Trader Behaviour vs Market Sentiment

Data Science Analysis Report

1. Introduction

Financial markets are strongly influenced by investor psychology, particularly during periods of heightened fear or greed. In crypto markets, where volatility is high and participation is largely retail-driven, understanding how traders behave across sentiment regimes can offer meaningful strategic insights.

This project analyzes the relationship between **market sentiment (Fear–Greed Index)** and **trader behavior** using historical trading data from Hyperliquid. The focus is on understanding how **trading activity, risk exposure, and risk-adjusted performance** vary across different sentiment conditions and whether certain regimes consistently lead to better or worse outcomes.

2. Datasets Used

2.1 Bitcoin Market Sentiment Dataset

- Daily sentiment classification:
  - Extreme Fear
  - Fear
  - Neutral
  - Greed
  - Extreme Greed
- Used as an external macro-level indicator of overall market psychology.

2.2 Historical Trader Data (Hyperliquid)

- Trade-level data including:
  - Account, Coin/Symbol
  - Execution price, trade size (USD)
  - Side (Buy/Sell)
  - Closed PnL
  - Fees, timestamps, leverage (where available)

Trades were aligned to sentiment data using **daily granularity**.

3. Methodology

1. Trades were grouped by **market sentiment class**.
2. Key behavioural metrics were computed:
   - **Trading Activity** → Average number of trades
   - **Risk Exposure** → Average traded USD volume.
   - **Risk-Adjusted Performance** → Sharpe Ratio (PnL volatility-adjusted)
3. Aggregated metrics were visualized to compare trader behaviour across sentiment regimes.

4. Analysis & Findings

4.1 Trading Activity vs Market Sentiment

Observation:

- Trading activity peaks sharply during **Extreme Fear**.
- Trade counts drop significantly during **Extreme Greed** and **Greed**.
- Neutral sentiment shows moderate participation.

Interpretation:

- Extreme Fear triggers **panic-driven overtrading**, likely due to forced exits, stop-loss hits, or aggressive dip-buying.
- During Greed phases, traders appear more selective and patient, leading to fewer trades.
- This suggests that **emotional stress increases activity but not necessarily decision quality**.

Insight:

High trading frequency during Extreme Fear may reflect reactive behaviour rather than systematic strategy execution.

4.2 Risk-Adjusted Performance (Sharpe Ratio) vs Sentiment

Observation:

- **Extreme Greed** exhibits the highest Sharpe ratio.
- **Extreme Fear** also shows relatively strong risk-adjusted returns.
- Neutral sentiment has the lowest Sharpe ratio.

Interpretation:

- Extreme Greed phases likely coincide with strong trends, allowing traders to achieve higher returns relative to risk.
- Surprisingly, Extreme Fear also delivers solid risk-adjusted performance, indicating opportunities for **contrarian or mean-reversion strategies**.
- Neutral markets may lack clear direction, reducing performance efficiency.

Insight:

Clear emotional extremes (fear or greed) appear more exploitable than calm, directionless markets.

4.3 Exposure vs Market Sentiment

Observation:

- The highest exposure occurs during **Extreme Fear**.
- Exposure declines significantly during **Extreme Greed**.
- Fear and Neutral regimes show intermediate exposure levels.

Interpretation:

- Traders deploy the most capital during market crashes or sharp downturns, increasing risk substantially.

- Lower exposure during Extreme Greed suggests profit-taking or cautious positioning despite optimistic sentiment.
- This asymmetry highlights that **risk-taking is more aggressive in fear than in greed**.

Insight:

Traders are willing to risk more capital during fear-driven markets, potentially increasing drawdown risk.

5. Combined Behavioural Insights

By combining all three dimensions:

- **Extreme Fear**:
  - Highest activity
  - Highest exposure
  - Reasonable risk-adjusted returns
    → Indicates emotionally driven but opportunity-rich conditions.
- **Extreme Greed**:
  - Lower activity
  - Controlled exposure
  - Best Sharpe ratio
    → Suggests disciplined trend-following behavior.
- **Neutral**:
  - Moderate activity
  - Moderate exposure
  - Weak performance
    → Likely unsuitable for aggressive strategies.

6. Strategic Implications

- **Avoid overtrading during Extreme Fear**; focus on structured entries and position sizing.
- **Trend-following strategies perform best during Extreme Greed**, with controlled leverage.
- **Reduce activity during Neutral sentiment**, as risk-adjusted returns are weakest.
- Sentiment regimes can act as a **macro filter** for strategy activation rather than a direct trading signal.

7. Limitations

- Sentiment data is aggregated at a daily level and may not capture intraday psychology.
- Analysis is based on historical trades and does not account for unobserved trader intent.
- Coin-level dynamics were not isolated in this study.

8. Conclusion

Market sentiment significantly influences trader behaviour in crypto markets. Emotional extremes lead to higher engagement and clearer performance patterns, while neutral conditions dilute edge. Incorporating sentiment-aware risk management can improve decision-making and strategy robustness in volatile trading environments.