Waterloo Quant Club
Fall 2025 Trading Competition

Introduction

Welcome to the Waterloo Quant Club (WQC) Trading Competition. Over the course of the event, you will play through a series of interactive games designed to capture different aspects of quantitative trading, including estimation, market making, risk management, information aggregation, and team-based strategy.

The competition will feature five main games:

- **Price is Right**: Fermi-style estimation and dynamic updating under feedback.
- **Trade or Tighten**: Market making and trading in private-information environments.
- **Kelly**: Optimal bet sizing and bankroll growth across a variety of structured bets.
- **Hidden Ledger**: Information discovery, negotiation, and inference using hidden rule cards.
- **Poker Auction**: Team-based auctions to build the strongest possible poker hand with limited budget and powerful "power-ups".

Your final standing in the competition will be determined by how well you place across these games, using a geometric-mean based scoring system described below. Beyond the scoreboard, the goal of the day is to give you a hands-on feel for the kinds of thinking that matter in quantitative trading: making decisions under uncertainty, reasoning from partial information, and coordinating effectively with a team.

Above all else, we just hope everyone gets the chance to meet new people and have fun!

Schedule and Logistics

Schedule

Please aim to arrive at **DC 1351** this Saturday, **November 22nd**, around **9:45 AM** so we can get everyone settled and start promptly at **10:00 AM**.

Introduction Going over competition logistics.	**10:00 – 10:15**
First Game: Price is Right Fermi-style estimation game.	**10:15 – 11:15**
Snack Break Quick snacks and stretch break.	**11:15 – 11:30**
Second Game: Trade or Tighten Market making with private information.	**11:30 – 12:30**
Lunch Food, socializing, and informal discussion.	**12:30 – 13:30**
Third Game: Kelly Optimal bet sizing and bankroll growth.	**13:30 – 14:30**
Fourth Game: Hidden Ledger Trading and inference game.	**14:30 – 15:30**
Fifth Game: Poker Auction Team-based auction to build the best hand.	**15:30 – 16:30**
Closing and Results Final leaderboard, prizes, and wrap-up.	**16:30**

Logistics

- **Bring your laptop, fully charged.** The first three games (*Price is Right*, *Trade or Tighten*, and *Kelly*) are run entirely electronically, so every participant will need a working device.
- **Please plan to stay for the full event.** We will be running scoring across all games and announcing final results at the end of the day.
- There will be **prizes for top performers** and **participation merch** for attendees.

Overall Scoring Format

Each game ultimately produces a *placement* for every player or team: first place, second place, third place, and so on. We will use these to calculate your overall *competition score*.

Suppose your placements (1 = first, n = num competitors = last) across the scored rounds are:

$$p_1, p_2, \ldots, p_5.$$

Your *competition score* is defined as the geometric mean of your placements:

$$S = \left(\prod_{r=1}^{5} p_r \right)^{1/5}.$$

The final leaderboard will be an ordered ranking of all the competitors' *competition scores*, from smallest (placing first overall), to largest (placing last overall). Smaller values of S correspond to consistently strong performance.

Ties on the overall leaderboard will be broken by, in order:

1. Lower arithmetic mean of placements, i.e. $\frac{1}{R} \sum_{r=1}^{R} p_r$.
2. Best single-game placement (compare 1^{st} vs 2^{nd}, etc.).
3. Coin flip (or equivalent random tiebreaker) if still tied.

Motivation

This scoring system is designed to shape incentives in a particular way:

- **You are rewarded for playing to win.** Moving from a mid-pack finish to a top finish in any game can noticeably pull down your geometric mean. Chasing high placements is therefore very valuable; simply "coasting" in the middle of the pack across all games is not a dominant strategy.
- **You are never completely out of it.** Because we average (via the geometric mean) across all rounds, a single bad round is not fatal. Strong performances in later games can still bring your overall score down significantly, so it is worth trying to maximize your placement in every game, even if an earlier one went badly.
- **Every game matters.** Each game contributes multiplicatively to your final score. You cannot rely on one huge win to carry you, but you also are not eliminated by a single mistake. The best overall strategy is to aim for strong, aggressive play throughout the entire competition.

Practical Notes

- If you fail to submit in a round, you will be treated as finishing last in that round.
- If two teams tie within a game (e.g. identical PnL), they share the corresponding placement; both placements feed into the geometric mean.

Game 1: Price is Right

Overview

Price is Right is an estimation game based on Fermi-style questions. For each question, you will submit multiple guesses for a hidden numerical quantity. Your goal is to get as close as possible to the true answer *without going over*.

Gameplay

- The game consists of a set of estimation questions (e.g. real-world counts, distances, or rates). Specific questions will be revealed only during the competition.
- For each question, you submit **three** guesses in sequence.
- After each guess, you learn either:
  - that you *busted* (your guess was above the true answer), or
  - your rank among all participants whose guesses did not bust.
- You should try to use this feedback to update your next guess (on the same quantity).

Scoring within the Game

For a given question:

- Let r_1, r_2, and r_3 be your ranks (1 = best) for your first, second, and third guesses among non-busting players.
- Busts are treated as finishing at the bottom of the field for that guess (tied with other busts).

We form a *question score*

$$s_{\text{question}} = 0.25\, r_1 + 0.25\, r_2 + 0.50\, r_3,$$

which places extra weight on your final guess.

If there are Q questions in the game, your *Price is Right game score* is the geometric mean

$$S_{\text{PR}} = \left(\prod_{q=1}^{Q} s_{\text{question},q} \right)^{1/Q}.$$

Players are ranked within Price is Right by minimizing S_{PR}. This *game placement* then enters the competition-wide geometric mean described in the overall scoring section.

Game 2: Trade or Tighten

Overview

Trade or Tighten is a live trading game built around private information and market making. In each scenario, players receive imperfect information about some underlying random quantity (or quantities) and must:

1. Bid for the right to make the market.
2. Set a market (a bid–ask spread) for the quantity.
3. Choose which direction to trade on that market as a taker.

Gameplay

- The game consists of multiple scenarios. Each scenario is a self-contained private-information environment (e.g. sums, products, or other functions of hidden numbers), but the exact questions will not be announced in advance.
- For each scenario, participants are randomly split into small pools (roughly 6–8 people), fixed for that scenario.
- A typical scenario proceeds as follows:
  1. **Information phase:** Each player receives some private signal about the underlying quantity.
  2. **Bidding phase:** Players submit bids for the right to make the market; the narrowest acceptable width (subject to rules announced on the day) wins.
  3. **Market making phase:** The winning bidder posts a market for the contract in their pool.
  4. **Trading phase:** Other players choose to buy or sell at the posted market.
  5. **Settlement phase:** The true value of the quantity is revealed; PnL on the market maker and traders is computed.
- For each scenario steps 2-4 will be repeated 3 times total prior to any settlement occurring, allowing you to learn and adjust your fair values and how you want to trade around it.

Scoring within the Game

Within each scenario:

- You accumulate PnL across the repeated rounds in your pool.
- At the end of the scenario, players in that pool are ranked by PnL (higher is better), producing a *scenario placement* for each player.

If you participate in K scenarios, with placements $p_1, \ldots, p_K$, your *Trade or Tighten game score* is

$$S_{\mathrm{TT}} = \left(\prod_{k=1}^{K} p_k \right)^{1/K}.$$

Players are ranked within Trade or Tighten by minimizing S_{TT}. This game placement is then one of the inputs to the overall competition geometric mean.

Game 3: Kelly

Overview

The motivation and theory behind this game is explained in this video.

The *Kelly* game is all about optimal bet sizing. In each question, you are given a positive-expected-value gamble (often involving dice, cards, or other random mechanisms) and must choose what fraction of your bankroll to wager. Your objective is to maximize the long-run growth rate of your wealth, not just the expected value of a single bet.

Gameplay

- For each question, you are given some scenario on which you can bet on, with the payouts in each outcome being well defined (and dependent on bet sizing).
- You choose a fraction $f \in [0, 1]$ of your current bankroll to wager. Submitting $f = 0$ means you sit out that question.
- You then receive a score which is the expected log growth of your bankroll for that scenario and your inputted bet size.

Different questions will involve different distributions (some discrete, some more spread out), but all will be designed so that a well-chosen fraction strictly improves your long-run growth rate. But be careful, betting too much can lead to negative expected growth.

Scoring within the Game

Let g_i be the multiplicative factor you score for question i (e.g. if you're expected to grow from \$1 to \$1.12, then $g_i = 1.12$). Suppose there are N questions in total.

- We first compute your *per-question growth factors* $g_1, \ldots, g_N$.
- To reduce the impact of one or two catastrophic errors, we drop your two worst growth factors and keep the remaining $N - 2$.
- Your *Kelly growth score* is the geometric mean of the remaining factors:

$$G_{\text{Kelly}} = \left(\prod_{i \in \text{kept}} g_i \right)^{1/(N-2)}.$$

Participants are ranked within the Kelly game by *maximizing* G_{Kelly} (higher long-run growth is better). This ranking is then converted into placements $1, 2, \ldots$ which count as your *Kelly game placement* in the overall geometric-mean scoring.

Game 4: Hidden Ledger

Overview

Hidden Ledger is a social-information and negotiation game played with standard playing cards and secret rule cards. Each team starts with:

- a hand of playing cards, and
- a small subset of rule cards describing how certain patterns or features of a hand score points.

The twist: no team starts with the full rulebook. To build a high-scoring hand, you must infer the missing rules by observing, trading, and negotiating with other teams.

Gameplay

- Teams are paired (or grouped) and given:
  - a fixed number of playing cards, and
  - several rule cards.
- Rule cards may refer to:
  - **Ranks** (e.g. all Aces, all 5s),
  - **Suits** (e.g. Spades vs. Hearts),
  - **Miscellaneous** (literally anything!).
- A rule card usually gives a condition and its point value or penalty. The backs of rule cards state what rank or suit (or miscellaneous) the card is **primarily** about. There are duplicates of each rule card, so multiple teams may possess the same rule card.
- During the trading phase, teams may trade playing cards and/or rule cards with other teams, subject to:
  - no revealing of cards of either type to other teams,
  - only backs of rule cards being visible before a trade (e.g. indicating a rank, suit, or "miscellaneous" type, so the counterparty knows what the rule will be about prior to closing a trade).
- After a fixed amount of trading time, trading ends. Each team submits only its *final set of playing cards* for scoring.

Scoring within the Game

At the end of a round:

- All rule cards are taken together to form the *full* scoring rules.
- Each team's submitted hand is evaluated according to this full rule set to produce a final point total.
- Teams are ranked by points (higher is better), giving a placement for that round.

Game 5: Poker Auction

Overview

Poker Auction is a team-based auction game. Each team starts with a fixed bankroll and bids on:

- individual playing cards from a standard deck, and
- a small set of powerful *power-up* items.

By the end of the game, each team will have assembled a poker hand (plus any power-ups they have acquired). Final standings are determined by hand strength (after applying power-ups), not by leftover cash, so bankroll must be spent strategically.

Gameplay

- There are 10 teams (of roughly 8 players each).
- The auctioned items consist of:
  - all 52 cards in a standard deck, and
  - 8 power-ups that allow limited manipulation of your cards.
- The auction proceeds in *rounds*. In each round, a small batch of items (e.g. 6 cards or power-ups) is auctioned off. The exact cards and powerups being auctioned off in each round will be displayed and known ahead of time, allowing for strategy building.
- Teams start with a fixed budget. For each item in a round:
  - Every team submits a bid, with the sum of bids in the round constrained not to exceed its remaining bankroll.
  - Bids for items in each round are not visible to others until after the round is over.
  - The auction uses a second-price rule: the highest bidder wins the item and pays the *second-highest* bid.
- Auction results (who won which item and at what price) are revealed after each round, allowing teams to update their strategy.
- At the end of all rounds, each team has collected a set of cards and any power-ups they have won. Power-ups are then applied according to their individual rules, after which each team designates its final poker hand.

Scoring within the Game

- Teams are ranked by the strength of their final hand (by following conventional poker hands) after applying power-ups.
- This ranking produces the *Poker Auction placement* for each team, which is then one of the placements entering the competition-wide geometric mean, with each player in the team receiving the same rank.