

Analyzing Trader Behavior and Market Sentiment in Bitcoin Trading

Introduction

This study examines how trader behavior, profitability, volume, and risk align with Bitcoin market sentiment ranging from Fear to Greed. Using historical order data from Hyperliquid and the Fear & Greed sentiment index, we reveal behavioral patterns influencing smarter Web3 trading strategies.

Data Overview

- Sentiment Dataset: Daily Fear & Greed index classifications and values from 2018 to 2025.
- Trader Dataset: Transaction level data from 32 traders and 246 trading symbols during 2024, including metrics like trade size, profit/loss, and timestamps.

Methodology

- Date and time fields were standardized to datetime types across datasets.
- Missing data verification confirmed dataset integrity.
- Trader data is aggregated daily for key metrics: total trades, unique traders, average closed profit/loss, and total volume.
- Daily sentiment classifications merged with aggregated trader metrics.
- Visual explorations and statistical tests compared trader behavior during different sentiment regimes.
- Risk proxies, trade size variability (standard deviation), and maximum trade size were computed and analyzed by sentiment.
- Correlation coefficients quantified associations between continuous sentiment scores and trading activity.

Key Findings

Trading Activity Surges During Fear

- **Total trades:** Fear (139) vs. Greed (58).
- **Trading volume:** Fear (3.75M) vs. Greed (1.15M).
- Differences are statistically significant ($p < 0.05$).
- Boxplots confirm wider spreads and more extreme outliers in Fear, indicating intense bursts of trading during negative sentiment phases.

Risk-Taking Amplifies Under Fear

- Both **maximum trade sizes** and **variability (STD)** of trade volumes are higher during Fear and Extreme Fear.
- Traders adopt larger, riskier positions when markets are distressed, reflecting a mix of forced liquidations and opportunistic entries.

Stable Trader Participation

- **Unique traders:** Fear (1.59) vs. Greed (1.46).
- No significant difference ($p = 0.245$).
- This shows that the pool of active traders remains stable, but their behavior shifts dramatically under Fear, resulting in more activity per trader.

Profitability Differences Are Not Significant

- Average closed PnL: Fear (200) vs. Greed (90).
- The difference is not statistically significant ($p = 0.376$).
- Profitability distributions, however, show high variability and extreme outliers, especially in Neutral and Extreme Fear regimes—indicating inconsistent outcomes.

Weak Correlations, Stronger Regime Effects

- Correlations between sentiment scores and trading metrics (volume, trades, PnL) are weakly negative (-0.116 to -0.182).
- Regime-based comparisons (Fear vs. Greed) reveal much stronger behavioral differences than linear sentiment values, underscoring the importance of regime analysis.

Conclusions

Contrary to the belief that optimism fuels trading activity, this analysis shows that **Fear-driven markets are significantly more active than Greed phases**. Elevated trade counts, higher volumes, and riskier position sizes suggest that panic selling, forced liquidations, and opportunistic entries dominate behavior when fear prevails.

While profitability itself does not differ meaningfully between regimes, outcomes are far more **variable and uncertain** under Fear. These findings highlight that market stress amplifies both trading activity and volatility, creating environments of heightened risk but also opportunity.

Recommendations

- **Intraday Monitoring:** Track hourly sentiment shifts to capture short-lived trading bursts during fear spikes.
- **Risk Controls:** Apply stricter leverage and position size limits during Fear phases to mitigate volatility risks.
- **Adaptive Strategies:** Automate trading strategies that dynamically adjust aggressiveness based on prevailing sentiment regimes.

Appendix

A. Data Files

- **Daily Aggregated Trader Data:** [daily_trader_metrics.csv](#)
- **Merged Trader Data with Sentiment Labels:** [merged_trader_sentiment.csv](#)

B. Code and Reproducibility

- **Analysis Notebook:** [notebook_1.ipynb](#)
- **GitHub Repository:** [GitHub Repo Link](#)

C. Visual Insights - [Outputs](#)





