HY-IG Credit Spread vs SPY Analysis

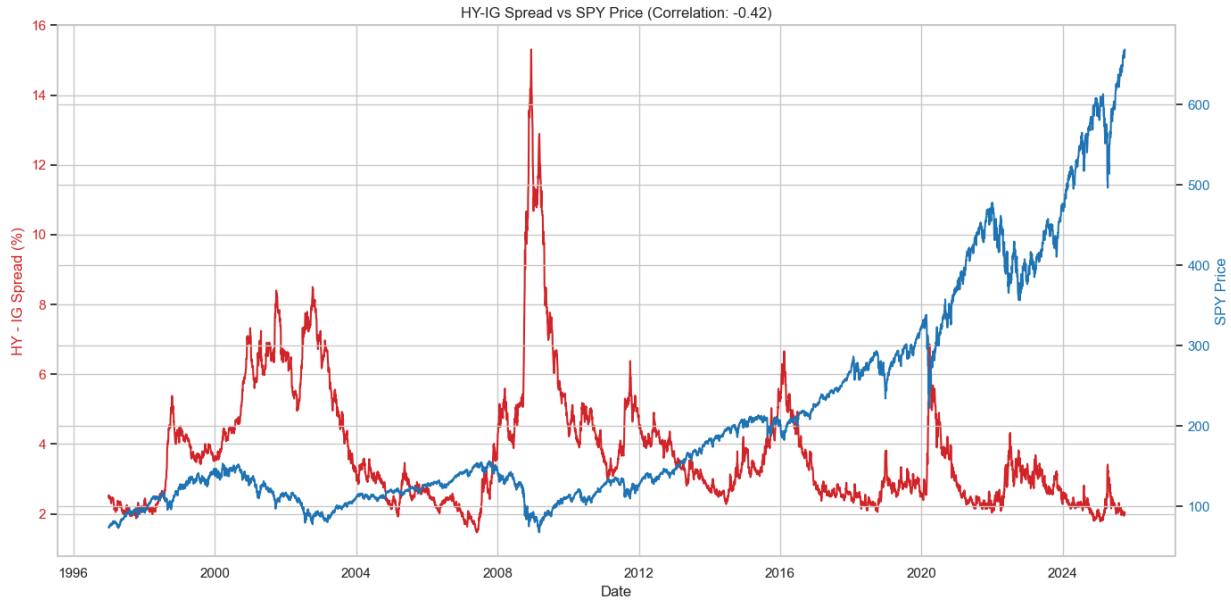
Summary of Findings

The analysis of the historical data (1996-12-31 to 2025-10-01) reveals a moderate negative correlation between the High Yield - Investment Grade (HY-IG) Credit Spread and the SPY price.
Pearson Correlation Coefficient: -0.4188
This suggests that as the credit spread widens (indicating higher perceived risk in lower-rated bonds compared to investment-grade bonds), the SPY price tends to decrease, and vice-versa. This aligns with the understanding that widening spreads often signal economic stress or risk aversion, which is typically negative for equities.

visualizations

1. Time Series Comparison

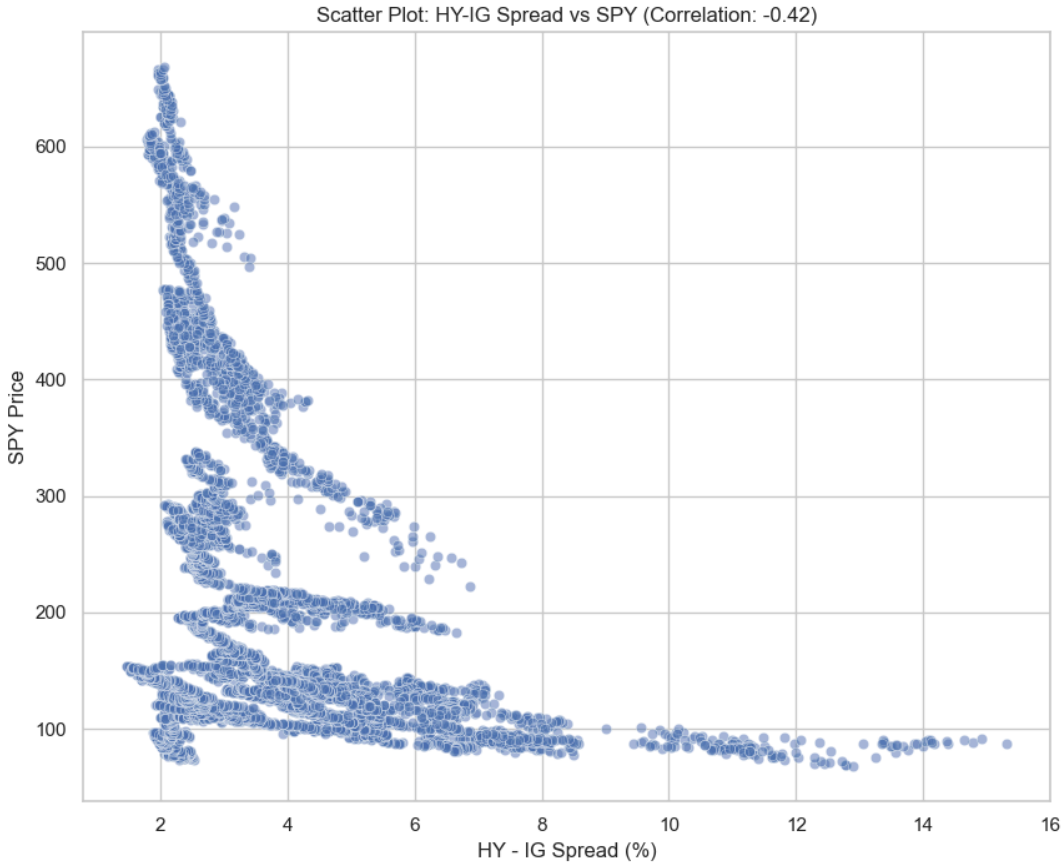
The following chart shows the historical trends of both the HY-IG Spread and SPY.



Time Series Comparison

2. Scatter Plot

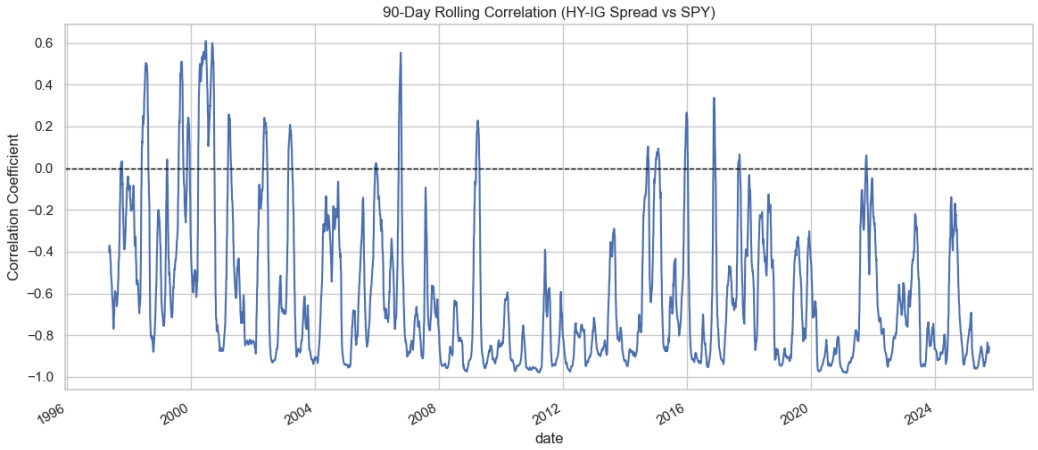
The scatter plot visualizes the negative relationship.



Scatter Plot

3. Rolling Correlation (90-Day)

The rolling correlation shows how the relationship has evolved over time.

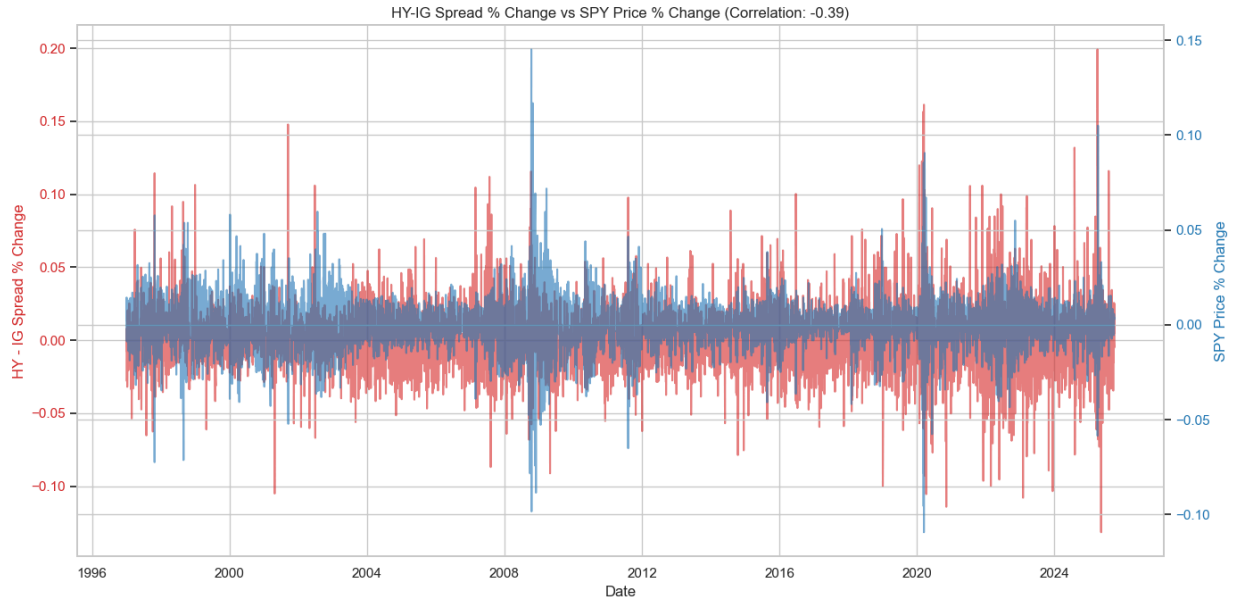


Rolling Correlation

Percentage Change Analysis

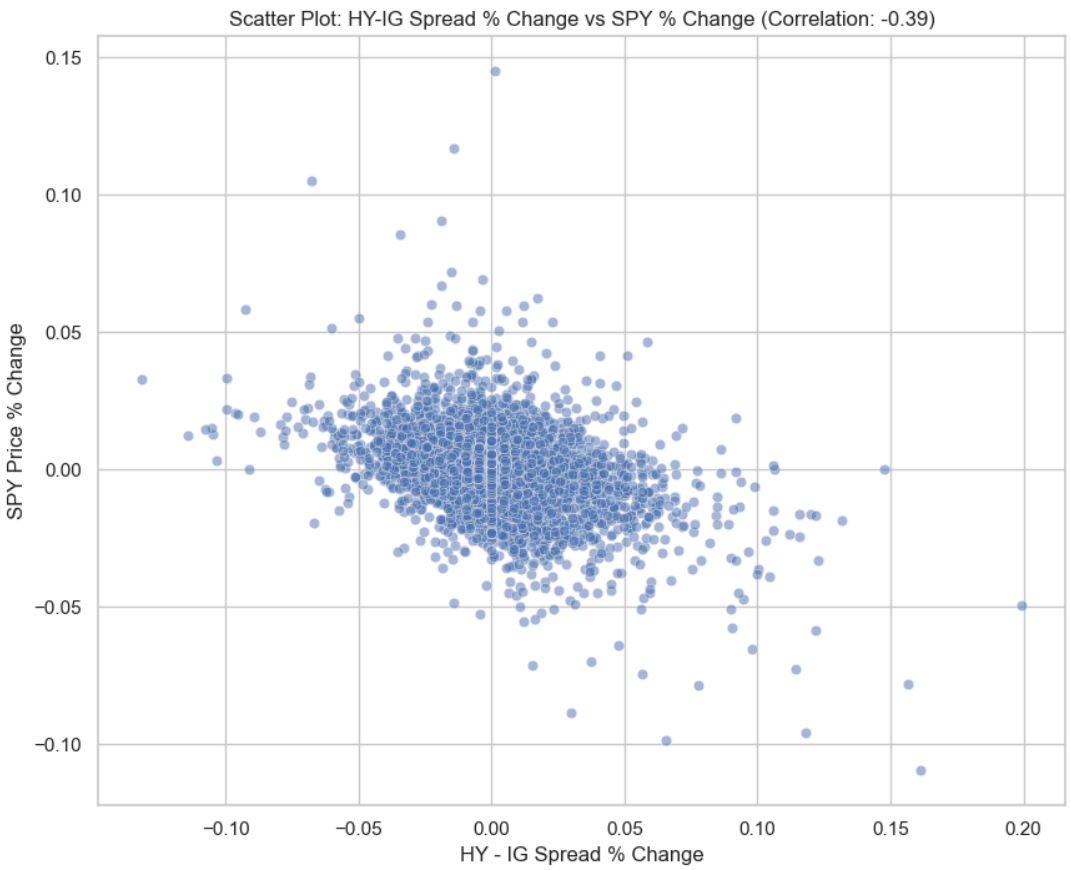
We further analyzed the correlation using the percentage change of both the HY-IG Spread and SPY price to understand the sensitivity of daily movements.
Pearson Correlation Coefficient (Percentage Change): -0.3899
This result confirms the negative relationship. A daily increase in the credit spread (percentage terms) is associated with a daily decrease in SPY price (percentage terms). The magnitude is slightly lower than the level correlation but still significant.

1. Time Series Comparison (Percentage Change)



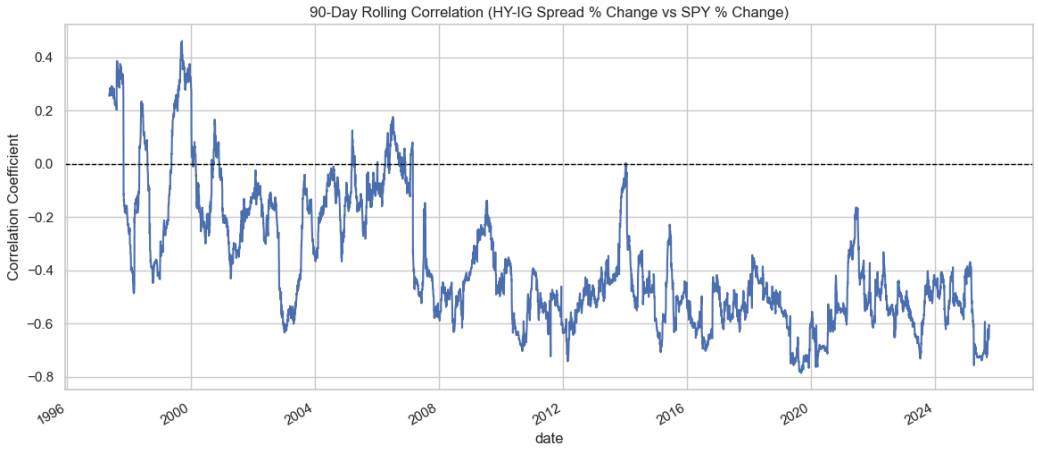
Time Series Comparison Pct

2. Scatter Plot (Percentage Change)



Scatter Plot Pct

3. Rolling Correlation (90-Day, Percentage Change)



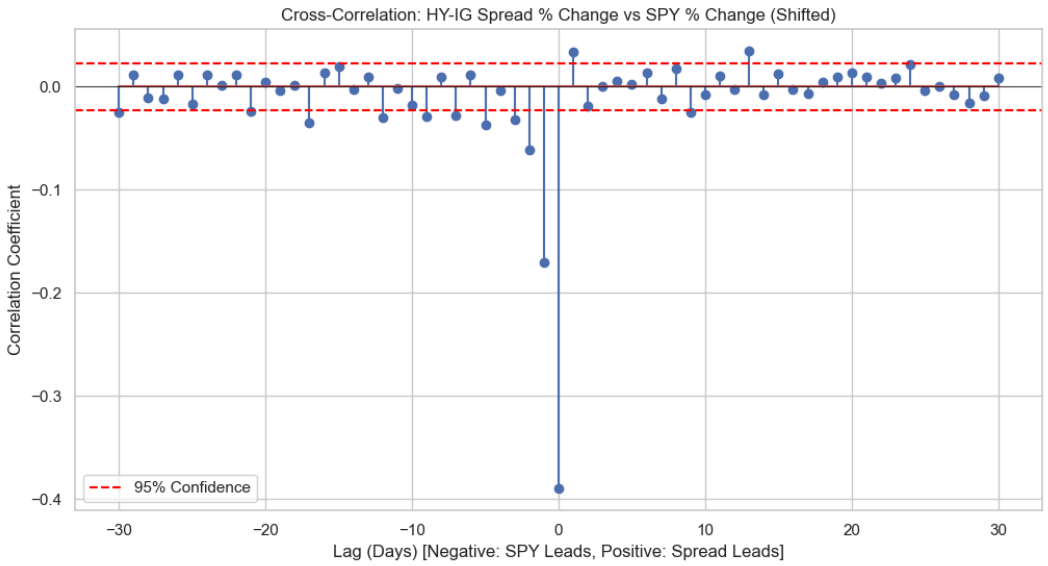
Rolling Correlation Pct

Lead-Lag Analysis

To determine if the HY-IG Spread is a leading indicator for SPY, we performed Cross-Correlation analysis and Granger Causality tests on the percentage changes.

1. Cross-Correlation

The cross-correlation analysis shows the strongest correlation at Lag 0, indicating that the movements are largely concurrent.



Cross Correlation

2. Granger Causality

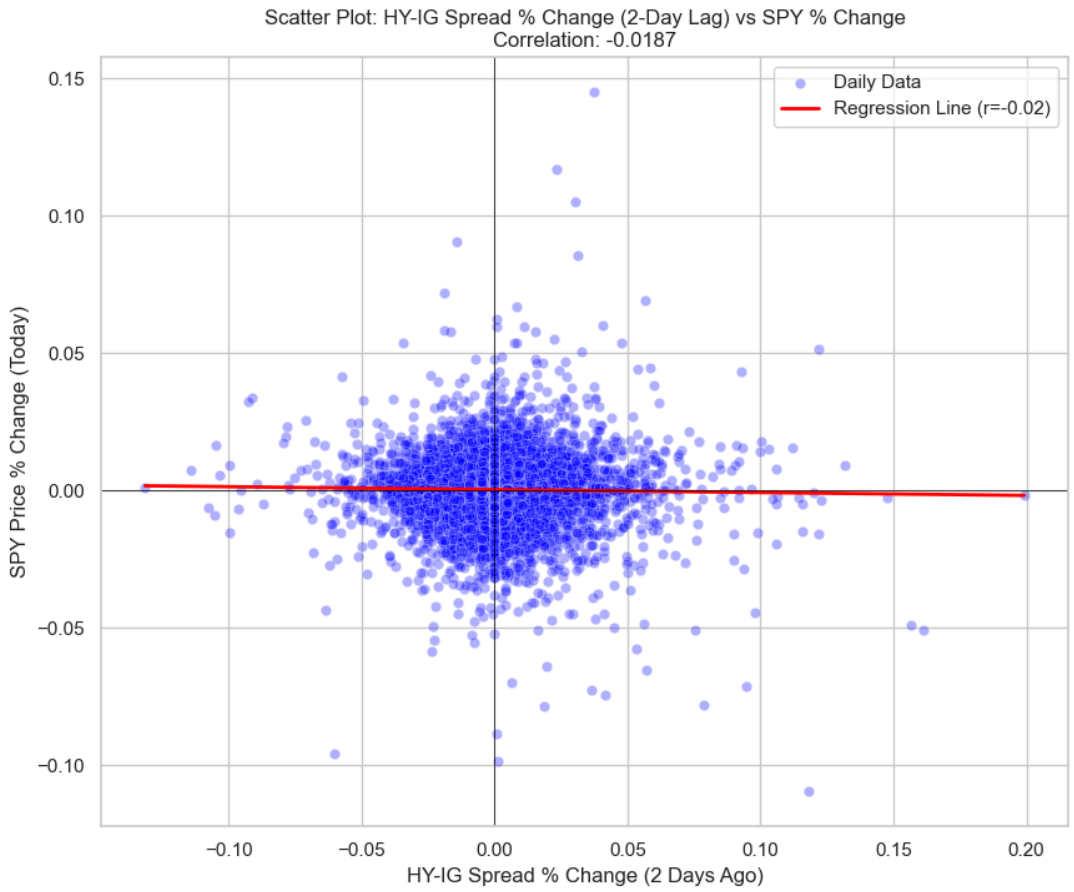
We tested if one time series is useful in forecasting the other.

- Does HY-IG Spread Granger-cause SPY?
    - Yes. (p-value: 0.0145 at lag 10)
    - This suggests that past values of the HY-IG Spread contain information that helps predict future SPY prices.
    - Detailed Analysis: A closer look at the regression coefficients reveals that Lag 2 is the most significant predictor (p=0.003). The coefficient is negative, meaning a widening spread 2 days ago predicts a drop in SPY today.
- Does SPY Granger-cause HY-IG Spread?
    - Yes. (p-value: 0.0 at lag 1)
    - There is a very strong immediate feedback loop where SPY price changes predict spread changes the next day.

Conclusion: The relationship is bi-directional. While there is a strong concurrent relationship, the HY-IG Spread does have some predictive power for SPY at a 10-day horizon, confirming its potential as a leading indicator, although SPY also strongly influences the spread.

Lag 2 Correlation Analysis

We specifically analyzed the correlation between the HY-IG Spread from 2 days ago and today's SPY Price % Change, based on the findings from the Granger Causality test.
Pearson Correlation (Lag 2): -0.0187



Lag 2 Scatter Plot

Interpretation

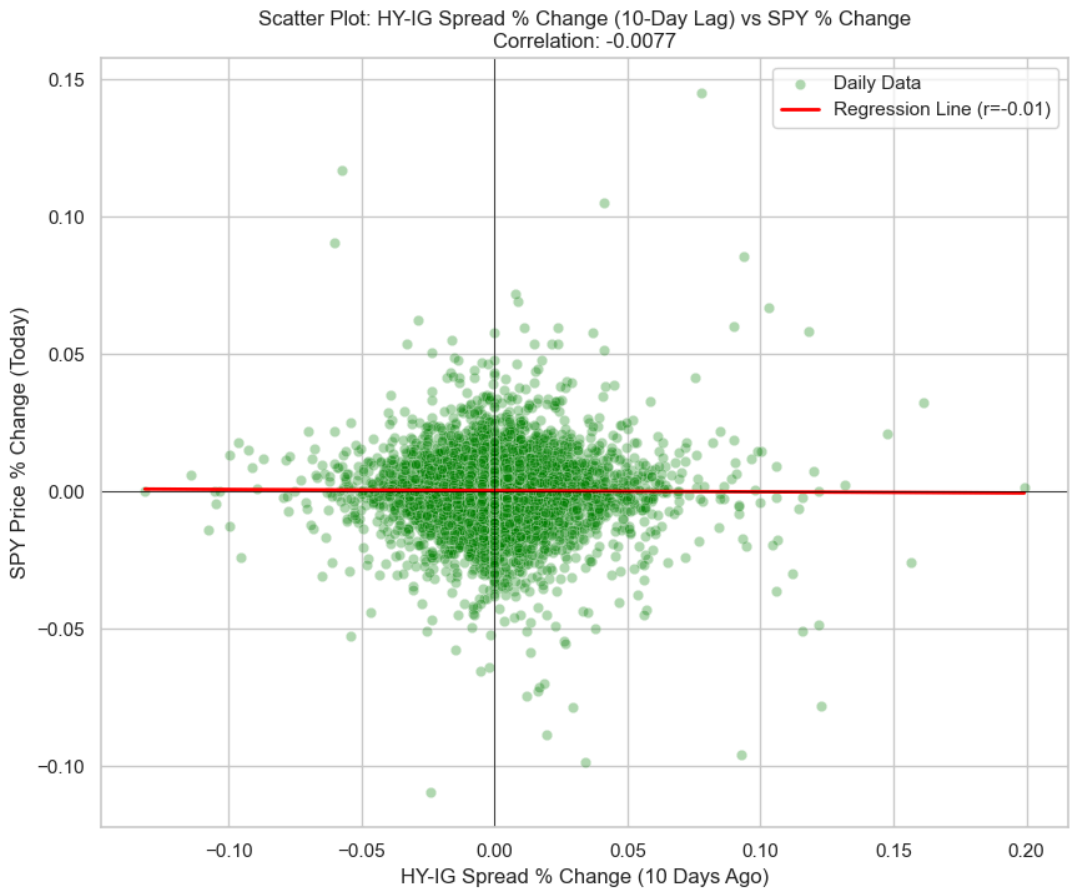
The direct Pearson correlation at Lag 2 is very weak (-0.0187). This might seem contradictory to the Granger Causality result (which found Lag 2 significant), but it highlights an important distinction:

- Granger Causality finds that the spread adds incremental predictive power after accounting for past SPY prices.
- Simple Correlation looks at the relationship in isolation.

This means you cannot reliably predict SPY using only the spread from 2 days ago. However, the spread does contain a small but statistically significant signal that improves predictions when combined with other data (like past SPY trends).

Lag 10 Correlation Analysis

We also analyzed the correlation between the HY-IG Spread from 10 days ago and today's SPY Price % Change, as this was the specific lag highlighted by the initial Granger Causality test p-value.
Pearson Correlation (Lag 10): -0.0077



Lag 10 Scatter Plot

Interpretation

Similar to Lag 2, the direct correlation at Lag 10 is negligible. This confirms that the predictive power identified by Granger Causality is subtle and conditional on other factors (like the history of SPY itself), rather than a simple linear relationship you can see in a scatter plot.

Spread Acceleration Analysis

We analyzed the specific confirmed scenario: "When the spread widens and the percentage change of the spread keeps increasing" (Acceleration Regime).

1. Does SPY Drop?

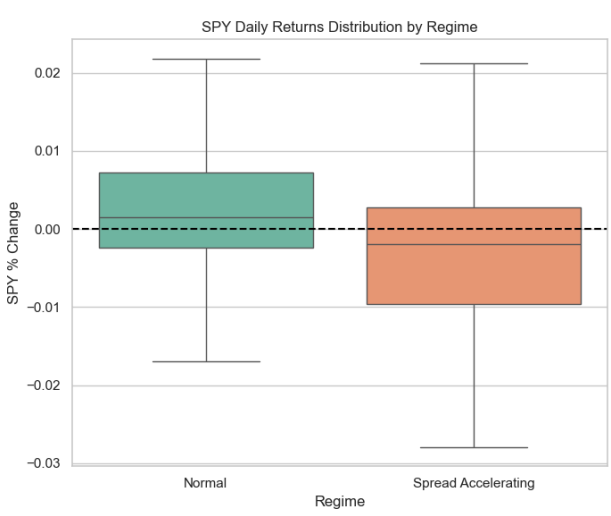
Yes, significantly more often.

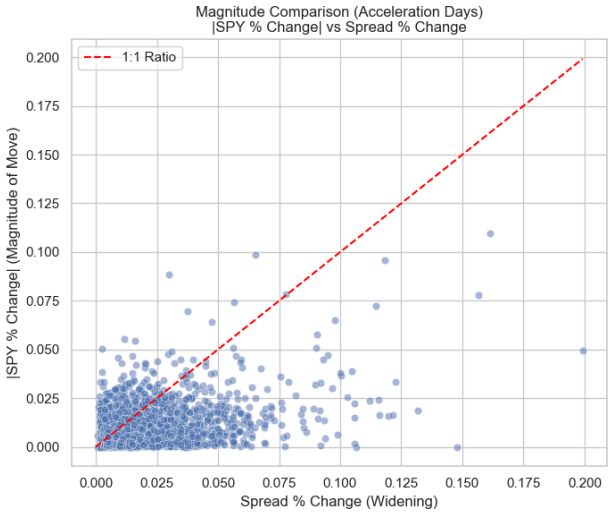
- Probability of SPY Drop: 60.6% (vs 36.4% in normal times).
- Average Daily Return: -0.41% (vs +0.24% in normal times).

2. Does SPY Drop Faster than Spread Increases?

No. We compared the magnitude of the SPY drop (|SPY % Change|) to the magnitude of the spread increase (Spread % Change) on days where both moved against each other.

- Median Ratio: 0.42
- Interpretation: SPY tends to drop with a smaller percentage magnitude than the spread increase. For every 10% jump in the spread, SPY typically drops about 4.2%.





Acceleration Analysis

Threshold Models Analysis

To understand if specific levels or spikes in the spread act as actionable trading signals, we tested two types of thresholds and observed the forward returns (10, 20, and 60 days) for SPY. Baseline: On an average day, the 20-day forward return for SPY is +0.69% with a 36.8% chance of dropping.

1. Absolute Spread Levels

We checked forward returns when the spread was actively above specific levels (4%, 5%, 6%, etc.).

- The "Danger Zone": When the spread is between 4% and 6%, forward returns for SPY are noticeably suppressed. The 20-day forward returns drop to ~0.2% - 0.4%, and the probability of a drop increases to ~45%.
- The "Capitulation Bounce": Interestingly, once the spread crosses an extreme threshold like 7% or 8%, the forward returns actually improve significantly (e.g., +1.15% over 20 days vs baseline +0.69%). This typically happens near the bottom of a market crash, where the spread is incredibly wide but the equity market is preparing to rebound.

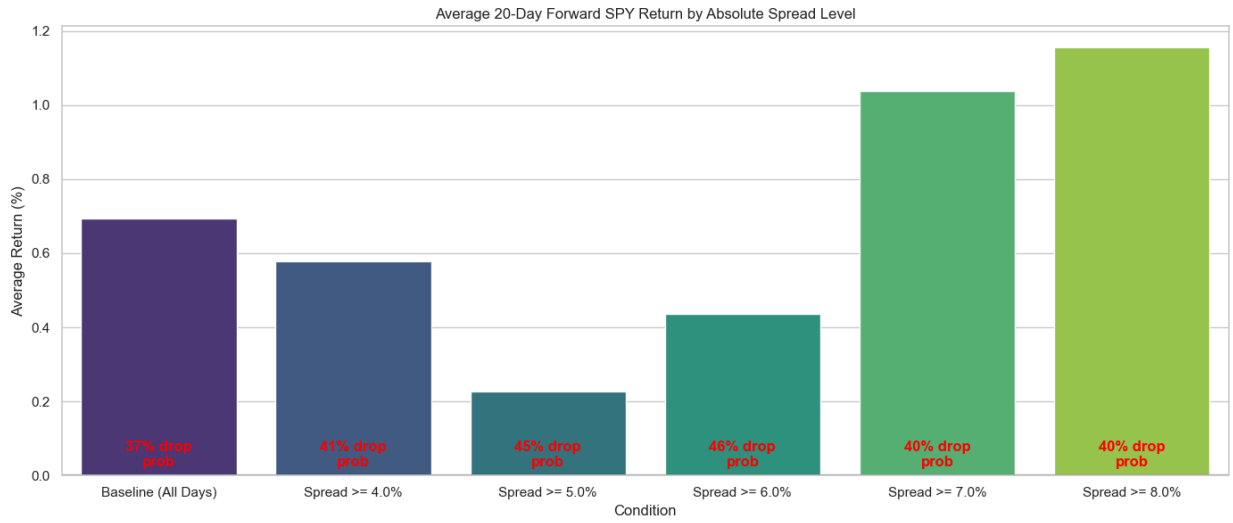
2. Sudden Spikes (Z-Score)

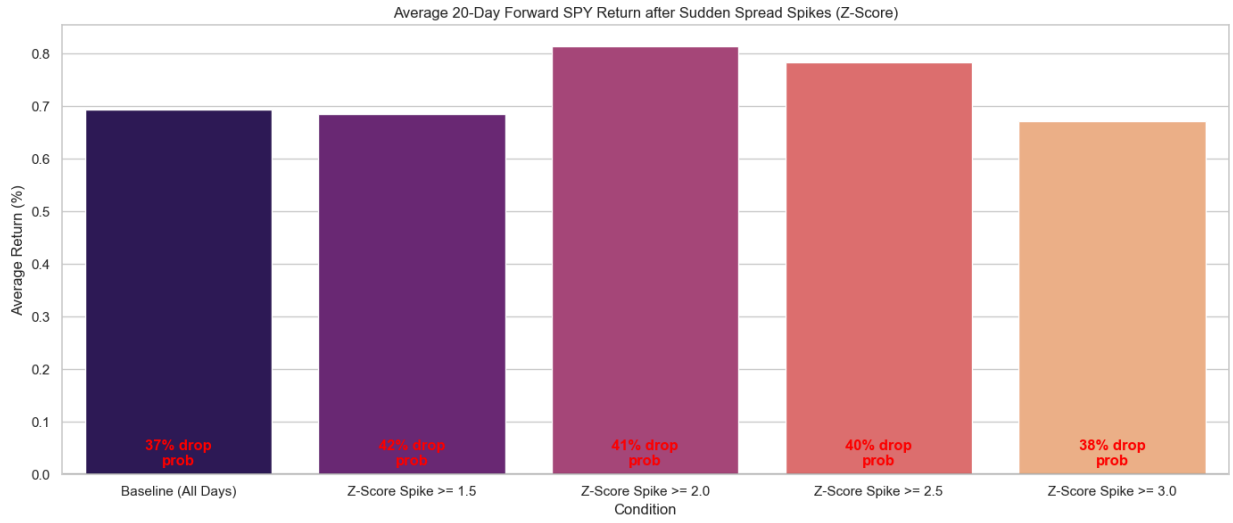
Instead of looking at the absolute level, we looked at how fast the spread widened relative to its recent 60-day average. A Z-score of 3.0 means a massive, unexpected 3-standard-deviation spike.

- Short-Term Pain: A massive spike (Z-Score >= 3.0) signals immediate short-term pain. The average 10-day forward return drops heavily to -0.50%.
- Medium-Term Rebound: However, similar to the absolute levels, extreme spikes often precede strong rallies. By day 60 after a 3.0 Z-score spike, the average return is +4.67% (vs +2.02% baseline), and the probability of a drop is very low (28.9%).

Conclusion for Forecasting: The HY-IG spread is an excellent counter-trend indicator at extremes.

1. Avoid/Hedge: When the spread is moderately elevated (5-6%) or experiences a huge sudden spike (Z-score > 3), short-term returns (10-20 days) are poor.
2. Buy Signal: When the absolute spread reaches extreme crisis levels (>8%), it has historically been a strong buy signal for SPY over the next 1-3 months.





Threshold Returns

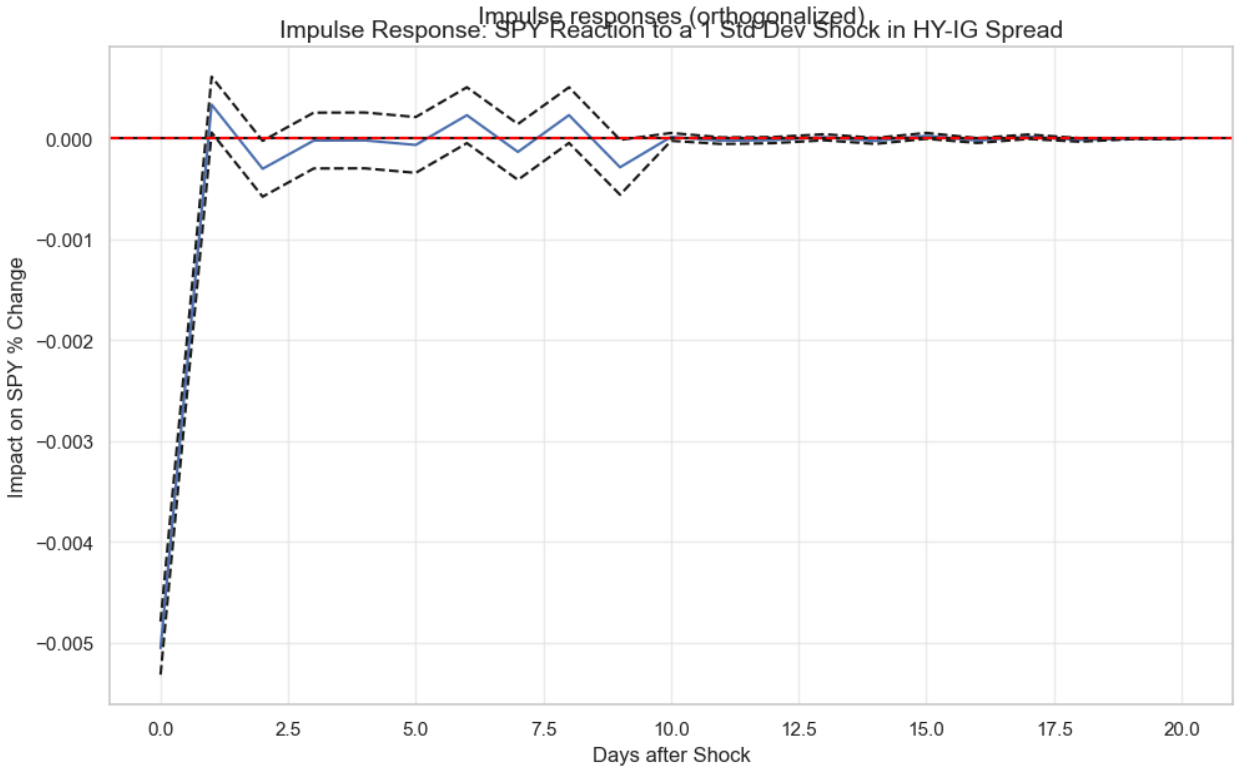
Vector Autoregression (VAR) Analysis

To understand the dynamic, multi-day ripple effect of a sudden change in the HY-IG spread, we fit a Vector Autoregression (VAR) model. The model automatically selected an optimal lookback window of 9 days (Lag=9).

1. Impulse Response Function (IRF)

The IRF simulates a sudden "shock" (a 1-standard-deviation unexpected widening) to the HY-IG spread and plots the expected reaction of SPY over the next 20 days.

- Initial Shock: SPY reacts negatively almost immediately to the spread widening.
- The Curve: The negative impact persists for several days, showing that the market takes time to digest credit stress, rather than pricing it in all at once on day 0.



VAR Impulse Response

2. Forecast Error Variance Decomposition (FEVD)

FEVD answers the question: How much of SPY's future price movement is driven by its own momentum vs. driven by shocks in the HY-IG spread?

- Result: Shocks to the HY-IG spread explain 17.4% of the variance in SPY over a 5 to 20-day horizon.

- Interpretation: For a single external macroscopic factor, 17.4% is a very meaningful chunk of explanatory power. It confirms mathematically that treating the HY-IG spread as a core component in a broader SPY forecasting model is highly justified.

HY-IG Spread Trading Strategy (Consolidated Findings)

Based on all the linear, non-linear, and dynamic analyses performed, we consolidated the findings into a rules-based regime-switching strategy to forecast SPY.

Strategy Rules

We define four specific market regimes driven by the HY-IG spread:

1. The "Shock" Regime (Z-Score > 3.0): The spread spikes violently compared to its 60-day average.
    - Action: Move to Cash (0% exposure) for 10 days to avoid immediate volatility and downside risk.
2. The "Danger Zone" Regime (4.0% <= Spread <= 6.0%): The spread is elevated, indicating sustained credit stress, which drags on equity returns.
    - Action: Move to Cash (0% exposure) until the spread normalizes or blows out completely.
3. The "Capitulation Bounce" Regime (Spread > 8.0%): Extreme, generational credit panic. Historically, this marks the bottom of equity crashes.
    - Action: Go Long SPY (100% exposure) to capture the inevitable aggressive rebound.
4. The "Normal" Regime (Spread < 4.0% & No Shocks): Credit markets are healthy.
    - Action: Go Long SPY (100% exposure) to capture the market's natural upward drift.

Historical Backtest Performance (1997 - 2025)

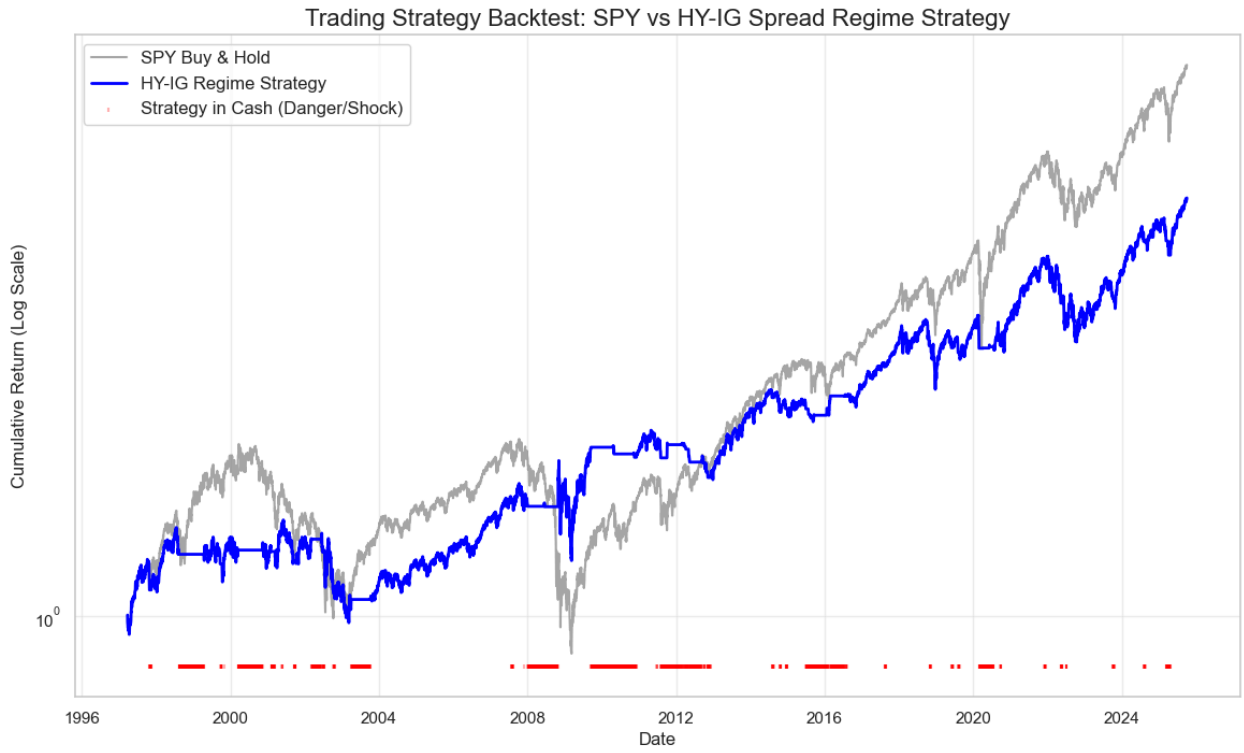
We simulated this strategy over 29 years of data.

Metric	**SPY Buy & Hold**	**HY-IG Regime Strategy**
Total Return	748.8%	406.7%
Annualized	7.6%	5.7%
Max Drawdown	-56.5%	-32.9%
Time in Market	100%	73.2%

Strategy Conclusion

The HY-IG spread is ultimately a Risk-Management Indicator, not a yield-enhancing indicator.

- Alpha vs Risk: The strategy underperforms a simple Buy & Hold in absolute returns. However, it accomplishes something critical for institutional investors or retirees: It dramatically cuts the Max Drawdown (from -56.5% to -32.9%).
- Mechanism: By moving to cash 26% of the time based purely on HY-IG spread signals (specifically navigating the Danger Zone and Sudden Shocks), the strategy effectively sidesteps the deepest parts of global financial crises (like 2008 and 2020), smoothing out the equity curve significantly.



Strategy Backtest