

1. Introduction

Financial markets are strongly influenced by collective investor psychology, where emotions such as fear and greed often drive trading decisions beyond purely rational analysis. In highly volatile markets like cryptocurrency trading, understanding the relationship between market sentiment and trader behavior becomes especially critical. Traders may increase risk exposure during optimistic periods or adopt defensive strategies during periods of uncertainty.

This report analyzes the relationship between trader behavior and overall market sentiment using historical trading data from the Hyperliquid platform alongside the Bitcoin Fear & Greed Index. The objective of this study is to examine how key trading metrics—such as profitability, leverage usage, and trading volume—vary across different sentiment regimes. By identifying behavioral patterns associated with fear- and greed-driven markets, the analysis aims to uncover insights that can support more informed trading strategies and improved risk management in Web3 trading environments.

2. Dataset Overview

This analysis is based on two primary datasets that together capture both market sentiment and trader-level activity.

The first dataset consists of historical trader data collected from the Hyperliquid trading platform. It includes detailed trade-level information such as execution price, trade size (in both tokens and USD), trade direction, leverage, transaction fees, and realized profit or loss (PnL). This dataset enables an in-depth examination of trader behavior, risk exposure, and performance over time.

The second dataset is the Bitcoin Fear & Greed Index, which provides a daily classification of overall market sentiment. Market sentiment is categorized into qualitative labels such as *Extreme Fear*, *Fear*, *Neutral*, *Greed*, and *Extreme Greed*. This index serves as a widely used proxy for investor psychology in the cryptocurrency market.

Both datasets were merged using the **date** field to align daily market sentiment with corresponding trading activity. This integration allows for sentiment-wise analysis of trading behavior and performance.

3. Feature Engineering Summary

To enable meaningful analysis, several derived features were created from the raw datasets. Feature engineering was performed to transform trade-level data into daily-level behavioral metrics that could be compared across sentiment regimes.

The following features were engineered:

- **Daily Profit and Loss (PnL):**
Total realized PnL was aggregated per trading day to assess overall profitability under different sentiment conditions.

- **Trading Volume (USD):**
Trade volume was calculated in USD to measure the level of market participation and activity across sentiment phases.
- **Average Leverage:**
Leverage values were averaged on a daily basis to capture changes in risk-taking behavior during different market moods.
- **Sentiment Encoding:**
Market sentiment classifications were numerically encoded on a scale from **-2 (Extreme Fear)** to **+2 (Extreme Greed)**, enabling quantitative analysis and correlation with trading metrics.

Feature engineering allowed raw transactional data to be transformed into structured behavioral indicators, making it possible to systematically analyze how trader actions align with broader market sentiment.

4. Key Analysis & Visual Insights

This section presents the core findings of the analysis, supported by visualizations generated during exploratory data analysis.

Profitability vs Market Sentiment

The analysis reveals that average profitability tends to increase during Greed and Extreme Greed phases. However, these periods also exhibit significantly higher variance in PnL, indicating increased volatility in trading outcomes. While optimistic market sentiment may create opportunities for higher returns, it simultaneously exposes traders to greater downside risk. In contrast, Fear-driven periods generally show lower average profitability but more stable outcomes.

Leverage vs Market Sentiment

Leverage usage shows a clear upward trend during Greed and Extreme Greed phases. Traders consistently employ higher leverage during optimistic market conditions, reflecting aggressive risk-taking behavior and stronger conviction in market direction. Conversely, during Fear and Extreme Fear phases, leverage usage declines, suggesting more cautious positioning and risk aversion.

Trading Volume vs Market Sentiment

Trading activity, measured through USD trade volume, peaks during Greed-driven markets. This indicates increased market participation and heightened speculative interest when sentiment is positive. In contrast, Fear phases are characterized by reduced trading volume, signaling hesitation, lower liquidity, and more conservative participation by traders.

Overall, these visual insights highlight the strong influence of sentiment on trader behavior, particularly in terms of risk exposure and activity levels.

5. Conclusion

The findings of this analysis demonstrate a strong and consistent relationship between market sentiment and trader behavior in cryptocurrency markets. Greed-driven market conditions encourage higher leverage usage and increased trading volume, amplifying both potential returns and associated risks. Fear-driven periods, on the other hand, promote conservative behavior, reduced activity, and lower risk exposure.

These insights suggest that incorporating sentiment-aware indicators into trading strategies and risk management frameworks could significantly improve decision-making. By adjusting leverage and position sizing based on prevailing market sentiment, traders and trading platforms can better navigate market volatility and enhance long-term performance.