, but perhaps push against the deallocation it received in the model portfolio for Public Pension Funds.

Indeed, we believe the "think globally" theme is of particular importance for this class of investor as they come under growing political pressure to invest domestically. We might instead suggest reductions to domestic government bonds and domestic equity. In some countries, we think longer-dated government bonds may have lost some of their haven appeal, even as policy rates come down, due to debt-sustainability concerns and a general demand for more term premium.

Regional diversification can be meaningful—especially during a turn in the interest-rate cycle, when monetary policies can diverge. In addition to interest-rate divergence, U.S. and European high yield markets, for example, differ quite markedly in terms of their sector constituents and their average credit quality. That shows up in their relative performance. A 10-percentage-point divergence of sixmonth returns was almost the norm for much of the period before 2013, even with currency effects hedged. It has occurred during four periods even in the low-volatility environment since then.²

But this is not only about regional diversification. Figure 5 shows the calendar-year performance of nine fixed income asset classes through this century. Every one of them has been top and bottom of the calendar-year league except global government bonds (which has never been the best performer) and global investment grade credit (which has never been the best or the worst performer).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Munis	17.1%	9.7%	13.7%	28.2%	11.6%	10.2%	11.7%	8.1%	9.7%	60.6%	15.2%	11.8%
EMD	12.7%	8.4%	13.2%	22.2%	11.4%	5.8%	9.9%	7.3%	8.9%	29.8%	12.2%	11.2%
Agency MBS	11.9%	8.3%	10.8%	7.7%	9.4%	3.9%	5.3%	6.2%	3.6%	18.5%	11.8%	7.3%
ABS & MBS	9.5%	7.6%	10.7%	6.6%	5.8%	3.6%	5.1%	5.3%	0.8%	16.3%	7.4%	6.1%
IL Bonds	8.6%	5.5%	8.6%	6.2%	5.5%	3.3%	5.0%	3.9%	-4.0%	14.5%	5.2%	5.3%
Gov Bonds	8.1%	4.5%	8.6%	3.0%	4.8%	3.2%	4.4%	3.3%	-4.7%	8.9%	4.6%	5.2%
IG Credit	7.2%	4.4%	8.5%	2.6%	3.3%	3.1%	2.6%	2.7%	-12.0%	0.9%	3.6%	4.1%
Cash	6.5%	4.0%	1.9%	2.2%	3.0%	2.9%	0.9%	1.6%	-20.7%	0.9%	2.3%	3.1%
High Yield	-5.5%	3.5%	-2.1%	1.2%	1.5%	2.3%	0.3%	-0.8%	-27.1%	0.9%	0.3%	0.3%
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
High Yield	18.8%	7.1%	9.8%	3.6%	15.9%	10.3%	2.2%	15.0%	9.3%	5.3%	1.8%	12.4%
EMD	17.4%	0.6%	9.7%	1.2%	10.2%	7.6%	1.8%	14.0%	7.7%	2.9%	-7.2%	11.1%
IG Credit	10.8%	0.3%	8.4%	1.2%	10.2%	5.4%	1.4%	11.5%	6.3%	1.8%	-8.2%	8.2%
IL Bonds	7.5%	0.1%	7.8%	1.0%	5.7%	5.2%	1.1%	7.7%	5.7%	0.2%	-9.0%	6.5%
Munis	7.3%	-0.4%	7.4%	0.8%	3.0%	2.8%	1.0%	7.4%	5.3%	0.0%	-11.8%	5.5%
ABS & MBS	6.4%	-1.8%	4.0%	0.3%	2.7%	2.6%	-1.0%	5.9%	5.3%	-1.0%	-13.2%	5.3%
Gov Bonds	4.4%	-2.9%	3.1%	-0.2%	1.5%	2.1%	-1.7%	5.9%	5.2%	-1.1%	-14.6%	4.9%
Agency MBS	2.4%	-4.5%	2.5%	-0.5%	0.7%	1.2%	-2.4%	5.4%	4.9%	-1.8%	-17.7%	3.9%
Cash	0.5%	-5.3%	0.2%	-2.1%	0.4%	1.1%	-4.3%	2.5%	1.0%	-2.3%	-17.8%	3.4%

FIGURE 5. THE DIVERSITY AND ASSET ALLOCATION OPPORTUNITY IN FIXED INCOME Calendar-year total returns

Source: FactSet, Neuberger Berman. Total returns, unhedged. Data as of December 31, 2023. Indices used: ICE BofA Global High Yield, JPMorgan EMBI Global Diversified, ICE BofA Global Corporate, ICE BofA U.S. ABS & CMBS, ICE BofA U.S. Agency, ICE BofA U.S. Municipal Securities, ICE BofA Global Government, ICE BofA Global Inflation-Linked Government. Cash is represented by U.S. dollar 3-month Libor.

What is more, there is further diversification and tactical opportunity to be exploited within each asset class, across credit quality, duration, floating-versus-fixed rates and other vectors. For example, within U.S. high yield, over six-month periods the returns of the lowest- and highest-rated bonds quite frequently diverge by 10 percentage points. They have diverged by 20 percentage points or more during four periods since 1997. Within U.S. investment-grade credit, the six-month returns of bonds with fewer than five years to maturity frequently diverge by two to five percentage points from bonds with longer maturity dates, even when they have very similar credit profiles.

² For this and other performance analysis in this section, see Ashok Bhatia and David Brown, "De-Siloing Your Fixed Income Portfolio" (May 2024) at https:// www.nb.com/en/link?type=article&name=whitepaper-de-siloing-your-fixed-income-portfolio.

Final Thoughts

In addition to our main thoughts on Official Institutions, we would like to close with brief comments on some other areas.

It is worth noting, for example, that beyond the asset classes we consider in detail in this paper, the optimization for Public Pension Funds also favored developed ex-U.S. equity and emerging markets debt. Following the recent announcement of stimulus plans in China, which we believe removes some of the deeper downside risks to both China's and the global economy, our fundamental views have become more aligned with this suggested reallocation. As a corollary, we also note that U.S. equity received a lower allocation in all three of the optimizations; we would reinforce that outcome with regard to U.S. large caps, but we take a more favorable view of U.S. small and mid-caps, value stocks and cyclical sectors outside of large-cap technology, where valuations are less full.

Finally, we caution against leaning too far into active asset allocation tilts as long as we remain in a high-uncertainty, high-volatility environment. We believe these conditions are likely to persist for some time, given current political and geopolitical risks and the ongoing turn in the business and interest-rate cycles. Moderate risk, combined with as much nimbleness as one's governance structure can afford, will help limit exposure to, and take advantage of, market reversals and dislocations.

ASSET CLASS ASSUMPTIONS & ESTIMATES

Capital market assumptions used herein reflect Neuberger Berman's forward-looking estimates of the benchmark return or volatility associated with an asset class. Estimated returns and volatilities are hypothetical return and risk estimates generated by Neuberger Berman's Institutional Solutions Group. Estimated returns and volatilities do not reflect the alpha of any investment manager or investment strategy/vehicle within an asset class. Information is not intended to be representative of any investment product or strategy and does not reflect the fees and expenses associated with managing a portfolio or any other related charges, such as commissions and surrender charges. Estimated returns and volatilities are hypothetical and generated by Neuberger Berman based on various assumptions and inputs, including current market conditions, historical market conditions and subjective views and estimates. Capital market assumptions shown reflect Neuberger Berman's intermediate-term (five to 10 years into the future) estimates and are reviewed and revised at least annually. Neuberger Berman also produces long-term (20+ years into the future) estimates are derived using a building block approach that reflects historical, current, and projected market environments, forward-looking trends of return drivers, and the historical relationships asset classes have to one another. These hypothetical returns are used for discussion purposes only and are not intended to represent, and should not be construed to represent, predictions of future rates of return. Actual returns of the various asset classes may vary significantly. Neuberger Berman makes no representations regarding the reasonableness or completeness of any such assumptions and inputs. Assumptions, inputs, and estimates are periodically revised and subject to change without notice. Estimated returns and volatilities should not be used, or relied upon, to make investment decisions.

Rate of Return Estimate: Rate of return or geometric return is a measure of average returns of an investment over a period of time. Geometric rate of returns are typically referred to as annualized compound rate of returns and are always less than or equal to the arithmetic mean return of the same time series. Geometric rate of returns are used for straight-line calculations within the analysis, for example, the cash flow calculations. In straight-line calculations, each year is represented as a gain, so the compound (geometric mean) rate of return is used to adjust for the amount needed to make up for a loss in a given year. For example, if you lose 5% in one year, and gain 5% the year after, you still have less than you started with at the beginning of year one.

Arithmetic Mean Estimate: Arithmetic mean or average return is calculated by dividing the sum of a series of numbers by the number of overall items. This is more typically thought of as an "average" of the data set. Arithmetic mean or average return ignores the impact of compounding in the context of analyzing investment returns and is the simple average of returns observed over a period of time. Arithmetic mean returns are used in this material and, if applicable, the Efficient Frontier, because, through randomization, losses and gains are being accounted for each year.

Standard Deviation: A statistical measure of the volatility based on the distribution of a set of data from its mean (average value). For example, a portfolio with an average return of 10% and a standard deviation of 15% would return a result between -5% and +25% the majority of the time (68% probability or 1 standard deviation), almost all of the time the return would be between -20% and +40% (95% probability or 2 standard deviations). Were standard deviation zero, the result would always be 10%. Generally, more aggressive portfolios have a higher standard deviation and more conservative portfolios have a lower standard deviation.

Index Definitions

USD Cash is represented by the **Barclays Benchmark Overnight USD Cash Index**, which measures the performance of a daily rolling money market deposit in USD.

Non-USD Cash is represented by the **SDR Currency Index**, which tracks the performance of the currencies in the International Monetary Fund's Special Drawing Rights basket against the USD, namely USD (41.73%), EUR (30.93%), RMB (10.92%), JPY (8.33%) and GBP (8.09%).

Domestic Government Bond and Global Treasuries are represented by the **Bloomberg Global Aggregate Treasuries Total Return Index** measures the performance, in USD, of Treasury bonds from the Bloomberg Global Aggregate Bond Index, a broad base, market capitalization-weighted bond market index representing intermediate term investment grade bonds traded worldwide.

TIPS are represented by the **Bloomberg U.S. Government Inflation-Linked All Maturities Index** includes publicly issued, U.S. Treasury inflation protected securities that have at least 1 year remaining to maturity on index rebalancing date, with an issue size equal to or in excess of \$500 million.

Domestic Corporate Bond and Global Credit is represented by the **Bloomberg Global Aggregate Credit Total Return Index**, which measures the performance, in USD, of corporate bonds from the Bloomberg Global Aggregate Bond Index, a broad base, market capitalization-weighted bond market index representing intermediate term investment grade bonds traded worldwide.

U.S. Agency MBS are represented by the **Bloomberg U.S. Mortgage Backed Securities Index Total Return Index**, which measures the performance, in USD, of fixed-rate agency mortgage backed passthrough securities guaranteed by Ginnie Mae (GNMA), Fannie Mae (FNMA), and Freddie Mac (FHLMC).

ABS and CMBS are represented by the **Bloomberg ABS+CMBS Index**, which tracks asset backed securities, agency mortgage backed pass-through securities, and investment grade commercial mortgage-backed securities.

CLOs are represented by the J.P. Morgan Collateralized Loan Obligation Index, which Tracks debt from broadly syndicated, arbitrage floating-rate U.S. CLOs.

Global High Yield is represented by the **Bloomberg Global High Yield Index**, which is a multi-currency measure of the performance of the global high yield debt market which brings together the Bloomberg U.S. High Yield, Pan-European High Yield, Emerging Markets Hard Currency High Yield Indices.

Local Projects are represented by the **ICE Bank of America U.S. High Yield Energy Index**, which tracks the performance of below investment grade, but not in default, U.S. dollar denominated corporate bonds publicly issued in the U.S. domestic market by companies in the energy sector, and includes issues with a credit rating of BBB or below, as rated by Moody's and S&P.

Emerging Markets Debt is represented by the J.P. Morgan Emerging Markets Bond Index (EMBI) Global Index, which measures total returns for traded hard currency debt instruments in the emerging markets; and the JPMorgan Corporate Emerging Markets Bond Index (CEMBI), which is a market-capitalization weighted index of corporate bonds issued by entities in emerging countries.

Developed Market ex-U.S. Equities are represented by the **MSCI World Ex U.S. Index**, which tracks the performance of large- and mid-cap stocks across 22 developed markets countries.

Emerging Market Equities are represented by the **MSCI Emerging Markets Index**, which tracks the performance of large- and mid-cap stocks across 24 emerging markets countries.

U.S Equities and Domestic Equities are represented by the respective Bloomberg Equity Large & Mid Cap Indices.

Domestic Real Estate, Core Real Estate and Value-Added Real Estate is represented by the **NCREIF Property Index**, which provides a historical measurement of unleveraged property-level returns and is comprised exclusively of operating properties acquired, at least in part, on behalf of tax-exempt institutions and held in a fiduciary environment. It is a market value-weighted index including apartment, hotel, industrial, office and retail properties.

Hedge Funds are represented by **HFRI Fund Weighted Composite Index**, designed to track the equal-weighted performance reported by the hedge fund managers listed within the HFR Database, which report in U.S. dollars monthly, net of all fees performance and assets under management, and have either (a) \$50 million assets under management or (b) at least \$10 million assets under management on the last reported month prior to the index rebalance, and have been actively trading for at least 12 months.

Commodities and Gold are represented by the **Bloomberg Commodity Index**, which is designed to be a highly liquid and diversified benchmark for commodities investments. The index provides broad-based exposure to commodities as an asset class, since no single commodity or commodity sector dominates the Index. This index is composed of futures contracts on 20 physical commodities traded on U.S. exchanges, with the exception of aluminum, nickel and zinc, which are traded on the London Metal Exchange (LME).

Private Equity is represented by their respective sectors in the **Cambridge Associates LLC U.S. Private Equity Index**, which tracks the pooled horizon return, net of fees, expenses, and carried interest, of 1,468 U.S. private equity funds (buyout, growth equity, private equity energy and subordinated capital funds), including fully liquidated partnerships, formed between 1986 and 2017.

Private Infrastructure Equity – Infrastructure/Other is represented by the **Cambridge Associates Infrastructure Index**, a horizon calculation based on data compiled from infrastructure funds, including fully liquidated partnerships. Private indexes are pooled horizon internal rate of return (IRR) calculations, net of fees, expenses, and carried interest.

Private Debt is represented by the **Credit Suisse Leveraged Loan Index**, which tracks the investable market of the U.S. dollar denominated leveraged loan market. It consists of issues rated "5B" or lower, meaning that the highest rated issues included in this index are Moody's/S&P ratings of Baa1/BB+ or Ba1/BBB+. All loans are funded term loans with a tenor of at least one year and are made by issuers domiciled in developed countries.

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