



AUTORITÉ  
DES MARCHÉS FINANCIERS

**2010 Scientific Advisory Board Conference**

How Should Regulators Address Changes in Equity Markets?



# MULTI-MARKET TRADING AND MARKET LIQUIDITY: THE POST-MIFID PICTURE

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*Disclaimer: The opinions expressed here are the views of the author and do not necessarily reflect the views and opinions of the AMF.*

# Topic and Objectives

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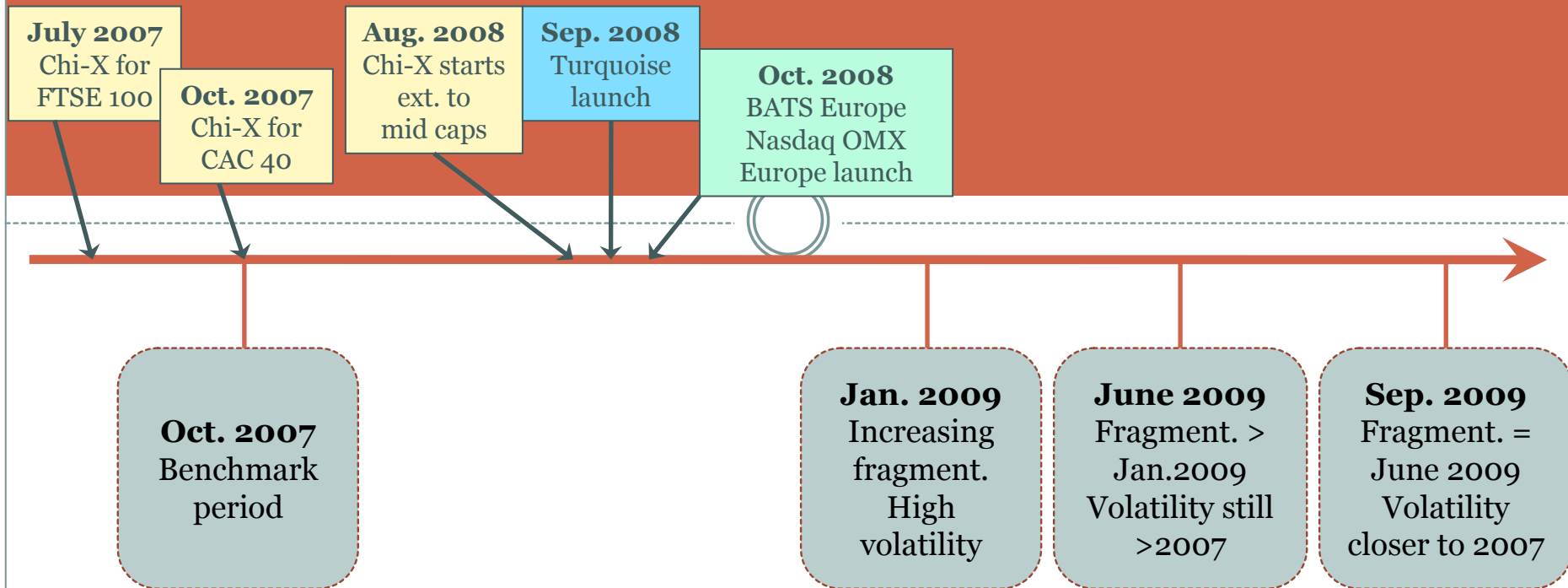
- **MiFID implementation on 1 November 2007**
  - Rise of competition between trading venues
    - RMs / MTFs / SIs
  - Best execution duties
  - Pre-trade and post-trade transparency obligations
  - Trade reporting facilities (TRFs):
    - BOAT, LSE European Trade Reporting Service, Reuters etc.
- **Issues**
  - How much is the order flow fragmented between marketplaces?
  - How has liquidity changed?
    - Spreads
    - Best-limit quote depth

# The Market for Markets



- **Main Regulated Markets**
  - **LSE-Borsa Italiana / NYSE-Euronext / Deutsche Boerse**
- **MTFs**
  - **Chi-X (Instinet)**
    - Started trading in **FTSE 100** securities in **July 2007**
    - Started trading in **CAC 40** securities in **October 2007**
    - Extended trading to **mid caps progressively** from **late August 2008**
  - **Turquoise** (Investment banks & LSE), started on **22 September 2008**
  - **Nasdaq OMX Europe** (Nasdaq OMX), started on **1 October 2008**  
closed on 21 May 2010
  - **BATS Europe** (BATS inc.), started on **31 October 2008**
  - **NYSE Arca Europe** (NYSE-Euronext), 9 March 2009
  - **Xetra International Market** (DB), 2 November 2009
  - **Dark pools:** Chi-X Delta, POSIT (ITG Europe) ...
- **OTC trading and internalization**

# Observation periods and sample



- **FTSE 100:** 51 securities
- **CAC 40:** 32 securities
- **Other SBF 120 components:** 57 securities

*Stocks of the financial sector excluded*

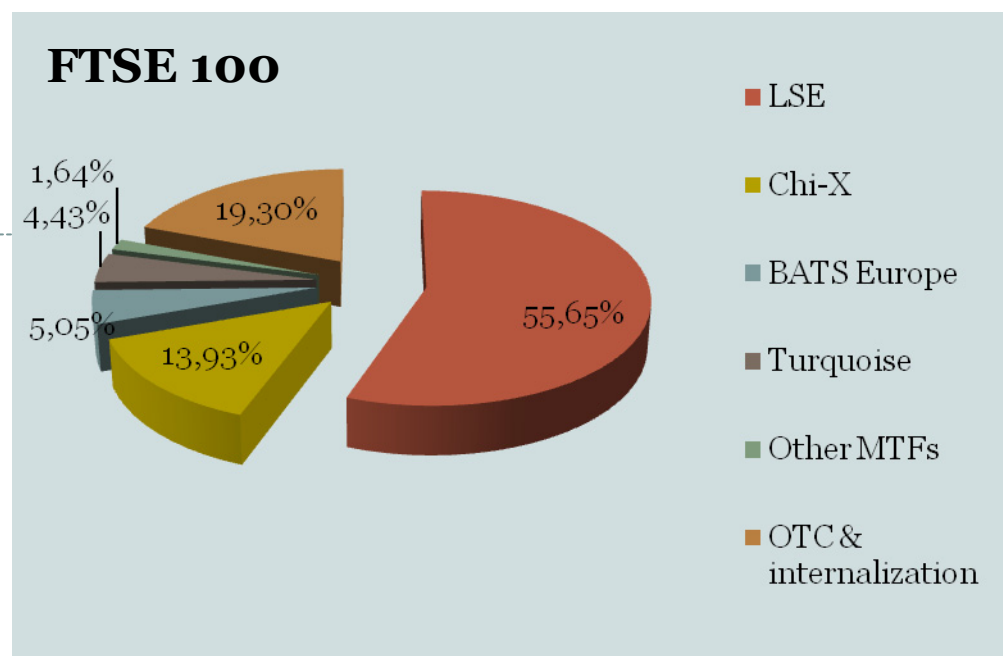
# Data



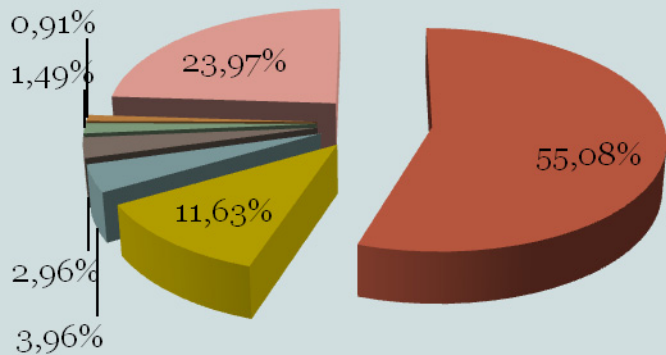
- **Provided by IFS (Intelligent Financial Systems)**
  - Data flow originating from Euronext, LSE, DB, Chi-X, Turquoise, Nasdaq OMX Eur. (Neuro), BATS Europe, PLUS, & BOAT
- **Quote data**
  - Bid and ask quotes every second as displayed in the OB of
    - Euronext, SETS (LSE), Xetra (DB),
    - Chi-X, Turquoise, Nasdaq OMX Eur., BATS Europe,
    - and on the PLUS quote-driven platform
- **Trade data**
  - All transactions executed on
    - Euronext, the LSE (in the OB and off the OB), DB,
    - Chi-X, Turquoise, Nasdaq OMX Eur., BATS Europe, PLUS
  - Trades reported to BOAT and the LSE European Reporting

# Market fragmentation in September 2009

Stats include batch auction trading, continuous trading, and internalized trading.

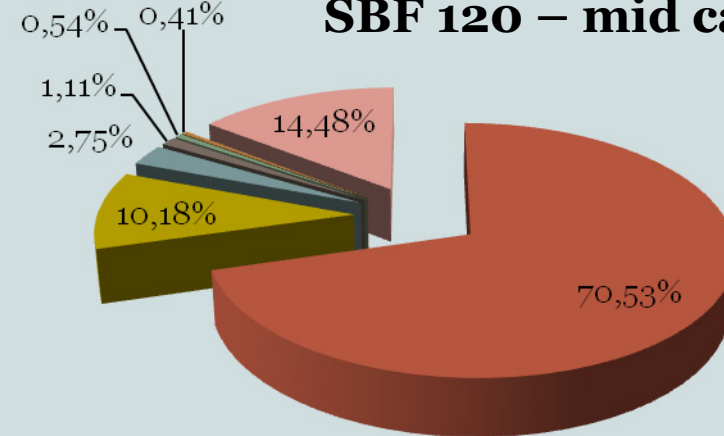


### CAC 40



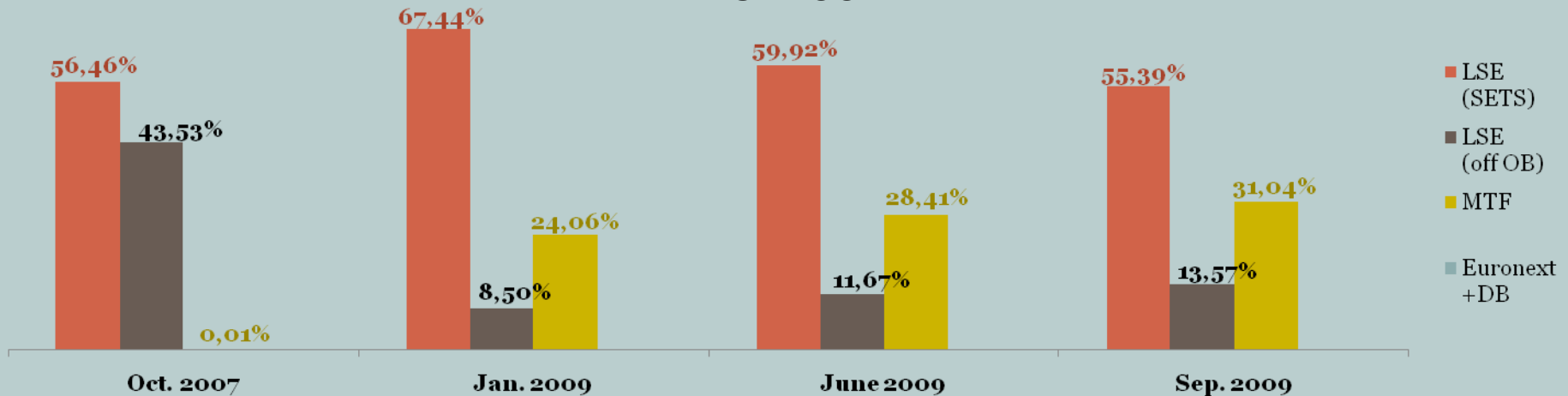
- Euronext
- Chi-X
- Turquoise
- BATS Europe
- LSE + DB
- Other MTFs
- OTC & internalization

### SBF 120 – mid caps

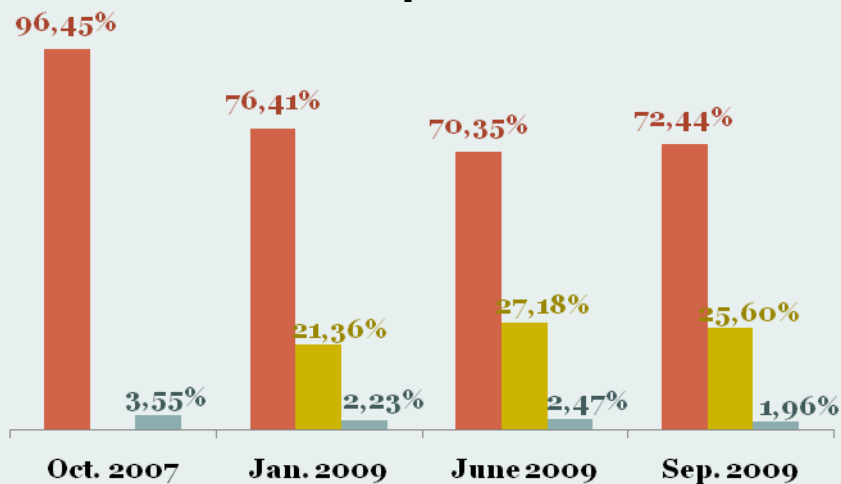


# Rise in market competition between RMs and MTFs across observation periods

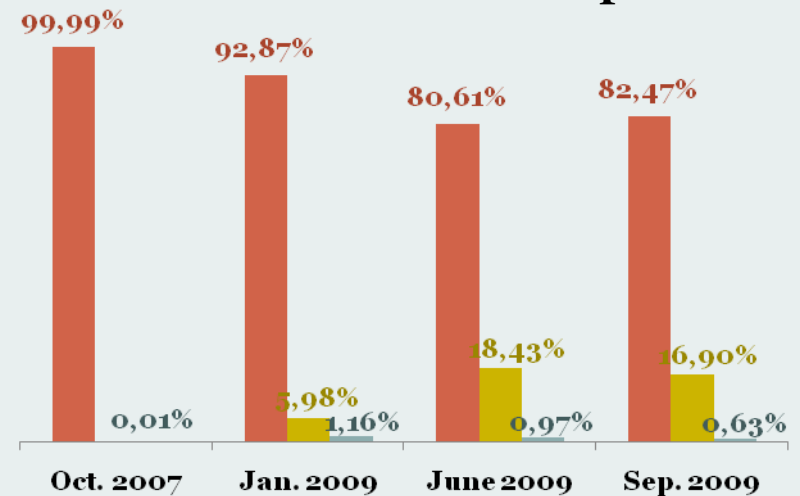
## FTSE 100



## CAC 40



## SBF 120 mid caps



# Liquidity measures



## ● Spreads

- Average quoted spreads:  $(\text{Ask}_{it} - \text{Bid}_{it}) / \text{Mid}_{it}$ 
  - Locally in a given market
  - Global: consolidated across markets by comparing the highest bid quote of all markets with the lowest ask quote of all markets
  - Sample mean: market-value weighted
- Average effective spreads:  $2(\text{Price}_{it} - \text{Mid}_{it}) / \text{Mid}_{it}$ 
  - Local: average over the transactions of a given market
  - Global: average over the transactions of all markets
  - Calculated with the cross-market mid
  - Trade-size weighted average per stock / Market-value weighted mean per sample

## ● Depth

- Displayed quantities associated with the best limit quotes (in K€)
  - Local or global by summing the quantities of all markets quoting the best limit price
  - Sample mean: market-value weighted



# Fragmentation measure



- Fragmentation index
  - Reciprocal of the Herfindahl concentration index

$$FI = \frac{1}{\sum (\text{market share in trading volumes})^2}$$

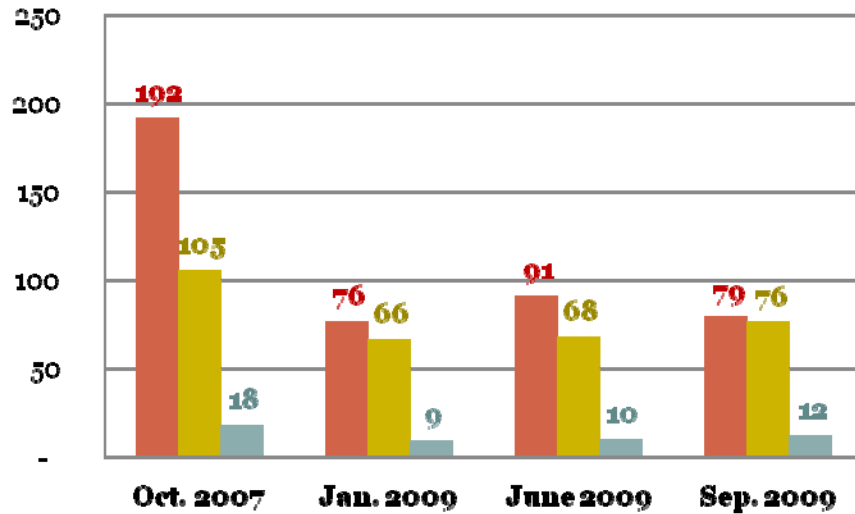
- If perfect concentration =>  $FI = 1$
- If  $N$  markets with equal market shares:

$$FI = \frac{1}{N \times (1/N)^2} = N$$

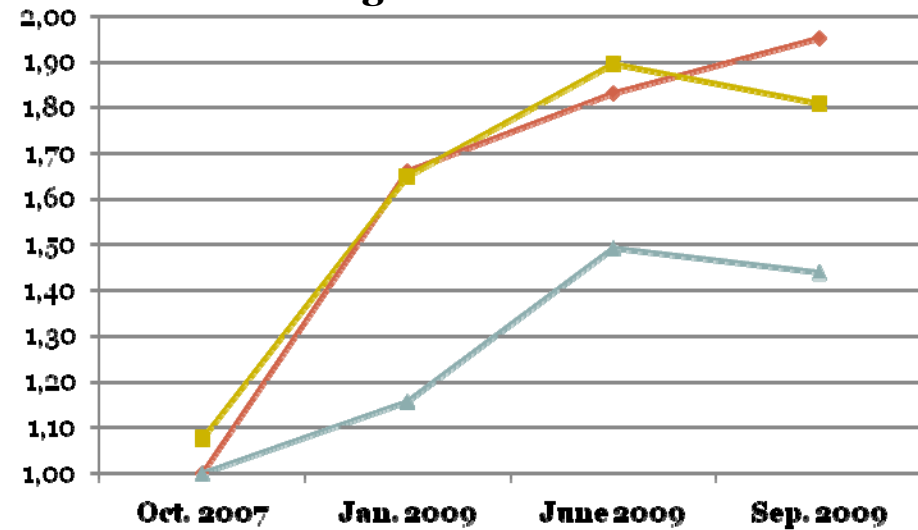
# Changes in liquidity

**FTSE 100**  
**CAC 40**  
**SBF 120 (mid caps)**

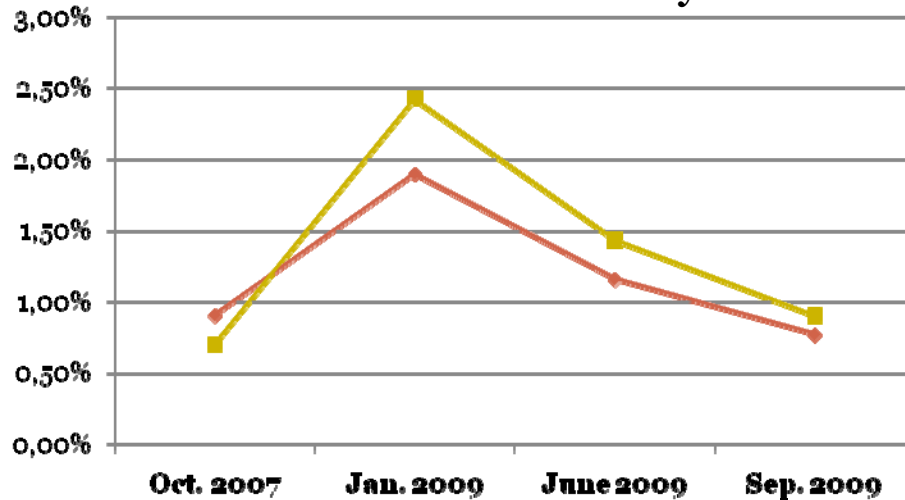
Volumes in €billion



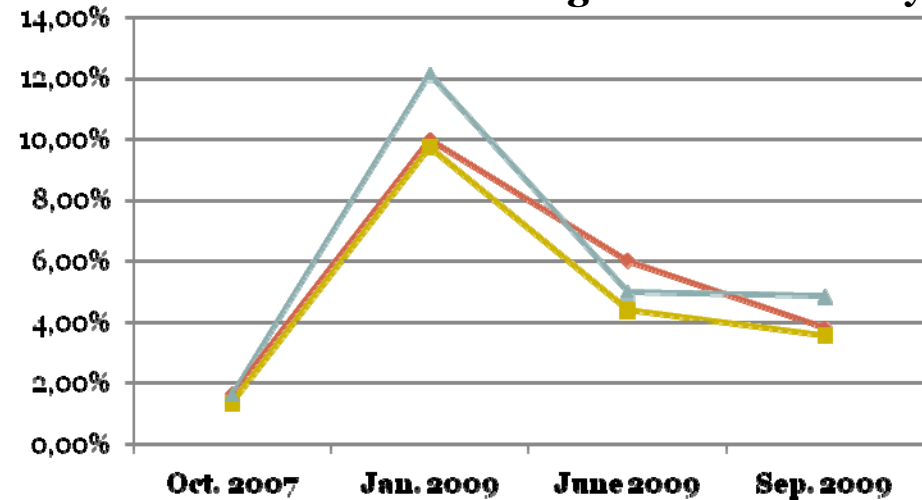
Fragmentation index



Index return volatility



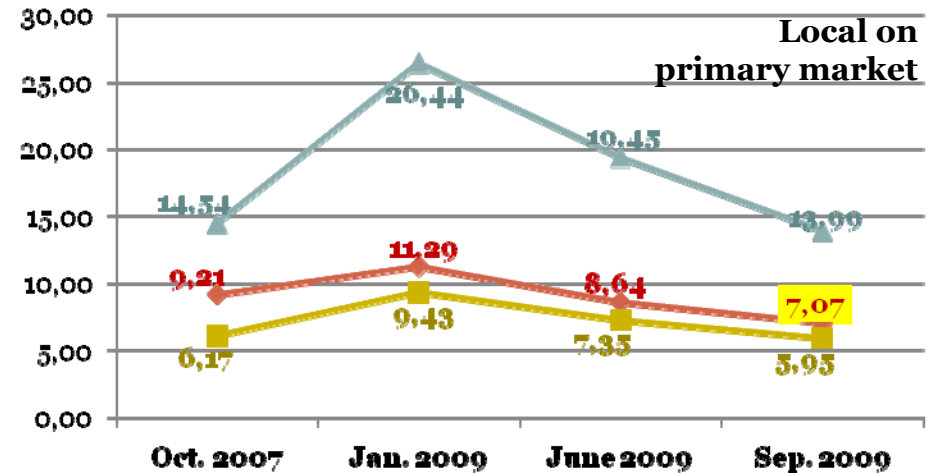
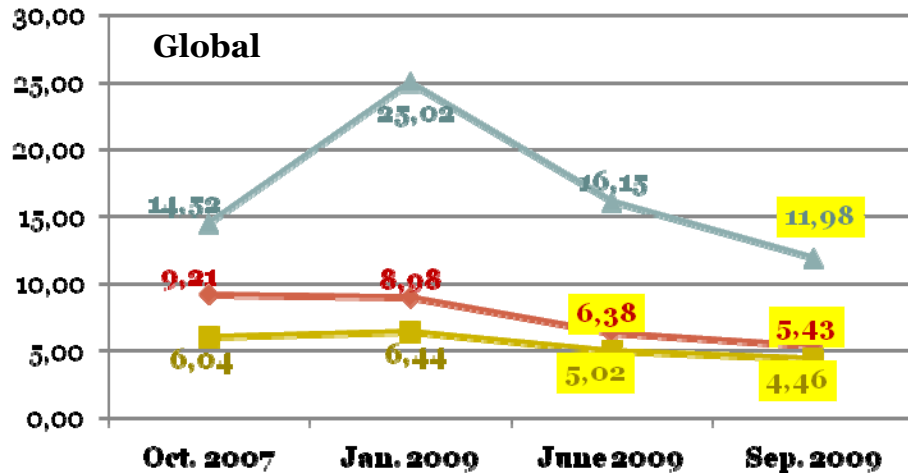
Cross-sectional average return volatility



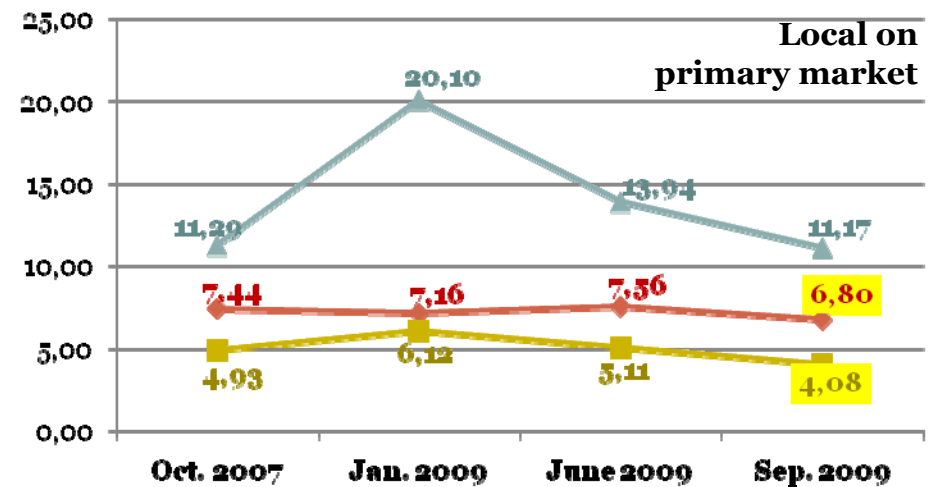
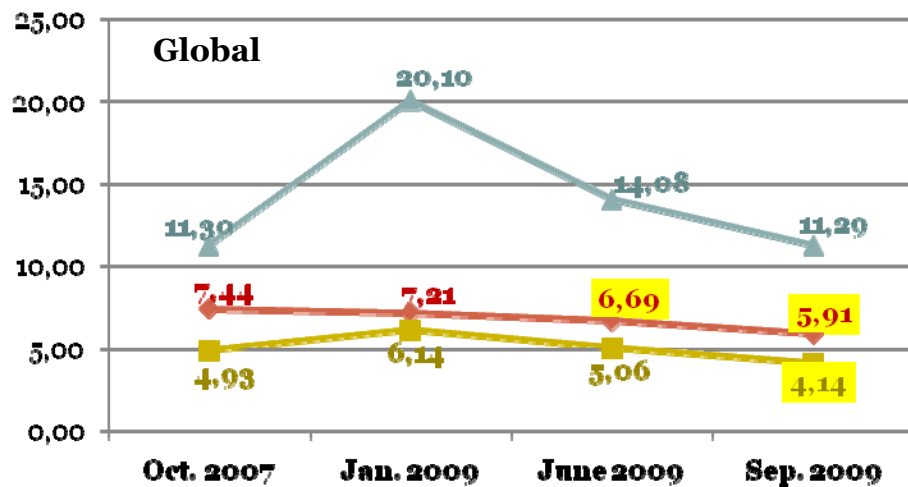
# Changes in liquidity – cont'd

FTSE 100  
CAC 40  
SBF 120 (mid caps)

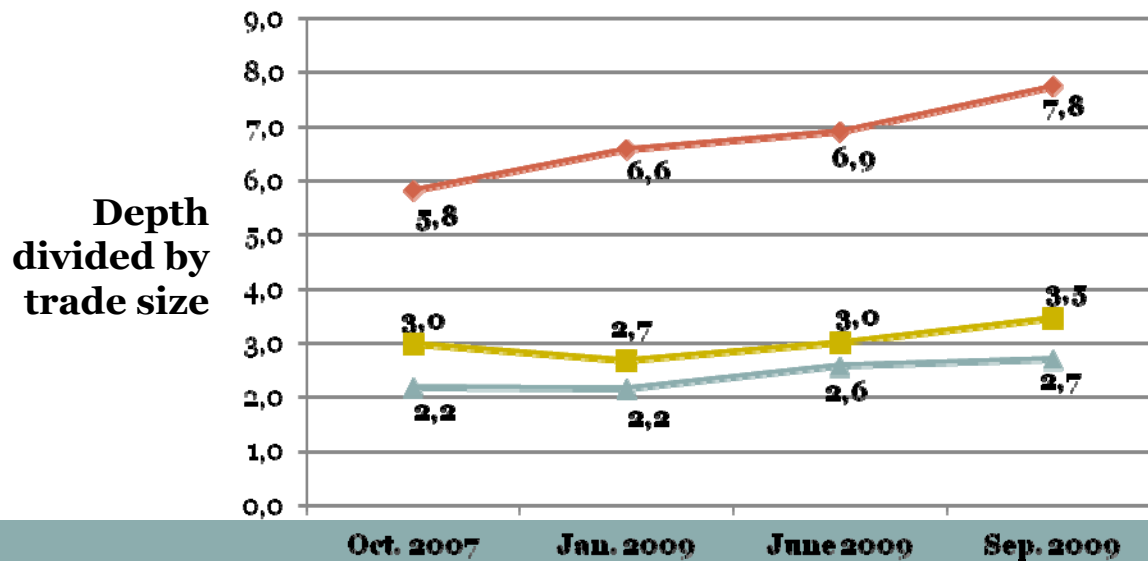
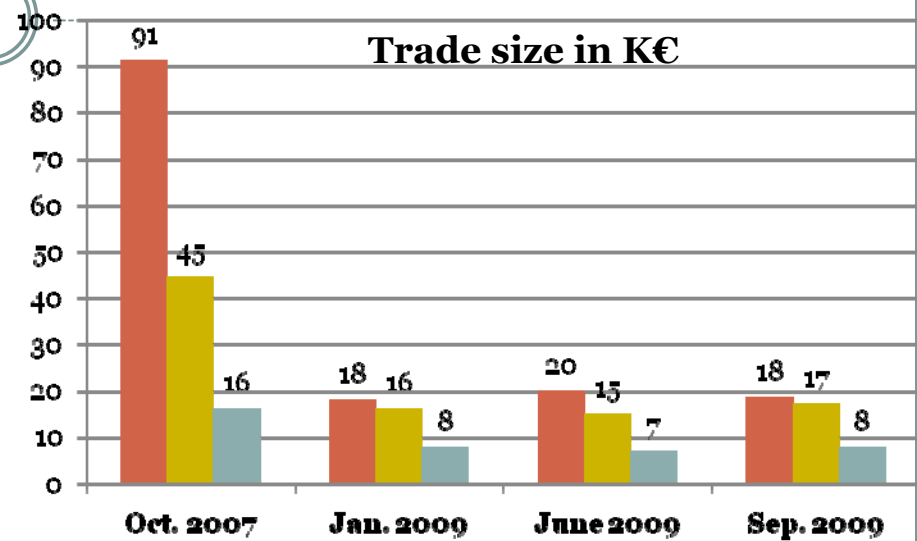
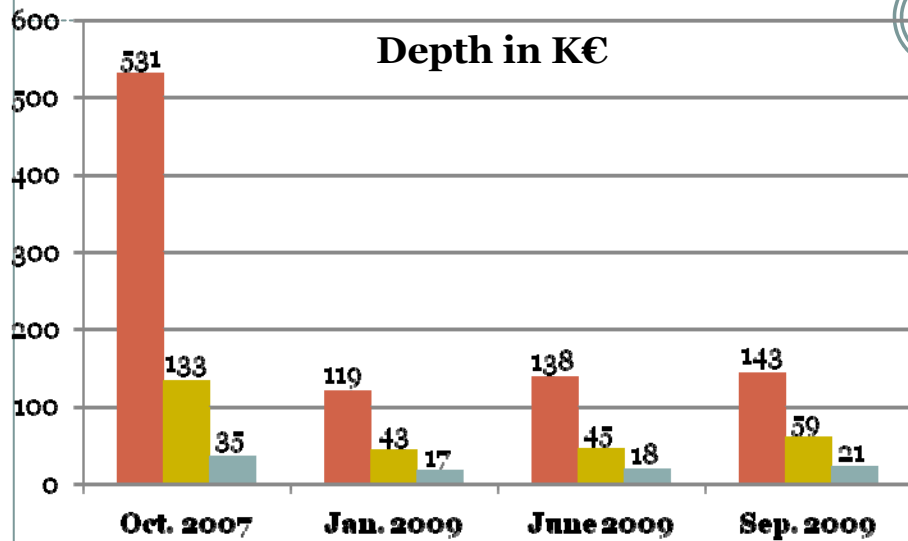
## Average quoted spreads (in bp)



## Average effective spreads (in bp) – OB trades only



# Changes in liquidity – cont'd



**FTSE 100**  
**CAC 40**  
**SBF 120 (mid caps)**

# Changes in liquidity – Multivariate analysis



## PANEL REGRESSIONS

Average spread

$$\text{or depth (stock } i, \text{ month } t) = a_1 \text{volatility} + a_2 \ln(\text{volume}) + a_3 (1/\text{price}) \\ + a_4 \text{Jan.2009} + a_5 \text{June2009} + a_6 \text{Sep.2009} + \alpha_i + \varepsilon_{it}$$

Control variables

Month dummies

Cross-section fixed effect

Error term

Average spread

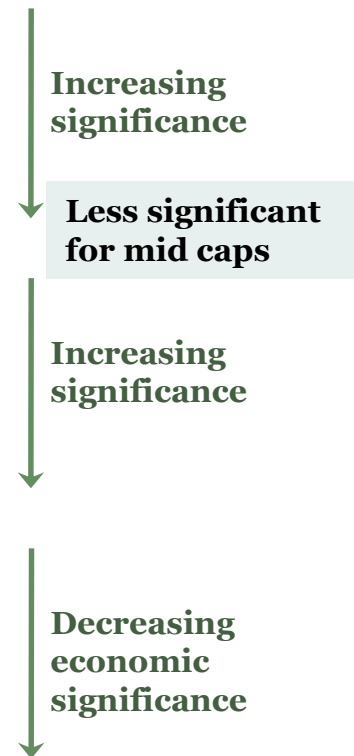
$$\text{or depth (stock } i, \text{ month } t) = b_1 \text{volatility} + b_2 \ln(\text{volume}) + b_3 (1/\text{price}) \\ + b_4 \text{FI}_{it} + \alpha_i + \alpha_t + \eta_{it}$$

Fragmentation index

Month fixed effect



Variables		All	FTSE 100	CAC 40	SBF 120 (mid caps)
Global quoted spread	Jan. 2009	-0.00002 (ns)	-0.00063***	-0.00008**	+0.00052**
	June 2009	-0.0005***	-0.00095***	-0.00023***	-0.00022 (ns)
	Sep. 2009	-0.00067***	-0.00105***	-0.00023***	-0.00048***
Global effective spread	Jan. 2009	0.00009 (ns)	-0.00041***	0.00001 (ns)	+0.00051***
	June 2009	-0.00013*	-0.00049***	-0.00008**	+0.00012 (ns)
	Sep. 2009	-0.00025***	-0.00053***	0.00012***	-0.00005 (ns)
Global quoted depth	Jan. 2009	-0.69604***	-0.79258***	-0.85670***	-0.41534***
	June 2009	-0.61521***	-0.60153***	-0.84921***	-0.42931***
	Sep. 2009	-0.50359***	-0.54449***	-0.61695***	-0.31897***



- Model with the FI variable

- Spreads and depth significantly decrease with FI over the whole sample
- By index:
  - Correlation between depth and FI is not significant except for SBF 120
  - Correlation between spreads and FI are weakly significant except for SBF 120
  - Methodological issues

# Changes in liquidity – 2-stage analysis in the post-MiFID periods

(Jan., June, & Sep.2009)



## 1<sup>ST</sup> STAGE

$$FI_{it} = c_1 \ln(\text{market value}) + c_2 \ln(\text{volume}) + c_3 \text{FTSE100} + c_4 \text{SBF120} + c_5 \text{June2009} + c_6 \text{Sep.2009} + \gamma_{it}$$



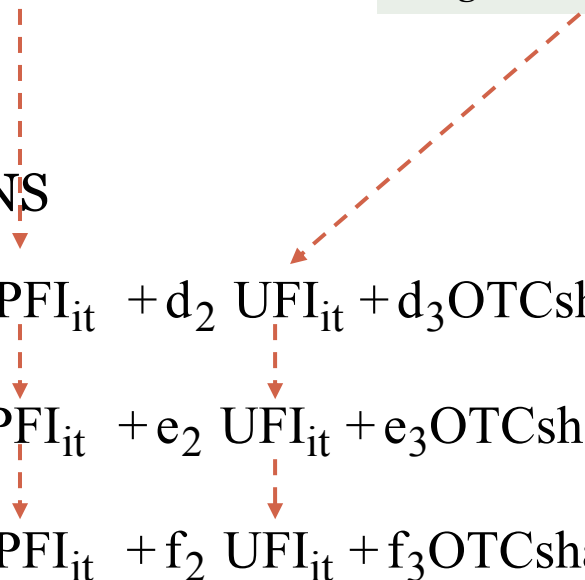
## 2<sup>ND</sup> STAGE:

### SEEMINGLY UNRELATED REGRESSIONS

$$\text{Quoted spread}_{it} = (\text{control variables}) + d_1 \text{PFI}_{it} + d_2 \text{UFI}_{it} + d_3 \text{OTCshare} + v_{it}^{\text{QS}}$$

$$\text{Effective spread}_{it} = (\text{control variables}) + e_1 \text{PFI}_{it} + e_2 \text{UFI}_{it} + e_3 \text{OTCshare} + v_{it}^{\text{ES}}$$

$$\text{Depth}_{it} = (\text{control variables}) + f_1 \text{PFI}_{it} + f_2 \text{UFI}_{it} + f_3 \text{OTCshare} + v_{it}^{\text{D}}$$



# Changes in liquidity – 2nd-stage SUR results



Variables		All	FTSE 100	CAC 40	SBF 120 (mid caps)
Global quoted spread	<b>PFI</b>	-0.00075***	-0.00094***	-0.00040***	-0.00197***
	<b>UFI</b>	-0.00072***	-0.00064***	0.00005 (ns)	0.00042 (ns)
	<b>OTC</b>	-0.00086***	-0.00048 (ns)	0.00008 (ns)	-0.00056 (ns)
Global effective spread	<b>PFI</b>	-0.00049***	-0.00030***	-0.00023**	-0.00087**
	<b>UFI</b>	-0.00078***	-0.00049***	+0.00003 (ns)	-0.00057*
	<b>OTC</b>	-0.00104***	-0.00035 (ns)	+0.00005 (ns)	-0.00047 (ns)
Global quoted depth	<b>PFI</b>	+0.76307***	+0.58013***	-0.09665 (ns)	+0.17156 (ns)
	<b>UFI</b>	+0.05415 (ns)	+0.45588***	+0.29603**	-0.32141***
	<b>OTC</b>	-0.28064 (ns)	+1.00560**	0.04648 (ns)	-0.17017 (ns)



# Changes in liquidity – Time series analysis



- Methodology
  - Daily averages of liquidity measures and daily fragmentation index (FI) from 1 Sep. to 30 Nov. 2009
  - 2-stage analysis
    - 1<sup>st</sup> stage: Regression of FI on liquidity determinants
    - 2<sup>nd</sup> stage: Panel regressions of liquidity variables on
      - PFI (endogenous fragmentation)
      - UFI (exogenous fragmentation),
      - Share of OTC & internalized trading
- Results
  - Spreads negatively relates to fragmentation
  - Depth positively relates to fragmentation
  - More significant for FTSE 100 stocks
  - Not significant for SBF 120 mid caps

# Conclusions



- End of 2009:  
substantial fragmentation but primary exchanges still dominant players
- 3 MTFs with significant market shares
  - Chi-X for all securities
  - BATS Europe more specifically on large UK equities
  - Turquoise more specifically on Euronext large equities
- No evidence that order flow fragmentation between trading platforms harms liquidity
  - Spreads have decreased between Oct. 2007 and Sep. 2009 in proportion with the level of market competition
    - More significant after June 2009
    - More significant for FTSE 100 stocks/ Less or no significant for SBF 120 mid caps
  - Depth and trade size declined dramatically between Oct. 2007 and Sep. 2009
    - More significant in Jan. 2009 and less pronounced afterward
    - Trade size decreased more than depth
    - Not only driven by fragmentation, other explaining factors
    - When focusing on 2009 data, depth positively related to fragmentation

# Conclusions – cont'd



- Caveats
  - Depth measure
    - Best limit quotes only
    - Static observation every second, no measure of the frequency of refreshment
  - Correlation analysis, not causality
  
- Potential issues to investigate
  - Explicit trading costs / Clearing costs?
  - Intraday volatility / Price discovery?
  - Reference prices