



International Centre for
Financial Regulation

Liquidity Effects of Trading Platforms Competition

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Plan

1. Background
2. The EuroSETS experiment
3. Main Findings
4. Implications
5. Conclusions

Significant Changes in European Financial Markets

- ③ Directive MIF (« MiFID ») in 2007:
 1. Abolition of « concentration rule »
 2. Best execution: price impact, speed, settlement costs etc ...
 3. Transparency (pre-trade, post-trade)



Increased Competition between Trading Platforms

Increased Competition between Trading Platforms

Ⓢ Incumbent markets

1. NYSE-Euronext
2. London Stock
Exchange
3. Deutsche Börse
4. Etc...

Ⓢ New Entrants

1. Chi-X
2. Turquoise
3. BATS Europe
4. Nasdaq OMX

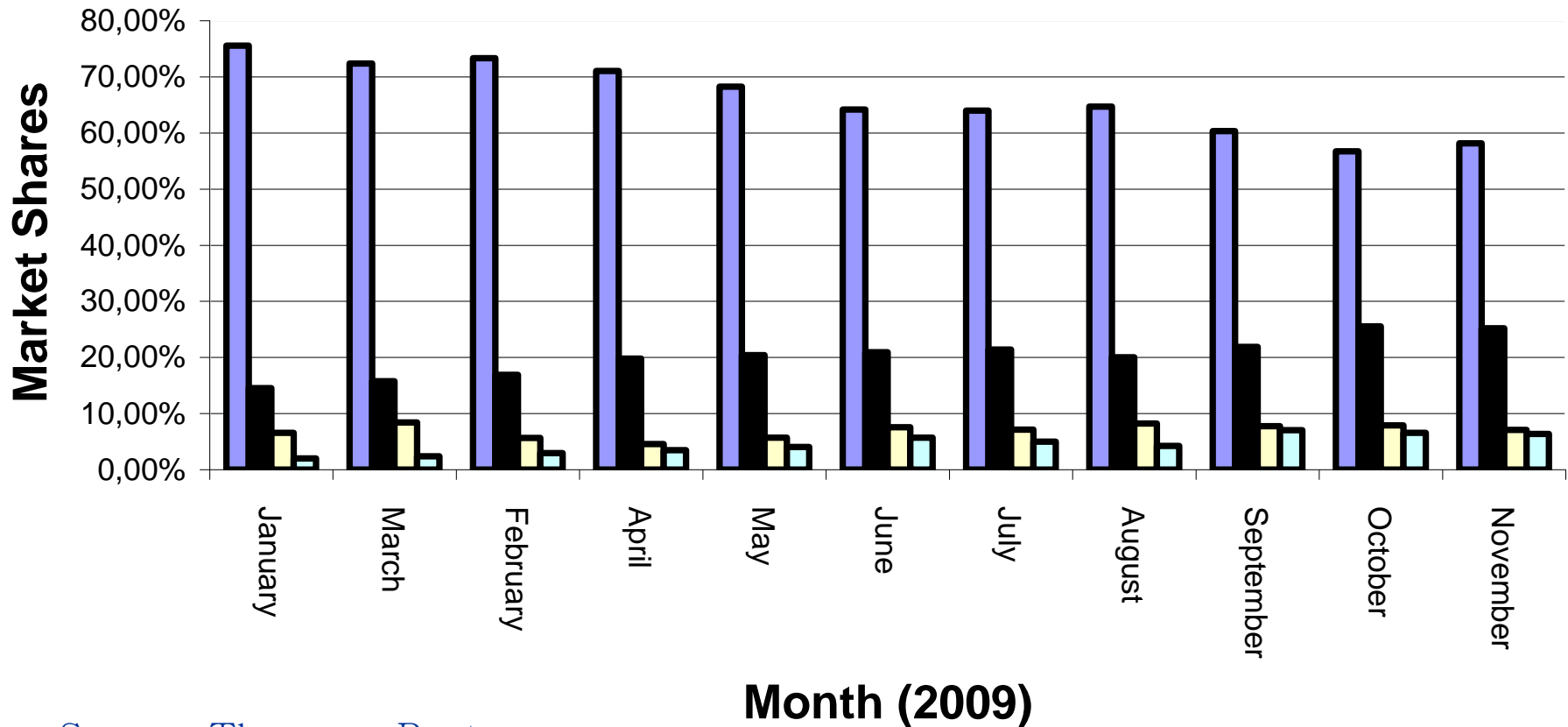
Market Shares (FTSE100 Stocks)

■ LSE Group

■ CHI-X

■ Turquoise

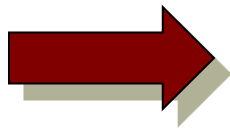
■ BATS Europe



Source: Thomson-Reuters

Consequences

- ✓ Increased market fragmentation
- ✓ Loss of market shares for incumbent markets
- ✓ New business models (Maker/Taker pricing; Free data etc...)
- ✓ New technologies (smart routing, data aggregators, electronic market-makers etc...)
- ✓ Innovations in market design (dark pools, etc...)



✓ Regulatory concerns; MiFID is up for revision in 2010

Same Concerns in the U.S

- ② « To what extent is fragmentation of buying and selling interest in individual securities among multiple market centers a problem in today's market? For example, has fragmentation isolated orders [...] reducing liquidity? »
- ② « Will the greater potential provided by advancing technology for the development of broker order-by-order routing systems [...] address fragmentation problems without the need for Commission action
- ② (SEC Release n034-42450 (2000))



RegNMS (2006)

1. « Trade-Through Rule »
2. Data Fees and Dissemination
3. Cap on take fee

Questions (incomplete list...)

@ Is market fragmentation good or bad?

1. For liquidity
2. For volatility
3. For price discovery
4. For cost of capital

@ In Theory:

1. Fragmentation is bad for liquidity due to economies of scale and network effects
2. But it encourages inter-market competition and innovation \Rightarrow Lower trading fees and more efficient trading technologies.

Questions (incomplete list...)

- ② **How to « regulate » inter-market competition?**
 1. Mandated inter-market linkages (« trade-through rules ») or can we rely on new technology?
 2. Should trading platforms' fees be regulated or not? (cap on take fees?)
 3. How should market data be priced? Who own market data?

- ② **Which level of transparency?**
 1. Effect of dark pools
 2. Costly vs. free quotes

- ② **Benefits and dangers of high frequency trading?**

⊙ *Much debated...But very few studies on these questions*

1. Lack of data
2. Lack of counterfactuals
3. Scarcity of truly controlled experiments

⊙ *For instance, consider the effect of market fragmentation on liquidity*

- ⊙ Many studies compare trading costs for securities traded in multiple markets
- ⊙ But very few analyze the effect of exit/entry of trading platforms on trading costs, **other things equal.**

Examples

| Authors | Market | Methodology | Main Finding |
|-----------------------------------|--------------------|---|---|
| DeFontnouvelle et al.(2003), JoF. | U.S option markets | Compare measures of liquidity after and before the advent of competition for order flow in US option listings | Spreads decline and depth increase when options become listed on multiple markets |
| Mayhew (2002), JoF | U.S option markets | Compare options traded on a single market with options traded in multiple markets | Options with multiple listings have smaller bid-ask spreads |
| Boehmer and Boehmer (2004), JbF | U.S ETFs markets | Compare measures of liquidity after and before entry of the NYSE in the trading of 30 ETFs | Significant reductions in bid-ask spreads and increases in depth after entry of the NYSE. |
| Fink et al.(2006), JbF | U.S equity markets | Evolution of measures of liquidity for Nasdaq stocks from 1996 and 2002 | Decline in bid-ask spreads, in part due to increased competition from ECNs. |
| Hendershott and Jones (2005), RFS | U.S ETFs markets | Compare measures of liquidity after and before Island goes « dark » for 3 ETFs in 2002 | Significant increase in trading cost. Decrease in quality of price discovery |

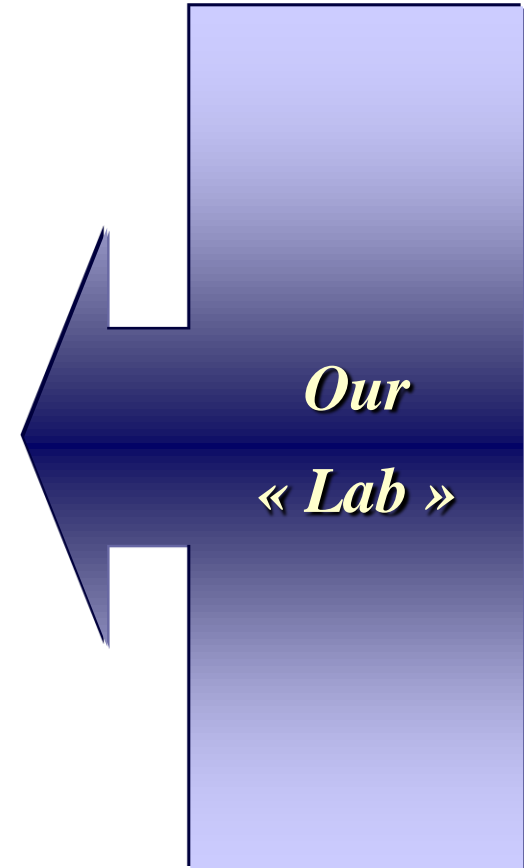
- ② *Europe is an interesting laboratory as:*
 - ② *Competing platforms often use similar trading mechanisms*
 - ② *Market fragmentation is a recent phenomenon.*

Plan

1. Background
2. The EuroSETS experiment

Euronext vs. LSE

- @ May, 23 2004 : Introduction of EuroSETS by the LSE in the Dutch market
- @ Goal :
 1. Make in-roads in Dutch « Blue-chips » traded on Euronextc (NSC)
 2. Encouraged by Dutch brokers
- @ NSC et EuroSETS
 1. Same trading mechanism (Centralized Limit Order Book, « CLOB »)
 2. Same clearing and settlement system
 3. Almost same membership
 4. No Trade-through rule
- @ Ideal to study (i) effects of fragmentation and (ii) effects of trade-through



DATA

- ✓ Limit order book snapshots
- ✓ Every 5 minutes
- ✓ For all AEX stocks (25 stocks)
- ✓ April 2004–January 2005

| | |
|-------------|------------|
| Ask/Qtity 3 | 43-700 |
| Ask/Qtity 2 | 42.97-5000 |
| Ask/Qtity 1 | 42.96-4900 |
| Bid/Qtity 1 | 42.93-1000 |
| Bid/Qtity 2 | 42-500 |

Euronext (NSC)–Royal Dutch–9:10

| | |
|-------------|------------|
| Ask/Qtity 3 | 43-500 |
| Ask/Qtity 2 | 42.97-1000 |
| Ask/Qtity 1 | 42.96-500 |
| Bid/Qtity 1 | |
| Bid/Qtity 2 | 42-500 |

LSE (EuroSETS)–Royal Dutch–9:10

| | |
|-------------|------------|
| Ask/Qtity 3 | 43-1200 |
| Ask/Qtity 2 | 42.97-6000 |
| Ask/Qtity 1 | 42.96-5400 |
| Bid/Qtity 1 | 42.93-1000 |
| Bid/Qtity 2 | 42-1000 |

Consolidated Book–
Royal Dutch–9h10

Plan

1. Background
2. The EuroSETS experiment
3. Hypotheses and methodology

Hypotheses

⊗ Hypothesis 1: Entry of EuroSETS increases consolidated depth

⊗ Hypothesis 2: Inverse relationship between **cumulative depth in EuroSETS** and frequency of trade-throughs at the expense of EuroSETS.

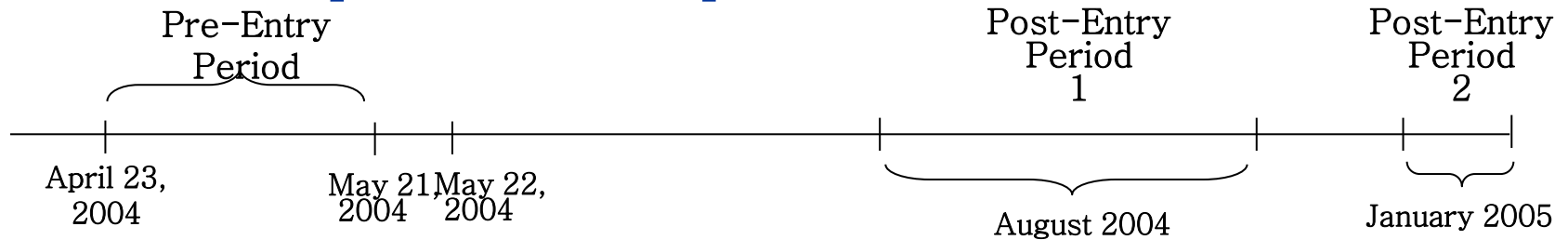
« Price protection encourages the display of limit orders by increasing the likelihood that they will receive an execution in a timely manner and helping preserve investors' expectations that their orders will be executed when they represent the best displayed quotation » SEC, RegNMS, p.36

⊗ Hypothesis 3: Inverse relationship between **consolidated depth** and frequency of trade-throughs at the expense of EuroSETS

Methodology 1/2

- ✓ Compare « average » measures of market liquidity (bid-ask spread, effective bid-ask spread, cumulative depth in consolidated book before and after the introduction of EuroSETS

- ✓ Two post event periods of observations:



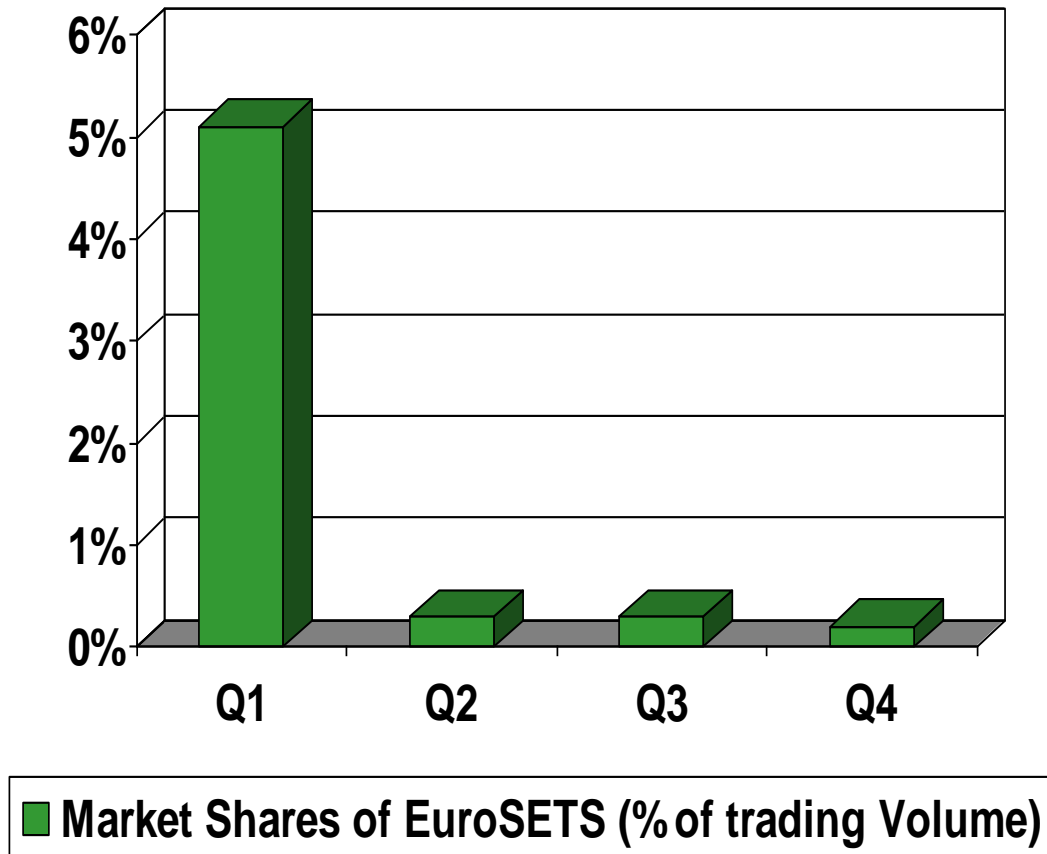
Methodology 2/2

- ✓ We control for external sources of variations in liquidity (volume, volatility etc...) with state of the art econometrics analysis
- ✓ Here I focus on the comparison between the post event 1 period and the pre-entry period.
- ✓ Stocks are grouped in Quartiles of capitalization (about 6 stocks/quartile). See list of stocks in Appendix.

Plan

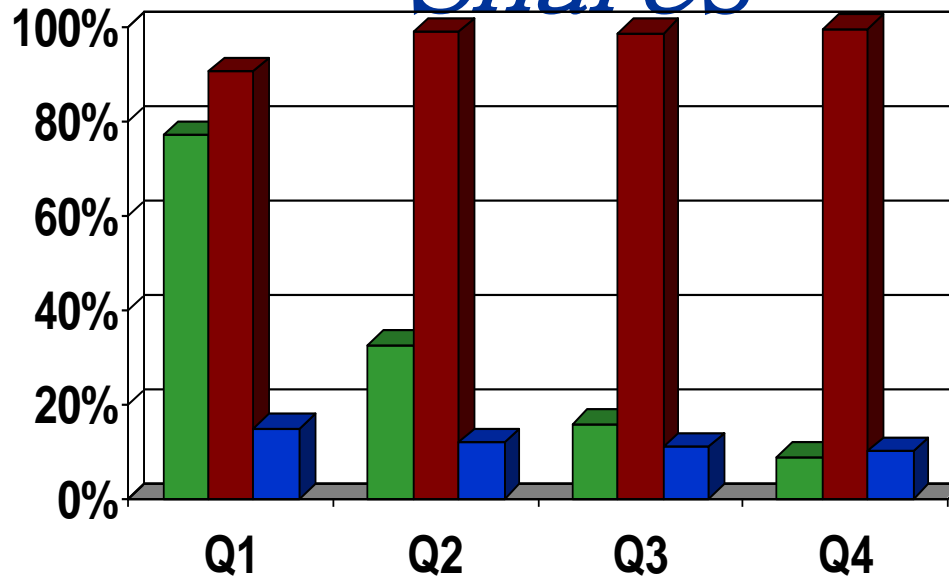
1. Background
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3. Hypotheses and methodology
4. Main Findings

Market Shares vs. Liquidity Shares



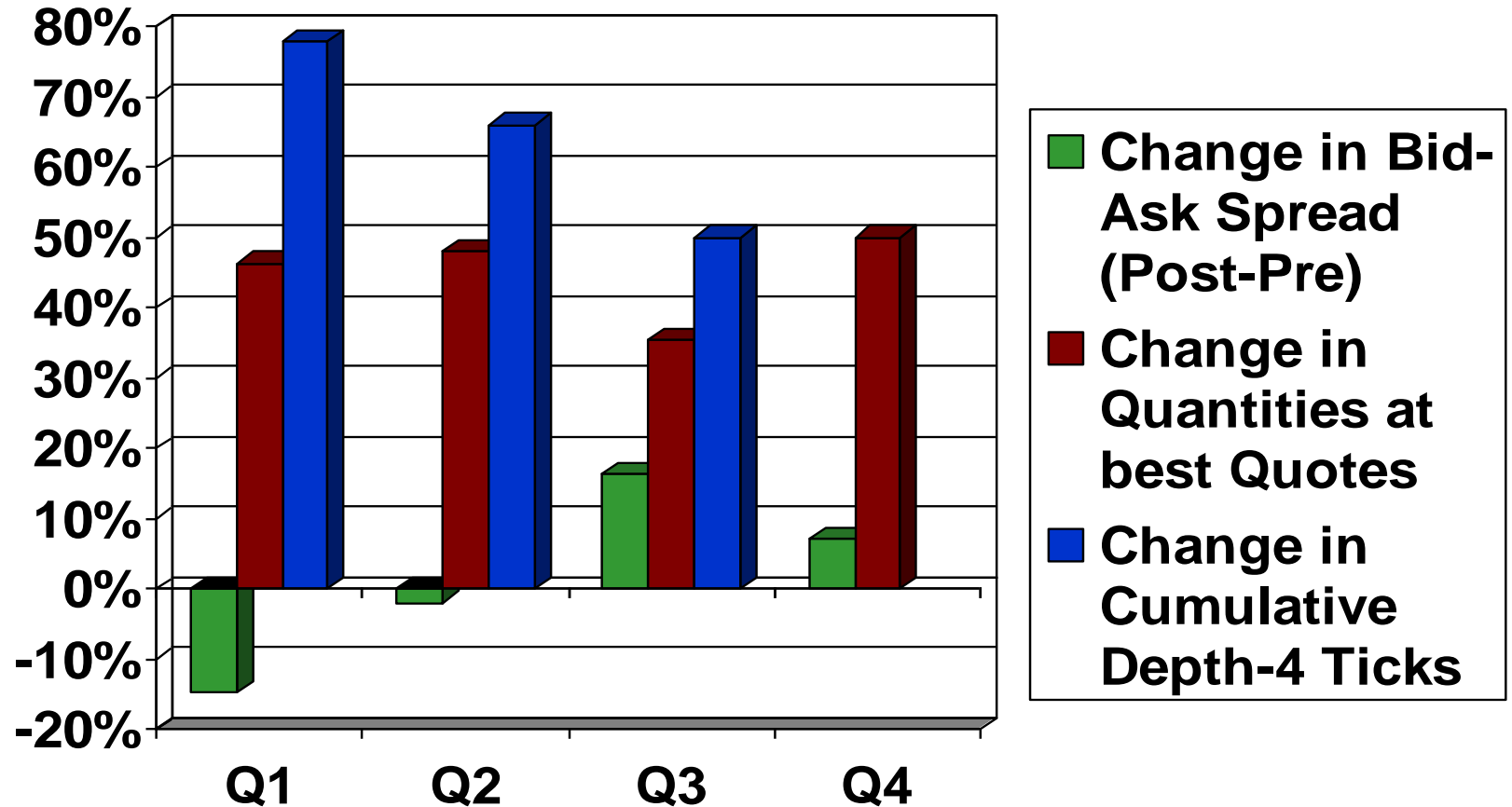
Market Shares vs. Liquidity

Shares



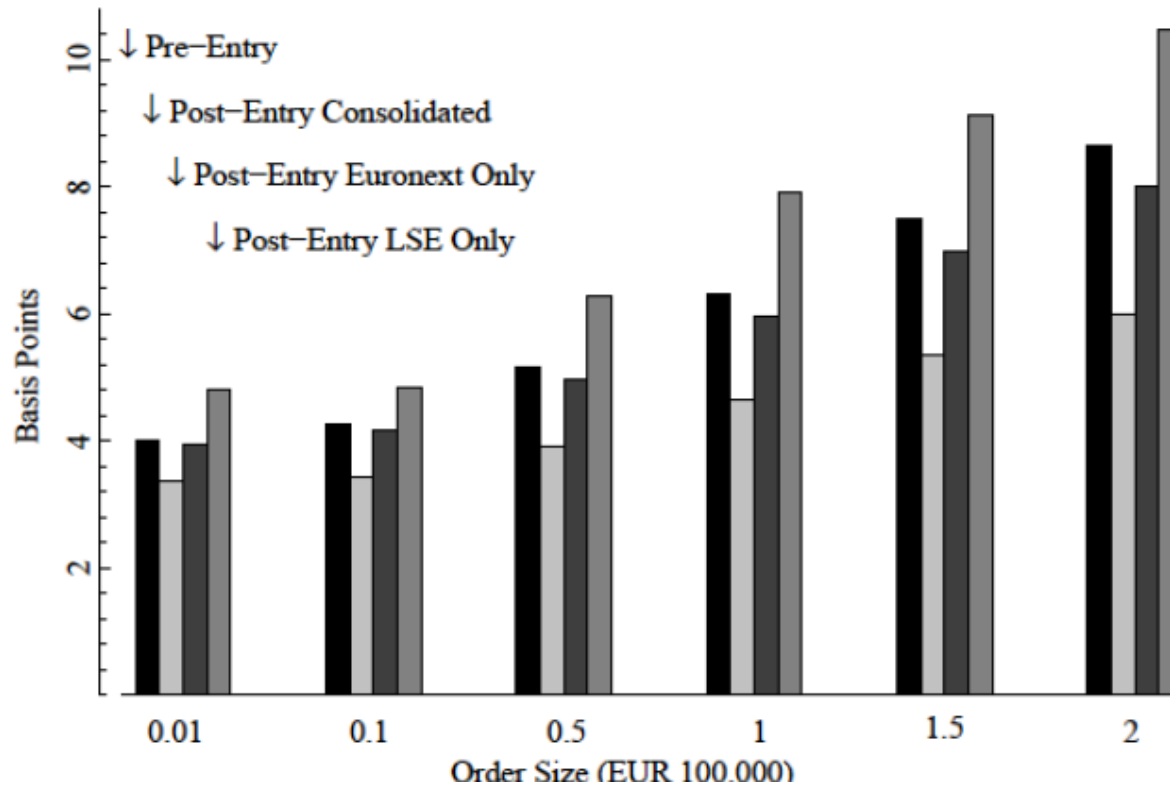
- % at best ask EuroSETs
- % at best ask NSC
- % Quantities offered at the best quotes (EuroSETs)

Liquidity and Fragmentation



N.B.: The methodology controls for factors affecting time-variations in market liquidity. Most findings are statistically significant at the 5% thresholds for changes in depth. See Table III in Appendix for more details.

Changes in Price Impacts



Trade-Throughs

© **Definitions:**

1. Trade-Throughs = trades outside the prevailing best bid and offer.
2. Trade-Throughs at the expense of market X = trades on market Y when market X posts the best quotes for the trade.
3. Trade-Throughs Rate at the expense of market X = fraction of trades that take place on Y among all trades taking place when market X posts the best quotes.

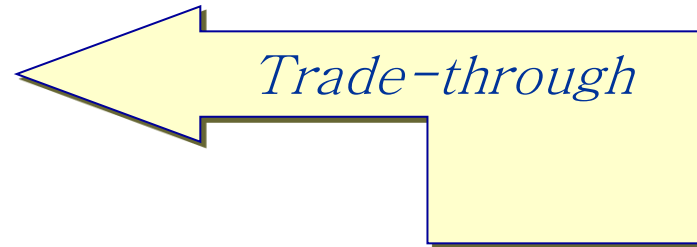
Trade-Throughs- Definition

| | |
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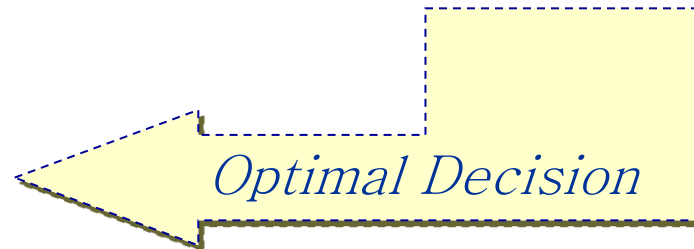
Euronext (NSC)-Royal Dutch-9:10

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LSE (EuroSETS)-Royal Dutch-9:10



Buy Market Order



Do Trade-Throughs Occur?

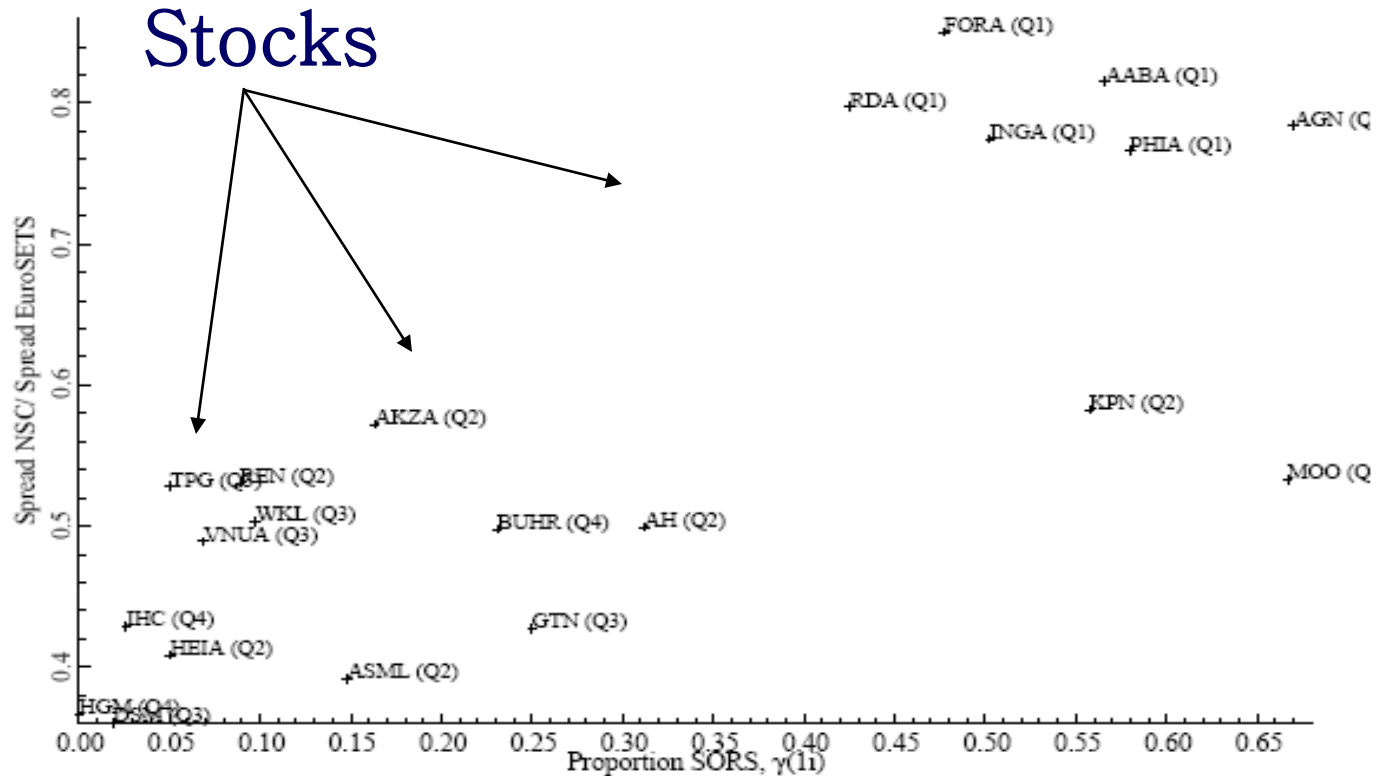
Trade-Through Rates:

| Q1 | Q2 | Q3 | Q4 |
|-----|-----|-----|-----|
| 46% | 78% | 90% | 77% |

- Why so frequent? Lack of smart routing technologies + « cost » of optimally splitting orders between platforms.
- Effects on EuroSETS liquidity? Two measures:

 1. NSC bid-ask spread/EuroSETS bid-ask spread
 2. EuroSETS volume at best quotes/total available volume at best quotes

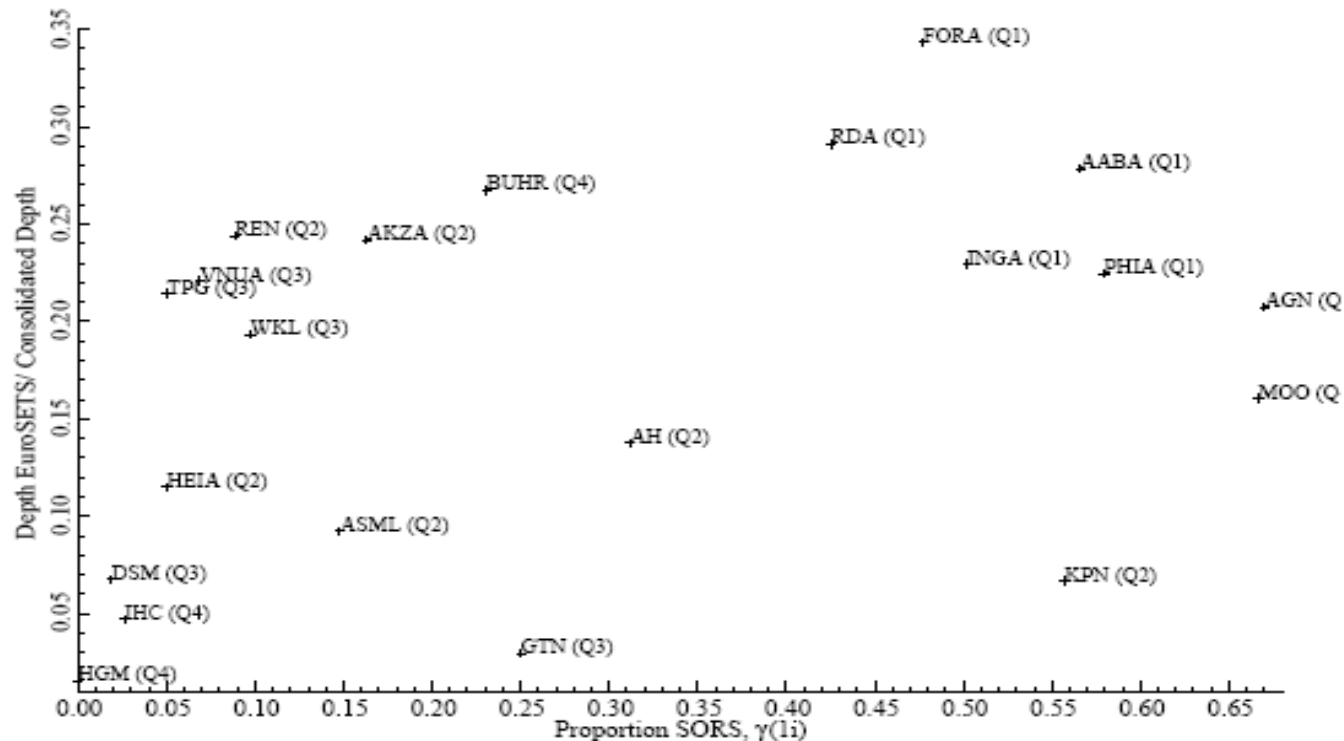
Trade-Trough Rate and EuroSETS Liquidity



X-Axis = 100% - Trade-Through Rate

N.B.: Results are confirmed through regression analysis. See Table V in Appendix

Trade-throughs and EuroSETS liquidity



X-Axis = 100% - Trade-Through Rate

N.B.: Proportion SORS = 1 - Trade-Through Frequency - Results are confirmed through regression analysis.
See Table V in Appendix

Trade-Through Rate and Liquidity

1/2

@ Cross-sectional regression analysis:

| Variable | Spread Ratio (Spread NSC/Spread EuroSETS) | | Depth Ratio (Depth EuroSETS/(Depth EuroSETS + NSC)) | |
|-----------------------|--|---------|--|--------|
| | P-E 1 | P-E 2 | P-E 1 | P-E 2 |
| γ_1 | 0.393** | 1.012** | 0.093 | 0.203* |
| Volume | 0.001** | 0.000 | 0.000 | 0.000 |
| Annualized Volatility | -0.004 | 0.003 | -0.004 | -0.002 |
| R ² | 0.77 | 0.89 | 0.34 | 0.68 |

*/**: significant at a 90%/95% significance level.

Trade-Through Rate and Liquidity

2/2

- ④ Is the increase in consolidated depth higher for stocks with fewer trade-throughs?
- ④ **Yes.** There is a negative correlation between changes in consolidated depth around the entry of EuroSETS and the trade-through rate:
 - ④ That is the improvement in liquidity following EuroSETS entry is less for stocks with a high trade-through rate.
 - ④ Even after controlling for other factors (volume, volatility etc...).

Value of « Smart Routing » 1/3

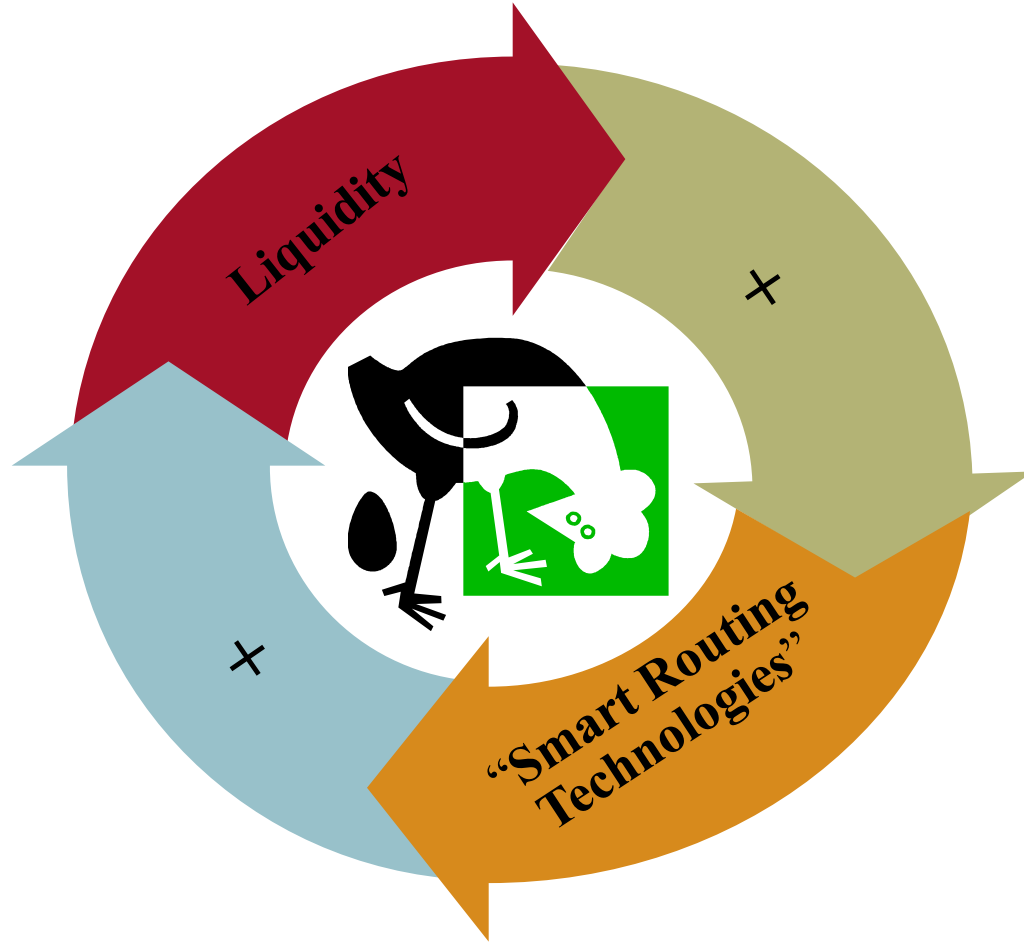
1. Why so many trade-throughs?
2. Cost/benefit Analysis–Value of being/using a « smart router »
3. Idea look at « generalized trade-throughs »:
all trades that could have been executed at better price by using both platforms.
 - Using « raw » prices (ignoring fees)
 - Accounting for fees

Value of « Smart Routing » 2/3

| | <i>Q1</i> | <i>Q2</i> | <i>Q3</i> | <i>Q4</i> |
|--|-----------|-----------|-----------|-----------|
| <i>Nber of generalized trade-throughs</i> | 16374 | 1172 | 769 | 18500 |
| <i>In % of total trades</i> | 7% | 1% | 1% | 1% |
| <i>Monthly Opportunity Cost (in k€)</i> | 313 | 39 | 24 | 8 |
| <i>Monthly Opportunity Cost (in k€; net of fees)</i> | 271 | 37 | 23 | 8 |

Value of « Smart Routing » 3/3

- ② The value of being/using a smart router appears small. May explain the prevalence of trade-throughs here.
- ② Does it mean that regulating trade-throughs is useless?
- ② But there is a chicken and egg problem:
 - If few brokers use smart routers, the trade-through rate is high
 - The liquidity of the entrant market is small
 - The benefit of using a smart router appears small
 - \Rightarrow few brokers use smart routers...



Plan

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4. Implications

Implications

- Ⓢ **Market fragmentation can improve consolidated liquidity.**

 1. Distinguishing consolidated liquidity from platform liquidity is important.
 2. Accounting for effects of intermarket competition on fees is important. Part of the effects that we see may be due to the « price war » triggered by the entry of EuroSETS.

- Ⓢ **Trade-throughs impair market liquidity**

 1. Best-execution does not appear spontaneously (at least not in our data...)
 2. Why?
 - ✓ Individual benefit of « smart routing » can be small relative to cost
 - ✓ But collective benefits (reduction in trading costs) can be large if widespread adoption of smart routing strategies.

- Ⓢ **Create a chicken and egg problem that acts as a barrier to entry.**

Implications

- Ⓜ Do we observe similar phenomena post MiFID?
 - ✓ I am not aware of similar studies with data from Chi-X, BATS, etc ...
 - ✓ Would be useful information for the revision of the directive ...

- Ⓜ Regulatory actions might be needed to prevent trade-throughs:
 - ✓ Inter-market linkages (as in the U.S.)
 - ✓ Adoption of smart routing technologies by the industry (problem : costly if no standard and require consolidation of book data)

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