# Post–Dec 2 Tracking Error Analysis

Lawrence vs Jianan Model

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## 1 Context

We analyze how well Lawrence's executed positions track Jianan's crypto model for the period starting **2025-12-02** ("post–Dec 2"). Positions are compared at the *holdings date* level against the model's target weights, aligned using the correct **T+2** convention: signals from day $T$ should correspond to holdings on day $T + 2$.

In this period there are

$$N_{\text{post}} = 182$$

symbol–day observations.

## 2 Top-Level Waterfall

Each symbol–day is classified into one of five mutually exclusive categories: MATCHED, MISSING_POSITION, WRONG_SIGN, MAGNITUDE_ERROR, and EXTRA_POSITION. Empirically, EXTRA_POSITION is negligible in this sample.

Table 1: Waterfall Breakdown (Post–Dec 2, 182 position-days)

| Category | Count | Share (%) |
|---|---|---|
| MATCHED | 40 | 21.9 |
| MISSING_POSITION | 84 | 45.9 |
| MAGNITUDE_ERROR | 36 | 19.9 |
| WRONG_SIGN | 22 | 12.3 |
| EXTRA_POSITION | $\approx 0$ | $< 1$ |

Only about 22% of symbol–days match the model within tolerance; the remaining 78% are missing, wrong sign, or mis-sized.

## 3 Missing Positions

For MISSING_POSITION cases, we compute the intended notional

$$\text{target\_notional} = |\text{target\_weight}| \times \text{portfolio\_value}$$

and compare it to the exchange's minimum notional requirement, min_usd, derived from the `hl_meta` table.

Relative to *all* 182 symbol–days:

Table 2: Missing Positions by Root Cause (Post–Dec 2)

| Reason | Count | Share of Missing (%) |
|---|---|---|
| BELOW_MIN_NOTIONAL | 72 | 86 |
| ABOVE_MIN_NOTIONAL | 12 | 14 |

- $\approx 39.6\%$ are missing because target notional is below the exchange's minimum (structural constraint for a \$2000 book).
- $\approx 6.6\%$ are missing despite being above the minimum—these are genuine execution or infra failures.

## 4 Wrong-Sign Positions and Day-Over-Day Flips

WRONG_SIGN cases are those where the actual exposure direction disagrees with the aligned T+2 signal, with non-trivial magnitude. For each such symbol–day we re-check the sign of the model at neighboring offsets:

- $T + 1$ (using signal from $T - 1$ in practice, "T-1 offset"), and
- $T + 3$ (delayed execution, "T-3 timing").

We classify each wrong-sign row as:

- **DUE_TO_T1_OFFSET** if the actual sign matches the T+1-aligned signal but not T+2.
- **DUE_TO_T3_TIMING** if the actual sign matches the T+3-aligned signal but not T+2 and not T+1.
- **UNEXPLAINED** otherwise.

For the post–Dec 2 period (22 wrong-sign cases), the breakdown from the existing analysis is:

- $\approx 58\%$ DUE_TO_T1_OFFSET,
- $\approx 42\%$ DUE_TO_T3_TIMING,
- 0% UNEXPLAINED.

Equivalently, about 13 of 22 wrong-sign trades are explained by using the wrong day (T-1), and about 9 are consistent with a one-day delay (T-3).

As a share of all 182 symbol–days:

$$\text{T1-driven wrong sign} \approx \frac{13}{182} \approx 7.1\%,$$
$$\text{T3-driven wrong sign} \approx \frac{9}{182} \approx 4.9\%.$$

Thus roughly 12% of all post–Dec 2 symbol–days are wrong sign, and nearly all of those are due to day-over-day flips combined with misaligned execution timing.

## 5 Magnitude Errors

MAGNITUDE_ERROR cases have the correct sign but differ from the target weight by more than 2% of portfolio value:

$$|\text{target\_weight} - \text{actual\_weight}| > 0.02.$$

In the post–Dec 2 period:

- 36 out of 182 symbol–days ($\approx 19.8\%$) fall into MAGNITUDE_ERROR.
- This rate is essentially unchanged from the pre–Dec 2 period ($\approx 21\%$), indicating that sizing issues (partial fills, price drift, lot constraints) are still a major component of tracking error.

## 6 Why Post–Dec 2 Is Still Broken

For the post–Dec 2 period:

- Only 21.9% of symbol–days match the model.
- About 39.6% are structurally untradeable (BELOW_MIN_NOTIONAL).
- The remaining $\approx 38.5\%$ are execution or infra issues:
  - $\sim 6.6\%$ missing above min notional,
  - $\sim 12\%$ wrong sign (mostly T-1 or T-3 timing),
  - $\sim 20\%$ magnitude errors.

In other words, even after the offset "fix", roughly two-fifths of the tracking error is due to mismatched timing and execution logic, and roughly another two-fifths is baked in by running too granular a model on a $2000 account under exchange minimums.