Bond Market Update

November 2022

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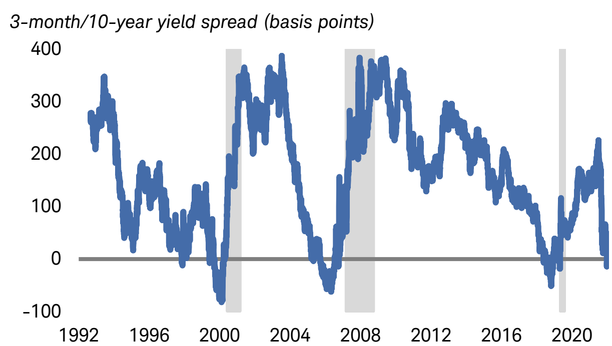
Schwab Center for Financial Research perspective

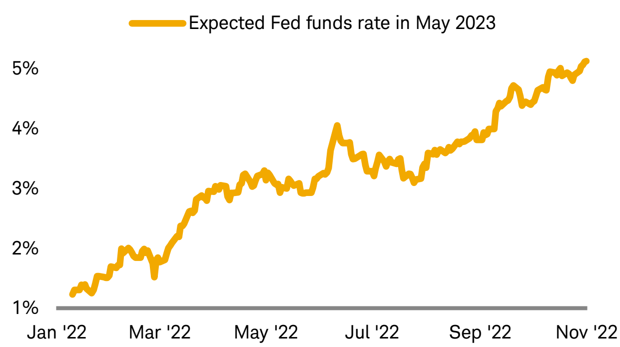
- **Yield curve inversion signals recession risk.** The 2-year/10-year treasury curve has been inverted since July, and the 3-month/10-year curve dipped below zero in late October. That's potentially bad news for the economy as each of the last 3 recessions has been preceded by an inversion of the 3-month/10-year treasury curve. Lag times have varied, and the depth of inversion doesn't correlate with the depth of a subsequent recession.
- **The Fed funds futures market is signaling a peak rate in the 4.75% to 5.25% range**, pointing to significant tightening in monetary policy over the next 6 months, despite signs of slowing growth.
- **Home prices are plunging as Fed tightens.** The 1.3% drop in August was the largest monthly decline since 2009, according to the S&P CoreLogic Case-Shiller Index, illustrating the effect of rising mortgage rates on housing prices. The drop in home prices will likely lead to slower spending due to a negative wealth effect.
- **Inflation is being driven by the service sector—especially rents.** Shelter costs, like rent and owners' equivalent rent, have helped drive up inflation. With home prices falling, we expect inflation to ease.

The 3-month/10-year Treasury yield curve is now inverted



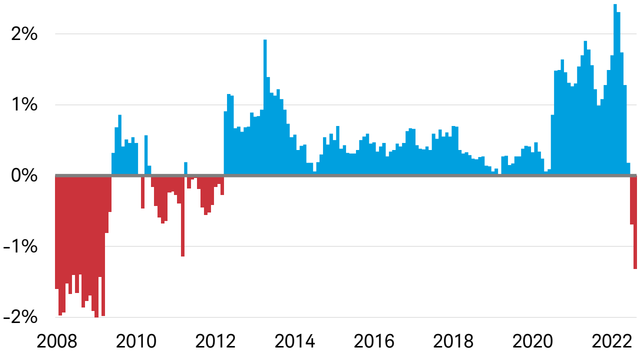
Source: Market Matrix US Sell 3 Month & Buy 10 Year Bond Yield Spread (USYC3M10 Index). Daily data as of 10/31/2022. **Shaded areas represent past recessions.**

The markets are pricing in a "peak" Fed funds rate in the 4.75% to 5.25% range



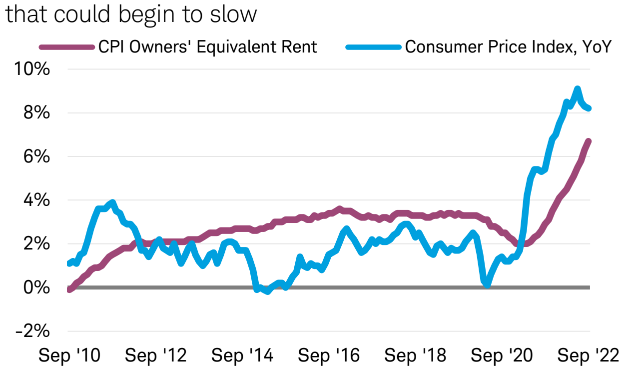
Source: Bloomberg. FED FUND 30DAY May23 (FFK3 COMB Comdty) as of 11/3/2022.

Home prices have begun to fall



Source: S&P CoreLogic Case-Shiller 20-City Composite City Home Price SA Index MOM (SPCS20SM Index). Monthly data as of August 2022.

Owners' equivalent rent has been a driver of inflation, but that could begin to slow



Source: Bureau of Labor Statistics. US CPI Urban Consumers Owners Equivalent Rent of Residences YoY NSA (CPRHOERY Index), US CPI Urban Consumers YoY NSA (CPI YOY Index) . Monthly data as of 9/30/2022.

Corporate Bond Market Update

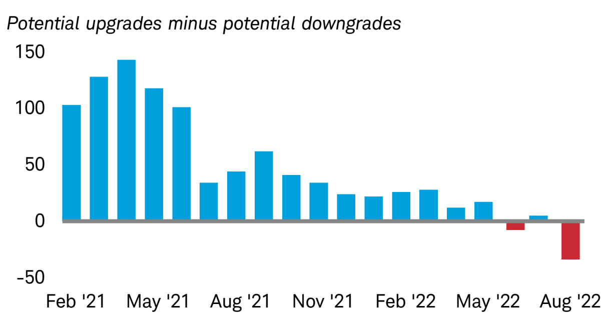
November 2022

Collin Martin, CFA
Director, Fixed Income Strategist
Taxable Asset Classes

Schwab Center for Financial Research perspective

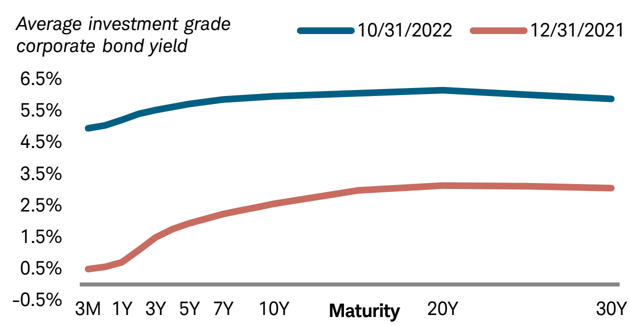
- **Tighter financial conditions and recession risk should weigh on corporate fundamentals.** Potential downgrades are now outnumbering potential upgrades, according to S&P, due to rising borrowing and labor costs and the potential for slower profit growth. High-yield bonds are more at risk than investment grade bonds, however.
- **Investment grade corporate bonds still appear attractive.** Yields are now at levels not seen since 2009. Credit spreads may rise modestly given the challenging economic outlook, but with many investment grade corporate bond yields above 5.5%, the entry point looks attractive for income-oriented investors.
- **High-yield bonds are more at risk of price declines.** High-yield bonds tend to perform poorly when the yield curve is inverted, and now both the 2-year/10-year and 3-month/10-year curves are inverted. Credit spreads are only slightly above the 10-year average, but given the poor economic outlook, we expect them to rise through the end of this year and into 2023. We expect to see a better entry point in 2023.
- **Preferred securities still appear attractive,** but prices could still fall modestly if the equity markets trend lower. Banks are generally well-capitalized, so the risk of dividend suspension for highly-rated preferreds appears low.

Credit risk is on the rise: potential downgrades are outnumbering potential upgrades



Source: S&P Global Ratings Credit Research and Insights, as of August 31,2022. Potential downgrades are issues rated AAA to B- with a negative outlook or ratings on CreditWatch negative; potential upgrades are those issues rates AA+ to B- with positive outlooks or ratings on CreditWatch positive.

Investment grade corporate bonds with maturities of five years or more now offer average yields above 5.5%



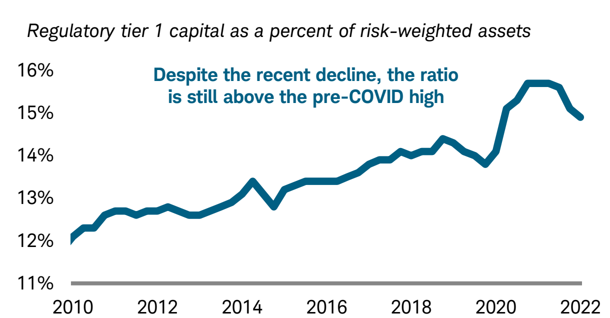
Source: Bloomberg, as of 10/31/2022 and 12/31/2021, respectively. USD US Corporate IG BVAL Yield Curve (BVSV0076 Index). For illustrative purposes only. Indexes are unmanaged, do not incur management fees, costs and expenses, and cannot be invested in directly. **Past performance is no guarantee of future results.**

An inverted yield curve usually spells trouble for HY bonds

Starting Yield Curve Slope	Average Next 12-Month Relative Return	
	2-yr/10-yr Curve	3-mo/10-yr Curve
Less than zero	-7.3%	-6.6%
Between 0 and 100 basis points	1.3%	-1.6%
Between 100 and 200 basis points	4.7%	4.2%
Above 200 basis points	9.7%	7.1%

Source: Bloomberg. Relative returns compare the average 12-month total returns of the Bloomberg U.S. Corporate High-Yield Bond Index (LF98TRUU) and the Bloomberg Intermediate Treasury Index (LT08TRUU Index) depending on the starting slope of the 3-month/10-year and 2-year/10-year Treasury yield curves, using monthly data from January 1984 through September 2022. For illustrative purposes only. **Past performance is no guarantee of future results.**

Banks are generally well capitalized and should be able to remain current on preferred coupon payments



Source: St. Louis Federal Reserve and the Board of Governors of the Federal Reserve System, using quarterly data as of 6/30/2022. Financial Soundness Indicator; Regulatory Tier 1 Capital as a Percent of Risk-Weighted Assets.
Note: Banks are the largest issuer of preferred securities, so the strength or weakness of financial institutions is important for the broad preferred securities market.

Municipal Bond Market Update

November 2022

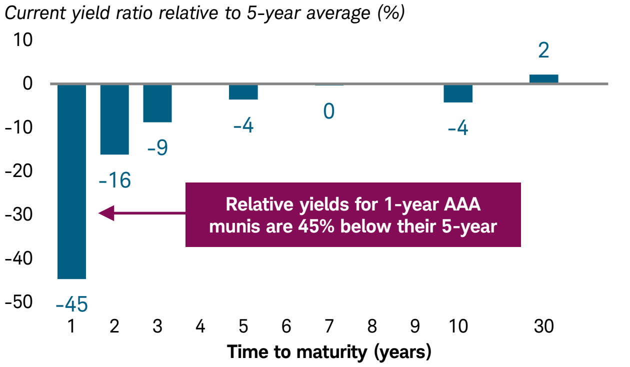
Cooper Howard, CFA
Director, Fixed Income Strategist
Municipal Bonds

Schwab Center for Financial Research perspective

- **Demand for short-term munis is keeping relative yields low**. Muni mutual funds and ETFs have experienced outflows in all but 7 weeks this year. Most of the outflows are coming at the expense of intermediate- and long-term munis while very short-term investments are attracting assets. This dynamic is pressuring relative yields on the short-end of the yield curve.
- **Rising credit spreads are making higher-rated munis more attractive.** Credit quality is relatively strong, yet spreads are rising. As a sign of the positive credit backdrop, state unemployment rates for all but 15 states are below their pre-pandemic levels, which bodes well for future tax revenues. With the recent rise in spreads, investors no longer need to target the lowest rungs of investment grade for yield. We suggest a focus on higher-rated issuers.
- **There's a risk to staying too short.** We believe that longer-term rates are near their peak and investors should consider extending duration to lock in yields. A ladder or a barbell strategy are two strategies to consider in this environment. For more, read our recent article.

Relative yields for the short-end of the yield curve are well below historical averages

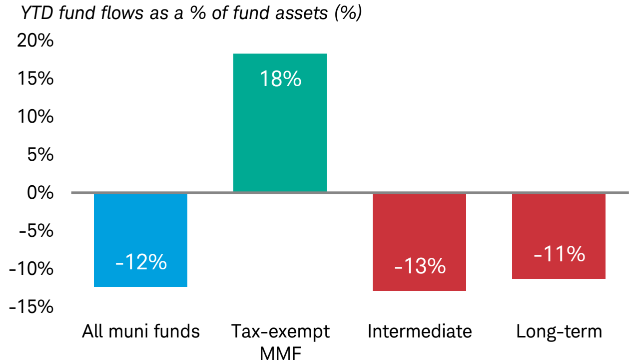
Current yield ratio relative to 5-year average (%)



Source: Bloomberg, as of 10/31/22. 5-year average is from 10/31/17 to 10/31/22. Relative yields are represented by the Bloomberg BVAL AAA Muni as a % of Treasury Yields.

Short-term muni funds have experienced inflows while longer-term funds have experienced outflows

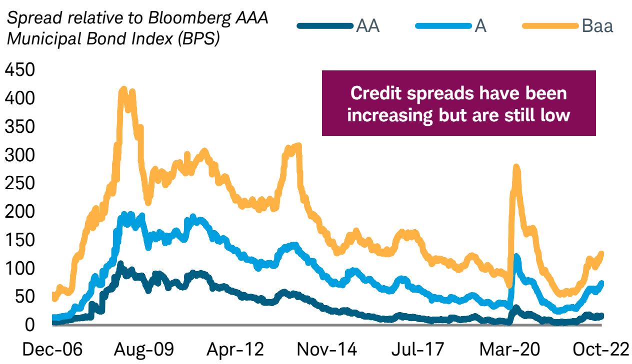
YTD fund flows as a % of fund assets (%)



Source: JP Morgan, as of 10/21/22.

Spreads are rising due to declining demand and not due to credit concerns, in our view

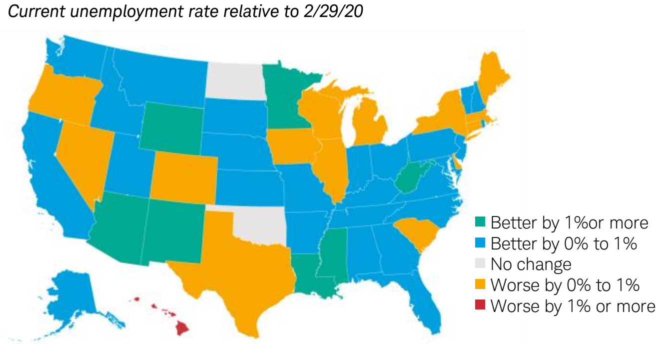
Spread relative to Bloomberg AAA Municipal Bond Index (BPS)



Source: Components of the Bloomberg Municipal Bond Index. As of 10/31/22. Difference in yields may be due to various factors such as different coupons, durations, or other factors. A spread is the difference in the yield to worst for the AA, A, or BBB indices relative to the AAA index.

35 states have an unemployment rate that is lower than their pre-pandemic rate

Current unemployment rate relative to 2/29/20



Source: Bureau of Labor Statistics. Change from 2/29/20 to 9/30/22.

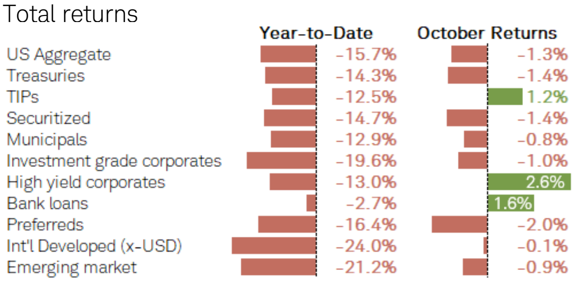
Fixed Income Market Snapshot

November 2022

Schwab Center for Financial Research strategy

- **Continue to extend duration gradually.** The markets appear to have already discounted the aggressive pace of rate hikes. Short-term Treasury yields may continue to rise gradually, but we believe upside is limited with the 10-year Treasury yield currently trading in the 4% area as the markets begin to price in rate cuts down the road. We suggest investors lock in these yields with certainty today.
- **Credit:** Move up in credit quality as corporate fundamentals should continue to deteriorate through the end of the year and into 2023. We prefer investment grade corporate bonds and preferred securities for those with a more aggressive risk tolerance. With financial conditions tightening and the yield curve continuing to invert, we suggest a more cautious approach with high-yield bonds and bank loans.
- **Munis:** The 5- to 7–year portion of the curve offers the most attractive yields relative to their risks. Relative yields lean rich for shorter-term bonds but are closer to their 5-year average for the intermediate part of the curve. Credit conditions are generally favorable, but we suggest focusing on higher-rated issuers.

Total returns



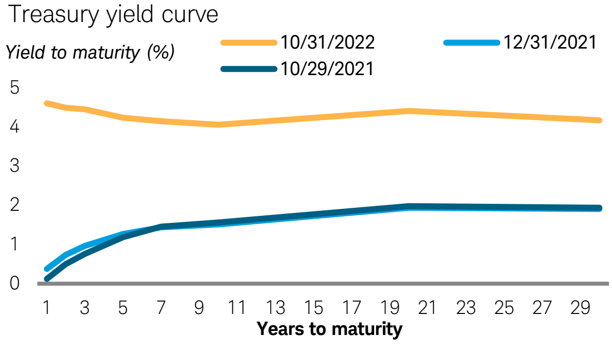
Source: Bloomberg. Returns from 12/31/2021 through 10/31/2022. Returns assume reinvestment of interest and capital gains. See disclosures for indexes used. For illustrative purposes only. **Past performance is no guarantee of future results.**

Key metrics

Key metrics	Current	One-month ago
2-yr. Treasury yield (%)	4.49	4.28
5-yr. Treasury yield (%)	4.23	4.09
10-yr. Treasury yield (%)	4.05	3.83
30-yr. Treasury yield (%)	4.17	3.78
10-yr. TIPS Breakeven (%)	2.51	2.15
2/10 Spread (BPS)	-44.1	-45.4
Dollar Index	1,334.3	1,337.5
5-yr. MOB spread (%)	77.3	76.6
10-yr. MOB spread (%)	83.9	85.0
IG Corporate OAS (BPS)	158	159
HY Corporate OAS (BPS)	446	523

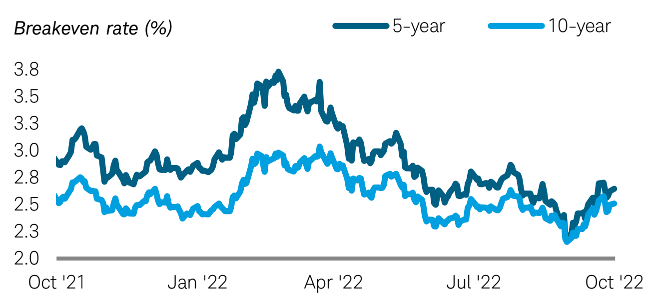
Source: Bloomberg, as of 10/31/2022 For illustrative purposes only. **Past performance is no guarantee of future results.**

Treasury yield curve



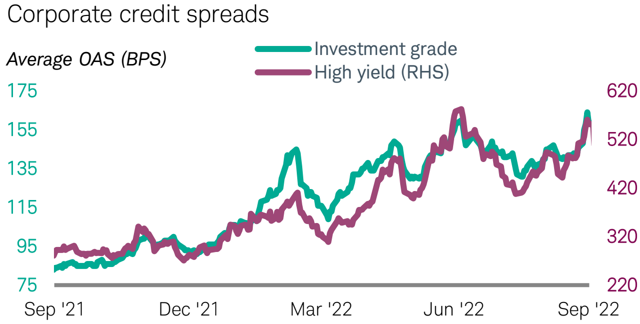
Source: Bloomberg, as of 10/31/2022. **Past performance is no guarantee of future results.**

TIPS breakeven rates



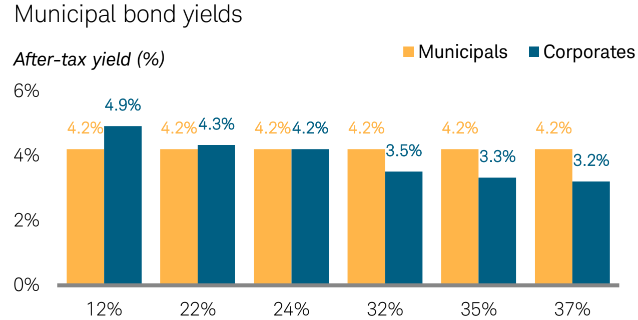
Source: Bloomberg, as of 10/31/2022. U.S. Breakeven 5 Year (USGGBE05 Index) US Breakeven 10 Year (USGGBE10 Index). For illustrative purposes only.

Corporate credit spreads



Source: Bloomberg, as of 10/31/2022. Bloomberg U.S. Corporate Bond Index (LUACTRUU) and Bloomberg U.S. Corporate High-Yield Bond Index (LF98TRUU Index). OAS is quoted as a fixed spread, or differential, over U.S. Treasury issues. For illustrative purposes only.

Municipal bond yields



Source: Bloomberg Municipal Bond Index and Bloomberg Corporate Bond Index, as of 10/31/2022. Corporates assume an additional 5% state income tax and 3.8% ACA tax for the 32% and above brackets. For illustrative purposes only. Indexes are unmanaged, do not incur management fees, costs and expenses, and cannot be invested in directly. **Past performance is no guarantee of future results.**

Important Disclosures

All views and opinions in this update are as of November 3, 2022.

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Investing involves risk including loss of principal.

Fixed income securities are subject to increased loss of principal during periods of rising interest rates. Fixed-income investments are subject to various other risks including changes in credit quality, market valuations, liquidity, prepayments, early redemption, corporate events, tax ramifications and other factors.

High-yield bonds and lower rated securities are subject to greater credit risk, default risk, and liquidity risk.

Tax-exempt bonds are not necessarily suitable for all investors. Information related to a security's tax-exempt status (federal and in-state) is obtained from third parties, and Schwab does not guarantee its accuracy. Tax-exempt income may be subject to the alternative minimum tax. Capital appreciation from bond funds and discounted bonds may be subject to state or local taxes. Capital gains are not exempt from federal income tax.

Treasury Inflation Protected Securities (TIPS) are inflation-linked securities issued by the US Government whose principal value is adjusted periodically in accordance with the rise and fall in the inflation rate. Thus, the dividend amount payable is also impacted by variations in the inflation rate, as it is based upon the principal value of the bond. It may fluctuate up or down. Repayment at maturity is guaranteed by the US Government and may be adjusted for inflation to become the greater of the original face amount at issuance or that face amount plus an adjustment for inflation.

Bank loans are typically below investment-grade credit quality and may be subject to more credit risk, including the risk of nonpayment of principal or interest. Most bank loans are floating rate, with interest rates that are tied to LIBOR or another short-term reference rate, so substantial increases in interest rates may make it more difficult for issuers to service their debt and cause an increase in loan defaults. Bank loans are typically secured by collateral posted by the issuer, or guarantees of its affiliates, the value of which may decline and be insufficient to cover repayment of the loan. Many loans are relatively illiquid or are subject to restrictions on resales, have delayed settlement periods, and may be difficult to value. Bank loans are also subject to maturity extension risk and prepayment risk.

International investments involve additional risks, which include differences in financial accounting standards, currency fluctuations, geopolitical risk, foreign taxes and regulations, and the potential for illiquid markets. Investing in emerging markets may accentuate these risks.

Preferred securities are often callable, meaning the issuing company may redeem the security at a certain price after a certain date. Such call features may affect yield. Preferred securities generally have lower credit ratings and a lower claim to assets than the issuer's individual bonds. Like bonds, prices of preferred securities tend to move inversely with interest rates, so they are subject to increased loss of principal during periods of rising interest rates. Investment value will fluctuate, and preferred securities, when sold before maturity, may be worth more or less than original cost. Preferred securities are subject to various other risks including changes in interest rates and credit quality, default risks, market valuations, liquidity, prepayments, early redemption, deferral risk, corporate events, tax ramifications, and other factors.

This information does not constitute and is not intended to be a substitute for specific individualized tax, legal, or investment planning advice. Where specific advice is necessary or appropriate, Schwab recommends consultation with a qualified tax advisor, CPA, financial planner, or investment manager.

Currencies are speculative, very volatile and are not suitable for all investors.

Municipal-Over-Bonds (MOB) Spread is the ratio between the yield on a municipal bond and a Treasury bond with the same time to maturity.

Basis points (BPS) One basis point (BPS) is equal to one one-hundredth of 1 percent..

Schwab does not recommend the use of technical analysis as a sole means of investment research.

Examples provided are for illustrative purposes only and not intended to be reflective of results you should expect to attain.

Diversification strategies do not ensure a profit and do not protect against losses in declining markets.

The policy analysis provided by the Charles Schwab & Co., Inc., does not constitute and should not be interpreted as an endorsement of any political party.

Correlation is a statistical measure of how two investments have historically moved in relation to each other, and ranges from -1 to +1. A correlation of 1 indicates a perfect positive correlation, while a correlation of -1 indicates a perfect negative correlation. A correlation of zero means the assets are not correlated.

Futures and futures options trading involves substantial risk and is not suitable for all investors. Please read the Risk Disclosure for Futures and Options prior to trading futures products. Futures accounts are not protected by SIPC.

A bond ladder, depending on the types and amount of securities within the ladder, may not ensure adequate diversification of your investment portfolio. This potential lack of diversification may result in heightened volatility of the value of your portfolio. You must perform your own evaluation of whether a bond ladder and the securities held within it are consistent with your investment objective, risk tolerance and financial Circumstances.

The Bloomberg Muni BVAL Curve is the baseline curve for BVAL tax-exempt munis. It is populated with high quality US municipal bonds with an average rating of AAA from Moody's and S&P. The yield curve is built using non-parametric fit of market data obtained from the Municipal Securities Rulemaking Board, new issues calendars, and other proprietary contributed prices. Represents 5% couponing.

Past performance is no guarantee of future results and the opinions presented cannot be viewed as an indicator of future performance.

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Index Definitions

Indexes are unmanaged, do not incur management fees, costs and expenses, and cannot be invested in directly.

The **Bloomberg U.S. Aggregate Index** (“Core Bonds”) represents securities that are SEC-registered, taxable, and dollar denominated. The index covers the U.S. investment grade fixed rate bond market, with index components for government and corporate securities, mortgage pass-through securities, and asset-backed securities. These major sectors are subdivided into more specific indices that are calculated and reported on a regular basis.

The **ICE BofA Fixed Rate Preferred Securities Index** (“Preferred Securities”) tracks the performance of fixed-rate USD-denominated preferred securities issued in the U.S. domestic market.

The **Bloomberg U.S. Corporate Bond Index** (“IG Corporate Bonds”) covers the U.S. dollar (USD)-denominated investment-grade, fixed-rate, taxable corporate bond market. Securities are included if rated investment-grade (Baa3/BBB-/BBB-) or higher using the middle rating of Moody’s, S&P and Fitch ratings services. This index is part of the Bloomberg Barclays U.S. Aggregate Bond Index (Agg

The **Bloomberg U.S. Treasury Index** (“U.S. Treasury Bonds”) includes public obligations of the U.S. Treasury excluding Treasury Bills and U.S. Treasury TIPS. The index rolls up to the U.S. Aggregate. Securities have $250 million minimum par amount outstanding and at least one year until final maturity.

The **Bloomberg U.S. Corporate High-Yield Bond Index** (“HY Corporate Bonds”) covers the USD-denominated, non-investment grade, fixed-rate, taxable corporate bond market. Securities are classified as high-yield if the middle rating of Moody’s, Fitch, and S&P is Ba1/BB+/BB+ or below.

The **Bloomberg U.S. Municipal Bond Index** (“Municipal Bonds”) is a broad-based benchmark that measures the investment grade, U.S. dollar-denominated, fixed tax-exempt bond market. The index includes state and local general obligation, revenue, insured and pre-refunded bonds. The AAA, AA, A, Baa, 1 Year (1-2), 3 Year (2-4), 5 Year (4-6), 7 Year (6-8), 10 Year (8-12), 15 Year (12- 17), 20 Year (17-22), and Long Bond (22+) are all subindices.

The **Bloomberg Emerging Markets USD Aggregate Bond Index** (“EM USD Bonds”) includes USD-denominated debt from emerging markets in the following regions: Americas, Europe, Middle East, Africa, and Asia.

The **Bloomberg US Mortgage-Backed Securities** Index measures the performance of mortgage pass-through securities guaranteed by the Government National Mortgage Association (Ginnie Mae),the Federal National Mortgage Association (Fannie Mae), and the Federal Home Loan Mortgage Corporation (Freddie Mac). It is constructed by grouping individual mortgage-backed security pools into aggregates or generics based on program, coupon, and vintage. It is a market-value weighted index.

The **Bloomberg Securitized Bond Index** (“Securitized”) represents the securitized section of the Barclays US Aggregate.

The **Bloomberg U.S. Treasury Inflation Protected Securities (TIPS) Index** (“TIPS”) is a market value-weighted index that tracks inflation-protected securities issued by the U.S. Treasury. To prevent the erosion of purchasing power, TIPS are indexed to the non-seasonally adjusted Consumer Price Index for All Urban Consumers, or the CPI-U (CPI).

The **Bloomberg Global Aggregate ex USD Bond Index** (“Int’l Developed Bonds (x-USD”) provides a broad-based measure of the global investment-grade fixed-rate debt markets. The two major components of this index are the Pan-European Aggregate, and the Asian-Pacific Aggregate Indices.

The **Morningstar LSTA US Leveraged Loan Index** is designed to deliver comprehensive, precise coverage of the US leveraged loan market. Underpinned by PitchBook | LCD data, the index brings transparency to the performance, activity, and key characteristics of the market.

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S&P/Case-Shiller U.S. National Home Price Index tracks the value of single-family housing within the United States. The index is a composite of single-family home price indices for the nine U.S. Census divisions.

The **Bloomberg Dollar Spot Index** tracks the performance of a basket of ten leading global currencies versus the U.S. Dollar. Each currency in the basket and their weight is determined annually based on their share of international trade and FX liquidity. The BBDXY Index data starts from Dec 31, 2004 with a base level of 1000.

The **Consumer Price Index** is an index that measures the weighted average of prices of a basket of consumer goods and services, weighted according to their importance.

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