

Financial Markets Microstructure

Exercises after L1

Egor Starkov

Københavns Universitet
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This lecture:

1 Let's talk about GameStop

2 Nikola who?

3 Problems from Lecture 1

- 1 What kind of traders are involved on both sides? Based on that fact: why has this story made the news?
- 2 Would now be a good time to buy GameStop stock? Why/why not?
- 3 Robinhood (trading app) halted trading in GameStop stocks at some point. Is there a scope for some regulatory intervention to prevent this kind of exclusion of retail traders?

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1 Let's talk about GameStop

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Is Hindenburg Research an insider? Is it an informed trader?

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Lecture 1

From Lecture 1: problems 1-3 from FPR ch.1 (pp. 44-45)

Orders

We have a collection of limit orders and market orders

- Limit buy orders:

- 100 shares at bid price 3
- 200 shares at bid price 4
- 200 shares at bid price 3.5
- 500 shares at bid price 2.5

- Limit sell orders:

- 500 shares at ask price 5
- 600 shares at ask price 3
- 500 shares at ask price 4

- Market buy order: 500

- Market sell order: 200

Call auction

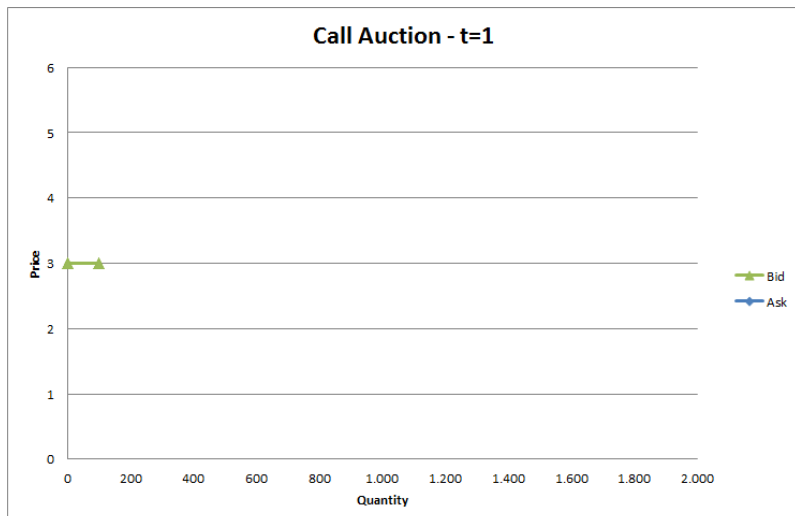
Recall idea of a call auction:

- Orders are collected (in a 'batch') and cleared at a certain frequency
- The price is chosen so as to maximize the number of executed orders
- **Uniform price**: all orders in a batch trades at same price

Let's build the auction step by step

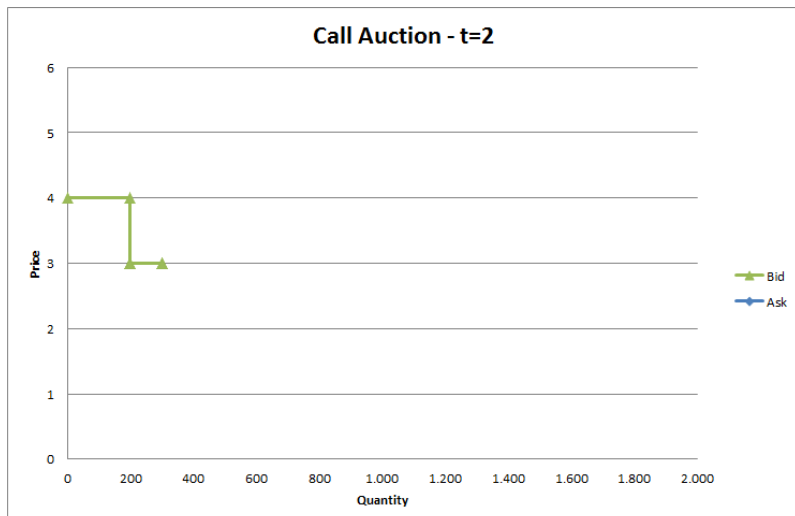
Call auction

Limit buy order of 100 shares at bid price 3



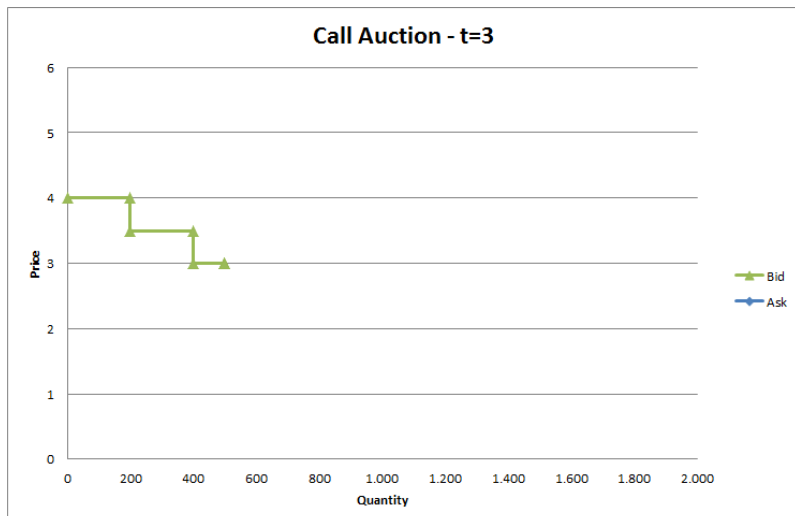
Call auction

Limit buy order of 200 shares at bid price 4



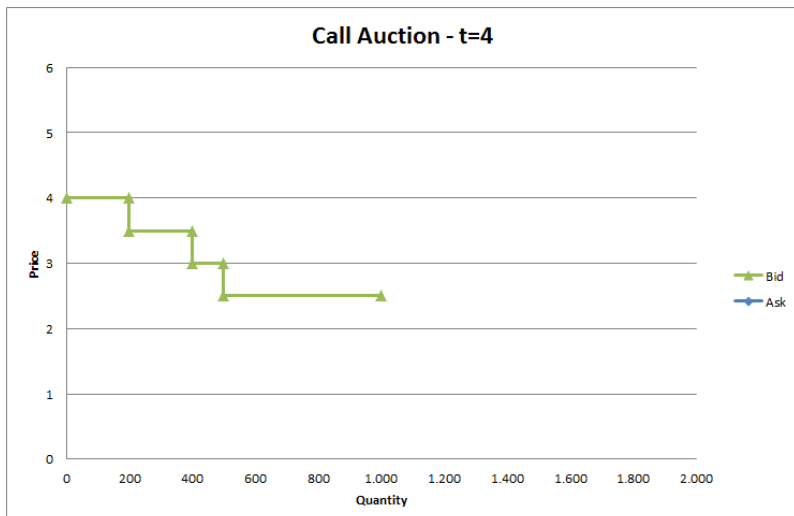
Call auction

Limit buy order of 200 shares at bid price 3.5



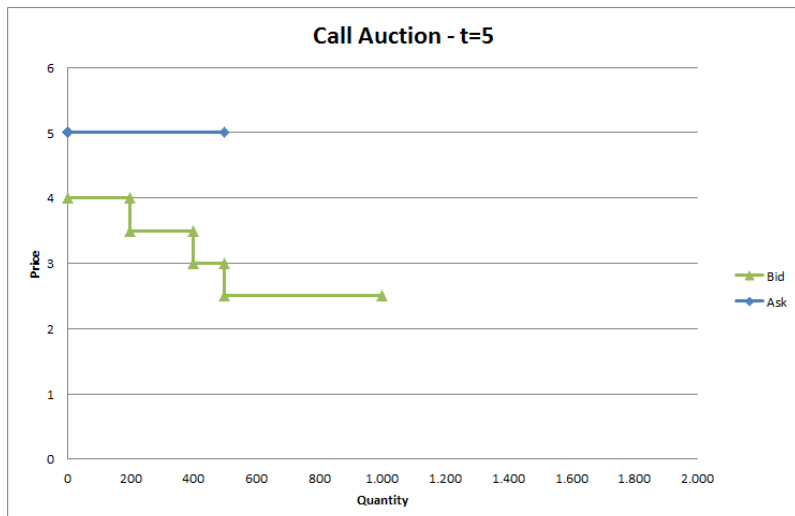
Call auction

Limit buy order of 500 shares at bid price 2.5



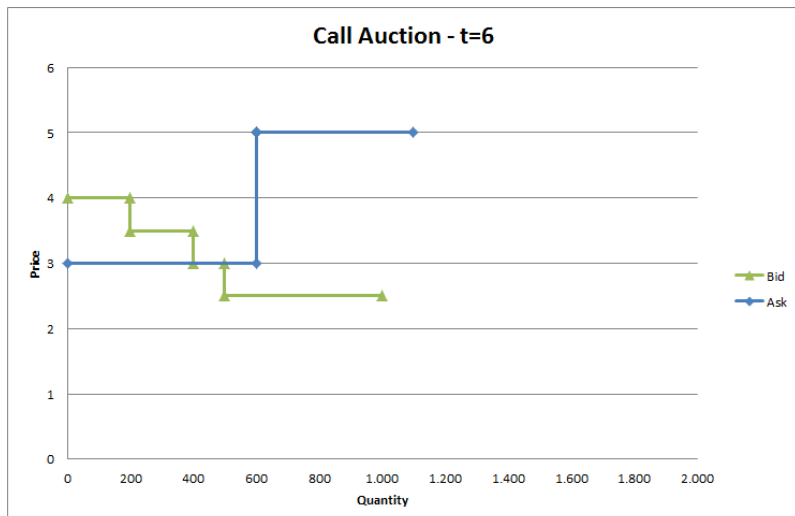
Call auction

Limit sell order of 500 shares at ask price 5



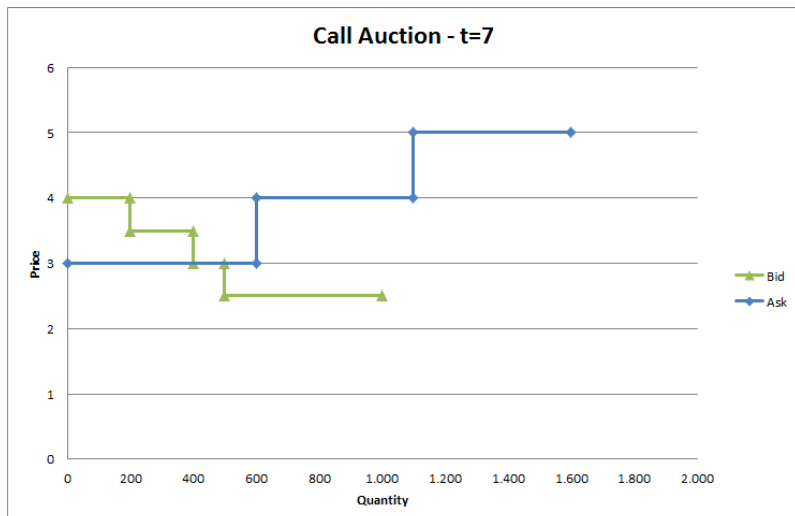
Call auction

Limit sell order of 600 shares at ask price 3



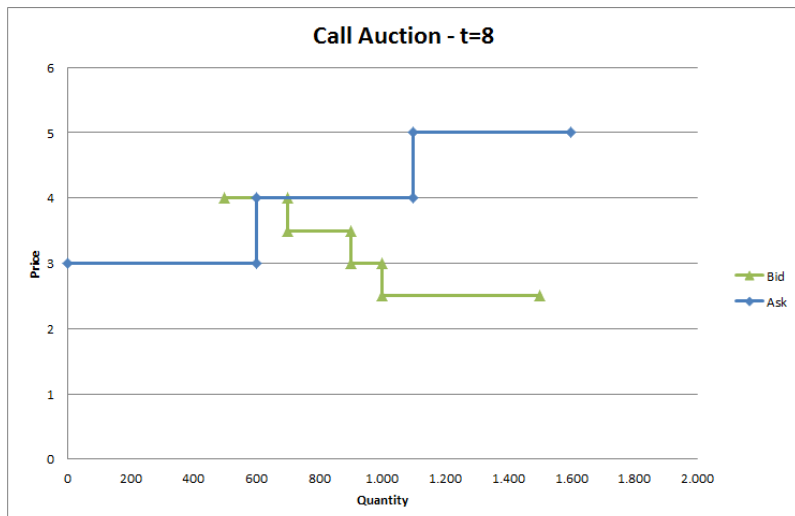
Call auction

Limit sell order of 500 shares at ask price 4



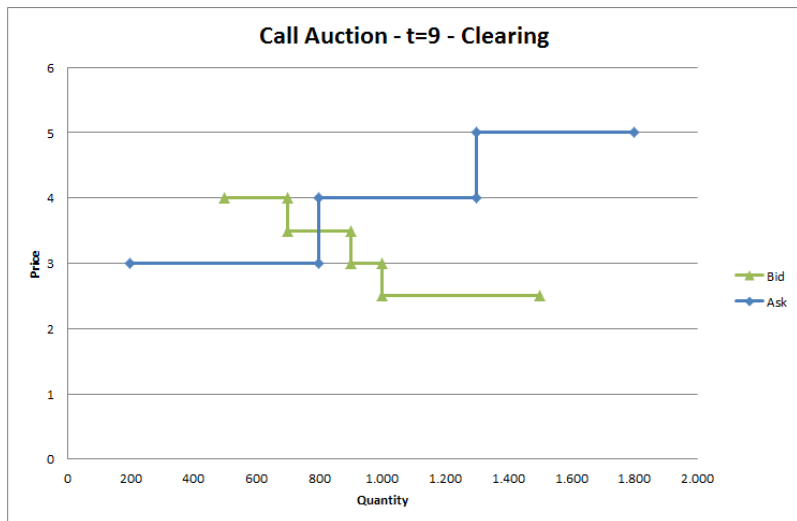
Call auction

Market buy order of 500 shares



Call auction

Market sell order of 200 shares



Call auction

Market clears at price 3.5, with 800 units being sold Filled buy orders:

- The market order is filled completely
- The limit order for 200 shares at price 4 is filled completely
- The limit order for 200 shares at price 3.5 is filled partially (100 shares)

Filled sell orders:

- The market order is filled completely
- The limit order for 600 shares at price 3 is filled completely

Thus: *Excess demand* at the clearing price

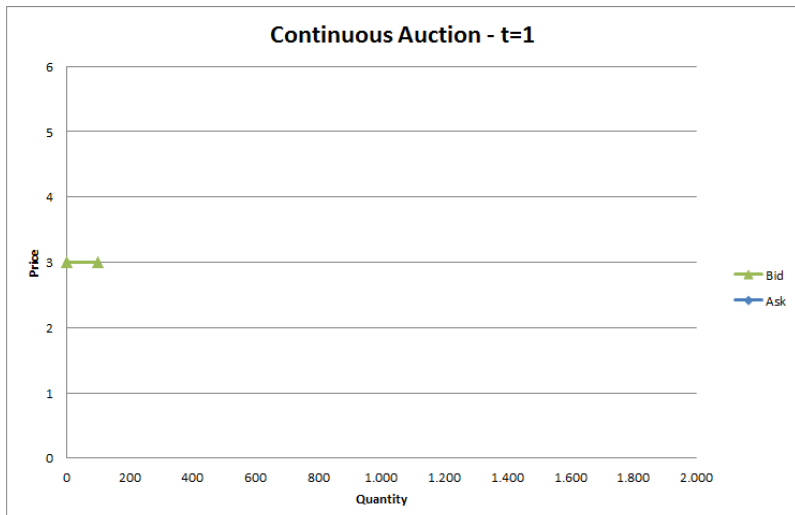
Continuous auction

Recall idea of a continuous auction:

- Some traders post limit orders (provide liquidity)
- Some traders post market orders (take liquidity)
- Trades occur either through
 - 1 a limit order 'match' (somebody posts a bid price above the lowest ask price), or
 - 2 through market orders
- **Discriminatory price:** depends on how your order is matched

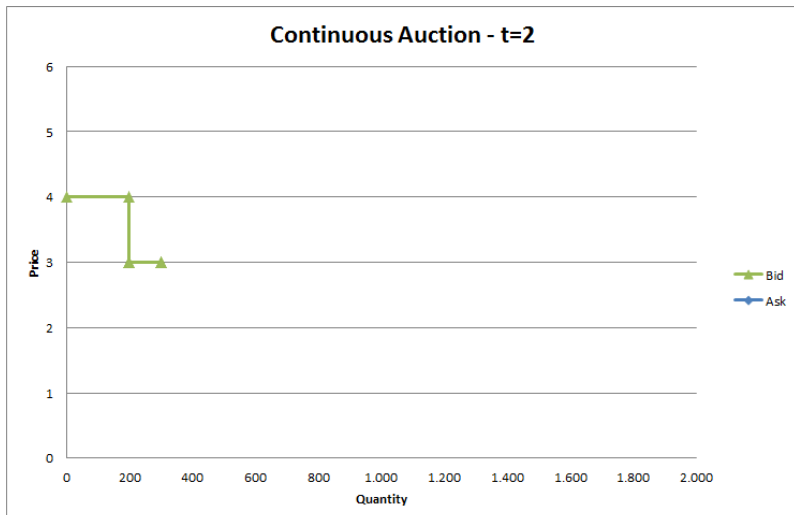
Continuous auction

Limit buy order of 100 shares at bid price 3



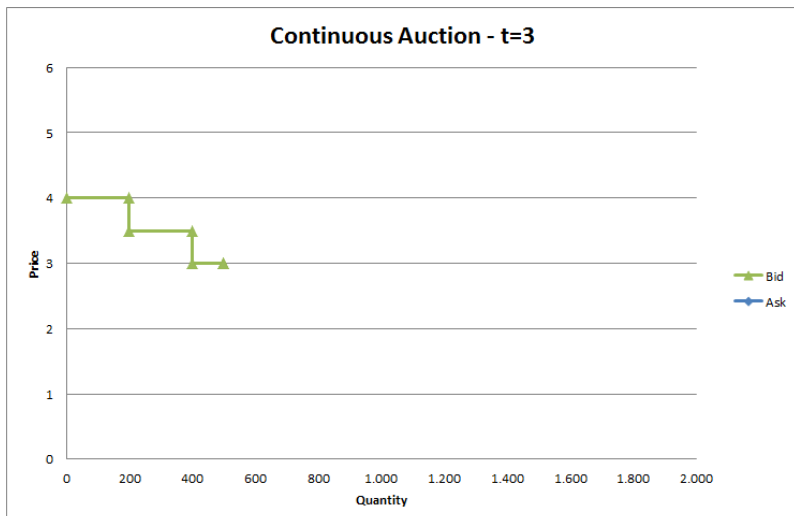
Continuous auction

Limit buy order of 200 shares at bid price 4



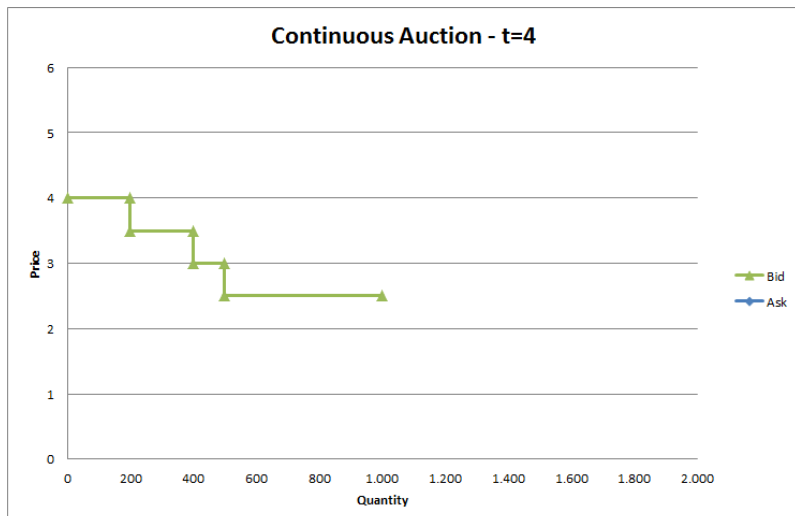
Continuous auction

Limit buy order of 200 shares at bid price 3.5



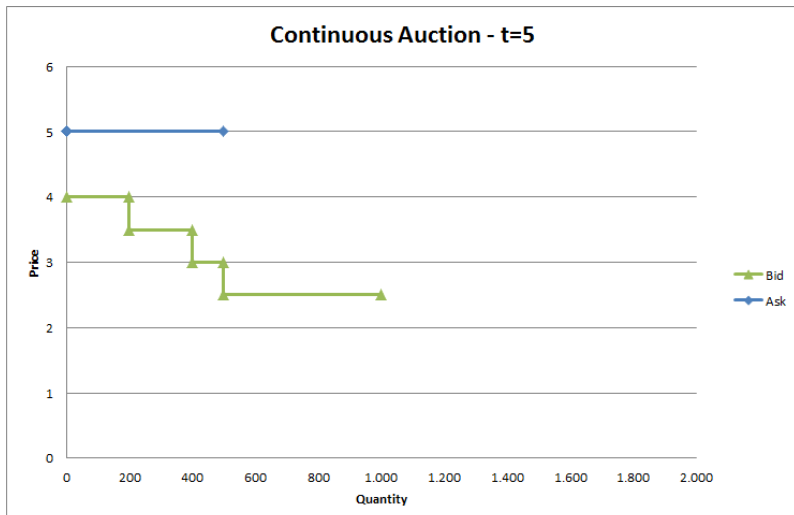
Continuous auction

Limit buy order of 500 shares at bid price 2.5



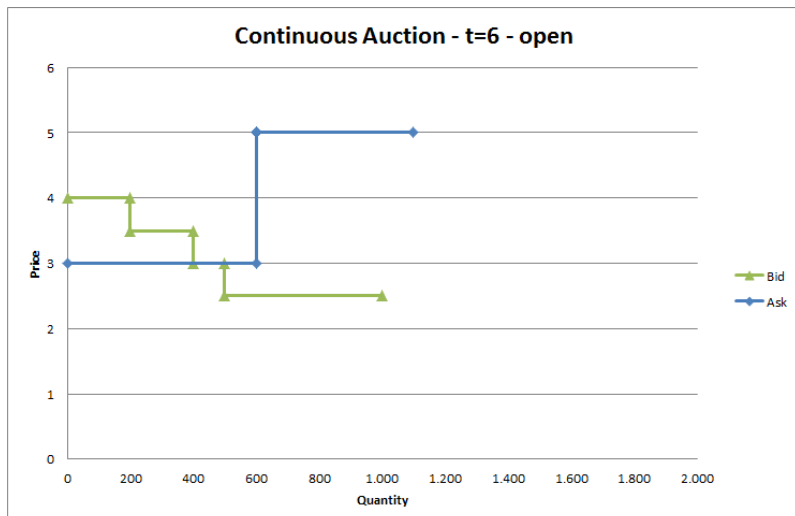
Continuous auction

Limit sell order of 500 shares at ask price 5. Spread = 1



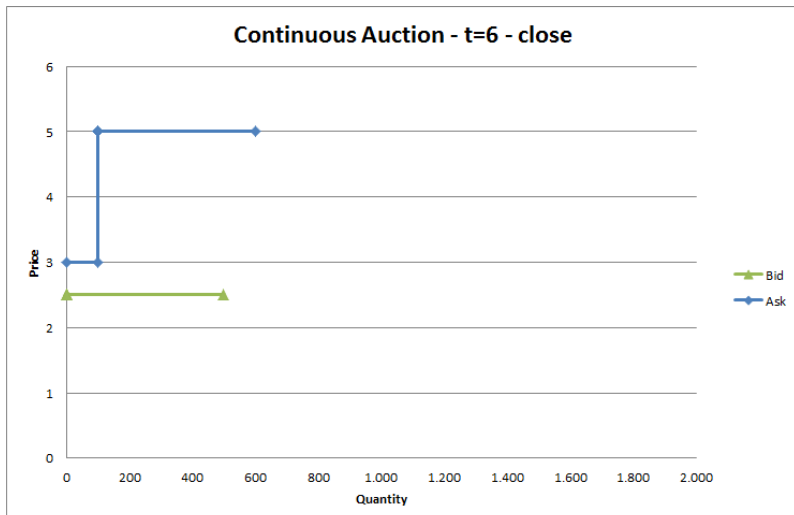
Continuous auction

Limit sell order of 600 shares at ask price 3



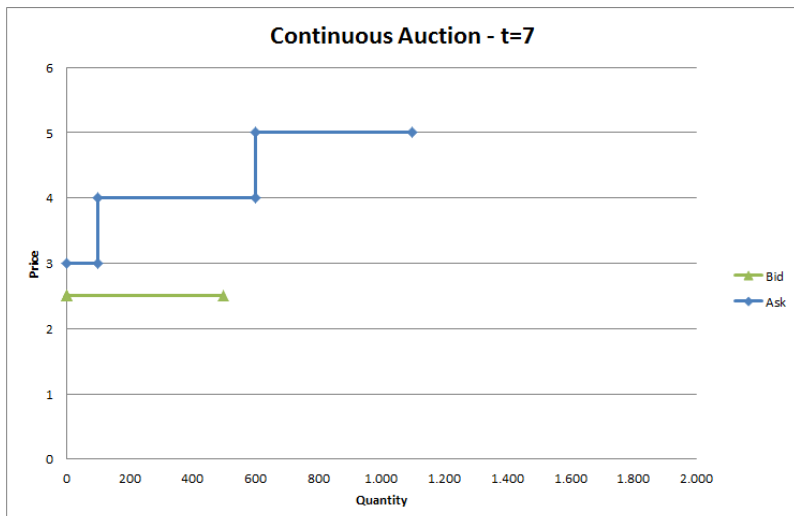
Continuous auction

Seller executes 200 shares at price 4, 200 at price 3.5, and 100 at price 3. Spread = 0.5



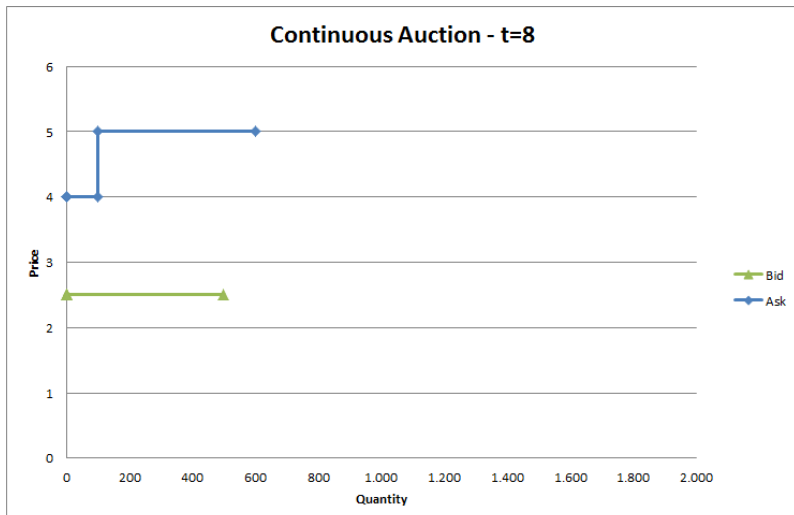
Continuous auction

Limit sell order of 500 shares at ask price 4. Spread = 0.5



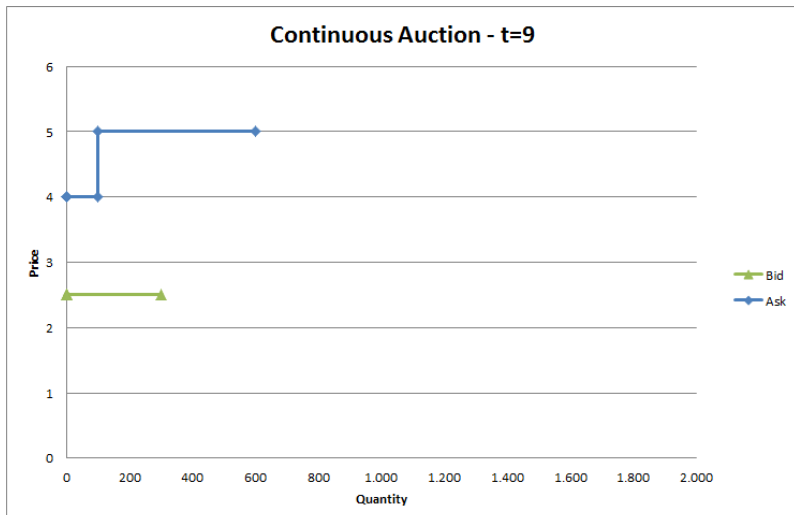
Continuous auction

Market buy for 500 shares – buys 100 shares at price 3, and 400 at 4. Spread = 1.5



Continuous auction

Market sell order of 200 shares. Executes against 200 shares at price 2.5. Spread = 1.5



Efficiency

Suppose limit order traders' valuation is equal to their price, market order buyers have valuation 10, market order sellers have valuation 0

Trader		Valuation	Desired trade	Actual trade	
				Call	Continuous
T1	B	3	100	0	100
T2	B	4	200	200	200
T3	B	3,5	200	100	200
T4	B	2,5	500	0	200
T5	S	5	-500	0	0
T6	S	3	-600	-600	-600
T7	S	4	-500	0	-400
T8	B	10	500	500	500
T9	S	0	-200	-200	-200

Welfare

We can also do a welfare calculation, using the post market holdings of each type

Trader		Valuation	Position (pre)	Desired trade	Post-market position	
					Call	Continuous
T1	B	3	0	100	0	100
T2	B	4	0	200	200	200
T3	B	3,5	0	200	100	200
T4	B	2,5	0	500	0	200
T5	S	5	0	-500	0	0
T6	S	3	0	-600	-600	-600
T7	S	4	0	-500	0	-400
T8	B	10	0	500	500	500
T9	S	0	0	-200	-200	-200
		Welfare	0		4350	3900

Note there's too much trade in cont auction: T1 buys 100 (valuation 3), T4 buys 200 (val 2.5), T7 sells 400 (val 4) – if these three met, they would reverse trades.

Clarifications

- To clarify: in the previous slide, I assumed that every trader starts with zero position.
- Welfare calculation just multiplies every trader's position (before or after trade) by their valuation for the asset, and sums over traders.

Conclusions

- The two formats result in different sets of trades.
- **Call auction** is **welfare-maximizing** given the orders, is also **Pareto-optimal** – there are no profitable trades left to conduct after market closes
- **Continuous auction** acts based on limited info (about future orders), results in **too much trade and less welfare**.
 - Some of the traders might regret their trades after seeing other trades in the market; there is scope for further welfare-improving trades that reverse some of those that happened.
 - But continuous auction is faster, gives more trading opportunities so may attract more traders