Arbitrage Arena stage 2

Statistical Arbitrage & Market-Neutral Trading

Problem Statement

Background

Foreign exchange markets exhibit strong cross-currency relationships driven by triangular parity, shared. Macroeconomic forces, liquidity transmission, and market microstructure effects. At high frequencies, temporary inefficiencies arise due to order flow imbalance and liquidity shocks, creating opportunities for statistical arbitrage strategies.

Objective

Design and implement a systematic FX statistical arbitrage strategy that exploits cross-currency
dependencies while maintaining market neutrality. The strategy must operate exclusively on 5-secondOHLCV data and generate robust risk-adjusted returns.

Input Data

Participants will receive a single ZIP file containing CSV files, one per currency pair.
File Structure:
fx_data.zip
• EUR_USD.csv
• USD_JPY.csv

• GBP_USD.csv
• USD_CNH.csv

(note that EUR_USD.csv contains value of euro in dollars)

CSV Scheme:
utc, open, close, high, low, volumn
All timestamps are in UTC with a fixed 5-second frequency. The column name volumn is intentional andmust not be renamed.

Strategy Requirements

• Identify statistical relationships across currency pairs (e.g., mean reversion, cointegration, correlation breakdowns).
• Generate causal long and short positions using only historical data.
• Maintain market neutrality (dollar-neutral or volatility-neutral approaches are acceptable).
• Apply appropriate risk controls and bounded position sizing.

Constraints

• No external datasets (macroeconomic data, news, order books, etc.).
• No future data usage or look-ahead bias.
• No manual regime labeling.
• **Transaction costs** will be applied internally by the evaluator.

Required Output

Participants must generate a CSV file named strategy_output.csv with the following schema:
• utc – Timestamp (UTC)
• pair – Currency pair identifier (e.g., EURUSD)
• position – Target position bounded between -1 and 1
• pnl – Incremental profit and loss for that bar
Evaluation Metrics

- Sharpe Ratio (primary ranking metric).
- Maximum drawdown.
- Market neutrality score (average net exposure).
- Turnover penalty.
- Performance robustness across currency pairs.

Submission Rules

Participants must submit a single ZIP file containing the strategy_output.csv file and the source code or notebook used to generate it. Outputs with missing timestamps, incorrect column names, NaN values, or invalid positions will be disqualified.

Evaluator Assumptions

- Positions are applied at bar close.
- PnL is computed using the next bar close.
- Multiple market regimes are tested.
- All transaction cost modeling is handled internally