

Market Structure Evolution

How the U.S. Markets Transformed



- Orders centralized at listing market
- **Markets operating manually**
- Institutional and retail orders interact
- Common set of rules and practices
- Average trade = 1,500 shares
- Quotes stable and often for “Size”
- **Quotes wide, +100 bps in large cap**
- Blocks trade on Exchange

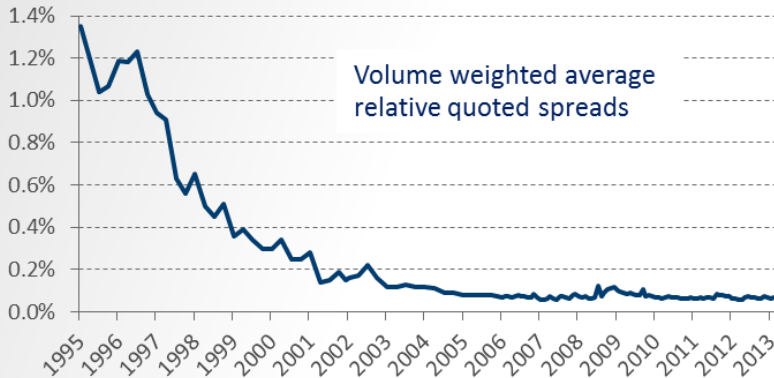
- Order fragmented over many markets
- 11 Exchanges & 40+ Broker Systems
- Retail orders trade Over-the-Counter(OTC)
- Diverse set of rules and practices
- Average trade size < 200 shares
- Quotes flicker and show little size
- Quotes narrow, 10 bps in large cap
- Blocks trade OTC, and only trade rarely

The Last 15 Years: The Cost of Trading has Fallen

Competition between market centers and market makers has driven trading costs down for all investors.

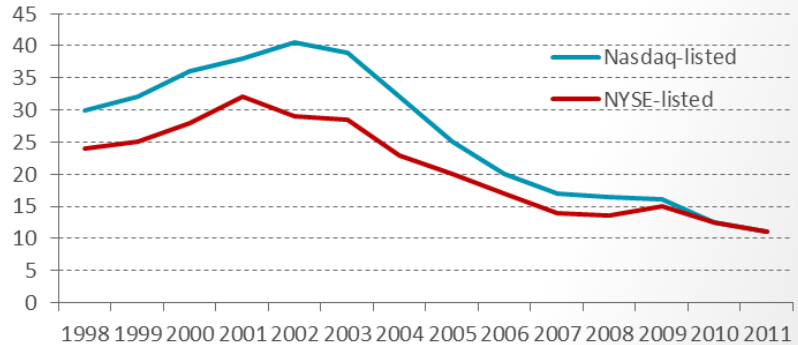
Automated firms are most active in the largest-cap, most actively traded stocks, where market quality is highest

Retail trading costs have declined.



Source: NASDAQ OMX Economic & Statistical Research

Institutional Trading Costs

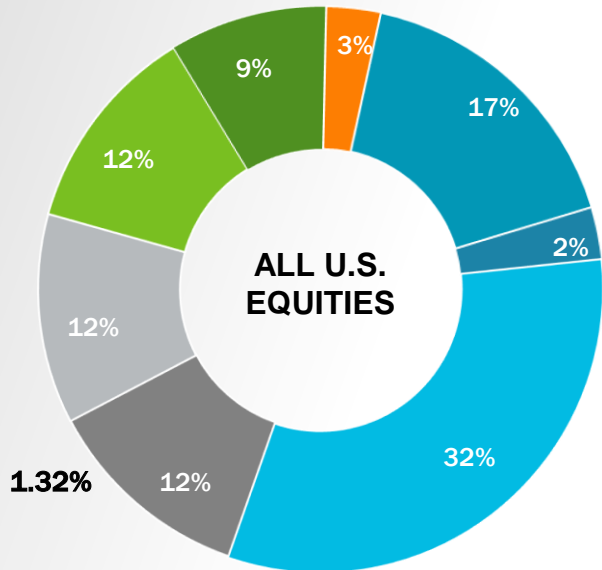


Source: Elkins/McSherry. Based on Q4 data from the Elkins/McSherry using VWAP benchmark. Beginning in 2010, E/M combined NYSE and Nasdaq trading

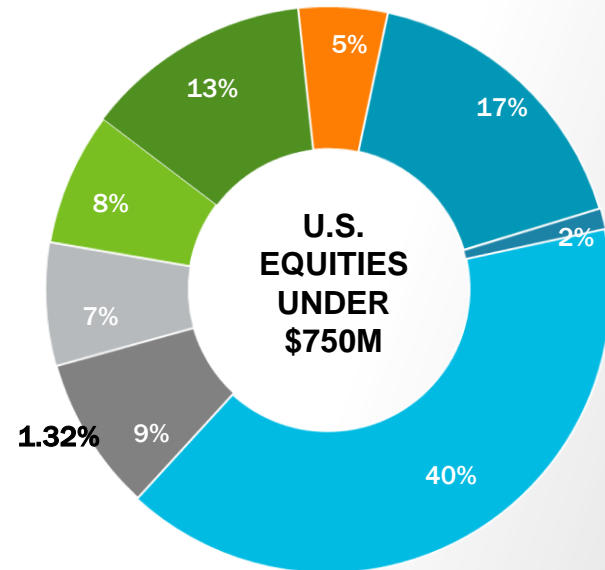
Fragmented markets a reality for large and small cap

The largest U.S. exchanges are Nasdaq and NYSE. Nasdaq, NYSE, BATS, BATS Edge and others offer electronic trading on order books. Off-exchange trading (OTC) is reported through the two Trade Reporting Facilities (TRF). Small caps are more likely to trade off-exchange than large cap.

US EQUITY MARKET VOLUME BREAKDOWN



US EQUITY MARKET VOLUME BREAKDOWN – COMPANIES UNDER \$750M

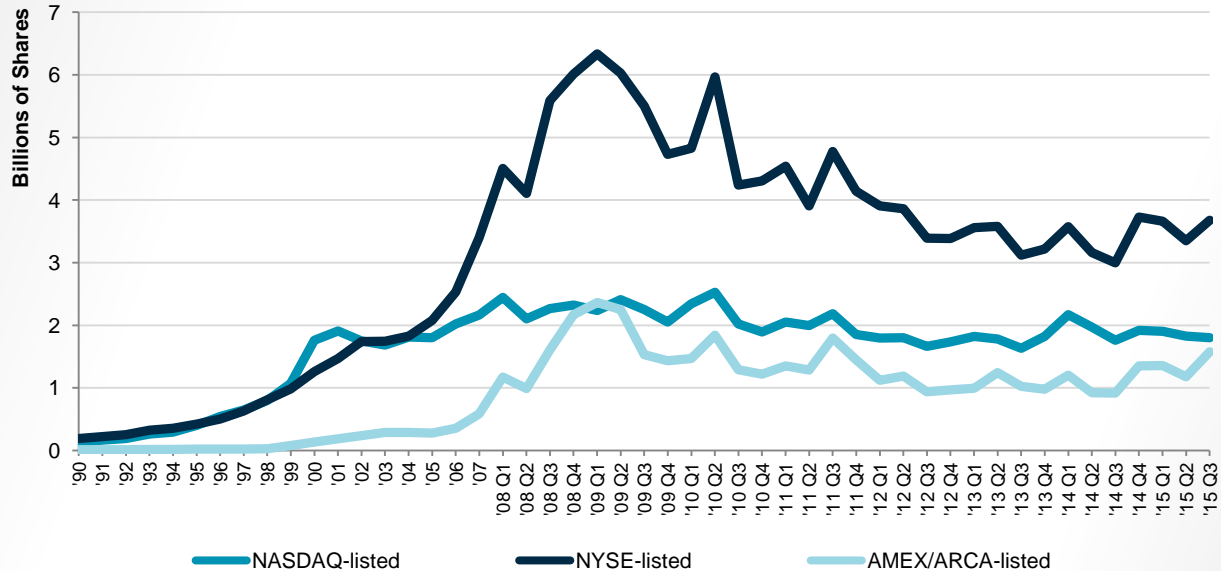


- NASDAQ Matched
- NASDAQ BX
- FINRA/NASDAQ TRF
- NYSE Arca
- NYSE Matched
- BATS
- EDGE
- Other

Source: NYSE Broker Volume Reports, Nasdaq, Bloomberg, FactSet Research Systems. Volume data represents percentage of total share volume reported to the consolidated tape. Internalized trades can be reported to the FINRA/Nasdaq TRF, a trade reporting facility of the Financial Industry Regulatory Authority, Inc. that is operated by Nasdaq. Trades reported to the FINRA/Nasdaq TRF do not reflect liquidity available on the Nasdaq Exchange book data from February 2015

Trading volume relatively flat since 2012

- Trading volume in the U.S. is typically measured in shares.
- Equity market volume in the US surged with deregulation in the early 2000s and then again during the Global Financial Crisis.
- Following the crisis, trading volumes have been relatively stable.



How the Nordic Markets Transformed

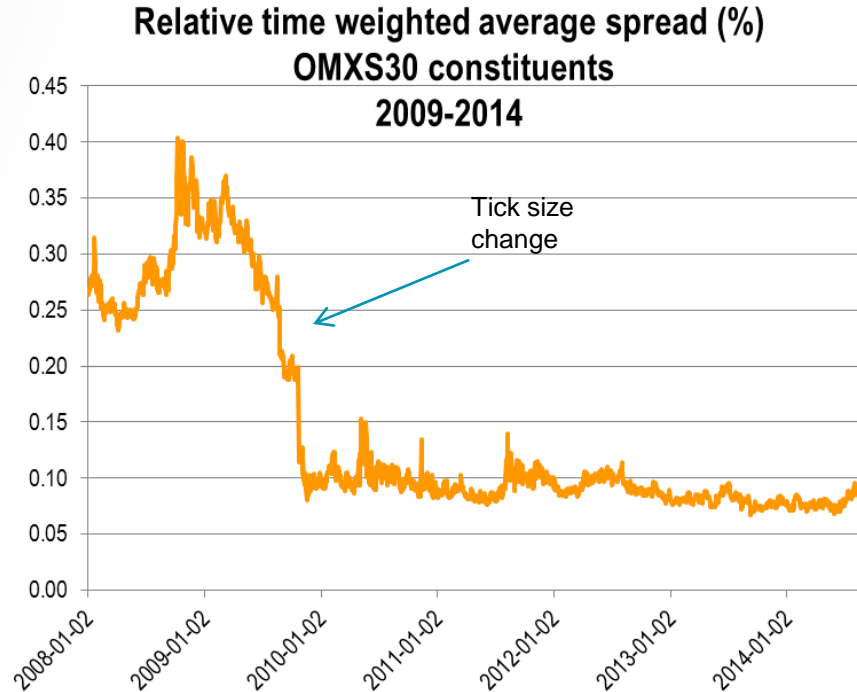


- Orders centralized at listing market
- Institutional and retail orders interact
- **Markets automated**
- Common set of rules and practices
- Average trade = large
- Quotes stable and often for “Size”
- Quotes +30 bps in large cap
- Blocks trade on Exchange

- Order fragmented over several markets
- Primary Exchange & 3 Broker Systems
- Diverse set of rules and practices
- Average trade size = smaller
- Quotes flicker and show less size
- Quotes narrow, 10 bps in large cap
- Blocks trade more frequently OTC

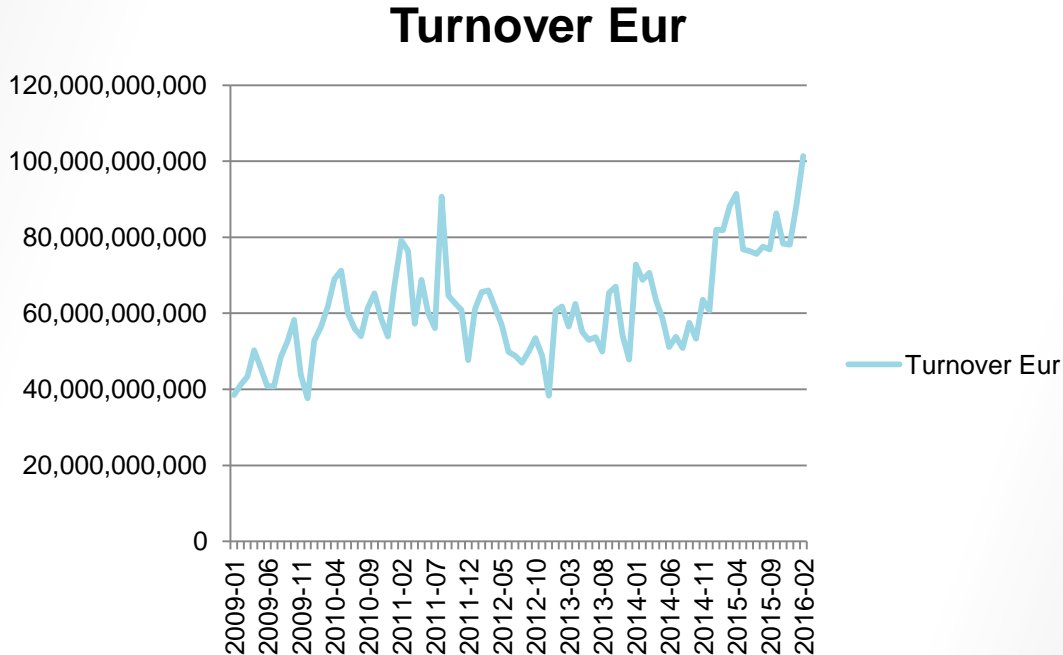
Market Quality in the Nordics

- The quoted spread declined drastically in Stockholm and the other Nordic markets after MiFID.
- Competition between the primary market and the new entrants drove the change in trading increment (tick sizes). The change in trading increments drove other changes as well.



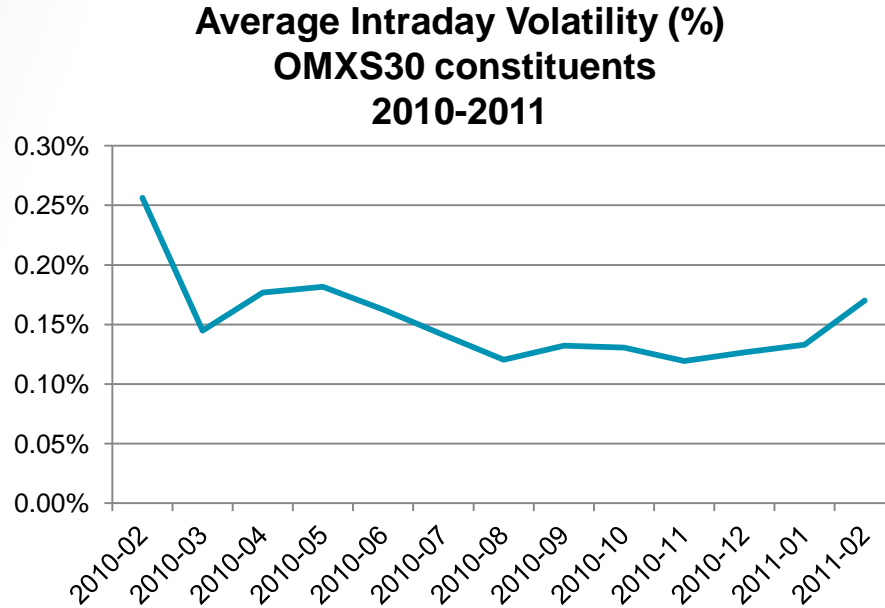
Nordic Trading Volume has Grown

- Trading volume in the Nordics is measured in value traded (turnover).
- Equity market volume in the Nordics did not surge with MiFID but fell with the Financial Crisis
- Following the crisis, trading volumes have been volatile but generally upward trending.



Market Quality in the Nordics

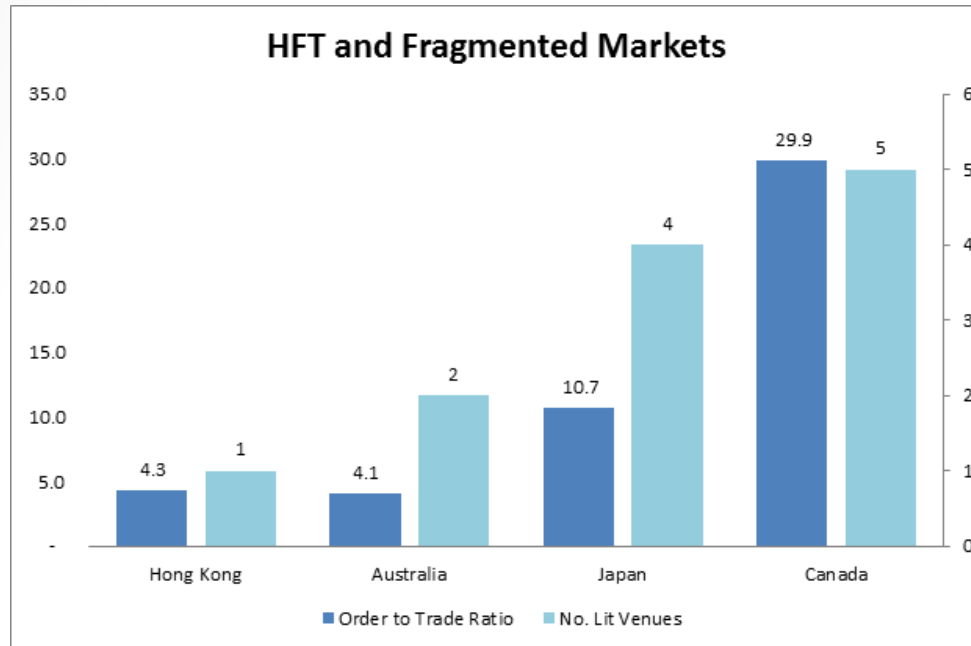
- MiFID did not create a change in volatility when it was implemented.
- The introduction of a new high performance trading system did lead to a drop in volatility in 2010.



•Standard deviation of the logarithmic returns in one minute intervals.
Monthly averages are computed from daily values.

A Consequence of More Markets: More Orders

- High Frequency Trading (HFT) is often part of introducing competition
- The more competing markets, the more important is high frequency trading.
- The U.S. is not shown. There are 11 lit venues and the order to trade ratio is around 100.



Role of Best Execution in Driving Competition

4 GEOGRAPHIES – 4 DIFFERENT GOALS

United States: Best Execution rules used to both create competition and drive incumbent exchanges to automate.

Europe: Best Execution rules used to both create competition and create a pan-European Market. (Not yet achieved)

Canada: Best Execution rules used to create competition without destroying the domestic market.

Australia: Best Execution rules used primarily to create competition.

Commonalities in Best Execution: Achieve the Best Possible Outcome for the Client

- Usually this means do no worse than the best price displayed in the market.
- Other Considerations are
 - Size of the Order,
 - Likelihood of Execution,
 - Other costs besides trading price,
 - Speed,
 - Customer instructions, and
 - Other circumstances.

THE DETAILS DEPEND ON PUBLIC POLICY AND HELP DETERMINE THE OUTCOME.

United States: Manual markets would not have “Protected” prices. Other incentives to automate.

Europe: MiFID I emphasis on market access for trading, clearing and settlement more than best execution.

Canada: Special policies to try and avoid trading moving to the U.S. Preserve scale in Canadian markets.

Australia: Introduced competition in multiple dimensions to diminish the influence of the incumbent.