Trader Behavior Analysis Under Market Sentiment Regimes

1. Executive Summary

This report presents a comprehensive analysis of the relationship between trader behavior and Bitcoin market sentiment using the Fear & Greed Index. By examining historical trading data from Hyperliquid platform merged with daily sentiment indicators, we uncover key behavioral patterns that emerge during different market conditions.

➢ **Key Findings:**
   a. Traders demonstrate significantly higher average profits during Extreme Greed periods ($67.89) compared to Extreme Fear ($34.54)
   b. Risk-taking behavior varies considerably across sentiment phases, with Fear periods showing the highest average trade size ($7,816 USD)
   c. Win rates are highest during Extreme Greed (46.5%) and lowest during Extreme Fear (37.1%) - Market sentiment appears to influence both trading frequency and position sizing strategies
   d. Traders demonstrate significantly higher average profits during Extreme Greed periods ($67.89) compared to Extreme Fear ($34.54)

2. Introduction

Cryptocurrency markets are highly sensitive to investor sentiment, often amplifying price movements and influencing trader decision-making. The Bitcoin Fear & Greed Index provides a structured measure of market emotion, categorizing sentiment into Extreme Fear, Fear, Neutral, Greed, and Extreme Greed.

This analysis aims to evaluate how these sentiment regimes align with changes in trader profitability, risk exposure, and trading behavior.

Objectives:

- Examine trader profitability across sentiment regimes
- Analyze risk-taking behavior through trade size variation
- Study win/loss dynamics and directional bias
- Derive insights relevant to trading and risk management strategies

3. Data & Methodology:

Data Sources

- **Historical Trader Data (Hyperliquid):** Trade-level data including execution price, position size, direction, and closed PnL
- **Bitcoin Fear & Greed Index:** Daily sentiment classification from Extreme Fear to Extreme Greed

Data Processing

- Timestamp normalization and date extraction
- Validation and conversion of numerical fields
- Inner join on trading date to align sentiment with trades
- Feature engineering for win/loss classification

Analytical Approach

The study employs descriptive statistics, grouped aggregations, cross-tabulations, and visualization techniques to evaluate sentiment-based behavioral differences.

4. Results & Analysis

I. Trading Activity by Sentiment:

Sentiment	Trades	Share (%)
Fear	61,837	29.3
Greed	50,303	23.8
Extreme Greed	39,992	18.9
Neutral	37,686	17.8
Extreme Fear	21,400	10.1

Insight:

Trading activity remains highest during Fear, indicating continued market participation even under pessimistic conditions.

II. Profitability Across Sentiment Regimes:

Sentiment	Mean PnL($)	Total PnL($)
Extreme Greed	67.89	2,715,171
Fear	54.29	3,357,155
Greed	42.74	2,150,129
Extreme Fear	34.54	739,110
Neutral	34.31	1,292,921

Key Observations:

- Average trade profitability increases with more optimistic sentiment
- Fear periods generate the highest total PnL due to higher trade volume
- Trade efficiency improves during Greed and Extreme Greed phases

III. Win Rate by Market Sentiment:

Purpose:

Shows trade success probability across sentiment regimes.

Market Sentiment	Win Rate (%)
Extreme Greed	46.5
Fear	42.1
Neutral	39.7
Greed	38.5
Extreme Fear	37.1

Key Observations:

- As this table answer" **when do trades work better? and shows emotional impact on decision quality."**

IV. Risk-Taking Behavior (Trade Size):

Market Sentiment	Average Trade Size (USD)
Fear	7,816
Greed	5,737
Extreme Fear	5,350
Neutral	4,783
Extreme Greed	3,112

Key Finding:

Contrary to intuition, traders deploy the largest positions during Fear rather than Greed. This suggests opportunistic "buy-the-dip" behavior and more cautious exposure during euphoric market phases.

V.   Trading Direction Bias

Market Sentiment	Buy Ratio (%)
Extreme Fear	51.1
Neutral	50.3
Fear	48.9
Greed	48.9
Extreme Greed	44.9

Behavioral Pattern:

- Slight contrarian buying during Extreme Fear
- Increased selling during Extreme Greed, consistent with profit-taking behavior

5. Key Insights and Strategic Implications

Performance Patterns

- Trade-level profitability improves during Greed and Extreme Greed
- High Fear periods generate volume-driven profits rather than higher-quality trades

Behavioral Insights

- Traders increase exposure during Fear, indicating value-seeking behavior
- Reduced position sizes during Extreme Greed reflect awareness of overextended markets

Strategic Implications

- Market sentiment should be used as a contextual risk indicator
- Position sizing strategies can be dynamically adjusted based on sentiment regimes
- Extreme sentiment conditions warrant tighter risk controls due to higher volatility

6. Limitations and Future Scope

Limitations

- Analysis limited to a single trading platform
- Results may not generalize across all traders or market cycles

- Only executed trades are observed, introducing survivorship bias

Future Research Directions
- Multi-trader behavioral analysis
- Strategy-level backtesting with sentiment-based filters
- Intraday sentiment-response studies
- Cross-asset comparison across cryptocurrencies

7. Conclusion

The research substantiates the notion that market sentiment is a primary factor influencing traders in terms of behavior and performance in the cryptocurrency market. In the Fear periods, traders with large positions increase their activities, while the Greed and Extreme Greed phases assure higher trade-level profitability and win rates.

Final Takeaway:

Traders should not rely solely on market sentiment but rather consider it a strong contextual input for risk management, position sizing, and trade timing decisions. The consciousness of sentiment can be a source of considerable advantage for the traders operating in the increasingly volatile crypto markets.

8. Appendix A: Technical Overview

- **Tools:** Python, Pandas, NumPy, Matplotlib, Seaborn
- **Processing:** Data cleaning, type conversion, date-based merging
- **Methods:** Descriptive statistics, cross-tabulation, grouped aggregation
- **Visualization:** Boxplots for PnL distribution and risk analysis

Appendix B: Data Dictionary

Field Name	Description
Account	Trader wallet identifier
Coin	Trading Pair
Execution Price	Trade execution price
Size Tokens	Position size in tokens
Size USD	Position size in USD
Side	Trade direction (BUY/SELL)
Closed PnL	Profit/loss of trade
Classification	Market sentiment category

Analysis Period: February 2018 – December 2024

Total Trades Analyzed: 211,218

Data Sources: Hyperliquid, Bitcoin Fear & Greed Index