Trading Behavior and Risk Assessment Across Fear–Greed Regimes

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1 Objective

This assessment evaluates whether trading behavior, profitability, and risk characteristics differ across market sentiment regimes defined by the Fear & Greed Index (FGI). The analysis aggregates trade outcomes to the *account–day* level and then compares summary metrics across regimes.

2 Data and Preprocessing

2.1 Inputs

- Historical trades dataset (`historicaldata.csv`): **211,224** trade rows.
- Fear–Greed Index dataset (`feargreedindex.csv`): daily FGI values and classification labels (date range 2018–02–01 to 2025–05–02).

2.2 Merge and Filtering

Trades were timestamp-parsed to daily granularity and left-joined with daily FGI on date. Because the trades extend beyond the FGI end date, the sample was restricted to the overlap window:

- Overlap date range: 2023–01–05 to 2025–05–02.
- Trades retained in overlap window: **35,864** trades with FGI available.
- Aggregated units: **32** unique accounts and **158** unique days.

3 Metrics

All regime-level metrics are computed from account–day aggregates.

3.1 Profitability (after costs)

- Daily PnL: $\texttt{dailypnl} = \sum \texttt{Closed PnL}$.
- Daily fees: $\texttt{fees} = \sum \texttt{Fee}$.
- **Net PnL**: $\texttt{net\_pnl} = \texttt{dailypnl} - \texttt{fees}$.
- Win rate: fraction of winning trades within each account–day.

3.2 Risk and intensity proxies

- Volatility proxy: `net_pnl_std` (standard deviation of daily net PnL within a regime).
- Downside frequency: `loss_rate` $= E[\mathbf{1}(\texttt{net\_pnl} < 0)]$.
- Drawdown (PnL units): per-account equity curve $E_t = \sum_{i \le t} \texttt{net\_pnl}_i$; drawdown $DD_t = E_t - \max_{i \le t} E_i$.
- Worst drawdown: minimum observed DD_t in the regime.
- Leverage / risk-taking proxy: `avg_notional_per_trade` = `volume_usd`/`trades`.
- Market-taking tendency: `taker_share` (fraction of trades where `Crossed=True`).

4 Regime-Level Summary

Table 1 reports regime-level averages and risk proxies.

Table 1: Risk and behavior metrics by Fear–Greed regime (account–day level).

Regime	Days	Avg net PnL	Net PnL SD	Loss rate	Avg drawdown	Worst drawdown	Avg volume
Greed	191	3127.18	24733.00	0.3613	-8825.03	-123960.82	298
Fear	157	11232.69	55821.02	0.3503	-11376.02	-126618.88	507
Extreme Greed	112	10287.46	57883.79	0.3839	-8442.75	-109074.04	162
Neutral	37	1949.04	5606.08	0.4054	-9143.02	-101162.39	322
Extreme Fear	33	84.95	1503.66	0.5758	-10616.51	-123972.01	290

Observations (descriptive). Extreme Fear exhibits the highest loss-day frequency (loss rate ≈ 0.576) and much lower average net PnL compared to Greed. Greed/Fear/Extreme Greed show substantially higher regime-level net PnL dispersion (SD) than Extreme Fear, indicating more variable outcomes.

5 Statistical Significance Test (Example)

To formally test whether mean net PnL differs across regimes, we compare **Extreme Fear** vs **Greed** using Welch's two-sample t-test (unequal variances).

5.1 Hypotheses

$$H_0 : \mu_{\text{Extreme Fear}} = \mu_{\text{Greed}}, \qquad H_1 : \mu_{\text{Extreme Fear}} \neq \mu_{\text{Greed}}.$$

5.2 Results

Welch t-test:

$$t = -1.6820, \qquad p = 0.0941.$$

Effect size (Cohen's d):

$$d = -0.1329.$$

Interpretation. At the conventional $\alpha = 0.05$ level, this test does **not** reject H_0 because $p = 0.0941 > 0.05$. The effect size is small in magnitude ($|d| \approx 0.13$), suggesting limited practical difference in *mean* net PnL between Extreme Fear and Greed in this sample.

6 Conclusion and Next Steps

- The regime tables indicate *descriptive* differences across sentiment states, especially in downside frequency (loss rate) and volatility proxies.
- The specific hypothesis test on mean net PnL (Extreme Fear vs Greed) is not significant at 5% and shows a small effect size.
- Recommended follow-up tests: run Welch tests (and effect sizes) on risk-centric variables such as `loss_rate`, `abs(net_pnl)` / dispersion, drawdown metrics, and `avg_notional_per_trade`, with multiple-testing control if many pairwise comparisons are performed.