# Trader Behavior Analysis Under Market Sentiment

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Abstract

This report analyzes the relationship between trader behavior and overall market sentiment using historical trading data and the Bitcoin Fear & Greed Index. The objective is to understand how trade volume and buy/sell behavior vary across different sentiment regimes such as fear, greed, and neutral conditions. The analysis focuses on behavioral patterns rather than predictive modeling.

## 1 Introduction

Market sentiment plays a critical role in influencing trading decisions, particularly in highly volatile markets such as cryptocurrencies. Traders often react differently under conditions of fear and greed, leading to variations in trade size, activity, and directional bias.

This study aims to examine how trader behavior aligns with daily market sentiment by analyzing trade volume and buy/sell activity across sentiment categories derived from the Fear & Greed Index.

## 2 Datasets Used

Two datasets were used for this analysis:

- Historical Trader Data: Contains individual trade records including timestamp, trade size in USD, trade direction (buy/sell), and realized profit or loss.
- Fear & Greed Index: Provides daily market sentiment labels such as Fear, Greed, Extreme Fear, Extreme Greed, and Neutral.

Both datasets were merged using calendar dates to associate each trade with the corresponding market sentiment.

## 3 Data Preprocessing

The trader dataset contained timestamps stored as Unix epoch values in milliseconds. These timestamps were converted into standard datetime format to extract daily dates. This conversion was necessary to correctly align the trader data with the daily sentiment index.

Only overlapping dates between the trader data and the sentiment dataset were considered to ensure valid analysis.

## 4 Exploratory Data Analysis

### 4.1 Market Sentiment Distribution

An initial analysis of sentiment distribution revealed that a significant proportion of trades occurred during fear-dominated market conditions. This indicates higher trading activity during periods of market uncertainty or negative sentiment.

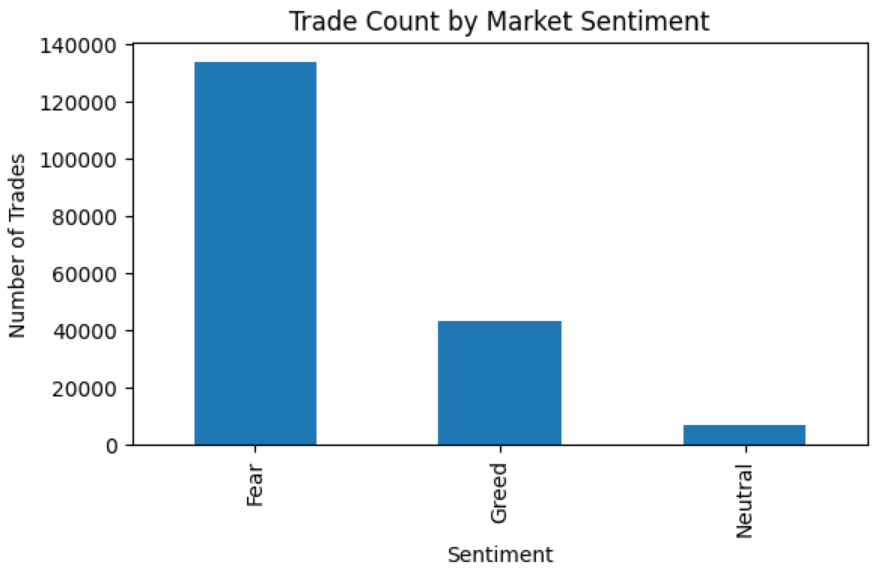


Figure 1: Distribution of trades across market sentiment categories

Figure 1 shows that most trades occurred during fear-dominated market conditions.

### 4.2 Trade Volume by Sentiment

To analyze trading intensity, the absolute trade size in USD was used as a measure of trade volume. The average trade volume was computed for each sentiment category.

The results show that average trade size is highest during fear periods, followed by greed and neutral conditions. This suggests that traders tend to place larger trades when market sentiment is negative.

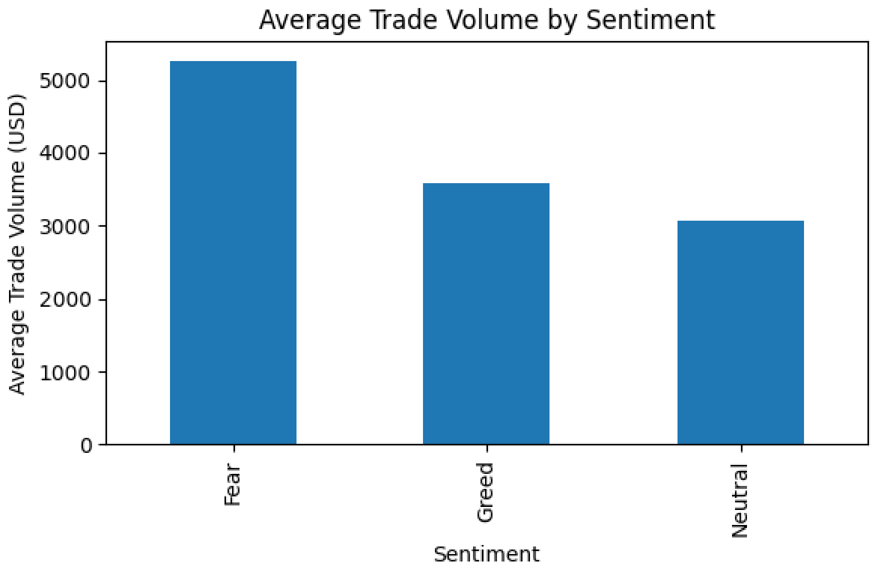


Figure 2: Average trade volume across market sentiment categories

The results indicate that average trade size is highest during fear periods, suggesting increased risk exposure during market uncertainty.

## 4.3 Buy vs Sell Behavior

Buy and sell trades were examined across different market sentiment categories to understand directional trading behavior. During fear-dominated periods, the number of buy and sell trades was found to be almost evenly balanced. This indicates a high level of uncertainty among traders, where market participants are divided between entering new positions and exiting existing ones in response to volatile conditions.

In contrast, periods characterized by greed showed a noticeably higher number of sell trades compared to buy trades. This behavior suggests profit-taking activity, where traders choose to close positions after favorable price movements rather than initiating new trades. Such behavior is commonly observed during optimistic market phases when prices are perceived to be near local highs.

Neutral sentiment periods exhibited relatively low trading activity overall, with no strong dominance of either buy or sell trades. This reflects reduced market participation and lower conviction when sentiment indicators do not strongly favor either optimism or pessimism.

Overall, the buy and sell patterns across sentiment regimes highlight how trader decision-making and risk appetite vary with changing market psychology.

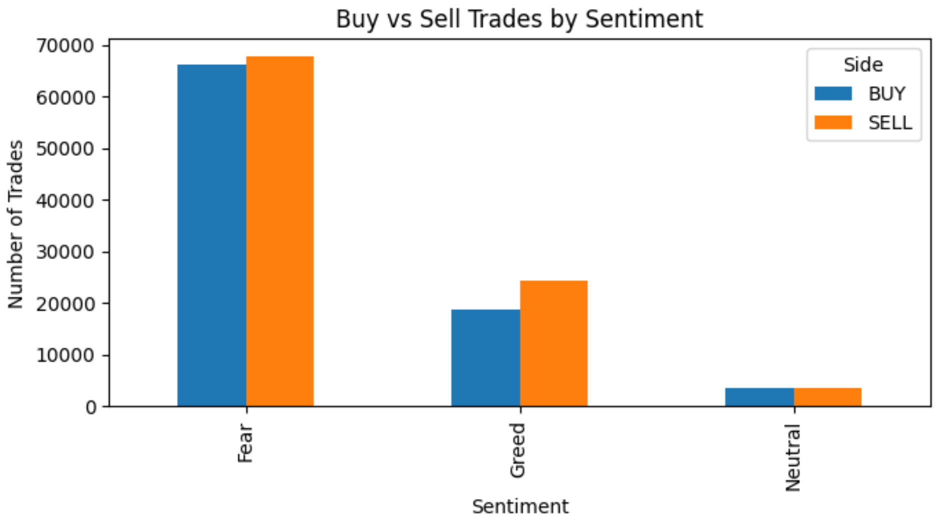


Figure 3: Buy vs sell trades across different market sentiment regimes

During greed periods, sell trades outnumber buy trades, which may reflect profit-taking behavior among traders.

# 5 Key Findings

- Trading activity is highest during fear-dominated market conditions.
- Average trade size is larger during fear periods, indicating increased risk exposure.
- Greed periods show a higher proportion of sell trades, likely due to profit booking.
- Neutral sentiment corresponds to lower overall market participation.

These observations are consistent with commonly observed market behavior during volatile and uncertain conditions.

# 6 Conclusion

This analysis demonstrates that market sentiment has a noticeable impact on trader behavior. Fear-dominated periods are associated with increased trading activity and larger trade sizes, while greed periods exhibit stronger selling behavior. Understanding these patterns can help traders and analysts better interpret market dynamics and participant behavior.

Future work could extend this analysis by incorporating asset-level breakdowns or longer historical windows to further validate these findings.