REPORT

Impact of Market Sentiment on Trading Performance: A Hyperliquid Case Study

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Summary

The purpose of this analysis is to understand how **market sentiment** (Fear, Neutral, and Greed) affects **trading performance and behavior** on the Hyperliquid platform. The study combines historical trading data with the Fear & Greed Index to evaluate differences in profitability, win rate, and trade size across sentiment conditions.

The analysis is based on **211,224 historical trade executions** from Hyperliquid, aggregated into closed trades to measure realized performance. This trading data was merged with daily market sentiment data from the Fear & Greed Index. Net profit was calculated after deducting transaction fees to ensure realistic results.

The results show that **trades executed during Fear market conditions are the most profitable**, with an average Net PnL of approximately **894 USD per trade**, compared to **459 USD during Neutral** periods and **357 USD during Greed** periods. Win rates are also higher during Fear (~**83%**) and Neutral (~**83%**) markets than during Greed (~**77%**). Additionally, traders take **larger positions during Fear**, with an average trade size of about **65,690 USD**, compared to only **14,571 USD during Greed**, indicating higher confidence during pessimistic market conditions.

Problem Statement

Cryptocurrency markets are highly volatile and strongly influenced by emotions such as **fear and greed**. Traders often make decisions based on market sentiment, but it is unclear how these emotions actually affect **profitability, win rate, and risk-taking behavior**. This study aims to understand the impact of market sentiment on real trading performance using historical trading data.

Objectives

- Analyze **profitability** under different market sentiments
- Compare **win rates** across sentiment conditions
- Study **risk behavior** using trade size
- Identify **trader behavior patterns** during Fear and Greed markets

Dataset Description

- This analysis uses two primary datasets to study the relationship between market sentiment and trading performance.

Data Sources

- **Hyperliquid historical trade data**: Contains detailed records of executed cryptocurrency trades, including trade size, direction, execution price, fees, and realized profit or loss.
- **Fear & Greed Index**: Provides daily market sentiment scores representing overall market emotion, categorized into Fear, Neutral, and Greed.

Time Period Covered

- The datasets cover trading activity and sentiment data over the same overlapping time period to ensure accurate alignment between trades and market sentiment.

Number of Records

- Trading data includes **211,224 trade executions**.
- Sentiment data contains **daily sentiment records**.

Key Columns Used

- From trading data: Closed PnL, Size (USD), Direction, Fees, Timestamp
- From sentiment data: Date, Sentiment Category, Sentiment Score

Dataset Summary Table

Dataset	Records	Key Fields
Trading Data	211,224	PnL, Trade Size, Direction
Sentiment Data	Daily	Fear & Greed Score

Data Cleaning & Preparation

Proper data cleaning and preparation were essential to ensure that the analysis produced **accurate and reliable results**. Several steps were performed to standardize, clean, and structure the data before analysis.

1. **Handling Missing Values**

The dataset was first checked for missing or null values across all columns.
No missing values were found in either the trading dataset or the sentiment dataset.
This confirmed that the data was complete and suitable for further analysis without the need for imputation or record removal.

Why it matters:
Missing values can distort calculations and lead to incorrect conclusions. Ensuring data completeness improves result reliability.

2. **Timestamp Normalization**

Trade timestamps were originally stored as strings in Indian Standard Time (IST). These timestamps were converted into a standard datetime format. From this, a **Date** column was extracted to represent the trading day.

Why it matters:
Sentiment data is available on a **daily basis**, so normalizing timestamps ensures correct alignment between trades and the corresponding market sentiment.

3. **Trade Aggregation Logic**

Individual trade executions belonging to the same order were grouped together using:

- Order ID
- Account
- Coin
- Date
- Side and Direction

For each aggregated trade:

- Trade size and fees were summed
- Execution price was averaged
- Closed profit or loss was combined

Why it matters:
A single trade order may be executed in multiple parts. Aggregation ensures that performance is measured at the **trade level**, not at the execution level.

4. **Closed vs Open Trade Identification**

Trades were classified as **Closed** or **Open** based on whether they resulted in a realized profit or loss. Only **closed trades** were retained for analysis.

Why it matters:
Open trades do not reflect realized performance. Analyzing only closed trades ensures that profitability and win rate calculations are accurate.

5. **Fee-Adjusted Net PnL Calculation**

For each closed trade, **Net Profit and Loss (Net PnL)** was calculated by subtracting transaction fees from the closed PnL.

Net PnL = Closed PnL – Trading Fees

Why it matters:
Ignoring fees can overestimate profitability. Fee-adjusted PnL reflects **real trading outcomes**.

6. **Sentiment Normalization**

Market sentiment data contained multiple sentiment labels such as *Extreme Fear* and *Extreme Greed*. These were simplified into three categories:

- **Fear**
- **Neutral**
- **Greed**

Methodology

This study follows a structured analytical approach to evaluate the relationship between **market sentiment** and **trading performance**. The methodology focuses on ensuring accurate performance measurement and meaningful comparison across sentiment conditions.

Aggregation Level (Order-Level Analysis)

The original trading dataset contained multiple executions for a single trade order. To avoid double counting and to correctly represent actual trading decisions, all executions belonging to the same order were **aggregated into a single order-level trade**.

Aggregation was performed using:

- Order ID
- Account
- Coin
- Trade date
- Side and trade direction
- Trade sizes and fees were summed, execution prices were averaged, and profits or losses were combined.

Why this approach was used:
Order-level aggregation reflects the true outcome of a trader's decision rather than individual partial executions.

Performance Metrics Calculated

- To evaluate trading outcomes, the following key metrics were calculated:

1. Net Profit and Loss (Net PnL)

- Net PnL was calculated by subtracting trading fees from the closed profit or loss of each trade.
- This metric represents the **actual realized profit** from trading activity.

2. Win Rate

- Each trade was classified as:

- **Win (1)** if Net PnL > 0
- **Loss (0)** if Net PnL ≤ 0
- Win rate was calculated as the percentage of profitable trades within each sentiment category.
- This metric measures **consistency and accuracy** of trading decisions.

3. Trade Size

- Trade size was measured using the **USD value of each trade**.
  Average trade size was analyzed to understand **risk-taking behavior** under different sentiment conditions.
- Larger trade sizes indicate higher confidence and risk exposure.

Grouping Strategy (By Market Sentiment)

- After merging trading data with the Fear & Greed Index, trades were grouped into three sentiment categories:
- Fear
- Neutral
- Greed
- All performance metrics were then calculated separately for each sentiment group.

  Why this grouping was used:
  It allows direct comparison of trader behavior and performance across different emotional market environments.

Techniques Used

- To support analysis and interpretation, multiple visualization techniques were applied:
- **Bar charts** to compare average Net PnL and trade size across sentiments
- **Count plots** to compare win and loss frequencies
- **Box plots** to examine the distribution, volatility, and outliers of Net PnL
- These visual tools help identify patterns, trends, and differences that are not easily visible in raw numbers.

Key Insights & Interpretation

- **Fear sentiment yields the highest profitability**
  Trades executed during Fear market conditions produce the highest average profits. During these periods, asset prices are often lower due to panic selling, which creates better entry opportunities. Traders who act during Fear are able to benefit when the market later stabilizes or recovers.

- **Traders increase capital allocation during fear**
  The average trade size is significantly higher during Fear periods, indicating that traders are willing to invest more capital when market prices are depressed. This suggests higher confidence and a belief that the downside risk is limited compared to the potential upside.

- **Greed sentiment reduces win consistency**
  Even though prices are rising during Greed markets, the win rate is lower. This happens because many traders enter trades late, after most of the price movement has already occurred. Overconfidence and crowded positions reduce the likelihood of consistent profits.

- **Higher volatility during fear leads to better risk-adjusted returns**
  Fear markets show larger price fluctuations, which increases risk. However, these larger movements also create greater profit opportunities. As a result, despite higher volatility, traders achieve better returns relative to risk during Fear compared to Greed markets.

Visualization Interpretation

1.Average Trade Size (USD) by Market Sentiment

What the chart shows
This bar chart compares the average trade size in USD under three market sentiments: Fear, Neutral, and Greed.

Observations

- Trades during Fear have the largest average size (≈ 65,000 USD).
- Neutral sentiment shows a moderate average trade size (≈ 36,000 USD).
- Greed has the smallest average trade size (≈ 14,000 USD).

Interpretation
During Fear periods, traders deploy significantly more capital per trade, indicating higher conviction when prices are depressed. In contrast, Greed markets see smaller trade sizes, suggesting cautious positioning or late participation at higher prices.

Result
➞ Traders take bigger risks during Fear and smaller positions during Greed.

2.Average Net PnL by Market Sentiment

What the chart shows
This bar chart compares the average Net Profit and Loss (Net PnL) achieved under each sentiment condition.

Observations

- Fear sentiment produces the highest average Net PnL (≈ 894 USD).
- Neutral sentiment results in moderate profits (≈ 459 USD).
- Greed sentiment shows the lowest average Net PnL (≈ 357 USD).

Interpretation
Despite negative market emotion, Fear periods offer better entry prices and higher upside potential. Greed periods, although optimistic, often lead to reduced profitability due to overextended prices and crowded trades.

Result
➞ Fear markets are the most profitable, while Greed markets underperform.

3. Win vs Loss Count under Each Sentiment

What the chart shows
This count plot displays the number of winning and losing trades for each market sentiment.

Observations

- All sentiments show more winning trades than losing trades.
- Fear and Neutral sentiments have a higher proportion of winning trades.
- Greed sentiment shows relatively more losses compared to its wins.

Interpretation
Higher win counts during Fear and Neutral conditions suggest better trade accuracy and decision-making. In Greed markets, emotional trading and late entries reduce consistency, increasing the number of losing trades.

Result
➞ Win consistency drops during Greed, even when market sentiment is positive.

4.Net PnL Distribution under Different Market Sentiments (Boxplot)

What the chart shows
This boxplot compares the distribution of Net PnL, including median values, spread, and outliers, across sentiment categories.

Observations

- Fear shows a wider distribution with large positive outliers.
- Greed shows a tighter distribution with lower median profit.
- Neutral remains balanced with moderate variability.

Interpretation
Fear markets are more volatile, meaning profits and losses fluctuate more. However, the presence of large positive outliers indicates strong upside potential. Greed markets show limited upside and lower median returns, despite lower volatility.

Conclusion

This report shows that market sentiment has a clear impact on trading performance. Trades executed during Fear conditions achieve higher profitability, better win rates, and larger capital allocation compared to Greed conditions. Although Fear markets are more volatile, they offer better entry opportunities and stronger risk-adjusted returns. In contrast, Greed markets reduce trade consistency due to overconfidence and late entries. Overall, the results support the effectiveness of contrarian, sentiment-aware trading strategies in cryptocurrency markets.

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