

Liquidity provision in a high frequency environment

Chirag Anand
(Macro/Finance Group, NIPFP)

May 20, 2016

- Proliferation of **algorithmic** and **high frequency** trading in to the markets.
- **Altered** the order book dynamics:
 - Ability to enter and modify / cancel an order in a short span of time.
 - And hence the old notion of limit orders supplying liquidity itself has changed.
- **The concerns:** The speed advantage with which the new class of traders are equipped hurt the other traders because
 - Difficult for other traders to trade on the liquidity supplying 'fleeting' limit orders.
 - The advantaged traders take away liquidity from the non-advantageous group.
- Hence, a **need to revisit** the question of liquidity supply with a focus on AT and non AT.

- Examines order submission and liquidity provision characteristics of AT and non AT in the context of the Indian equity markets. We ask:
 - Q.1 Are there a lot of fleeting orders in the market?
 - Q.2 Within the trades, do AT supply liquidity or demand it?
- NSE equity markets are an interesting case:
 - Unlike the U.S, it is not a fragmented market structure.
 - Data contains a long time series that can be used to distinguish a *low* AT and *high* AT period, & with every order and trade tagged as AT and non AT.

- **Raw data:** Tick by tick orders and trades data from NSE, timestamped in jiffies.
Using this data, we recreate the full order book.
- **Segment:** NSE spot and stock futures.
- **Period:** Nov - Dec 2009 (Prior co-location) and Nov - Dec 2013 (post co-location).
- **Sample:** Top 200 firms by market cap in 2009 and 2013.
- **Final sample:** 147 stocks.

Q.1: Are there a lot of fleeting orders in the market?

Percentage of order cancellations in SSF market

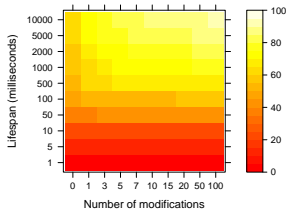
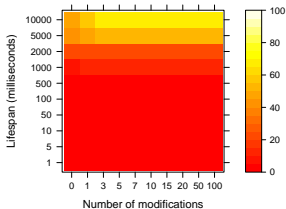
MCap quartiles	<i>As % of orders entered</i>			
	Q1 (Highest)		Q4 (Lowest)	
	2009	2013	2009	2013
Algo	39.30	93.19	26.98	78.41
Entered	0.02	0.03	0.03	0.11
Modified	0.04	0.08	0.06	0.17
Traded (E)	1.48	2.17	0.90	2.50
Cancelled (F)	37.77	90.91	26.00	75.63
NonAlgo	59.90	6.40	71.29	20.86
Entered	1.30	0.46	2.66	1.63
Modified	0.33	0.10	0.74	0.32
Traded (G)	13.12	2.69	15.29	9.43
Cancelled (H)	45.16	3.15	52.60	9.49
Cancelled (F+H)	82.93	94.06	78.60	85.12
Traded (E+G)	14.59	4.85	16.19	11.93
# of orders	58,140	192,537	7,340	27,506
# of stocks	34	37	17	20

Speed of order cancellations in SSF market

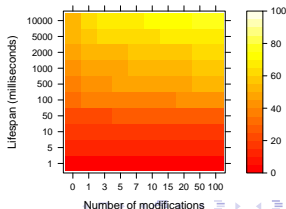
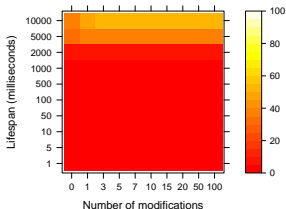
2009

2013

Q1 (Highest market cap)



Q4 (Lowest market cap)



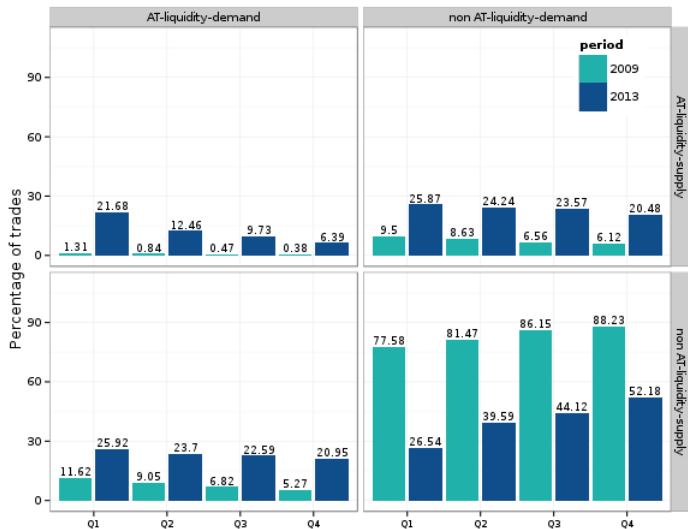
Depth at order entry/cancellation

MCap quartiles Order location at Entry, Exit	As % of orders cancelled in <1 second			
	Q1 (Highest)		Q4 (Lowest)	
	2009	2013	2009	2013
	<i>As % of orders cancelled in <1 s</i>			
(< 1], (< 1]	10.63	4.66	32.43	12.06
(1, 3], (< 1]	0.94	0.57	1.03	0.84
(3, 5], (< 1]	0.11	0.10	0.09	0.12
(> 5], (< 1]	0.15	0.02	0.06	0.02
(< 1], (1, 3]	7.33	4.39	10.74	7.77
(1, 3], (1, 3]	17.86	6.38	27.95	18.93
(3, 5], (1, 3]	0.72	0.84	0.31	0.89
(> 5], (1, 3]	0.30	0.06	0.07	0.05
(< 1], (3, 5]	0.68	0.16	0.45	0.78
(1, 3], (3, 5]	3.06	5.28	1.22	11.42
(3, 5], (3, 5]	4.47	7.65	3.88	12.27
(> 5], (3, 5]	0.89	0.66	0.33	0.67
(< 1], (> 5]	7.20	5.97	6.38	6.24
(1, 3], (> 5]	7.89	4.64	4.40	7.21
(3, 5], (> 5]	4.14	4.61	1.62	5.82
(> 5], (> 5]	33.64	54.02	9.05	14.92

- We do not see significant percentage of fleeting orders.
- AT contribute significantly to order cancellations (90.23%), but have a little share in trades (8%).
- Significant percentage of order cancellations within one second (63%).
- Most of these 'fast' cancellations are away from the touch.

Q.2 Within the trades, do AT supply liquidity or demand it?

Liquidity provisioning by AT and non AT (SSF)



- Is there a significant intraday pattern of order activity?
- Is there a difference in the order flow pattern during stress periods?
- How could these characteristics be explained in terms of the underlying variables of market liquidity?

Thank you

Comments/Questions?

anand.chirag@gmail.com