

"Modern" Market Makers

Bank of Canada Workshop on Microstructure

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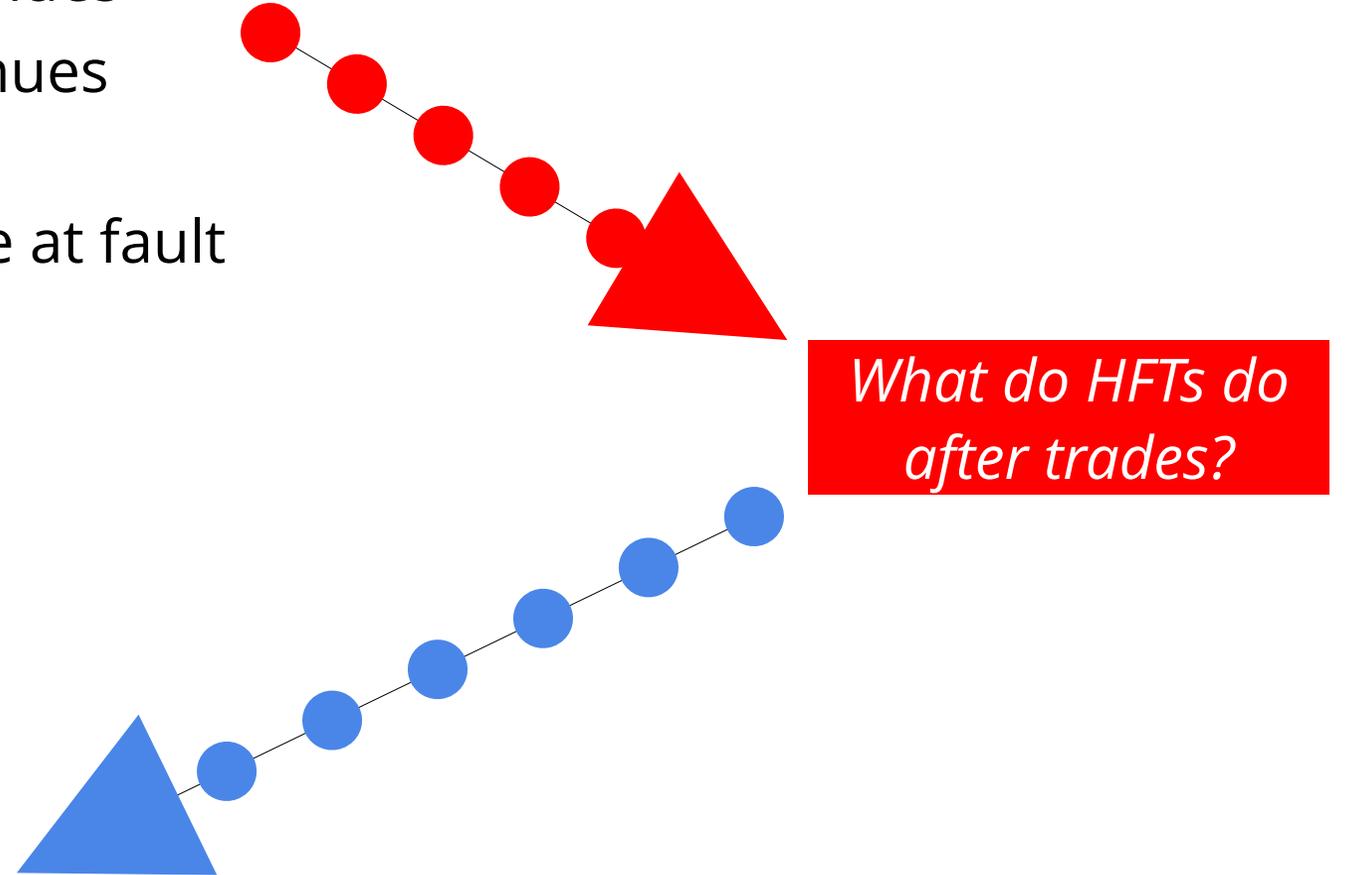
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Popular Line of Reasoning

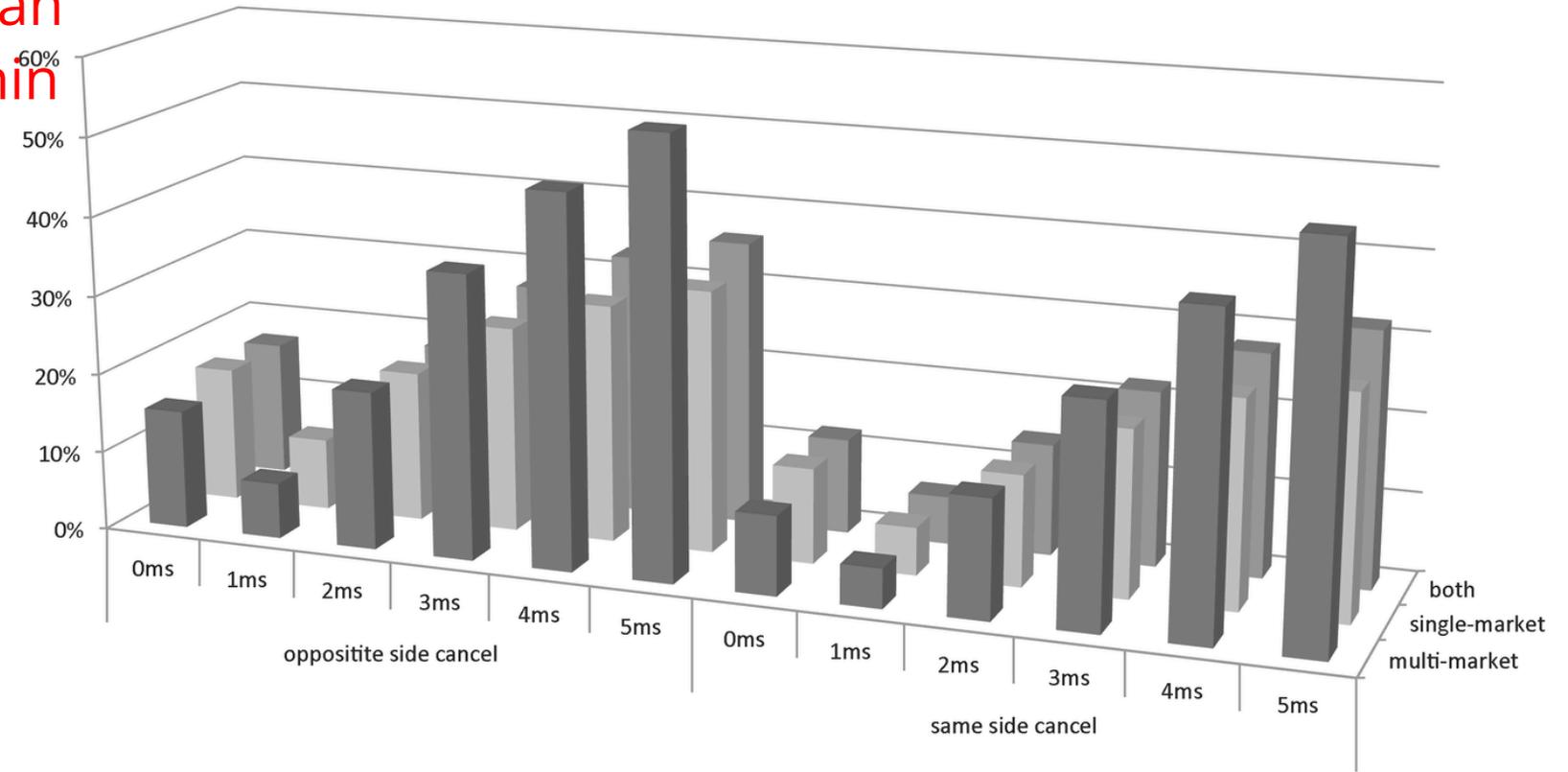
- traders report that after they submit orders, all hell breaks loose:
 - quotes "fade"/"slide" on other venues
 - "others" get to trade on other venues before them
- => HFTs and fragmented markets are at fault



Flurry of HFT Activities after Trades

Most 50% of trades are quickly followed by a cancellation by an order on a different venue within 5ms of the trade

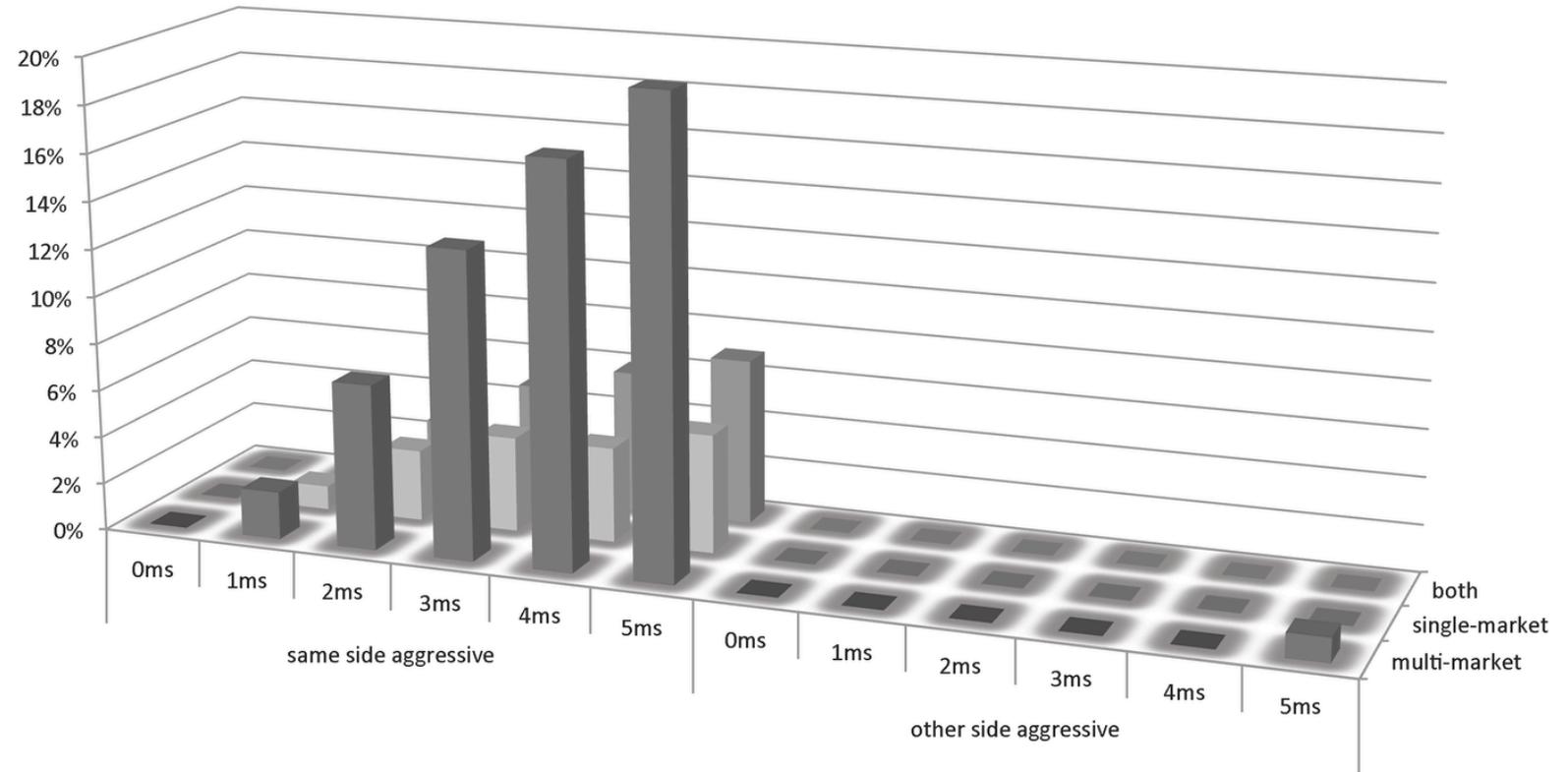
... and this is more extreme after multi-market trades



quotes for further trades disappear

Flurry of HFT Activities after Trades

90% of multi-market trades are followed by an aggressive trade on another venue in the direction of the original trade within 5ms and also more extreme for multi-market trades



trades in same direction occur

■ multi-market ■ single-market ■ both

Research Question of the paper:

What explains this behavior and what is its impact?

- **Step 1:** Characterize/describe fast (HFT) traders' reaction to trades:
 - Do they cancel their orders?
 - Do they submit own aggressive orders?
 - Difference single vs multi-market orders?
- **Step 2:** What explains the reaction? Is there a difference between single and multi-market trades?
 - size?
 - type of trader?
 - information?
- **Step 3:** What does the HFT behavior do?

Disclaimer: we do not intend to imply nefarious behavior!!!

What should we expect?

Text

Literature

- Trades = information.
 - Baldauf and Mollner (2015): only smart trade everywhere
 - van Kervel (2015): only sophisticated have access to SORs
 - => Reprice & take out "stale quotes".
- Market makers post everywhere but only want to trade once.
 - Cancel existing orders (van Kervel (RFS 2015))

Critical Ingredients

- Existing literature did not have
 - HFTs
 - regulation-mandated integrated mkts
- Want now:
 - examine HFT? => **trader level** info
 - impact of mandated multi-mkt? => need trader level to identify multi-mkt vs single mkt
 - identification => need **instrument**
- proprietary masked **trader-level data** for all Canadian equity markets (provided by IIROC)
 - use 30 most frequently traded non-crosslisted stocks, March - May, 2013.
- *a critical market-organization change that eliminated latency between two of the three main markets (markets A and B) => candidate for **instrument***

Identifying Traders

- Similar to Comerton-Forde, Malinova, Park (2017)
- **Fast traders:** Use three criteria (across many securities on many days: 307 securities, Jan& Feb, 2013)
 - regularly submit and cancel orders very quickly (median submit-to-cancel times).
 - submit/cancel most orders very quickly subsequent to someone else's activity.
 - react quickly to a particular, regular, market-wide news announcement (the market-on-close imbalance).
 - classified: ~82 (out of ~4,900)
- **Retail:** special order type that can only be used by retail
- **Institutions:** trade-strings:
 - at least 10 distinct orders
 - single direction on a day

What is a multi-market trade?

- same trader ID
- submit *marketable order* on separate markets
- within 5 milliseconds
 - mktable=can trade or is immediate-or-cancel

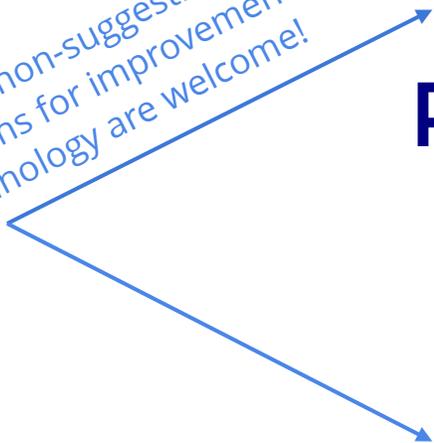
Post-trade Cancellation

- different market than trade
- cancellation by fast trader
- within 1,2,...,5 milliseconds
- QF: cancellation on opposite side of trade within 5 ms

Post-trade Aggressive

- different market than trade
- aggressive by fast trader
- within 1,2,...,5 milliseconds
- LA: aggressive (mktable & IOC) on same side of trade within 5 ms

meant non-suggestively;
suggestions for improvement of
terminology are welcome!



Not the first to look at fragmented markets

- Long literature, including
 - Joel Hasbrouck (e.g., "One Security, Many Markets: Determining the Contributions to Price Discovery", JF 1995)
 - O'Hara & Ye (JFE 2011): good for mkt quality
- recently
 - van Kervel (RFS 2015): over-posting exists
 - Baldauf & Mollner (WP 2015) (theory): splitting of liquidity across markets
 - Brogaard, Riordan, Hendershott (WP 2016): HFT generate price discovery even in absence trading.

Step 2: Are multi-market trades different?

Simple summary stat: price impact

*Naive conclusion: multi-market trades have higher price impact **therefore** they are more informed*



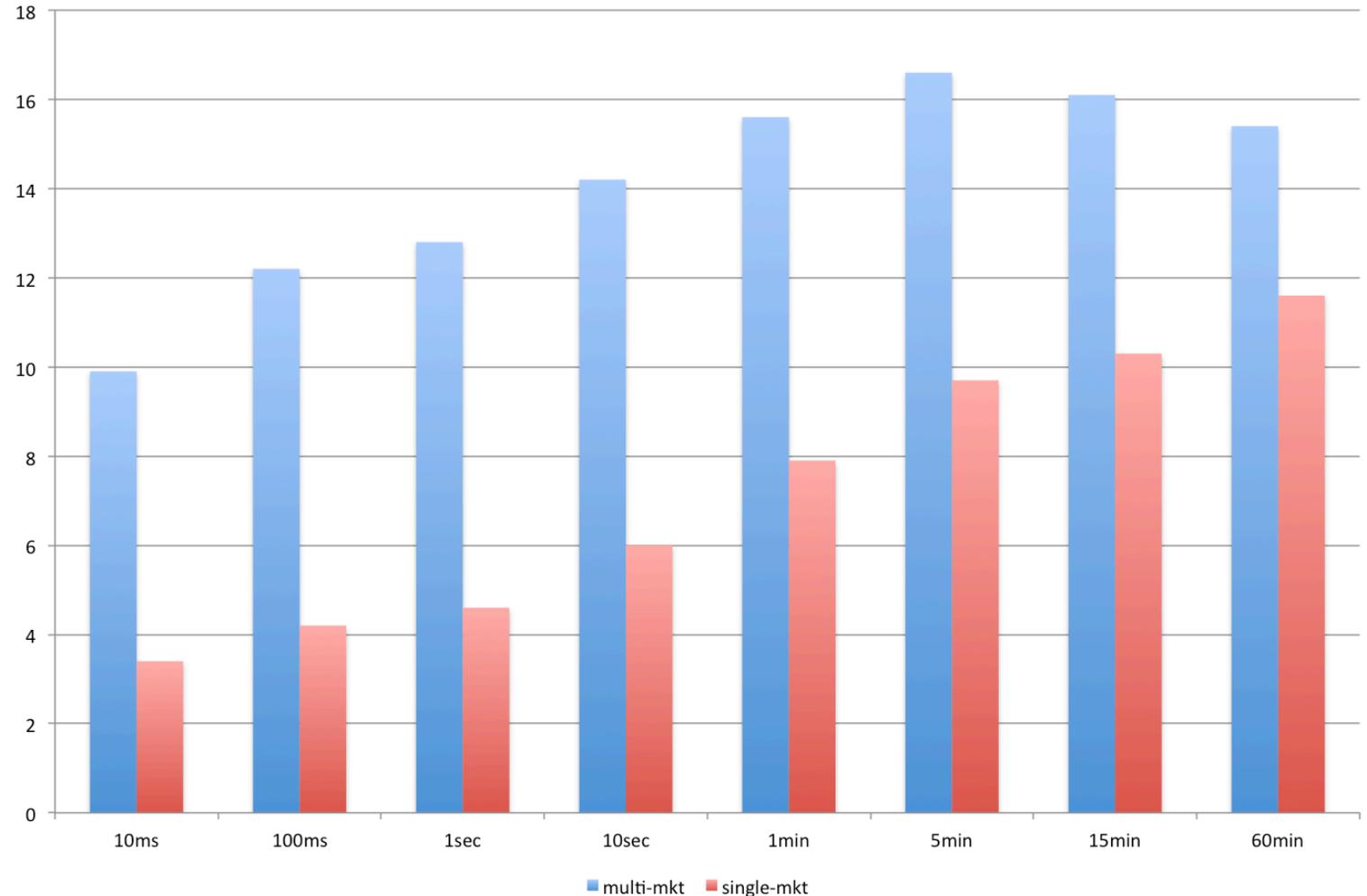
Baldauf & Mollner and van Kervel say: multi-market = smarter



HFTs should react more



case closed

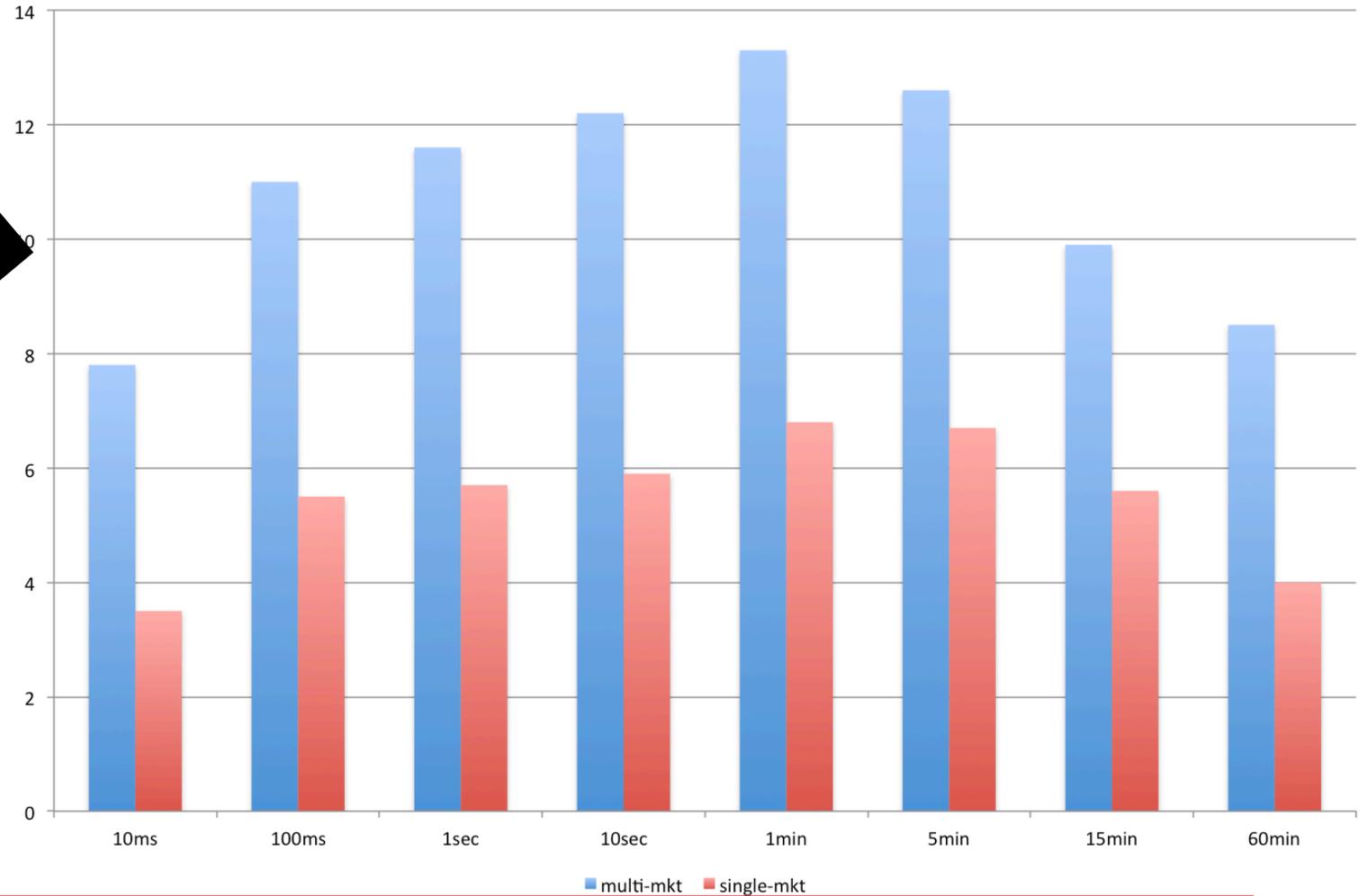


Multi-market => more informed trader?

Price impact for retail trades

Reminder:

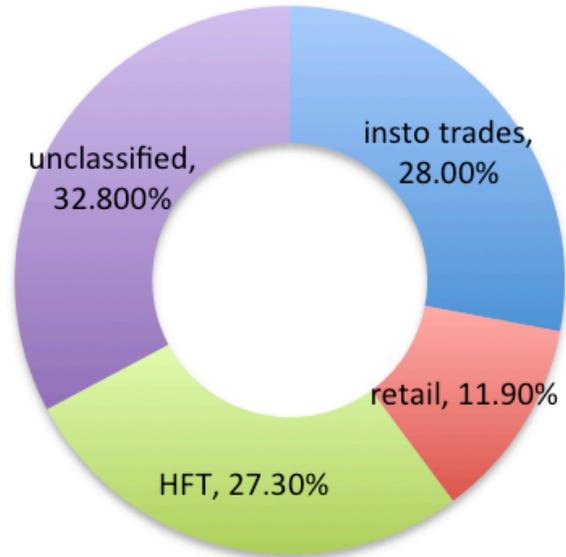
- Broker SORs may have to split larger orders to obey OPR
- Brokers may want to split larger orders to avoid high costs



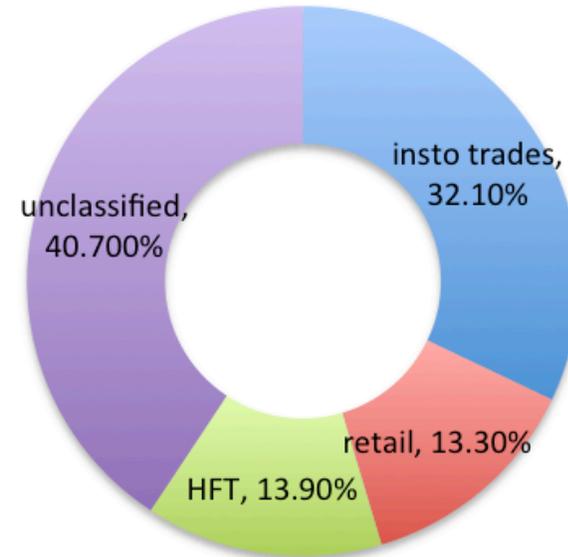
Conclusion: If we believe that retail orders are less informed, then the price impacts shouldn't look this different.

Usage Stats

Whole market

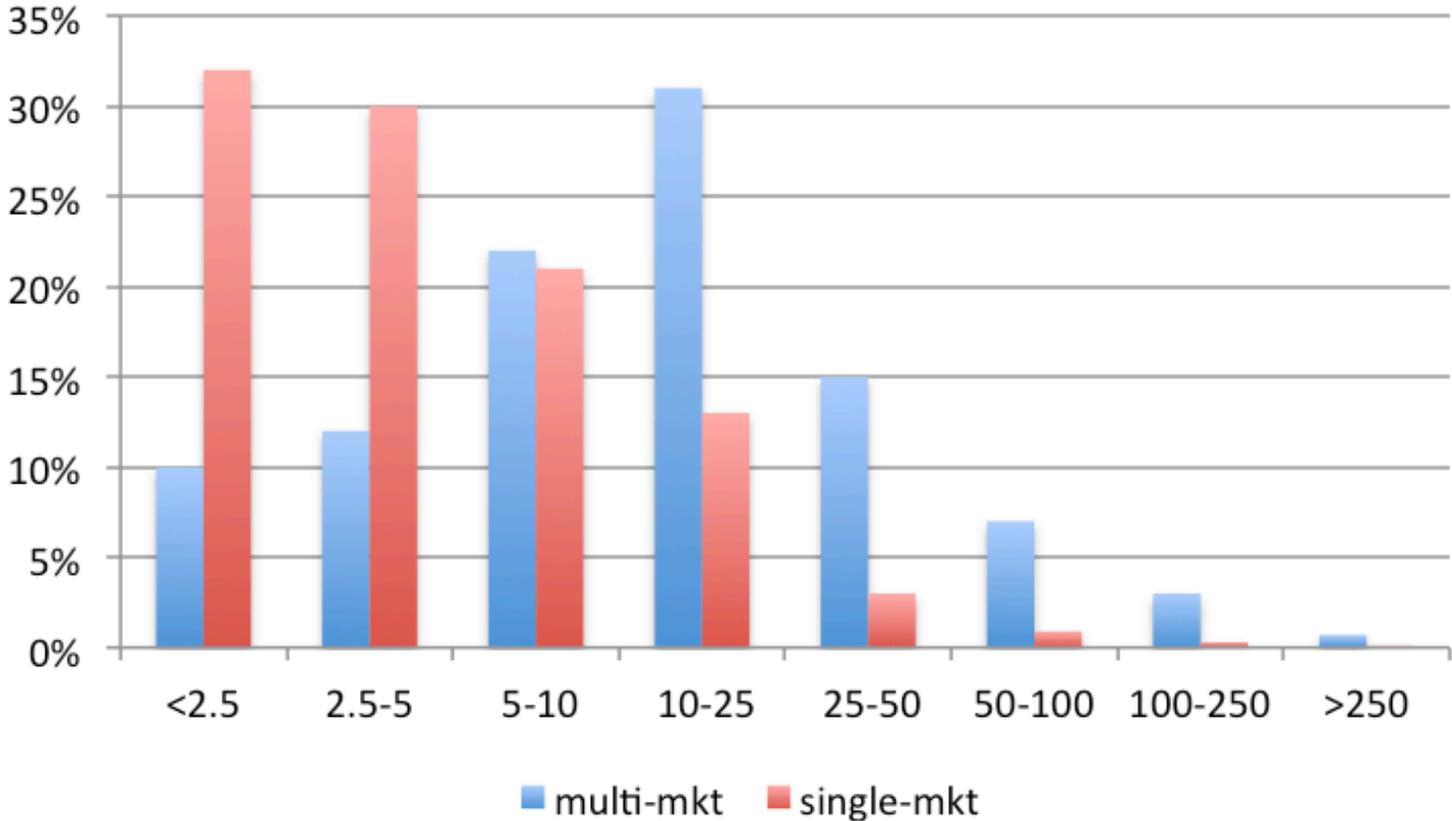


Multi-market



Is it size?

Size distribution



Conclusion: multi-mkt orders are larger

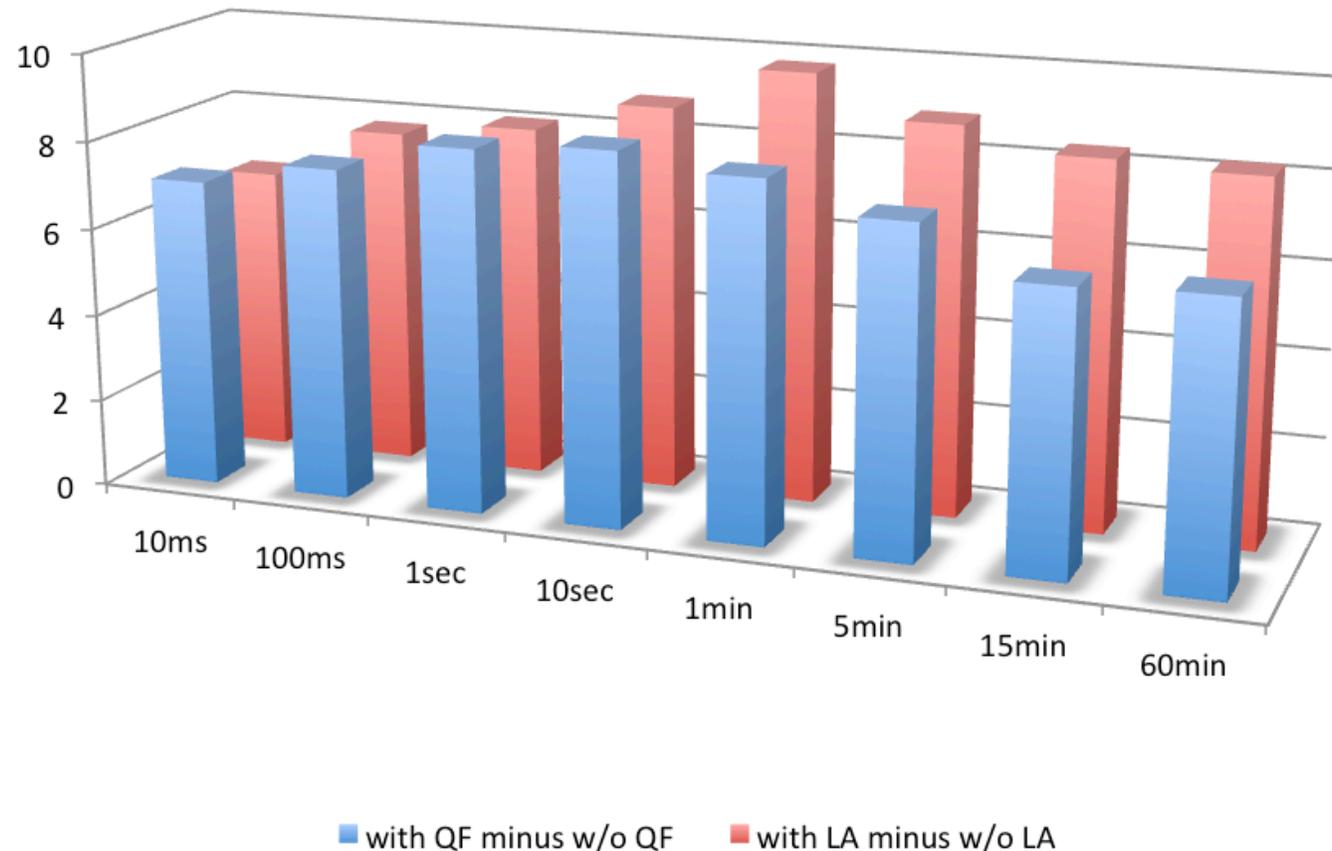
Is it size?

*price impact by size:
multi market minus single market*

Conclusion: even for similar size, price impact of multi-market orders is larger.

Could price impact be larger because of the HFT reaction?

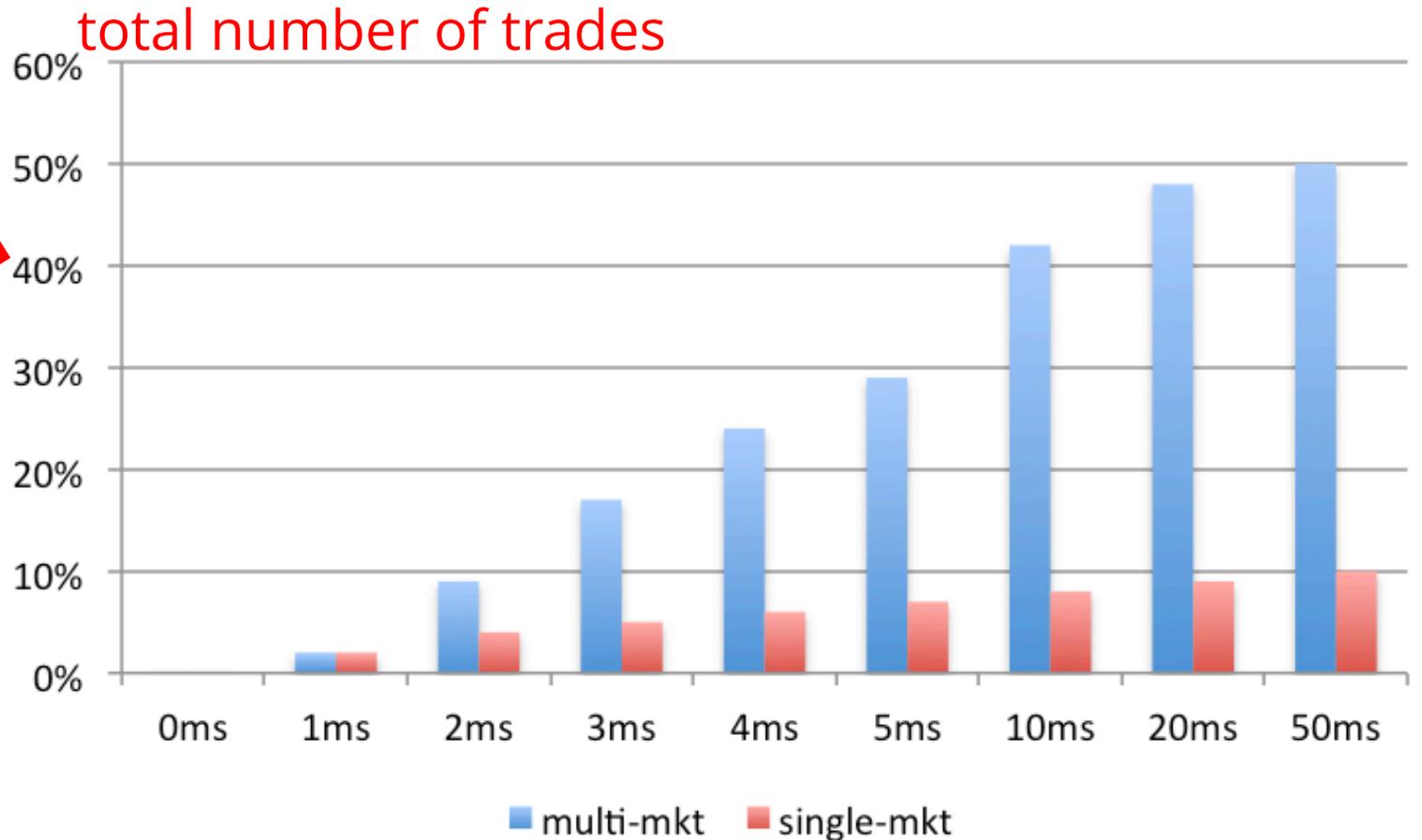
Plotting: price impact with HFT reaction minus price impact without HFT reaction



Observation: HFT makes your trade look fat

(same direction minus opposite direction)

Conclusion: HFT reaction looks like there is much more activity than warranted by the original trade



Bottom Line

- multi-mkt trades are larger but
 - using multi-mkt is/can be regulation requirement
 - retail use them regularly
- multi-mkt have larger price impact
 - even for retail
 - for same size
- multi-mkt with HFT cancellations/aggressive submissions
 - have larger price impacts.
 - look "bigger"

The Big Question

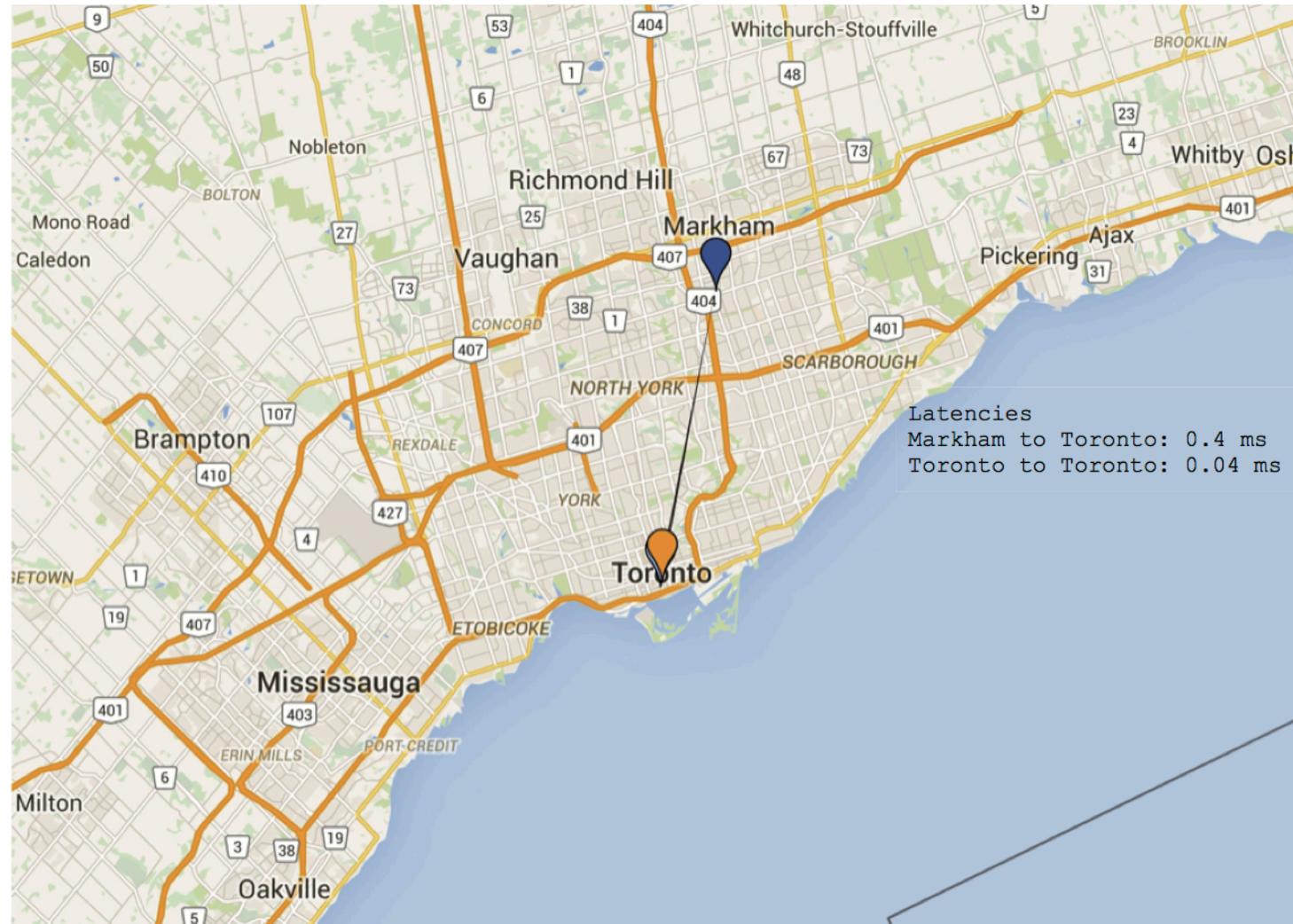
- Is reaction
 - indicative/reacting to information
 - HFT push prices to the "right" level
 - noise
 - HFT reaction obfuscates price discovery

How to identify?

- Idea: if latency between venues disappears
 - premise: non-HFT order flow should remain similar
 - if price discovery => HFT can create same level of it
 - QF and LA harder to perform
 - if noise => lower price impacts

How do you make physical latency disappear?

Market A and B move to the same data centre



What would we expect?

- if you post on both A and B, you cannot avoid being "hit" on both, i.e. no more outrunning
 - depth should decline
 - spreads may increase
 - fewer post-trade cancellations
 - post-trade aggressive is less clear (theory harder)

Changes in Liquidity

	qspread bps	ln(BBO \$-depth)	%time at best with bid or ask	%passive HFT relative to local	%passive HFT relative to all
latency × market A	0.73	-0.11**	-0.03***	-3.07*	-2.90***
latency × market B	0.07	0.03	0.00	1.61	1.54***

Changes in Behavior

	%multi- market trades	%multi- market QF	%single with QF	%multi- market LA	%single with LA
no latency	-0.4 (-0.75)	-5.47*** (-3.29)	-4.24*** (-3.59)	-3.25** (-2.30)	-0.99** (-2.45)

Changes in Price Impacts

Difference in differences of multi- vs. single-mkt orders before vs after

	<\$2,500	\$2,500 -\$4,999	\$5,000 -\$9,999	\$10,000 -\$24,999	\$25,000 -\$49,999	\$50,000 -\$99,999	\$100,000 -\$249,999	≥\$250,000
Price impact								
10ms	-1.30** (-2.18)	-1.64*** -2.67	-1.99*** (-3.32)	-1.41 (-1.64)	-1.43*** -2.94	-2.15* (-1.93)	0.05 (0.05)	-0.92 (-1.07)
100ms	-1.55* (-1.84)	-1.17* (-1.96)	-1.31** (-2.00)	-1.03 (-1.23)	-0.86 (-1.09)	-1.49* (-1.87)	-0.70 (-0.57)	-1.95* (-1.74)
1sec	-1.86* (-1.89)	-1.21** (-2.10)	-1.31* (-1.76)	-0.90 (-1.04)	-2.09 (-1.62)	-3.09*** (-2.93)	-0.79 (-0.56)	-2.22* (-1.87)
10sec	-1.57 (-1.57)	-1.10* (-1.78)	-1.14 (-1.60)	-2.02** (-1.96)	-2.10 (-1.41)	.442** (-2.10)	-0.50 (-0.30)	-3.45** (-2.06)
1min	-1.09 (-1.03)	-1.65* (-1.78)	-2.89** (-2.31)	-1.29*** (-3.24)	-2.67* (-1.69)	-5.28 (-1.59)	0.20 (0.11)	-3.06 (-1.41)
5min	-0.58 (-0.48)	-3.17*** (-2.67)	-2.65** (-2.53)	-1.65*** (-3.12)	-2.71 (-1.10)	-10.04** (-2.24)	-1.87 (-0.47)	-3.51*** (-3.17)
15min	-0.65 (-0.26)	-3.34** (-2.05)	-1.32 (-0.99)	-1.28 (-0.83)	-4.23 (-1.06)	-5.95 (-1.49)	-1.70 (-0.30)	-1.91 (0.00)
60min	-2.76 (-0.58)	-10.10*** (-2.72)	2.01 (0.00)	-1.85 (-0.58)	-1.83 (-0.36)	-10.38 (-1.27)	1.44 (0.22)	-2.39 (-0.46)

Bottom line: price impacts of multi-market orders decline

Summary and Conclusion

- Multi-market trades are
 - common
 - often required by regulation
 - also performed by choice (and without need?)
 - not the sole purview of sophisticated traders
- How do fast traders react to trades?
 - Fast traders cancel quotes rapidly and take out (stale) quotes after trades.
 - Stronger reactions to multi-market trades
- What does HFT behavior do?
 - Increases price impact of orders
 - *indication that in multiple mkts, HFT **obfuscate** price discovery*