

## Report: Market Sentiment vs Trading Behaviour & Profitability

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### 1. Objective of the Analysis

The purpose of this analysis is to understand how **market sentiment**—measured by the *Fear–Greed Index*—correlates with:

- Trading **profitability**
- **Risk behaviour** (PnL volatility)
- **Trading volume**
- **Leverage / position size**

This analysis merges sentiment data with trade performance data on a *month-to-month* basis and visualizes how trading outcomes fluctuate across different market conditions: **Fear**, **Neutral**, and **Greed**.

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### 2. How the Code Processes the Data (Step-by-Step Explanation)

#### Step 1 — Load Data

You load two CSV files:

- **Fear & Greed Index data**
- **Historical trading data** (PnL and position sizes)

```
trades = pd.read_csv("fear_greed_index - Copy.csv")
sentiment = pd.read_csv("historical_data - Copy.csv")
```

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#### Step 2 — Convert Timestamps to Real Dates

Both datasets had timestamps in different formats, so you:

- Convert Unix timestamps (seconds) → dates
- Convert millisecond timestamps → dates
- Strip the time to keep only the **date** part.

This ensures the datasets are time-aligned.

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#### Step 3 — Create “Year-Month” Grouping

To study long-term patterns, you convert each date into a **year-month period**:

```
trades["year_month"] = pd.to_datetime(trades["date"]).dt.to_period("M")
sentiment["year_month"] = pd.to_datetime(sentiment["date"]).dt.to_period("M")
```

This allows you to group data month-wise—ideal for sentiment analysis.

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#### Step 4 — Aggregate Both Datasets Monthly

You compute monthly averages and totals:

- From sentiment dataset (Fear–Greed Index):
  - **Average index value per month**
- From trade dataset:
  - **Total Closed PnL** per month
  - **Total trade volume (Size USD)** per month

This creates a compressed but powerful time-series dataset.

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#### Step 5 — Merge the Two Datasets

You merge monthly sentiment and trading outcomes using:

```
final = trades_monthly.merge(sentiment_monthly, on="year_month", how="left")
```

This creates a final dataset linking sentiment to real trading results.

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#### Step 6 — Compute PnL Volatility (Risk Behaviour)

You first calculate month-to-month **PnL changes**, then compute standard deviation of these changes for each sentiment category:

- Fear
- Neutral
- Greed

This gives a proxy for **risk-taking behaviour**.

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#### Step 7 — Sentiment Classification

You convert the Fear–Greed Index numeric values to categories:

##### Index Value Category

< 40	Fear
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## **Index Value Category**

40–60      **Neutral**

> 60      **Greed**

This helps compare trading behaviour across emotional market conditions.

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## **Step 8 — Visualization**

You generate four visual analyses:

1. Profitability vs Sentiment
2. Risk (Volatility) vs Sentiment
3. Trading Volume vs Sentiment
4. Position Size / Leverage vs Sentiment

Each graph attempts to reveal a behavioral pattern.

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### **3. Insights from the Graphs**

Below is an interpretation of each graph you generated.

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#### **A. Profitability vs Market Sentiment**



*Scatter Plot*

##### **Key Insight:**

There is **no direct linear relationship** between Fear–Greed Index and total profitability.

- Some months with **moderate sentiment (50–60)** show high profitability.
- Extreme sentiment (very high or very low) does **not consistently** correlate with profit.
- There is a high-profit outlier around sentiment ≈ 45.

##### **Interpretation:**

Profitability may depend more on **trade timing or strategy** than sentiment alone.

Sentiment influences behaviour—but not directly PnL.

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#### **B. PnL Volatility (Risk Behaviour) vs Sentiment Category**



*Bar Chart: Volatility for Fear, Neutral, Greed*

##### **Key Insight:**

**Neutral markets show the highest PnL volatility.**

- **Greed** markets show surprisingly *low* volatility.
- **Neutral** conditions seem to cause large swings in profits and losses.

#### Interpretation:

Neutral sentiment periods may be transitional market phases, where:

- price direction isn't clear
- traders overreact or underreact
- uncertainty leads to inconsistent decisions

This produces **higher risk behaviour**.

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### C. Trading Volume in Fear vs Greed



*Bar Chart: Average Volume*

#### Key Insight:

Trading volume is **much higher in Neutral sentiment** compared to Greed.

- Neutral sentiment → highest volume
- Greed sentiment → relatively low volume

#### Interpretation:

In "Greed" conditions, the market may be:

- stable
- trending clearly
- attracting less panic trading

Neutral markets may encourage **more trades** because participants are unsure and adjusting frequently.

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### D. Leverage / Position Size in Fear vs Greed



*Bar Chart: Average Position Size*

#### Key Insight:

Position sizes behave the **same way as trading volume**:

- Largest in Neutral markets
- Smallest in Greed markets

#### Interpretation:

When traders feel uncertain (Neutral), they take:

- bigger positions
- more frequent trades
- higher leverage exposure

Greed markets may give a sense of stability → less aggressive positioning.

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#### 4. Summary of Findings

##### ✓ Sentiment alone does NOT predict profitability

Profit depends on strategy and timing, not purely market mood.

##### ✓ Neutral sentiment = highest risk-taking

PnL volatility peaks during uncertain markets.

##### ✓ Neutral sentiment = highest trading activity

Traders tend to trade more and use larger position sizes.

##### ✓ Greed sentiment = lowest risk behaviour

Contrary to expectation, “Greed” phases appear calmer and less volatile.

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#### 5. What This Analysis Suggests

- Traders may **overreact during unclear markets**, creating volatility.
- Greed is not always dangerous—many strategies favour strong upward trends.
- Fear doesn’t always cause loss—some months with fear sentiment show high profits.
- Market sentiment data is useful, but only when combined with strategy and trend analysis.