Trader Behavior vs Market Sentiment – Hiring Assignment

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Executive Summary

This project analyzes 211,224 Hyperliquid trades from 32 wallets against the Bitcoin Fear & Greed Index to uncover behavior–regime edges and deploy a calibrated prediction policy that filters high-probability trades. Overall win rate is 41.13% with $10.30M total PnL after fees and $245.86k fees paid. Results confirm regimes matter, behavior matters, and even a weak classifier yields economic lift when used as a filter.
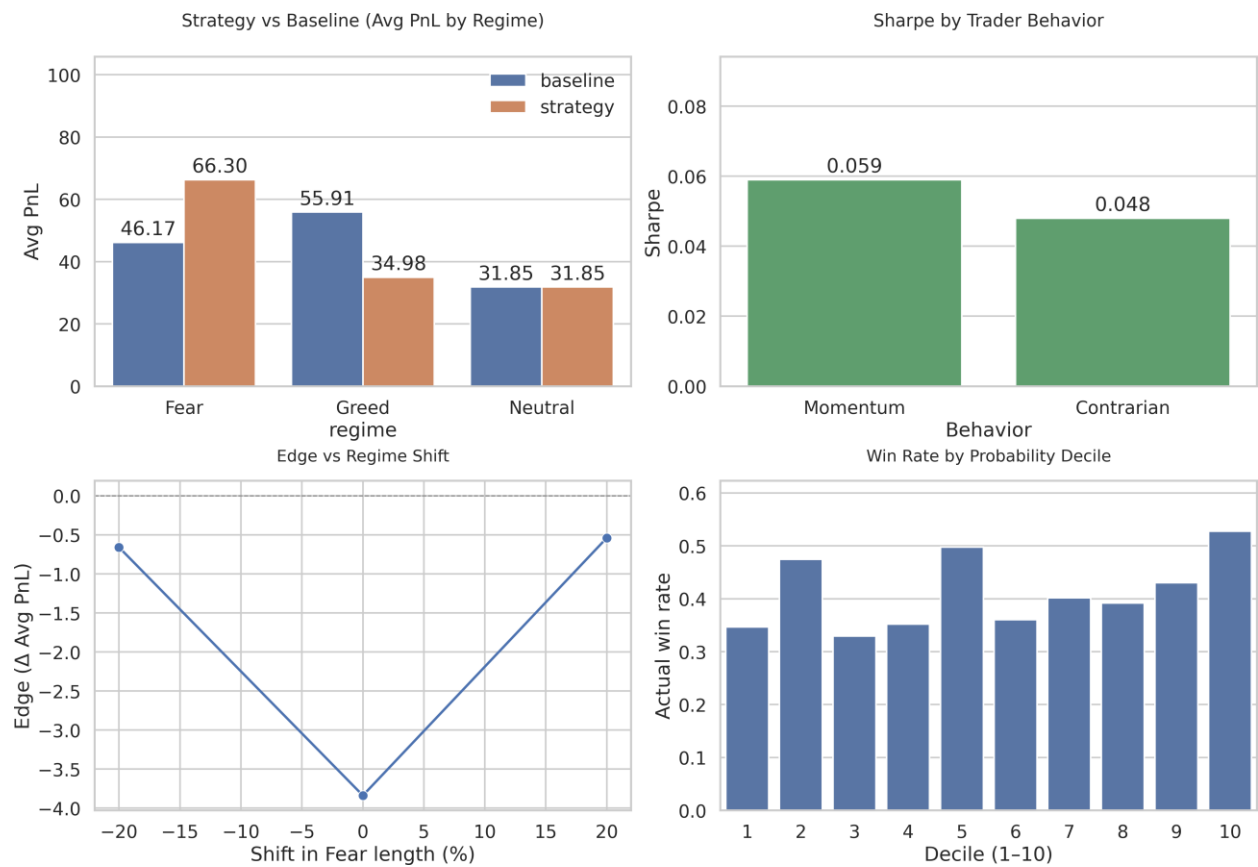

Figure 1: Executive dashboard of key results

Data & Preparation

- Cleaned/standardized trade schema; engineered pnl_after_fees, is_win, notional_usd, and regime.

- Sentiment merged per trade without loss: Fear 61,510, Greed 48,668, Extreme Greed 40,180, Neutral 39,563, Extreme Fear 21,303.

- Scope: 32 wallets, 246 coins, 2023-04-30 → 2025-05-01; overall win rate 41.13%; total fees $245,857.72.

Four Trader Types (Behavior × Order Type)

What it shows: Crossing behavior (Contrarian vs Momentum) with order type (Maker vs Taker) yields four personas to route orders by regime.

- **Contrarian-Maker:** Best in Fear—contrarian edge + rebates; default in Fear with baseline or 9 decile score.

- **Momentum-Taker:** Best in Greed—captures momentum despite fees; use in Greed with 10 decile score.

- **Contrarian-Taker and Momentum-Maker:** Generally dominated; consider only with strong probabilities or liquidity constraints.

Differentiator 1 – Contrarian vs Momentum

What it shows: Stable behavior exists by regime; contrarians excel in Fear while momentum excels in Greed.

- Coverage: 28 traders; 14/14 split by median contrarian_delta.

- Outcomes: Contrarian—Fear 46.64% vs Greed 33.69% (PnL Δ +$69.49/trader); Momentum inverts in Greed.

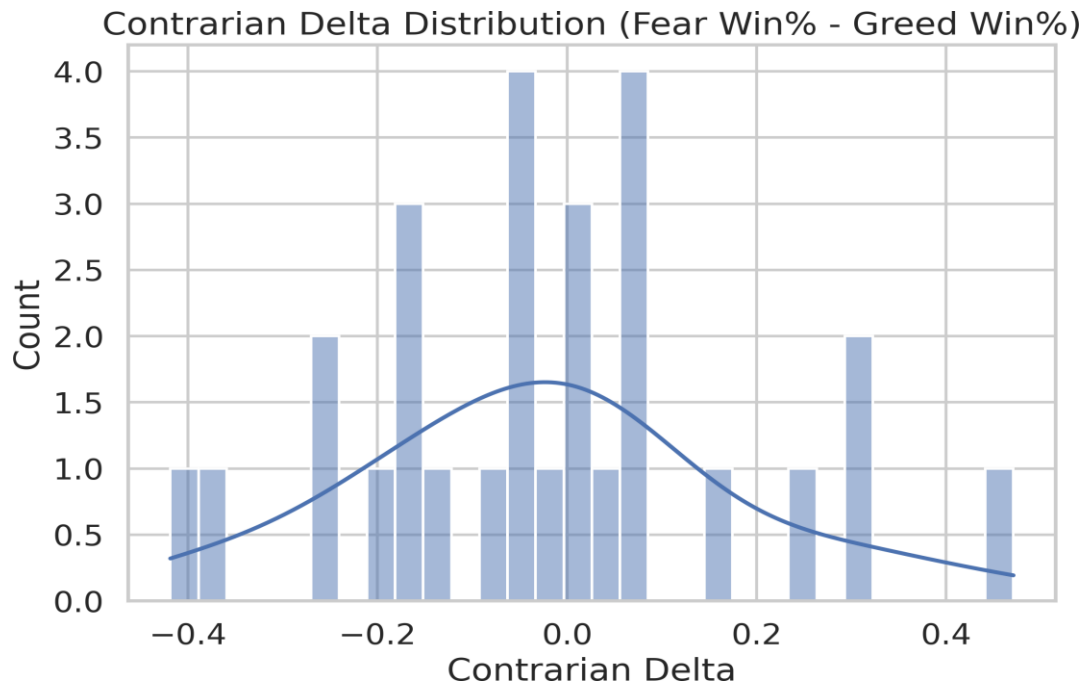- Significance: ²=11.53 (p=0.009) significant; per-trader t-test p=0.614 not significant.

Figure 2: D1: Contrarian delta distribution

Differentiator 2 – Taker vs Maker

What it shows: Order type creates a structural PnL gap magnified by fees and sentiment.

- Makers $69.09 vs Takers $35.63; taker fee impact −$1.776/trade.

- Mann–Whitney significant (U=4.596e9, p<1e−6).

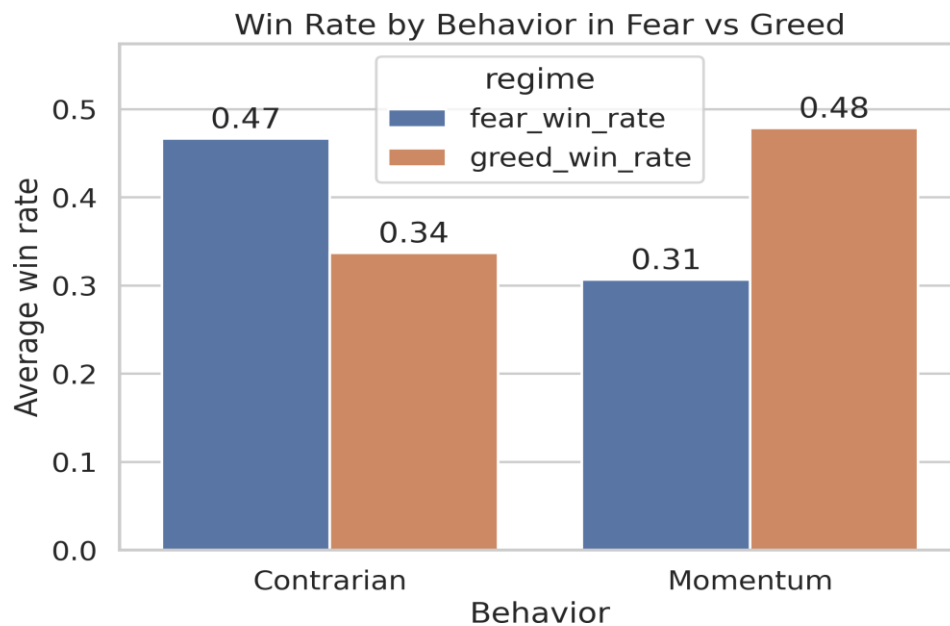- Makers lead in Greed/Extreme Greed; Takers lead in Extreme Fear.
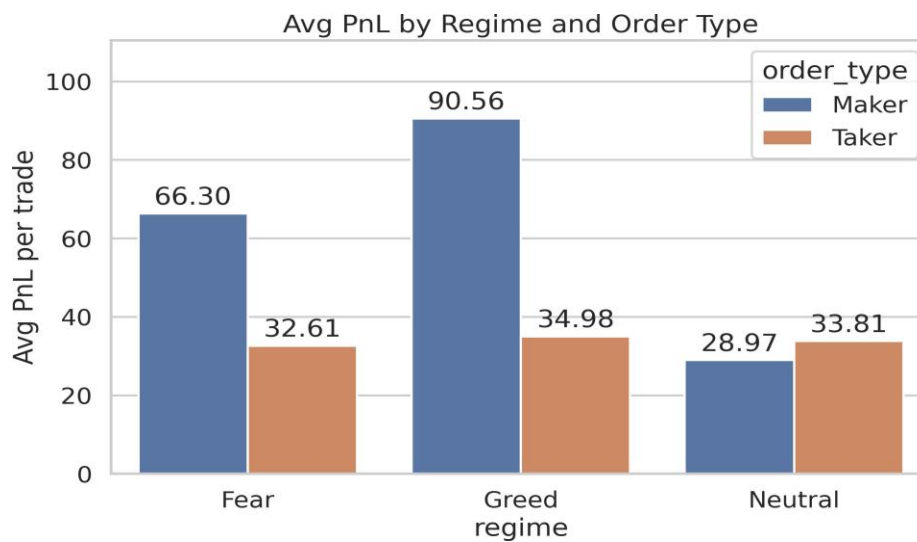

Figure 3: D1: Behavior × Regime win rate.

Figure 4: D2: Avg PnL by regime & order type

Differentiator 3 – Risk & Tests

What it shows: Regimes shift risk-adjusted returns and pass multiple significance tests.

- Sharpe: Extreme Greed 0.088 > Neutral 0.057 > Fear 0.050; Profit Factor strongest in Extreme Greed (10.26x).

- Tests: t-test Fear vs Greed p=0.040; ANOVA p=3.70e−5; ² p<1e−10.

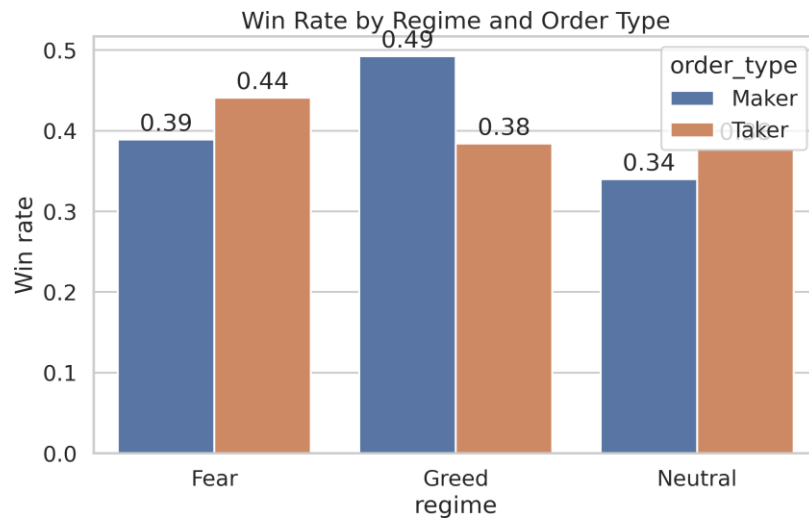- Spearman =0.0398 (weak but significant); Cohen's d   −0.01 (negligible).
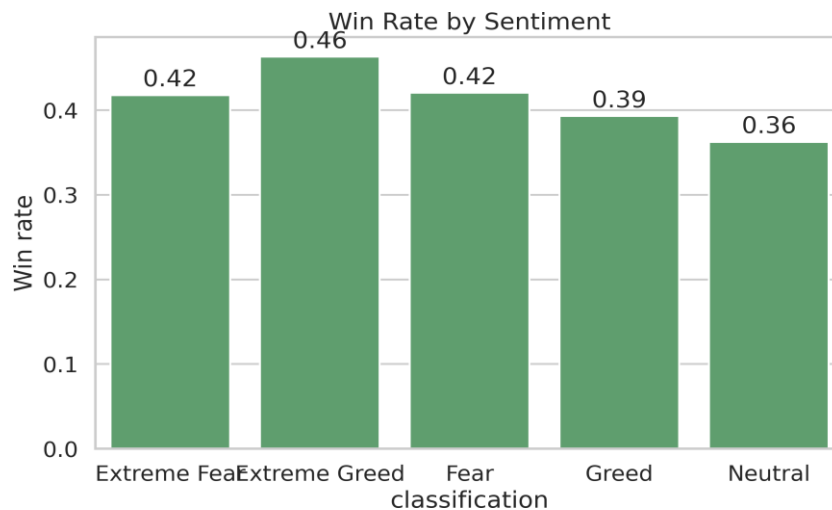

Figure 5: D2: Win-rate by regime & order type

Figure 6: D3: Win-rate by sentiment

Differentiator 4 – Regime Strategy

What it shows: Maker-in-Fear / Taker-in-Greed rule needs score gating to avoid Greed underperformance.

- Edge vs baseline: Fear +$20.13, Greed −$20.93, Neutral 0.
- Route Maker in Fear by default; Taker in Greed only when score high.
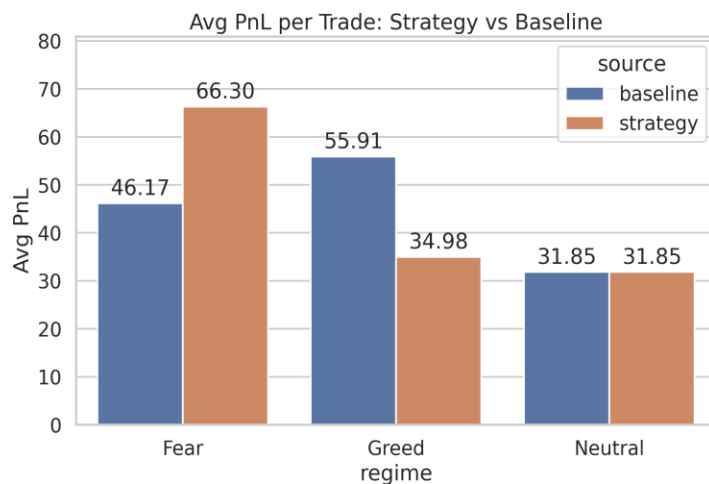- Introduce fee-aware thresholds in Greed.

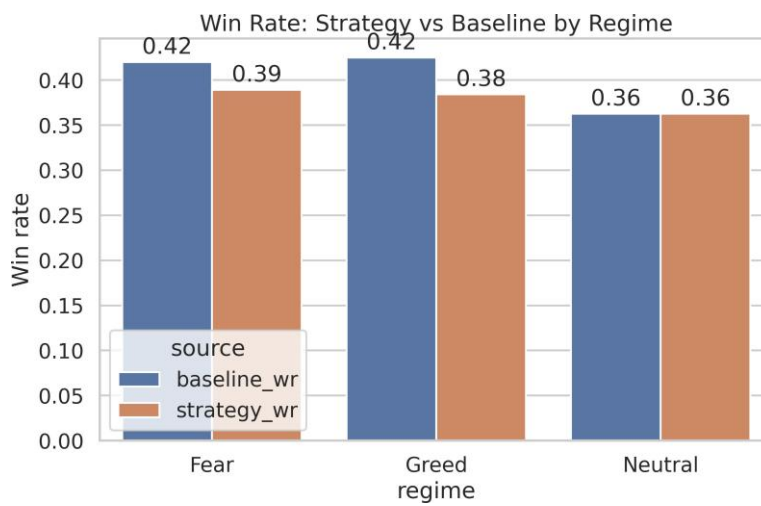**Figure 7:** D4: Strategy vs baseline (Avg PnL)

Figure 8: D4: Strategy vs baseline (Win-rate)

Differentiator 5 – Risk by Behavior

What it shows: Momentum smoother; Contrarian higher-beta and regime-sensitive.

- Momentum: higher Sharpe/Sortino (~0.059/0.087), lower drawdown.

- Contrarian: higher mean but bigger drawdowns; allocate in Fear.
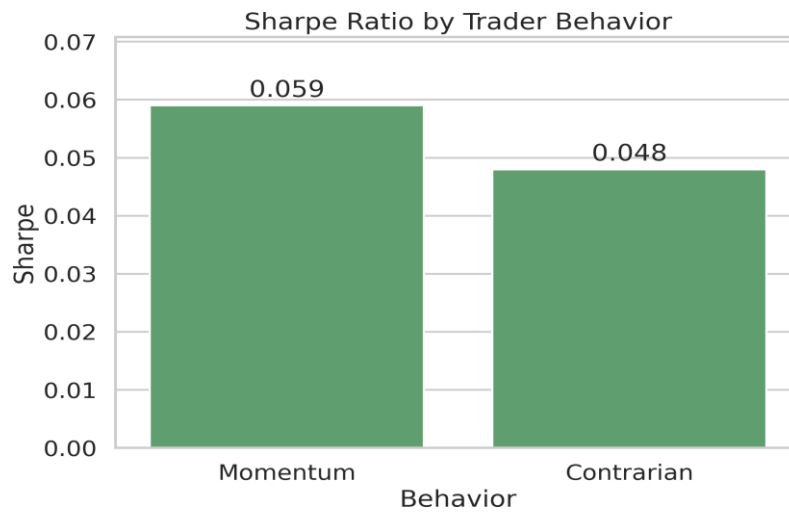
- Blend: momentum core, contrarian satellite in Fear.

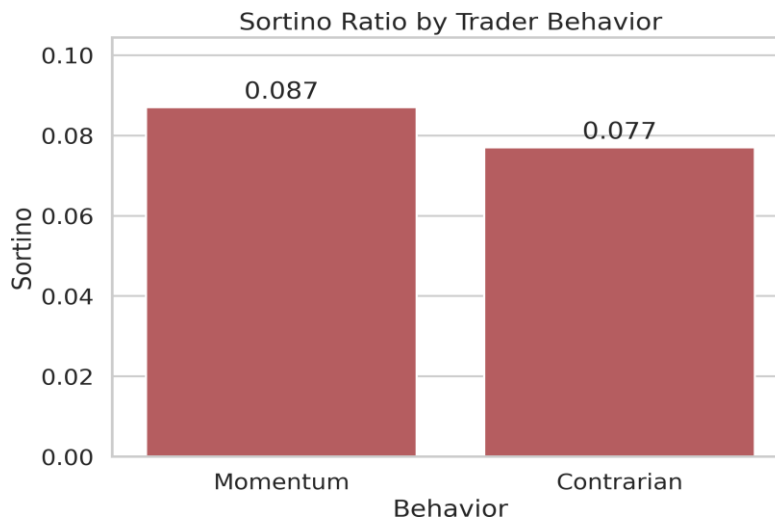**Figure 9:** D5: Sharpe by behavior

Figure 10: D5: Sortino by behavior

Differentiator 6 – Sensitivity

What it shows: Edges are fragile to regime-length shifts without probability gating.

- ±20% shifts: Strategy_Edge ~ −0.66 to −0.54.

- Greed extensions hurt unless filtered; Fear extensions help modestly.
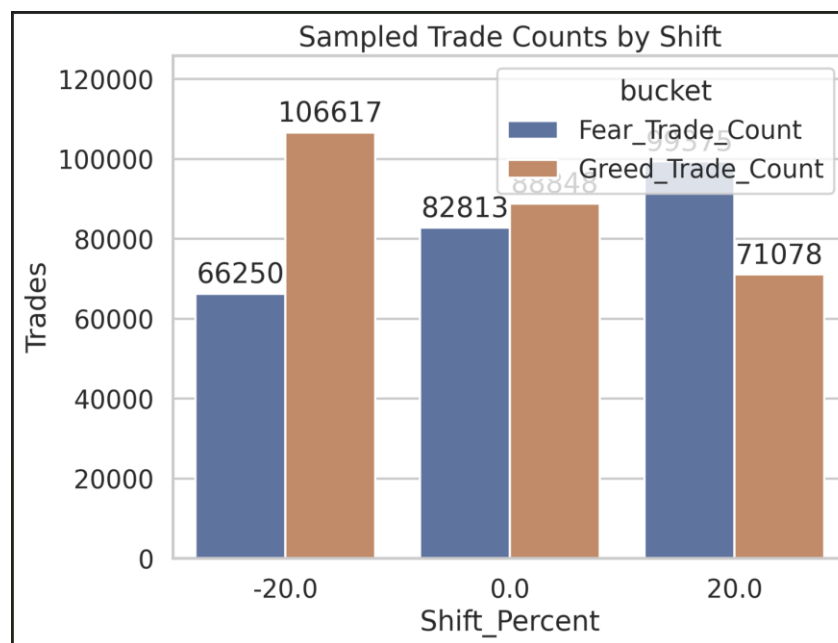
- Enforce probability deciles to stabilize.

Figure 11: D 6 : Sample Trade Counts by Shift

Differentiator 7 – Predictive Model

What it shows: Even a weak classifier adds value as a filter.

- CV ROC-AUC 0.427±0.045; full-set ROC-AUC 0.536.

- Top features: momentum_in_greed, is_fear_regime, behavior_numeric.
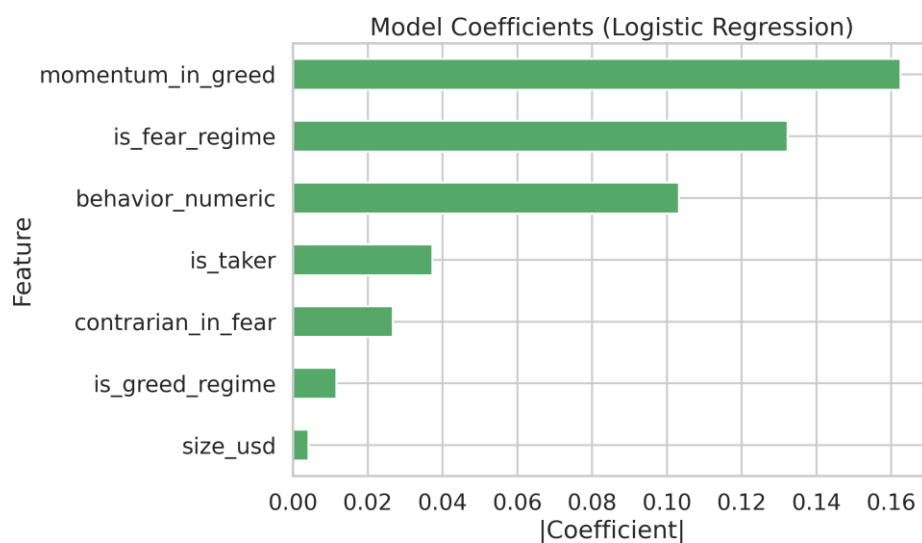
- Group outcomes align with the regime logic.
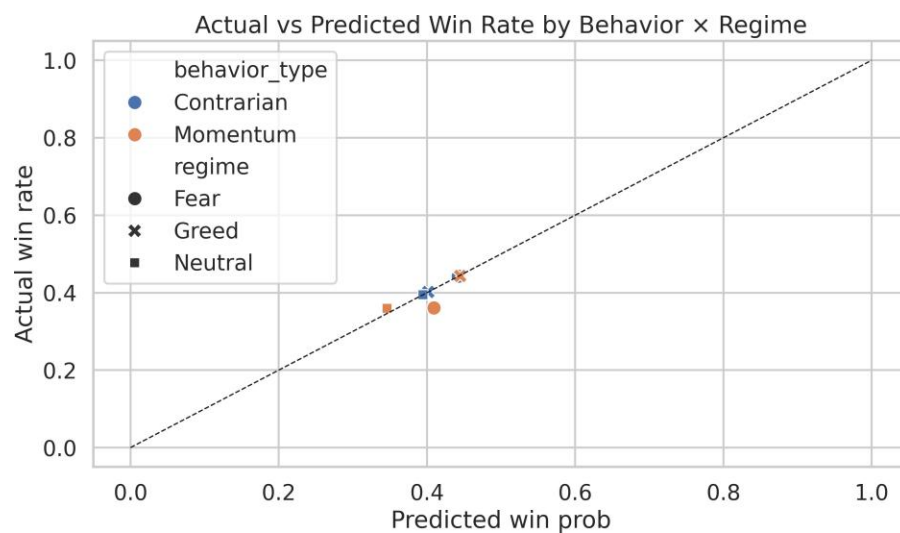

Figure 12: D7: Model coefficients (| |)

Figure 13: D8: Actual vs predicted by behavior × regime

Differentiator 8 − Calibration, Lift & Policy

What it shows: Calibrated probabilities enable profitable filtering.

- Calibration ROC-AUC 0.535, Brier 0.241.
- Decile 10 win rate 52.8% with avg PnL $127.5; threshold = 10.
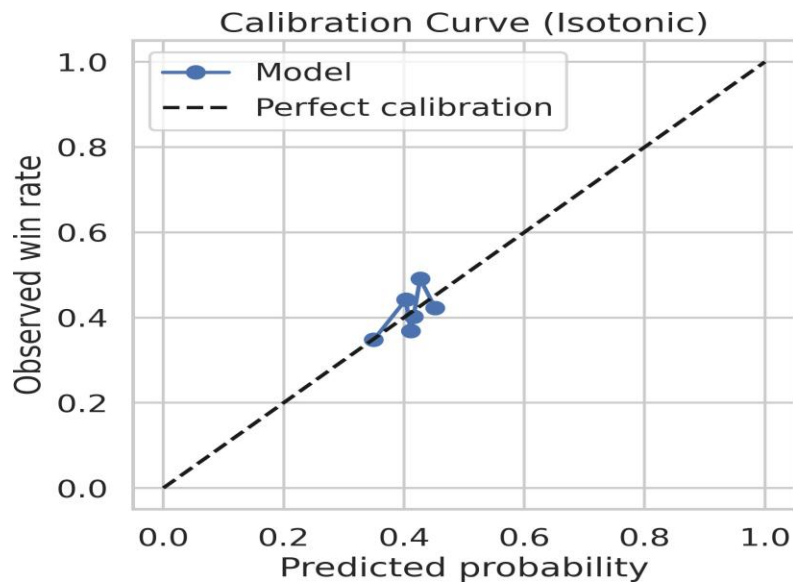- Policy: Greed +$102.19, Fear +$55.27; Neutral negligible.

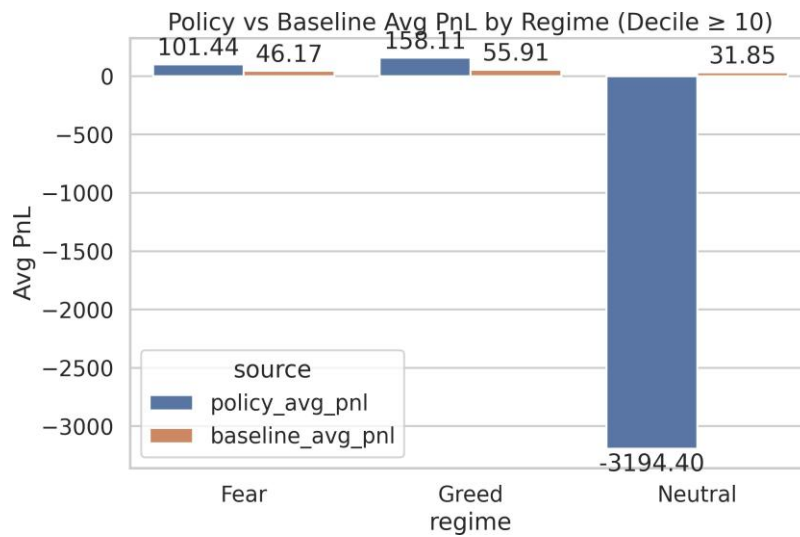**Figure 14:** D8: Calibration curve (isotonic)

Figure 15: D8: Policy vs baseline by regime

Actionable Policy

- Route Maker in Fear; Taker in Greed only when predicted decile 10; Fear requires 9.

- Size taker orders conservatively unless score top decile and spread acceptable.

- Productionize: real-time scoring → gate → persona template (Contrarian-Maker in Fear, Momentum-Taker in Greed).