Competition Between Financial Exchanges
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High-level questions
In the debate over high frequency trading, the frequent call (Call) mechanism has recently been proposed as a replacement for the continuous double auction (CDA) mechanisms that currently run most financial markets [1,2]. An important question for the possible use of frequent call auctions is how they would work in the presence of existing CDA markets [3]. In this paper, we want to answer:

(Q1) What is the effect of competition between platforms that use these two different mechanisms when agents can strategize over platform choice?
(Q2) Can frequent call mechanisms drive trade away from CDAs?

Competing-market model
We build a competing-market model to analyze platform competition between these two financial markets.

A single security with an underlying true value is traded in each market

Two markets are running simultaneously in continuous-time

Traders arrive according to Poisson processes, can choose which market to enter and the order type and price

Results of fixed-strategy environment
Our key measure of the social welfare is the price of immediacy – the expected loss suffered by background traders.

<table>
<thead>
<tr>
<th>Per-order profit</th>
<th>Proportion of orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call-C</td>
<td>CDA-C</td>
</tr>
<tr>
<td>1.5</td>
<td>1.0</td>
</tr>
<tr>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>-0.75</td>
<td>0.25</td>
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<tr>
<td>-1.5</td>
<td>0.0</td>
</tr>
<tr>
<td>-2.25</td>
<td>0.0</td>
</tr>
<tr>
<td>-3</td>
<td>0.0</td>
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</tbody>
</table>

Results show that
1. background traders are better off in the Call market than the CDA market in the system with competition (left figure)
2. The Call market absorbs a large fraction of orders (right figure)

Results of learning environment
• Informed traders learn the policy for which market they choose as a function of the distance between their private signals and the market price using a reinforcement learning algorithm.
• Each market also has a fixed set of traders who are committed to that market in order to ensure some flow of trade in both markets.

Results show that
1. Learned strategies yield an approximate equilibrium; typically above 90% of orders are placed in the CALL market.
2. All informed traders placing all their orders in the call market is an equilibrium.

References
2. Budish et al. The high-frequency trading arms race: Frequent batch auctions as a market design response. QJE, 2015.
3. Wah et al. Strategic market choice: Frequent call markets vs. continuous double auctions for fast and slow traders. AMMA, 2015.

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