REGULATING HFT
GLOBAL PERSPECTIVE

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HFT Perspectives

- Michael Lewis:

  ….markets are ***rigged*** in favor of faster traders at the expense of smaller, slower traders.

- Gregg Berman (SEC) *speaking on whether HFT is harming the market*:

  “In spite of what you read everywhere, in spite of what many market participants say, and in spite of what many jurisdictions and other regulators might say about the equity markets, they’re not broken”

- Charles Jones (Academic) *on the impact of HFT*:

  “Virtually every time a market structure change results in more HFT, liquidity and market quality have improved because liquidity suppliers are better able to adjust their quotes in response to new information.”

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HFT Excesses Triggering Calls for Regulatory Intervention

- US Flash Crash, 2010 (poor execution algorithm)
  - Navinder Sarao (spoofing)
- Facebook IPO, 2012 (faulty exchange software and high HFT activity)
- Knight Capital, 2012 (technical glitch and rogue algo)
- Panther Energy Trading, 2013 (spoofing)

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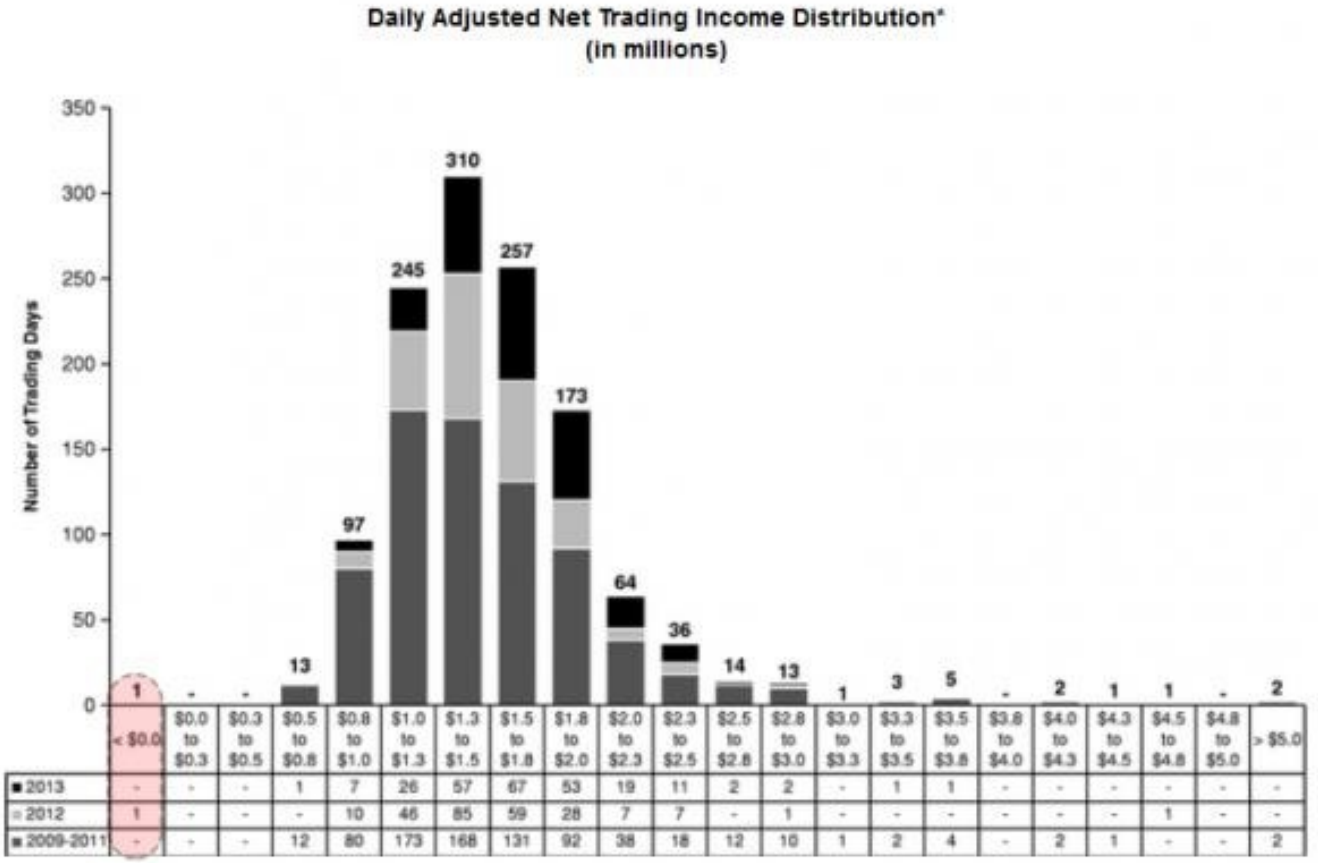
Profitability of HFT Firms
Virtu Financial before its IPO



Beneath the Posturing

- HFT strategies are not new…they existed in manual markets
  - Market making
  - Arbitrage
  - Event-based trading

- Regulatory issues and responses are also not new… they are similar in nature to what happened in manual markets
  - October 1987
  - Flash crash of 1962
  - Transaction taxes were in vogue in the US until the mid 1960s.

HFT Exacerbates Recent Shifts in Market Structure

- Market fragmentation post regulatory changes (RegNMS in the US, MIFID in EU)
  - Greater internalization
  - Lower incentive to display orders
- Selective market making
  - Market makers with no affirmative obligations
- Vast improvements in technology (including huge reduction in cost)
  - Technology intermediation instead of human intermediation
  - Huge messaging traffic and infrastructure overload
  - Increase in execution speed
- Lower tick sizes
  - Trade compression

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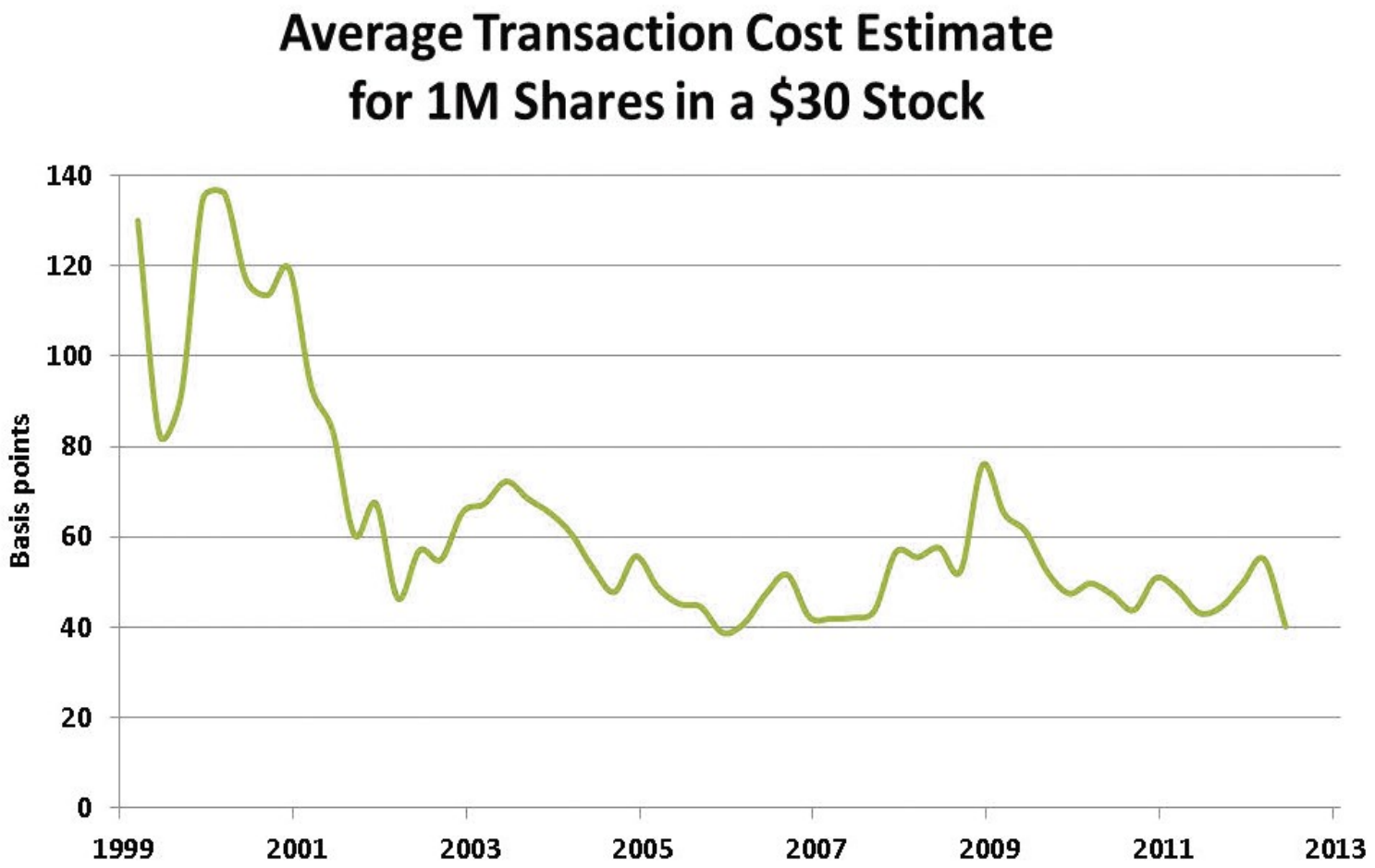
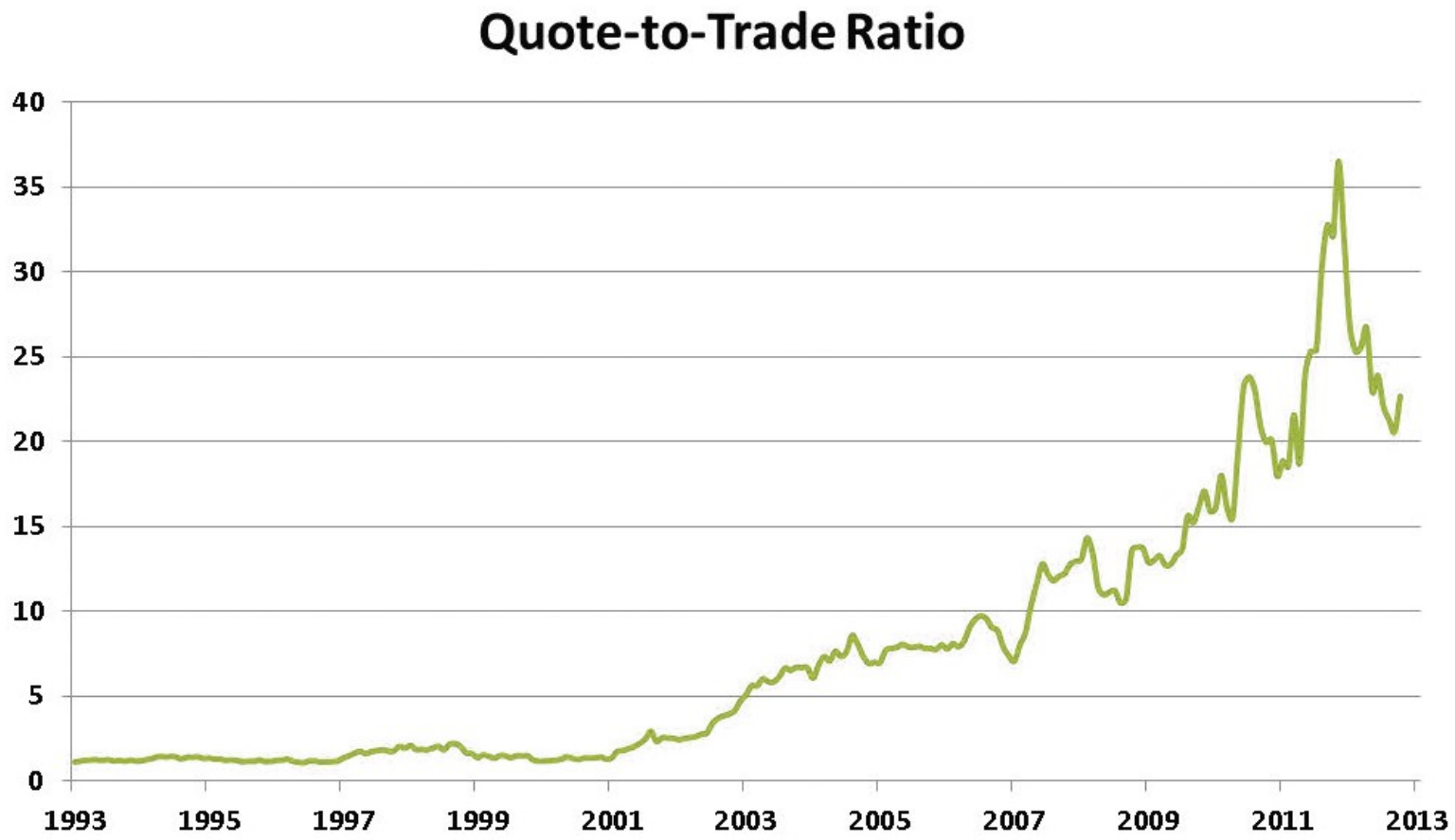
Reduction in Transaction Costs



Source: Angel, Harris and Spatt (2013)

Increase in Messaging Traffic



Source: Angel, Harris and Spatt (2013)

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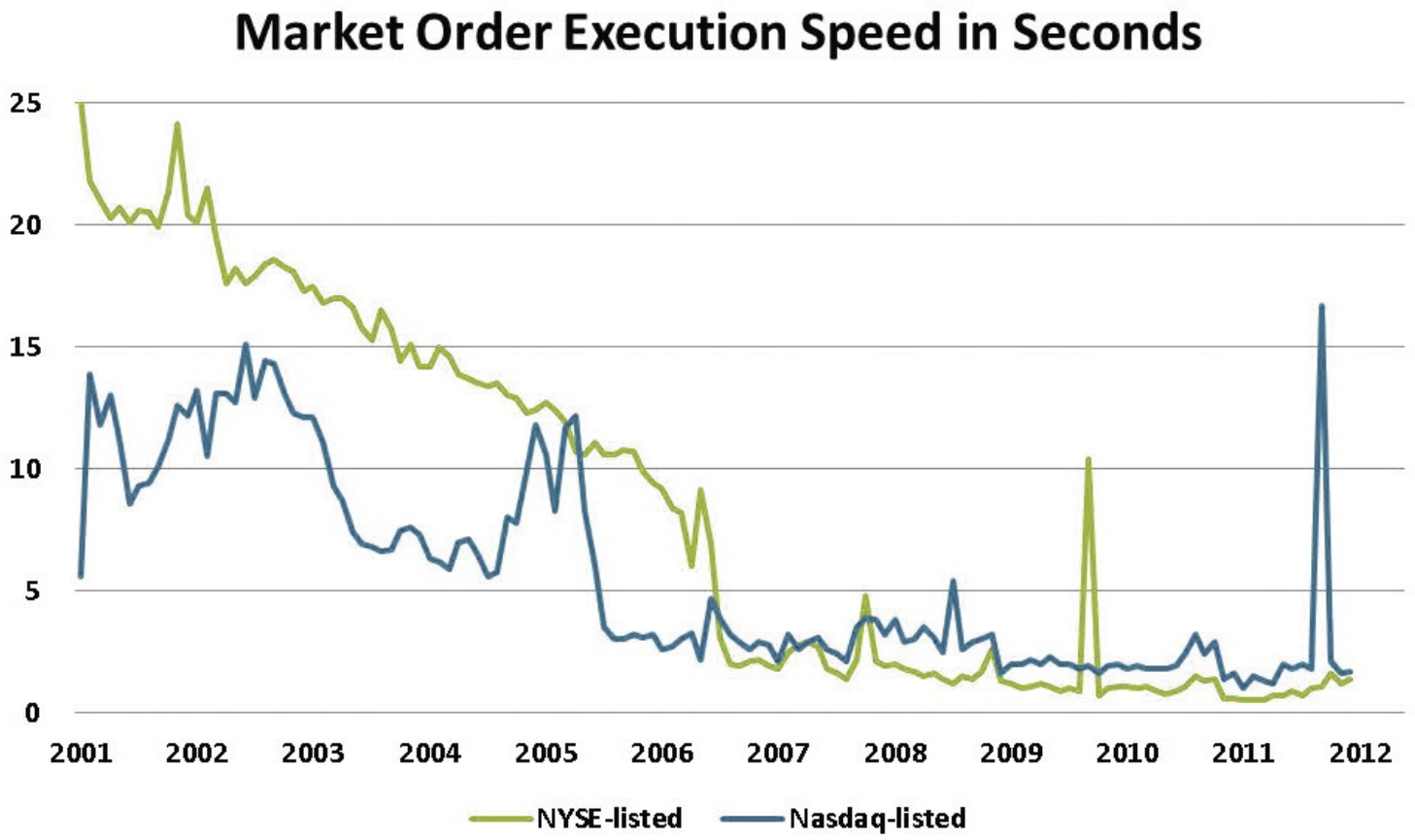
Reduction in Execution Speed



Source: Angel, Harris and Spatt (2013)

HFT Practices Under Scrutiny

- Rogue algos
- Sudden withdrawal of liquidity provision
- Pseudo strategies to elicit response from other traders (“spoofing”)
- Taxing infrastructure without creating benefit
- Externalities imposed by poor risk controls
- Exploiting market weaknesses systematically

Could disrupt price discovery and orderly functioning of markets (and impact “market integrity”)

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Approach to Regulatory Interventions

- Regulatory goals ("technology is here to stay")
  - Aimed to level the playing field; create fairness
  - Discourage socially disruptive or undesirable behaviour
  - Promote good price discovery and effective and orderly functioning of capital markets (reduce chances of market failures)
  - Reduce unnecessary volatility (speculation)
  - Uphold market integrity (prevent market manipulations) and market stability
  - Protect the interests of fundamental investors
- Approach include extensive research + public comments
  - Divergence between interests of law makers, regulators and market operators
- Constraints
  - Externalities from regulatory actions
  - Cooperation across markets/regulatory jurisdictions
  - Capacity and capability constraints

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State of Regulatory Interventions So Far

- Low-Medium (Asia, US/UK)
- High (EU)

Observed variations:

  - Level of self regulation vs. mandated regulation
  - Level of trader discretion

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Global Regulatory Responses to HFT - 1

Country/Region	Regulation	Last Amendment	Reason	% Algo Contribution	Assessed Impact
EU (MiFID Regulation)	**Proposed:** Risk controls; report algorithmic strategies to regulators; audit trail; negotiated market-making agreements designed to provide market liquidity regardless of market conditions; controls for direct market access; 500 millisecond hold times (believed to be struck from final proposal); circuit breakers; algorithmic testing; max OTR; minimum tick size; ability to cancel erroneous orders; creation of volume and price thresholds; financial transaction taxes on executed and canceled orders	2013	Level playing Field, Government Revenues	40%	
Germany	**Existing:** Registration with BaFin; licensing; ability to deny use of any algorithmic trading strategy; OTR; minimum tick size; fee for order amendments and cancelations; flagging of algorithmic orders; risk management processes and procedures; documentation of algorithms; clarification of market abuse definition	2013	Market Integrity, Fairness	40%	
UK	**Proposed:** Financial transaction tax set at the average HFT profit E: Financial transaction tax of 0.01% on modified or canceled orders that exceed 80% of all orders or are	2013	Reduce Trading, Control Market outcomes, Remove Behavioural factors for social optimality, fairness	35-60%	
France	**Existing:** Financial transaction tax of 0.01% on modified or canceled orders that exceed 80% of all orders or are executed within half a second; 0.20% transaction tax on French companies with market cap of at least €1B; registration with French regulators; audit trails; documentation of algorithms	2013	Reduce Trading liquidity, discourage speculative financial activities, encourage useful ones		France's share of European equity turnover has been reduced from 23 percent in 2011 to an estimated 12.85 percent in 2013
US	**Proposed:** Pre-trade controls; post-trade controls; system safeguards; mandatory registration and reporting; standardized order types; testing of algorithms; documented evidence of capacity, integrity, resiliency, availability and security adequate to maintain operational capability; scheduled testing; continuity and disaster recovery plans; system redundancy; financial transaction taxes	2013	Fairness, market stability, income redustribution, creating formal regulation for existing market integrity practices utilised by traders and exchange	50%	HFTs have reduced from a peak of 61% in 2009 to 49% currently

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Global Regulatory Responses to HFT - 2

Country/Region	Regulation	Last Amendment	Reason	% Algo Contribution	Assessed Impact
Canada	**Existing:** Message processing and trade volume fees on trades and order submissions, cancelations, and modifications **Proposed:** Risk management and supervisory controls; price and volume thresholds; cancelation and/or modification of erroneous orders	2013	Government/regulator income generation, market integrity	40%	HFTs have reduced from 42% in 2011 to 34% in 2013
Japan	**Existing:** Monitoring; systemic limitations	2014	Encourage HFT growth, lower transaction costs	45-50%	Increase in HFT from 36% in 2010
Singapore	**Existing:** Stamp duty of $0.20 per $100 of value for equities **Proposed:** Stamp duty rebates for HFTs	2012	Encourage HFT growth	30%	
Hong Kong	**Proposed:** Code of conduct; control and supervision of orders; management and supervision of design, development, deployment, and operation of electronic trading; provision of adequate security, reliability, and capacity; required recordkeeping including audit logs; post-trade controls; required testing schedule; risk management controls	2014	Market Integrity, Discourage HFT growth	20%	
China	**Existing:** Stamp duty on equities fluctuating between 0.1% and 0.3%		Discourage HFT		
Australia	**Existing**: Recent market integrity rules banning manipulative trading practices	2014	Market Integrity	30%	
Russia	Introduced low-latency connection between Moscow and London with a sub-40-	2013	Encourage HFT	40%	Increased Liquidity
Mexico	HFT is encouraged in general; However. foreign HFT firms cannot connect directly to the exchange, but must go through a local broker	2013	Encourage HFT		
Brazil	Order execution times have been cut from 30 milliseconds nearly down to 1 millisecond; messaging limits designed to disrupt high order cancelation rates; transparency practices in place to make it easy for regulators to track the "life cycle" of a trade	2013	Encourage HFT	10%	

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Specific Regulatory Interventions

- Investigating market manipulations quickly
  - Automated forensic analysis on a fast basis
- Protecting serious traders from front running and spoofing
- Reducing the speed race
  - Tinkering with rules to reduce gaming – randomize time stamping (delaying order entries randomly), tick sizes etc.

Specific Regulatory Interventions

Ex-ante measures

- Algo notifications (including regulatory approval pre-release)
  - In general it is widely used but its benefits are overstated (no study that examines its benefits in detail)
  - Confidentiality remains a key issue
  - One solution that might work is the disclosure of absolute parameters (“boundary conditions”) that the algo must satisfy at all times
  - Regulators can combine these parameters to determine the max impact that algos can have. Exchanges can combine across algo traders to determine infrastructure capacity.
  - Orders are tagged by algo ID that identifies the particular algo that generates the order. It forces the algo writer to understand the boundaries of the algos and then test it out thoroughly before releasing it in the market.
  - Algo writers need not provide confidential strategy related information but rather provide only boundary conditions which are common to all algos.
  - Examples of boundary conditions
    - Max rate of message generation per second
    - Max dollar volume/trades per second
    - Max net position
    - Max number of spread changes that can be made per second
    - Max number of cancellations per second

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Specific Regulatory Interventions

Ex-ante measures

- Order and position limits (exchange–driven)
- Tick size adjustments
- Minimum resting time
  - Orders more likely to get stale and be picked off (spreads will widen and depths will fall)
- Maker-taker pricing abolitions
- Trade-at rule – cannot match without improving prices (aimed at dark pool liquidity which just matches the BBO)
  - May indirectly hurt retail traders as commissions/prices would be higher
  - May indirectly contribute to retail flow trading with prop flow (dealers post orders in the exchange for their own account and then trade against it with the retail flow)
- Other internalization constraints (lighting up dark pools)
- Randomized intraday call auctions
- Pre-trade risk controls at the broker level

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Specific Regulatory Interventions
Proposed/Implemented

Ex-post measures

- Circuit breakers
  - Purpose is to prevent discovery of bad prices.
  - Single stock vs. market wide breakers
    - Limit up Limit down rule (LULD) to replace single stock circuit breakers
      - Dynamic price bands around a reference price (arithmetic mean over the previous 5 minutes)
  - Cooling off time post breaks
    - Use auctions to collect orders for efficient price discovery
  - Widely used with innovations
  - Randomize or hide trigger points (Deutsche Borse does not publish trigger points)
- Trade limits
- Market marker obligations (doubtful starter)
- Order to trade ratio fees (message traffic fees)
- Transaction taxes (or non-transaction tax like in France)
  - Increase cost of trading in general (widen spreads; US dropped it in 1965)
  - Lower market liquidity (e.g. France – turnover halved)
- Throttles on message traffic, kill switches
- Randomizing order queuing within the same price/arrival time (EBS has tried it in its FX platform)
- Reporting innovations (varying reporting frequencies; report prices real time but not trade sizes)
- Post-trade risk controls at the broker level
- Real-time monitoring and surveillance to size up aggregate impact of strategies (MIDAS in the US)

CFTC Wish List for Reporting

1. Effective spreads
2. Order-to-fill ratios
3. Execution speed for different order types and sizes
4. Aggressiveness imbalance
5. Price impact for given trade sizes
6. Average order duration
7. Order efficiency
8. Rejection order ratio
9. Net position changes versus volume
10. Branching ratios
11. Volume imbalance and trade intensity
12. Herfindahl-Hirschman indexes based on market share of open positions under common control
13. Metrics on the number of price-changing trades involving ATSs

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Conclusion

- Technology is here to stay
  - Manage its usage rather than reduce it
- Provide safeguards through clear and easy to apply policies
  - Provide for impartial application of rules
- Allow market mechanism to compete away excess rents but prevent monopoly formation
  - Tax undesirable behavior without stifling competition

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