Trader Behavior vs Market Sentiment

An Empirical Analysis Using Hyperliquid Trading Data

Analysis Report

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Contents

1 Objective

The objective of this assignment is to analyze how trader behavior and performance change under different market sentiment conditions, using historical trading data from Hyperliquid and the Crypto Fear & Greed Index.

Specifically, we study how **profitability**, **risk-taking**, **win rate**, and **trading strategy** (Buy vs Sell) vary across different sentiment regimes such as Extreme Fear, Fear, Neutral, Greed, and Extreme Greed.

2 Datasets Used

2.1 Hyperliquid Trader Data

This dataset contains individual trade-level information, including:

- Execution price
- Trade size (USD and tokens)
- Trade direction (Buy / Sell)
- Start position
- Closed Profit & Loss (PnL)
- Transaction metadata

Each row represents a single executed trade.

2.2 Fear & Greed Index

This dataset provides daily market sentiment labels, including:

- Extreme Fear
- Fear
- Neutral
- Greed
- Extreme Greed

Each trading day is classified based on overall market psychology.

3 Data Preprocessing

The following steps were performed to ensure data integrity:

1. Converted trade timestamps into standard datetime format.
2. Extracted trading dates from timestamps.
3. Converted sentiment dates into the same date format.
4. Merged trader data with sentiment data using the trading date.
5. Checked for missing values across all columns.
6. Removed all rows with missing data to ensure clean analysis.

After preprocessing, the dataset contained only valid and complete trades, each tagged with the corresponding market sentiment.

4 Feature Engineering

Since leverage was not directly available, alternative risk and performance indicators were constructed:

Profitability: Measured using Closed PnL (Profit/Loss per trade).

Trade Risk: Approximated using Size USD, representing capital deployed per trade.

Win Indicator: A trade was considered a win if Closed PnL > 0.

Strategy Type: Trades were classified as Buy (Long) or Sell (Short) using the Side column.

These features allow meaningful analysis of trader behavior without relying on leverage data.

5 Profitability Analysis by Market Sentiment

Average Profit/Loss per trade shows a strong dependence on market sentiment.

Table 1: Average PnL per Trade by Sentiment

Sentiment	**Average PnL (USD)**
Extreme Greed	$\sim$ \$67.9
Fear	$\sim$ \$54.3
Extreme Fear	$\sim$ \$34.5
Neutral	$\sim$ \$34.5
Greed	Lower than Fear

Key Observations

- **Extreme Greed** has the highest average PnL ($\sim$ \$67.9).
- **Fear** also shows relatively strong profitability ($\sim$ \$54.3).
- Extreme Fear and Neutral periods show lower average profits ($\sim$ \$34–35).
- Surprisingly, Greed (non-extreme) shows lower profitability compared to Fear.

This suggests that traders perform best during emotionally extreme market phases, especially Extreme Greed.

6 Risk Analysis (Trade Size vs Sentiment)

Average trade size (USD) was used as a proxy for risk.

Key Observations

- The largest trades occur during **Fear** ($\sim \$7,816$).
- Greed also sees high trade sizes ($\sim \$5,736$).
- Extreme Greed surprisingly has the lowest average trade size ($\sim \$3,112$).

Traders appear to commit more capital during Fear than during Greed. This indicates that traders may deploy capital more aggressively during fear-driven markets, possibly attempting to buy perceived dips.

Table 2: Average Trade Size by Sentiment

Sentiment	Avg Trade Size (USD)
Fear	$\sim \$7,816$
Greed	$\sim \$5,736$
Extreme Fear	$\sim \$5,349$
Neutral	$\sim \$4,782$
Extreme Greed	$\sim \$3,112$

7 Win Rate Analysis

Win rate measures the percentage of profitable trades.

Table 3: Win Rate by Market Sentiment

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

Insight Although trade sizes are higher during Fear, win rates peak during Extreme Greed, indicating better trade timing and momentum-following behavior.

8 Strategy Analysis: Buy vs Sell

Profitability was further analyzed by separating Buy (Long) and Sell (Short) trades.

Key Findings

- During **Extreme Greed**, Sell trades are significantly more profitable than Buy trades.
- During **Fear**, Buy trades outperform Sell trades.
- In Greed and Neutral conditions, Sell trades consistently show higher average PnL.

Implications

- Contrarian strategies (selling during extreme optimism) perform well.
- Buying during Fear tends to be more profitable than selling.

9 Behavioral Analysis — Revenge Trading

Traders were analyzed to see if they increase trade size after a loss.

Table 4: Trade Size Behavior Post-Win vs Post-Loss

Previous Trade Outcome	Avg Next Trade Size ($)
After Win	$5,683
After Loss	$5,147

Insight Traders do **NOT** increase trade size after a loss. This shows disciplined risk management and no evidence of revenge trading in this dataset.

10 Business Implications

This analysis provides actionable insights for a Web3 trading firm:

- **Risk Controls:** Can be adjusted dynamically based on sentiment.
- **Capital Allocation:** Should be higher during Fear, but with tighter risk management.
- **Momentum Strategies:** Work best during Extreme Greed.
- **Short Positions:** May be favored during Greed phases.

Integrating sentiment-aware rules into trading systems can significantly improve performance.

11 Conclusion

The study demonstrates that market sentiment plays a critical role in shaping trader behavior and performance. Profitability, risk appetite, and strategy effectiveness all vary significantly across sentiment regimes.

Understanding these patterns allows trading firms to design smarter, sentiment-aware trading strategies and improve long-term outcomes.