Tapping hidden liquidity: Flash Orders at the NASDAQ

Johannes A. Skjeltorp[§], Elvira Sojli[†] and Wing Wah Tham[†]

[§]Norges Bank [†]Erasmus University

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Motivation

1. Recently, orders have migrated from NYSE to alternative trading venues including NASDAQ, Electronic Communication Networks (ECNs), and regional exchanges
2. This development was aided by:
   - Establishment of National Market System
   - Elimination of NYSE Rule 390 which restricted offboard trading for some exchange-listed stocks (SEC Rule 19c-3)
   - Increasing availability of innovative electronic crossing and trading networks
3. The proliferation of venues provides a wealth of trading options and innovations
   - Lower latency/Collocation
   - Sophisticated crossing networks
   - Payment for order flow

Motivation

1. Increasing concern from SEC how these innovations may affect market quality in individual and aggregate market
2. One recent concern is the controversial practice of flash trading or use of "flash orders" in U.S. equity and option markets
3. Very short lived actionable indications of market interest (IOI)
   - An IOI expresses a trading interest where price, side, and number of shares is not always specified, and execution can only occur after further interaction between the parties, (O'Hara, 2010)
   - An actionable IOI allows the buy-side trader to immediately trade on the indication directed to them

Flash Orders Pros and Cons

Definition

Flash orders expose submitted marketable orders for a pre-defined period of time by a trading venue to only its participants, at or improving the national best bid/offer (NBBO) which is quoted at another trading venue.

- "flashed" orders may execute locally at the NBBO or better, while normally they would have been routed away to other exchanges
- Provide investors with new way of exposing orders resulting in improved execution quality, lower transaction costs and volatility
- Might cause increased fragmentation of liquidity, potentially worsening market quality and quality of price discovery for the general public
- Since flash orders are *not* disseminated to all market participants, might generate two-tiered market and cause misdirection of liquidity that otherwise would have been exposed to the general public

Questions

1. How do IOIs, like flash orders, affect market quality?
2. Market quality is a broad concept, thus examine sub-questions that aim at understanding how different aspects of market quality are affected by IOIs
   - *i.* How does the introduction (and removal) of the flash order facility affect displayed market liquidity, execution quality, and price discovery?
   - *ii.* Does flash activity in one exchange attract liquidity from the non-flash exchanges at the individual stock level?
   - *iii.* Understanding the intra-day dynamics of flash order usage

These questions have important implications for the information efficiency of prices, investors' trading strategies, market quality, market makers' behavior, and investors' welfare

Contributions

1. This paper is the first to study the impact of IOI on the U.S. equity market
2. Provide a window into dark pools as two of the largest dark pools (Getco/Knight Link) use predominantly actionable IOIs and are implementing similar mechanisms in Europe
3. Address questions and concerns raised with respect to flash orders in particular, and the effect of increased competition/fragmentation from ATSs and Dark Pools in general
4. Contribute to the on-going policy debate on actionable IOI

Data Description

1. Use complete set of quotes and trades in Nasdaq system
2. Retain stocks for which information is available in TAQ and Compustat
3. Exclude preferred, warrant, right, derivative and other stocks, retaining only common stocks (Common Stock Indicator Type=1)
4. Focus only on common shares (Share Code 10 and 11) and stocks that do not change primary exchange, ticker symbol, or CUSIP
5. Exclude stocks that exhibit a price lower than $5 or market value less than $1,000,000
6. Sample period: March 23, 2009 to November 30, 2009 and flash period June 10, 2009 - August 31, 2009
7. Reconstruct the complete limit order book for 50 stock for whole sample period

Empirical Approach

1. Compare flashed vs. non-flashed orders
2. Relate flash characteristics with stock characteristics
3. Compare market quality for stocks for pre, flash, and post period
   - Difference-in-difference analysis against Toronto (TSX) cross-listed stocks
4. Examine characteristics of market quality
   - Liquidity - Spread (quoted and effective spread), depth, Illiquidity Ratio, execution speed and fill rates
   - Price discovery - Short-term volatility, return autocorrelation, and variance ratios
5. Relate flash occurrence and frequency to state of NBBO
6. Analyze relation of flash intensity with volume share and change in other trading venues (exchanges and dark pools)

Findings

- Flashed orders exhibit higher execution rates, lower execution times, and better fill rates compared non-flashed ones
- Stocks with highest flash ratio (flashed/total orders) exhibit largest spreads and ILR
- Market wide effects
  - Dif-in-dif shows that market liquidity for small and medium size stocks that are flashed improves significantly
  - Market for flashed stocks is more efficient during flash period, as volatility and return autocorrelation drops
- Individual exchange effects
  - Slope and depth of Nasdaq LOB improves substantially during flash period, improvements reversed after flash facility is withdrawn
  - Stock's flash intensity & ratio negatively correlated with share of and changes in trading volume of same stock in other exchanges

Difference in Difference Cross Listed Stocks

Event	Volume (1)	Difference (2)	Spread (3)	Difference (4)	ILR (5)	Difference (6)	Volatility (7)	Difference (8)
				Panel A. Tercile 1				
0	15.475		-0.121		-5.628		0.002	
1	20.901	5.427***	-0.104	0.018*	-4.625	1.003*	0.003	0.001**
		[4.147]		[1.995]		[1.991]		[2.496]
				Panel B. Tercile 2				
0	52.037		-0.077		-1.248		0.002	
1	86.239	34.202***	-0.077	0.000	-1.421	-0.173	0.003	0.001***
		[8.565]		[0.043]		[-0.518]		[2.876]
				Panel C. Tercile 3				
0	206.987		-0.074		-0.958		0.002	
1	251.887	44.900***	-0.062	0.012	-0.535	0.423	0.003	0.001***
		[2.583]		[1.485]		[1.530]		[3.729]

- Market becomes more efficient - volatility increases after removal of flash
- Liquidity improves for small stocks - spreads and ILR increase after removal of flash for Tercile 1
- Liquidity deteriorates for large stock - spreads and ILR do not change after removal
- Volume increases - increased probability of being picked off from informed traders, or market volume shifts toward dark pools (Buti et al. 2010)

Remaining Work

- Given the different results on spread across different size terciles - decompose effective spreads into realized spread and adverse selection (Hendershott, Jones, and Menkveld, 2010)
  $espread_{jt} = rspread_{jt} + advselection_{jt}$
- Analyse when flash orders occur using the difference between Nasdaq and NBBO spreads
- Investigate order migration and improvement in LOB comparing LOB depth with and without flash (Buti, Rindi, and Werner 2010)
- Regression of link between flash intensity and volume changes in other exchanges and trading venues

Conclusions

- Using flash orders is beneficial from the perspective of the order submitter
- Market wide effects - Introduction of IOIs improves liquidity, but largest benefits accrue to small and less liquid stocks
- Exchange effects - Flash facility improves liquidity of exchange that uses it, taking away market share from competitors
- Introduction of flash does not seem to hinder market quality, but it does not lead to substantial improvements either

Nasdaq vs NBBO Spreads