

TraderExercise #4



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Call Auctions – *What are we waiting for?*

Most major stock markets open and close trading with a call auction. A continuous market for trading operates the rest of the day. Call auctions batch orders to create large multilateral trades in which buyers and sellers arrive at a single price. In this simulation, you will observe the price formation process of a call auction. You will be handling a large buy or sell order as a buy-side trader, and can choose to participate in the 3-times a day auctions. Some in the simulation will be proprietary traders, seeking to trade profitably using both the call and continuous market structures.

An electronic call auction clears the market for an asset at a predetermined point in time. By bunching many transactions together, a call market increases liquidity, and can significantly decrease transaction costs for participants. As an alternative market structure, call auctions impact order flow and handling decisions, price discovery, and market transparency.

Orders put into call auctions are “priced” orders. In other words, all orders are limit orders; there are no market orders. During *continuous* trading in an order book, limit orders trade *at their limit prices* when they execute. In the call auction, however, limit orders can receive price improvement. For instance, a buy order in a call may have a maximum price to pay of £20.50, but execute at £20.40. A seller may have had a lowest price limit of \$£0.30, but receive £20.40 in the call.

Pricing Mechanism. The most common mechanism for setting the clearing price in a call is to choose the price that maximizes the quantity that can trade. The exhibits below show the accumulated orders on the book. Buy orders accumulate from high prices to low on the left. Sell orders accumulate from low to high price. Orders that are willing to sell at £19.80 are added to sell orders willing to sell at no less than £19.90.

Arrival of Orders over Time. In the illustration below, the call auction is shown in three stages as it forms. On the left, the call auction is in an early stage and there are no prices at which buy and sell orders overlap in price. In the middle stage, an indicative price of £20.30 is shown, and 365 would trade at that price if the auction expired then. The late stage call auction has additional buy orders and a price of £20.40 is indicated with a quantity of 633 that can trade at that price.

Early					→	Middle					→	Late						
Indicative		Imbalance				Indicative		Imbalance				Indicative		Imbalance				
0.00		10000				20.30		132				20.40		5				
BIDS		OFFERS				BIDS		OFFERS				BIDS		OFFERS				
X	0	0	21.00	1296	0	X	0	35	21.00	1445	0	X	0	0	22.00	1869	0	X
X	0	0	20.90	1165	0	X	0	35	20.90	1314	0	X	0	0	21.90	1869	0	X
X	0	0	20.80	1005	0	X	0	90	20.80	1154	0	X	0	0	21.80	1869	0	X
X	0	0	20.70	878	0	X	0	90	20.70	1027	0	X	0	0	21.70	1869	0	X
X	0	0	20.60	695	0	X	0	128	20.60	810	0	X	0	0	21.60	1869	0	X
X	0	0	20.50	543	0	X	0	314	20.50	658	0	X	0	35	21.50	1869	0	X
X	0	0	20.40	496	0	X	0	365	20.40	580	0	X	0	99	21.40	1847	0	X
X	0	0	20.30	413	0	X	0	365	20.30	497	0	X	0	99	21.30	1792	0	X
X	0	0	20.20	178	0	X	0	365	20.20	262	0	X	0	133	21.20	1778	0	X
X	0	0	20.10	38	0	X	0	365	20.10	96	0	X	0	133	21.10	1698	0	X
X	0	0	20.00	0	0	X	0	365	20.00	58	0	X	0	168	21.00	1503	0	X
X	0	0	19.90	0	0	X	0	365	19.90	27	0	X	0	240	20.90	1372	0	X
X	0	187	19.80	0	0	X	0	552	19.80	0	0	X	0	322	20.80	1212	0	X
X	0	253	19.70	0	0	X	0	618	19.70	0	0	X	0	322	20.70	1085	0	X
X	0	491	19.60	0	0	X	0	856	19.60	0	0	X	0	396	20.60	868	0	X
X	0	753	19.50	0	0	X	0	1118	19.50	0	0	X	0	582	20.50	716	0	X
X	0	1046	19.40	0	0	X	0	1411	19.40	0	0	X	0	633	20.40	638	0	X
X	0	1155	19.30	0	0	X	0	1520	19.30	0	0	X	0	633	20.30	555	0	X
X	0	1197	19.20	0	0	X	0	1562	19.20	0	0	X	0	633	20.20	283	0	X
X	0	1362	19.10	0	0	X	0	1727	19.10	0	0	X	0	662	20.10	117	0	X
X	0	1458	19.00	0	0	X	0	1823	19.00	0	0	X	0	725	20.00	79	0	X
X	0	1501	18.90	0	0	X	0	1866	18.90	0	0	X	0	725	19.90	48	0	X

Market Price Impact in a Call Auction. In a call auction, large submitted quantities provide depth to the market and allow large orders to have minimal adverse impact on the auction clearing price. In the middle example below, however, an increase in the size of a buy order causes the clearing price to increase relative to the benchmark case on the left. In the example on the right, a larger size sell order moves the price down.

Base case: 135 will trade at 19.90 in this call auction.

Example 1: If the quantity to buy at 20.20 or less is increased from 15 to 25, the clearing price moves to 20.00 and the quantity increases to 140.

Example 2: If the quantity to sell at 19.80 or greater is increased from 35 to 95, the clearing price falls to 19.80 and the quantity increases to 145.

Buy Orders			Sell Orders			Buy Orders			Sell Orders			Buy Orders			Sell Orders		
Quantity	Aggregate		Aggregate	Quantity		Quantity	Aggregate		Aggregate	Quantity		Quantity	Aggregate		Aggregate	Quantity	
0	0	20.60	250	20		0	0	20.60	250	20		0	310	20		20	
5	5	20.50	230	0		5	5	20.50	230	0		5	290	0		0	
10	15	20.40	230	45		10	15	20.40	230	45		10	290	45		45	
20	35	20.30	185	5		20	35	20.30	185	5		20	245	5		5	
15	50	20.20	180	10		25	60	20.20	180	10		15	240	10		10	
45	95	20.10	170	20		45	105	20.10	170	20		45	230	20		20	
35	130	20.00	150	15		35	140	20.00	150	15		35	210	15		15	
10	140	19.90	135	50		10	150	19.90	135	50		10	195	50		50	
20	160	19.80	85	35		20	170	19.80	85	35		20	145	95		95	
30	190	19.70	50	10		30	200	19.70	50	10		30	50	10		10	
10	200	19.60	40	20		10	210	19.60	40	20		10	200	40		20	
25	225	19.50	20	20		25	235	19.50	20	20		25	225	20		20	
20	245	19.40	0	0		20	255	19.40	0	0		20	245	0		0	
10	255	19.30	0	0		10	265	19.30	0	0		10	255	0		0	

Questions - Answer these questions based on the simulations.

1. What was your approach to using the call auction? How much of your order did you enter into the auctions? What percentage of this quantity entered executed?
2. How did the availability of the 12:45 pm and closing call auction impact your trading behavior in the continuous market?

			<u>Sim #1</u>		<u>Sim #2</u>
3. Record your	Closing position	=	_____	=	_____
	Average price	=	_____	=	_____
	VWAP	=	_____	=	_____
	% Traded with Market Orders*	=	_____	=	_____
					* From Leader Board
	Prop Trader P&L	=	_____	=	_____

4. Did your call auction trading improve your results?

5. What would you do differently if you played again?