



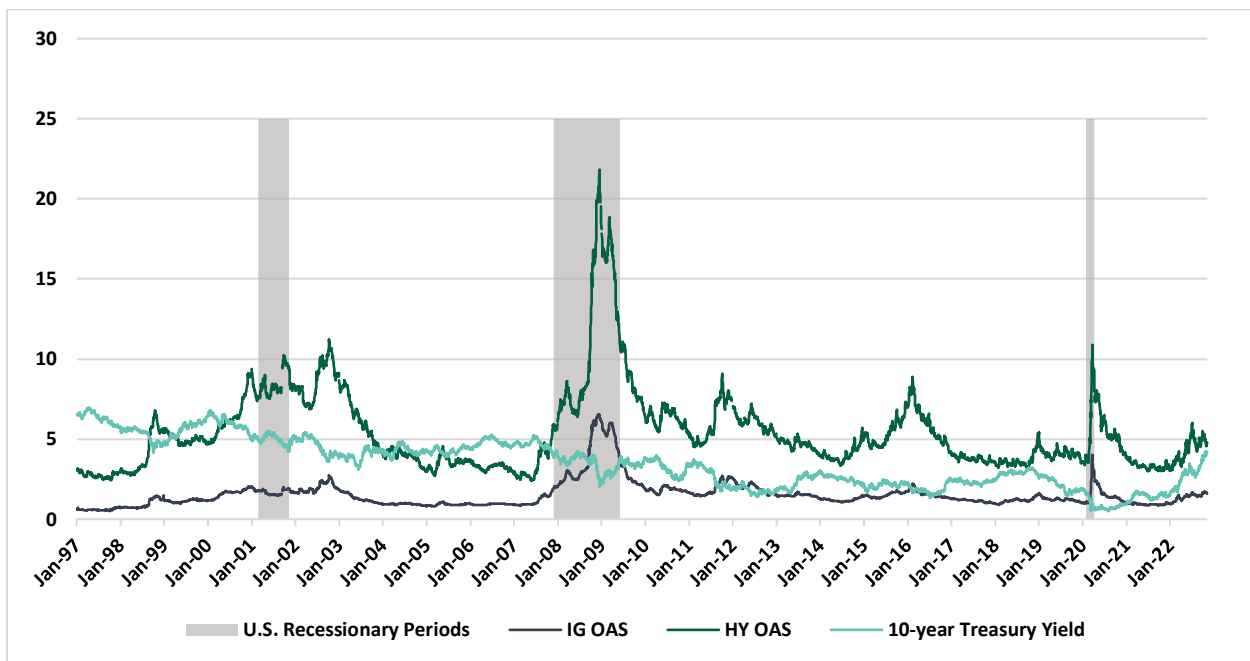
HOSKINCAPITAL

Abstract

Understanding the changes in bond prices and their relationship to other economic indicators can help us make two vital decisions when allocating a fixed-income portfolio. First is credit quality, which can be gauged by changes in the investment grade option-adjusted spread (IG OAS) or the high yield option-adjusted spread (HY OAS). The second decision is duration, which adjusts the interest rate risk within the portfolio. Duration decisions can be informed by movements of the 10-year Treasury yield, Bank Prime Loan Rate, and the 10-Year Breakeven Inflation Expectation. Based on our back tests and qualitative research from other sources, we have identified nine indicators that can educate how one might allocate a fixed income portfolio in any given market environment.

I. Leading Indicators

Figure 1: Leading Indicators. 1997 - Present



Leading indicators are designed to signal the beginning of trends, such as drawdowns or bull runs. Option-Adjusted Spread (OAS) is the difference of a bond yield compared to the yield of a U.S. Treasury bond of the same maturity - that is virtually free of default risk. [Contessi, Pierangelo De Pace, and Guidolin \(2013\)](#) mention when OAS rises, this implies bond prices decrease instantaneously and vice versa. Many investors favor the analysis of yield spreads because they offer investors a clearer picture of the underlying trade-offs. Overall, analyzing these spreads help investors determine the best credit quality for a portfolio.

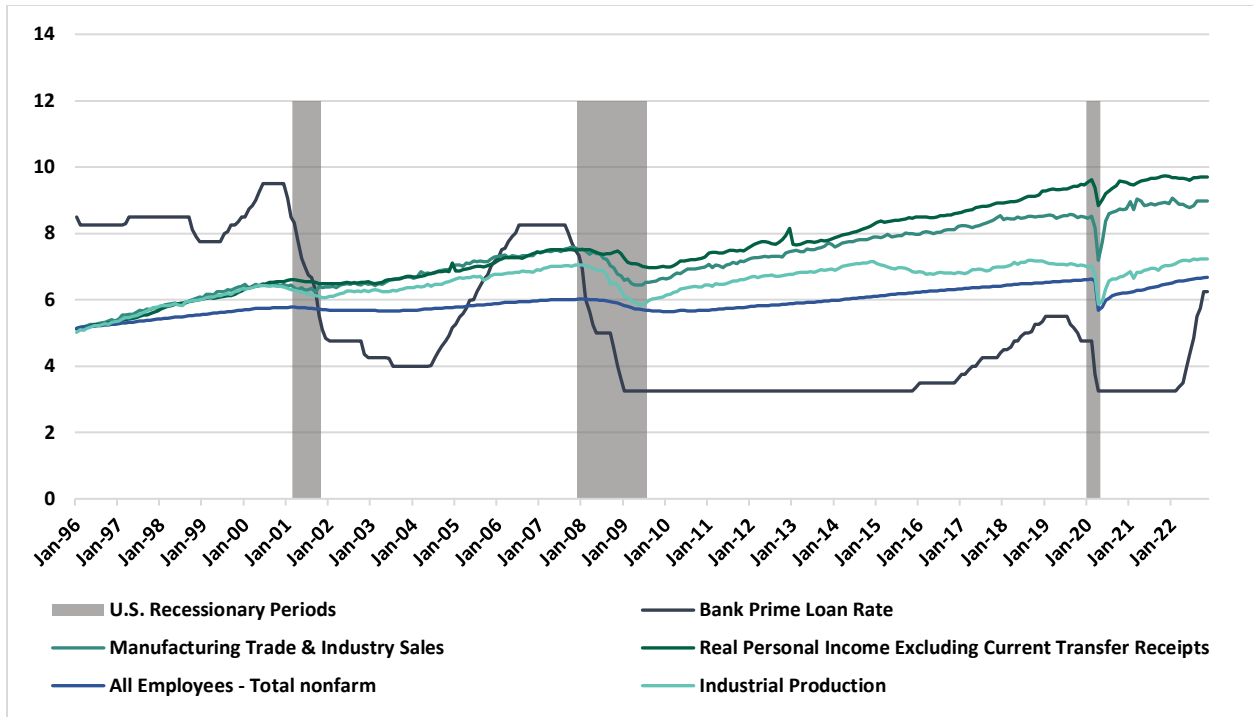
As [Contessi, Pierangelo De Pace, and Guidolin \(2013\)](#) documents, fixed income spreads widen shortly before the onset of recessions and narrow again before recoveries, providing an investor with a leading indicator of economic cycles. As observed in [Figure 1](#), the 10-year Treasury yield declined over 20 basis points each time a recession or economic slowdown occurred. The last time the 10-year Treasury yield had a similar decline, IG OAS exceeded 150 bps during the 2020 Covid-19 shutdown. These indicators moved together during the dot-com bubble through 9/11 (1991-2003), the great recession (2008), the European sovereign debt crisis (2011), and the China economic slowdown (2015-2016). With the changes in OAS and the 10-year Treasury yield, it is essential to monitor these indicators today because these are all precursors that have historically resulted in a recession with two or more quarters of negative GDP growth.

As spreads widen, the value of fixed income investments diminishes. This is due to increased credit risk and interest rate risk in the fixed income market. With a growing concern of a recession occurring in the near future and IG OAS and HY OAS rising, this can indicate that now could be a good time to begin adjusting credit risk and duration in a fixed income portfolio. Similar to 1981, today's economy is experiencing high inflation, increasing short-term rates, decreasing construction, and decreasing manufacturing. [Sablik \(2013\)](#) informs that the Fed stomped out inflation during that period by tightening the money supply, which eventually dumped the economy into a recession.

The 10-year Treasury yield is a critical leading indicator because it forms the base of most interest rates in the United States ([Baldrige and Curry \(2021\)](#)). As a result, the 10-year dictates the economy's cost of debt capital. When the cost of capital is low, economic participants can use additional debt to fund purchases and innovation. Changes in the 10-year Treasury yield provide insight into the economy's future rate of expansion (GDP) and risk of inflationary pressure. Insight into both factors helps investors balance the trade-off between credit risk and yield.

II. Lagging and Coincident Indicators

Figure 2: Comparison of Coincident Indicators and the Bank Prime Loan Rate. 1996 - Present



*The value of coincident indicators is normalized for comparison

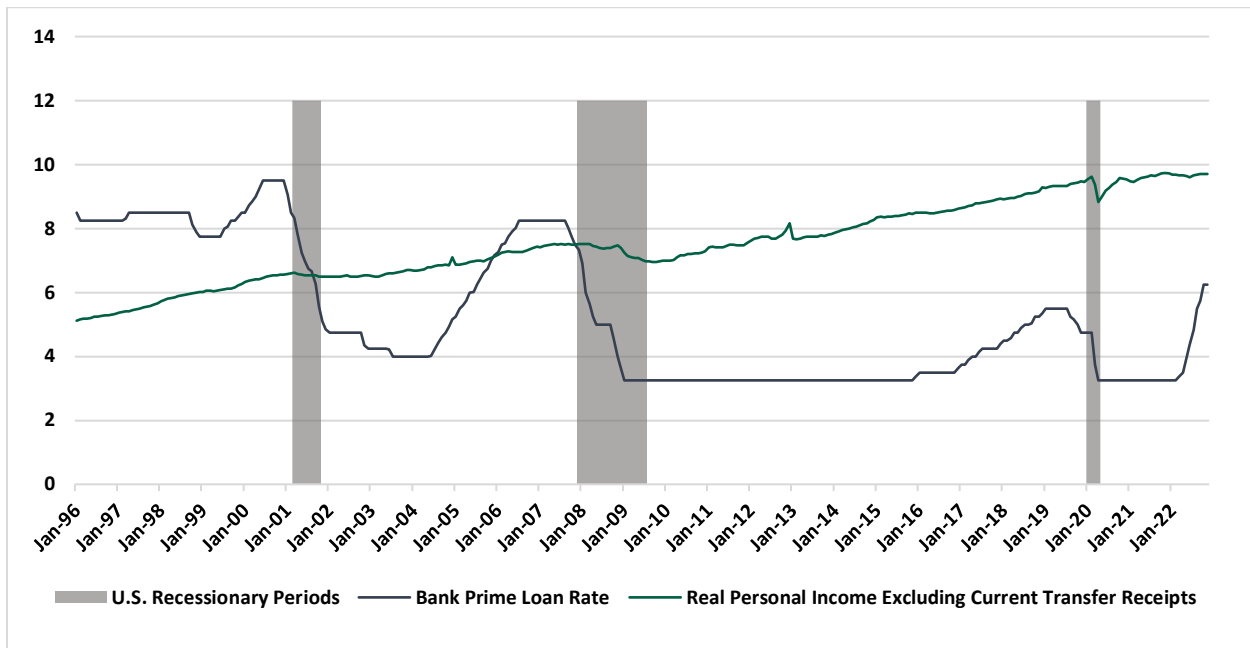
Figure 3: Coincident Indicators' Regression Analysis

Coincident Economic Indicators:	R-Square (BAGG)	R-Square (GDP)	Multiple R (BAGG)	Multiple R (GDP)	P-value (BAGG)	P-value (GDP)
Real Personal Income Excluding Current Transfer Receipts	96.8%	99.4%	98.4%	99.7%	0E+00	0E+00
Real Manufacturing and Trade Industries Sales	93.3%	98.7%	96.6%	99.4%	2.08E-301	0E+00
All Employees, Total Nonfarm	85.4%	94.7%	92.4%	97.3%	5.87E-216	0E+00
Industrial Production: Total Index	81.4%	91.4%	90.2%	95.6%	5.22E-189	1.70E-274

To identify coincident indicators with the most correlation, we ran a linear regression analysis. While all of these indicators show a significant correlation against the Bloomberg Aggregate Bond Index and GDP, the most correlated indicator is Real Personal Income Excluding Current Transfer Receipts. Personal Income's R-Square (BAGG) value of 96.8% has highest percentage of movement being an independent variable, that can be explained by the movements of a dependent variable (BAGG). Additionally, Personal Income's R Multiple (BAGG) of 98.4% has

the highest correlation with the BAGG and a very low P-value that shows the chance of this correlation occurred randomly is very low.

Figure 4: Lagging Indicators. 1996 - Present

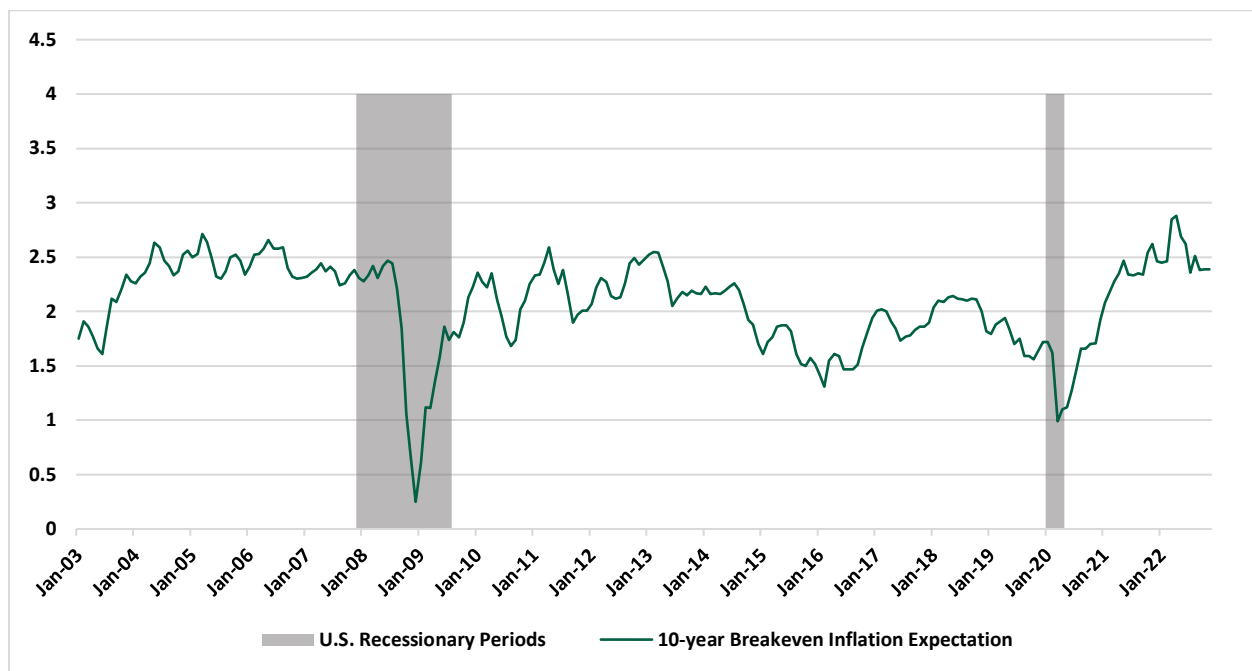


**The value of Real Personal Income Excluding Transfer Receipts is normalized for comparison*

The most observable movements between the lagging and coincident indicators are shown when the Bank Prime Loan Rate begins to decline, Personal Income also starts to decline, and the 10-year Inflation Expectation sharply declines during each recessionary period. The Bank Prime Loan Rate reaches its minimum during each economic slowdown to encourage more spending. As mentioned by the [Federal Reserve \(2013\)](#), many banks set their prime rates based partly on the target level of the federal funds rate - the rate banks charge each other for short-term overnight loans - established by the Federal Open Market Committee. Significantly, the Bank Prime Loan Rate had the sharpest increase in the second half of 2022 than in any other historical period. The Bank Prime Loan Rate and Personal Income Excluding Current Transfer Receipts (Personal Income) showed consistent trends across U.S. recessionary periods. The 10-year inflation expectation records began in 2003, as seen in [Figure 5](#). [Brock 2021](#) describes Personal Income as a relevant indicator for analyzing the fixed income market because it gives an

overview of the strength of the consumer sector of an economy, which is a significant portion of GDP.

Figure 5: 10-year Breakeven Inflation Expectation. 2003 - Present



The 10-year inflation expectation is a significant indicator for bond markets, because the expectation of higher inflation is concerning for bonds because it could diminish the purchasing power of a bond's future cash flows. For example, if a bond pays a 4% yield and inflation is 3%, the bond's real rate of return is 1% [Nielsen \(2022\)](#). If there is a higher current rate of inflation and a higher expected rate of inflation, yields will rise across the yield curve due to investors demanding a higher yield to compensate for inflation risk.

III. Economic and Market Review

At the beginning of 2022, bond yields spiked due to the CPI rising to 7% in 2021, the fastest pace since 1982 [Pellejero \(2022\)](#). The year started with markets and investors having a lot of optimism, hoping the Fed had everything under control. Markets and the Fed believed that inflation would be transitory and expected that only three large rate hikes would be required to tame inflation.

Another factor that influenced rising inflation was the Russia-Ukraine war. A day after the Russian invasion, IG OAS decreased by 5 bps and HY OAS decreased by 29 bps. This caused investors to transition into safer assets due to the high level of uncertainty, and the 10-year US Treasury yield declined 27.7 bps the following week.

Q2 2022 started with yields on short-term Treasuries climbing more than longer-term bonds, causing the yield curve to be flat and inverted for all of 2022 thus far. Investors see this as a red flag alert that a recession is looming based on historical data. [Goldfarb \(2022\)](#) exceptionally describes how yields on Treasuries largely reflect investors' expectations for what short-term interest rates set by the Fed will average over the life of a bond. Longer-term yields are generally higher than shorter-term yields because investors want to guard against the risk of unexpected inflation and rate increases.

The pace of Fed rate hikes is rapid compared to previous cycles

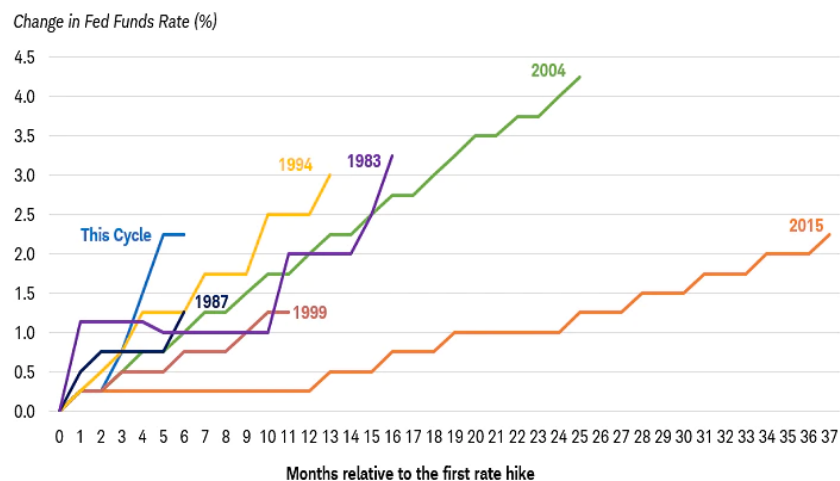


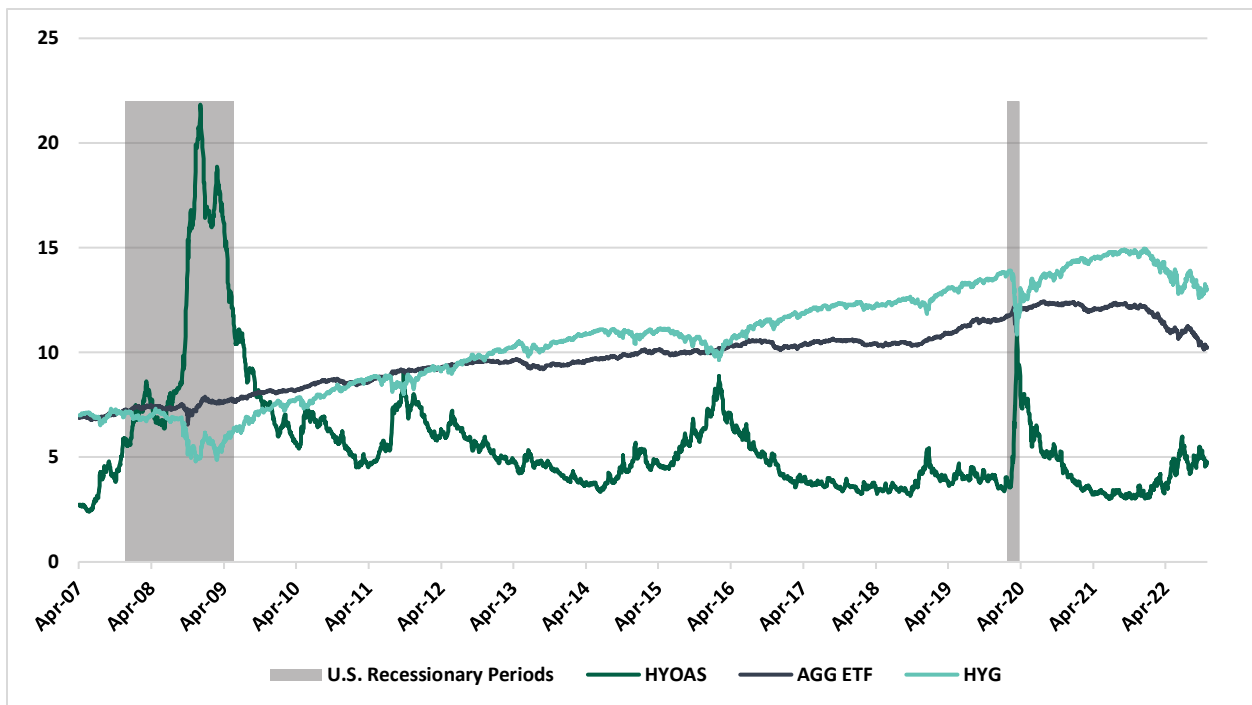
Chart from: [Jones \(2022\)](#)

When inflation peaked at 9.1% in June, the Treasury market started to catch up to the Fed's hawkish intentions to tackle inflation, which sent yields spiking from August into September. This is due to breakeven inflation expectations being very volatile as the Fed continued its rate hikes. The market expected only three large rate hikes from the Fed to put a dent in inflation. However, inflation has proved to be stickier than expected, resulting in bond yields tumbling. The Bloomberg Aggregate Bond Index declined -4.32% in September, the worst monthly sell-off in 40 years. While the headline CPI began to decrease from 8.3% to 8.2% in August and September, the year-over-year Core CPI was still increasing with September's Core CPI rising to 6.6%, a 40-year record high.

IV. ETF Performance Relating to the Bond Aggregate

When these economic indicators are compared with different bond ETFs, each ETF display different correlations between each other and each recessionary period. This shows how different classes of risk and duration respond to recessions and drawdowns in the US economy.

Figure 6: HYG Performance compared to HY OAS and AGG. 2007 - Present



[Figure 6](#) shows HY OAS compared to the iShares Core U.S. Aggregate Bond ETF (AGG) and the iShares iBoxx \$ High Yield Corporate Bond ETF (HYG). Following is a similar graph but with the iShares 20+ Year Treasury Bond ETF (TLT). [Loomer and Wiersma \(2022\)](#) note that returns of high yield bonds have tended to be negatively correlated with U.S. Treasury returns. If U.S. Treasuries are expected to lose value when rates rise, then high yield bonds should increase in value. During the 2008 great recession, the 2010 European sovereign debt crisis, the 2016 China economic slowdown, and the Covid-19 shutdown, HYG experienced notable drawdowns of over 300 bps. These drawdowns show correlation with rises in HY OAS, which decrease the value of high yield securities. Another factor can also include a lack of investor confidence during these transitions. Before the Fed's fourth-consecutive rate hike, [Greifeld and Hajric \(2022\)](#) informed that nearly \$2.5 billion exited from the \$21 billion iShares Short Treasury Bond

ETF (SHV). [Greifeld and Hajric \(2022\)](#) and [Greifeld \(2022\)](#) suggest that this can be viewed as a sign that traders have more confidence in riskier assets or they're extending their duration to prepare their portfolios for a potential recession. At the end of October 2022, the high yield corporate bond market is signaling similar confidence to that of the equity markets. [Greifeld \(2022\)](#) also notes that DataTrek co-founder Nicholas Colas argues, "We are looking for HY spreads over Treasuries to continue to narrow as a confirmation that the current equity market rally has further room to run." From October into December 2022, HY OAS decreased by 75 bps, indicating price appreciation from higher demand.

Relative to the AGG, every time HY OAS rises 100 bps and more, HYG underperforms, and TLT outperforms as investors flee to safety during each recessionary period. This is significant because these leading indicators illustrate repeatable trends with these fixed income ETFs. As stated by [McWhinney \(2022\)](#), investors eventually will prefer long Treasury bonds based on the premise that they offer a safe harbor from falling equities markets, provide preservation of capital, and have the potential for appreciation in value as interest rates decline.

Figure 7: TLT Performance compared to HY OAS and AGG. 2003 - Present

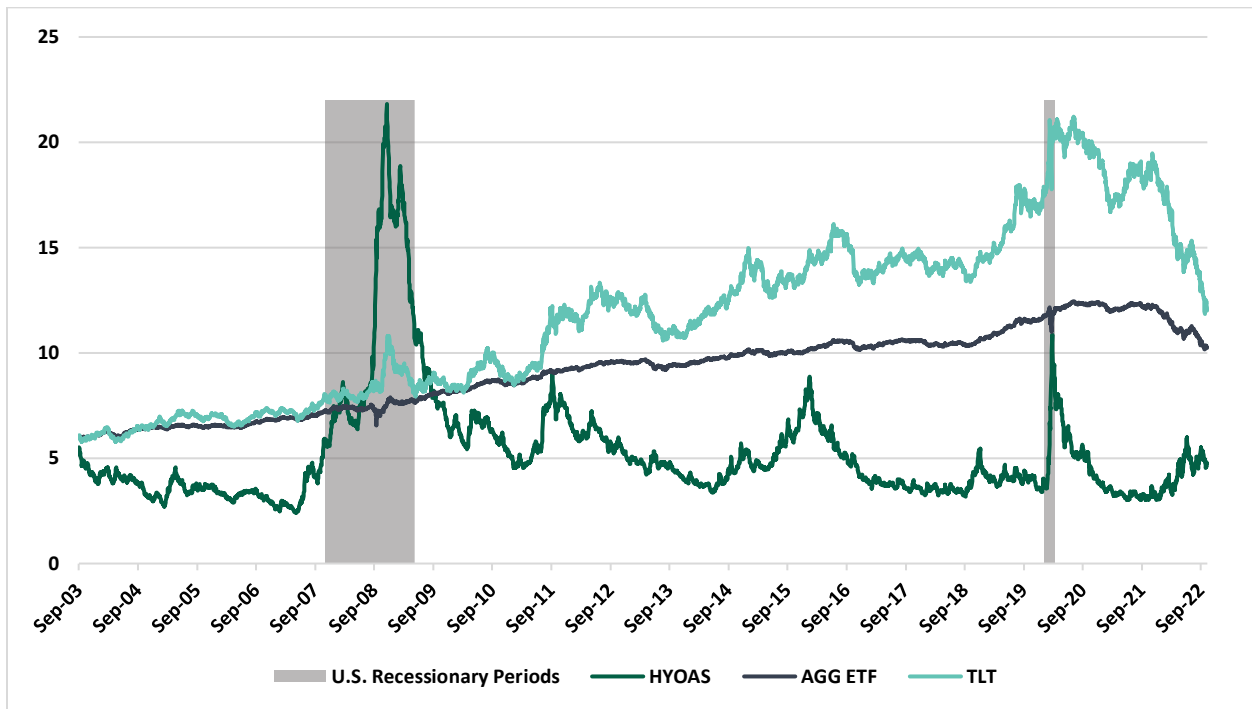
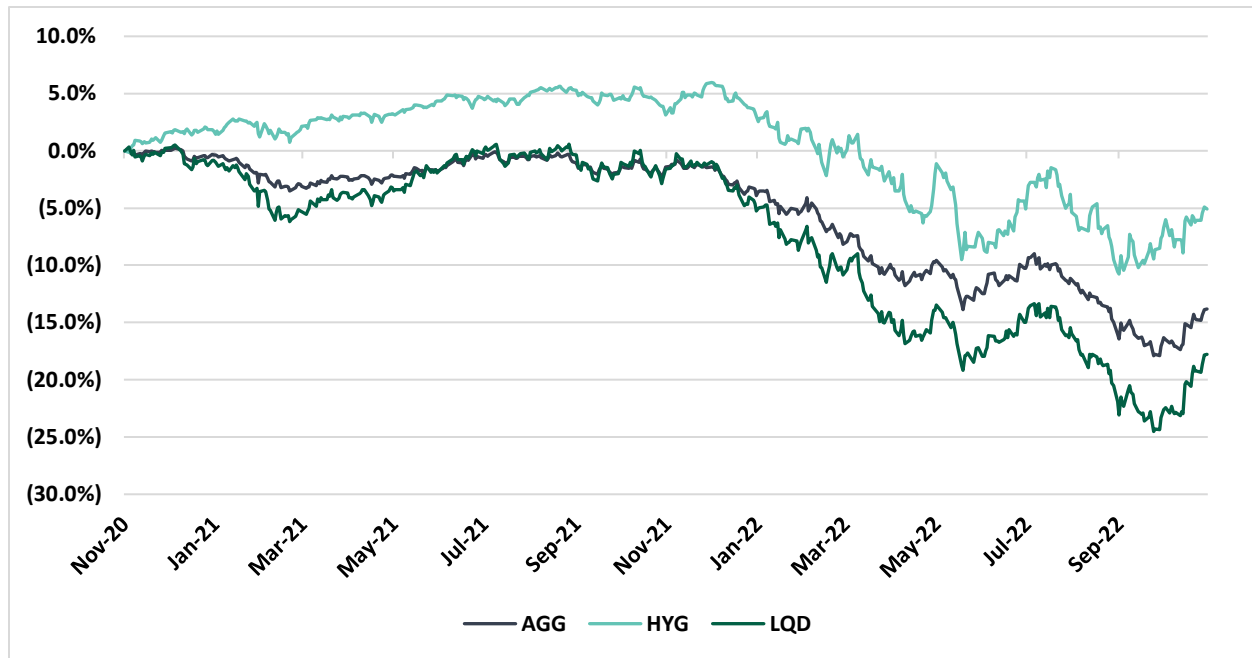


Figure 8: Total Return of AGG, HYG, and LQD. November 2020 - Present



In the last year, HY investments have outperformed other bond securities. The chart above shows a visualization comparing a normalized total return of the AGG compared to LQD and HYG. While all of the returns in 2022 are negative, the most appealing return is the HYG beating the AGG by 204 bps as of November 9th, 2022. Articles by [PIMCO \(2017\)](#) and [Loome and Wiersma \(2022\)](#) explain how HY securities can outperform other asset classes during periods of high inflation due to it having a low duration. A lower duration results in less downside risk because money can be reinvested quicker into new bonds with higher rates. To go more in-depth, [PIMCO \(2017\)](#) states that high yield bond prices are much more sensitive to the economic outlook, such as the 10-year inflation expectation, and corporate earnings than to day-to-day fluctuations in interest rates.

V. Conclusion

This report highlights the trends that an investor can follow when making decisions around the duration and quality of their portfolio based on the leading, lagging, and coincident indicators. These indicators are essential as they provide a foundation for forecasting trends in the BAGG and the U.S. economy. IG OAS has widened in the last year, but from October to December 2022, we have seen spreads decrease significantly by 31 bps, and the yield curve remains

inverted. This recent OAS trend could be noise when you look at the overall trend in the last year; however, nothing can be certain.

One of our lagging indicators, the Bank Prime Loan Rate shows rates skyrocketing; however, this will only persist for so long. After a large majority of rate decreases in the past, a recession follows. This is part of our goal for observing trends and seeing whether they have changed direction. The 10-year Inflation Expectation is an essential lagging indicator because it is one of the main drivers determining the prices for bonds and fixed income sector allocation.

Each leading indicator can provide data points for each significant drawdown in Treasuries, Mortgage-Backed Securities, and IG Corporates. High yield and Treasury ETFs showed opposite movements in each recessionary period and HY OAS movement. What's significant in today's bond market environment is that investors are battling high inflation and rising rates versus other recessionary periods. Yet, fixed income markets are starting to feel less pressure as inflation recedes.

References

Baldrige, Rebecca; Curry, Benjamin, 2021, Understanding The 10-Year Treasury Yield
[Forbes](#)

Brock, Thomas; 2021, Personal Income and Outlays
[Investopedia](#)

Contessi, Silvio; Pierangelo De Pace, Massimo Guidolin, 2014, How did the financial crisis alter the correlations of U.S. yield spreads?, *Journal of Empirical Finance* 28, 362-385.
[Google Scholar](#)

Federal Reserve, 2013, *What is the prime rate, and does the Federal Reserve set the prime rate?*
[Federal Reserve](#)

Goldfarb, Sam, 2022, Bond Selloff Rattles Markets
[Wall Street Journal](#)

Greifeld, 2022, Nearly \$1 Billion Swamps Junk-Bond ETF in Record Haul Before Fed
[Bloomberg](#)

Greifeld, Katherine; Vildana Hajric, 2022, Record Cash Is Draining From Safest Bond ETFs Ahead of Fed Hike
[Bloomberg](#)

Jones, Kathy, 2022, Rate Hikes, Quantitative Tightening, and Bond Yields
[Charles Schwab](#)

Loome, Kevin; Ashley Wiersma, 2022, High Yield Bonds Could Prove Resilient as Inflation Surges

[T. Rowe Price](#)

(Fig. 2) Cumulative fixed income returns when 10-year Treasury yield rose more than 100 bps

Period	Beginning Date	End Date	10-Year Treasury Yield Move	U.S. High Yield	Loans	U.S. Agg.	10-Year Treasuries	U.S. Short-Term Gov't./Credit
1	12/31/08	06/10/09	189 bps	29.88%	32.50%	-0.20%	-11.99%	1.28%
2	10/08/10	12/28/10	110 bps	1.52	2.50	-2.82	-8.14	-0.54
3	07/24/12	09/05/13	161 bps	9.62	7.54	-3.57	-10.13	0.36
4	07/08/16	12/15/16	124 bps	5.23	4.78	-4.28	-9.87	-0.66
5	09/08/17	11/08/18	119 bps	2.68	5.81	-2.93	-7.17	-0.03
6	07/31/20	03/31/21	120 bps	7.39	8.38	-3.56	-9.79	0.21
Average				9.39	10.25	-2.89	-9.52	0.10
Median				6.31	6.68	-3.25	-9.83	0.09

As of December 31, 2021.

U.S. High Yield represented by ICE BofA U.S. High Yield Constrained Index; Loans by S&P/LSTA Performing Loan Index; U.S. Agg. by Bloomberg U.S. Aggregate Bond Index; U.S. Short-Term Gov't./Credit by Bloomberg 1–3 Year Government/Credit Index. Bloomberg Index Services Limited. See Additional Disclosures.

McWhinney, James, 2022, The Impact of an Inverted Yield Curve

[Investopedia](#)

Nielsen, Barry, 2022, Understanding Interest Rates, Inflation, and Bonds

[Investopedia](#)

Pellejero, Sebastian, 2022, Treasury Yields Decline After Inflation Data

[Wall Street Journal](#)

PIMCO, Investment Education - High Yield Bonds

[PIMCO](#)

Sablik, Tim, 2013, Recession of 1981–82

[Federal Reserve History](#)