

Informed trading in a two-tier market structure under financial distress

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Motivations

- ➊ Recent concerns across market participants about the declining in both the **level** and **resilience** of market liquidity, especially for fixed-income markets.
- ➋ The government bond is the dominant segment of the Euro area bond market and one of the largest in the world with around €7 trillion outstanding nominal value at the end of 2016.
- ➌ In particular, secondary market liquidity is essential to a well-functioning government bond market.
- ➍ Secondary market liquidity in the European sovereign bond markets is mainly provided through dealer intermediation.
- ➎ Market participants expressed concerns about a perceived increase in the fragility of market liquidity in the dealer-intermediated markets.
- ➏ The segmentation of the government bond market has always been more the result of an historical structure.

Electronic trading in fixed income markets

The fixed income market has historically been divided into:

- ① an **inter-dealer** segment, in which dealers trade with one another
- ② a **dealer-to-customer** segment, in which dealers trade with their customers
 - ▶ Request-for quote (RFQ) protocol accounts for around 95% of total transaction volume in the dealer-to-customer markets (BIS, 2016).

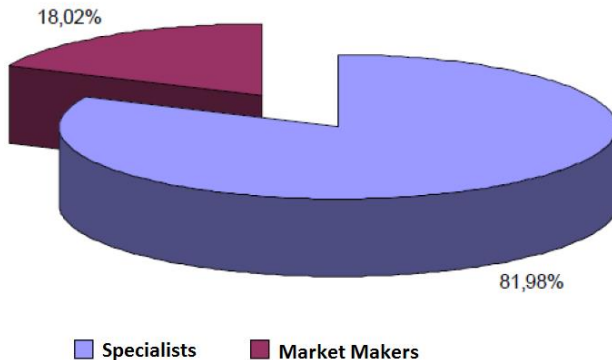
Inter-dealer platform (MTS)

- **Regulated wholesale** electronic market created in 1988
- Supervised by the Italian Treasury, Bank of Italy and CONSOB
- Two types of market participants:
 - ① Market Makers
 - ★ satisfy strictly requirements in terms of trading volume
 - ★ **post** bid and ask quotes on selected bonds
 - ② Dealers
 - ★ can trade bonds on the basis of the bid/ask prices posted by MMs
 - ★ **cannot input** prices in the system
- There **is** pre- and post- trade anonymity

► Appendix

The Specialists' market presence on MTS

% of total amount traded on average on MTS



Dealer-to-customer platform (BondVision)

- It was launched in 2001 in “response to continuous requests from institutional investors to access the liquidity of the MTS markets”
- Regulated market supervised by the Ministry of Economy and Finance (government) and by CONSOB (non-government)
- It is a multi-dealer request-for-quotes (RFQs) system.
- Three phases in the trading process:
 - 1 Request
 - 2 Proposal
 - 3 Acceptance
- There is **not** pre- and post- trade anonymity

Selected literature on liquidity

US Bond Market:

- Goyenko et al. (2011) compare the liquidity and its determinants of on- and off-the-run treasuries of different maturities.
- Fleming and Remolona (1999) study the price and volume response of US Treasury markets to unanticipated news.
- Fleming (2003) compares different liquidity metrics in the US Treasuries market.
- Pasquariello and Vega (2012) study the impact of open market operations by NY FED and find a positive impact on market liquidity.

European Bond Market:

- Darbha and Dufour (2013) construct several alternative liquidity measures and study their contribution to yield spreads before and after the sovereign bond crisis.
- Pelizzon et al. (2015) study the relationship between market liquidity and credit risk.
- Schneider et al. (2016) analyse the sovereign bond market of the Eurozone between 2011 and 2015.

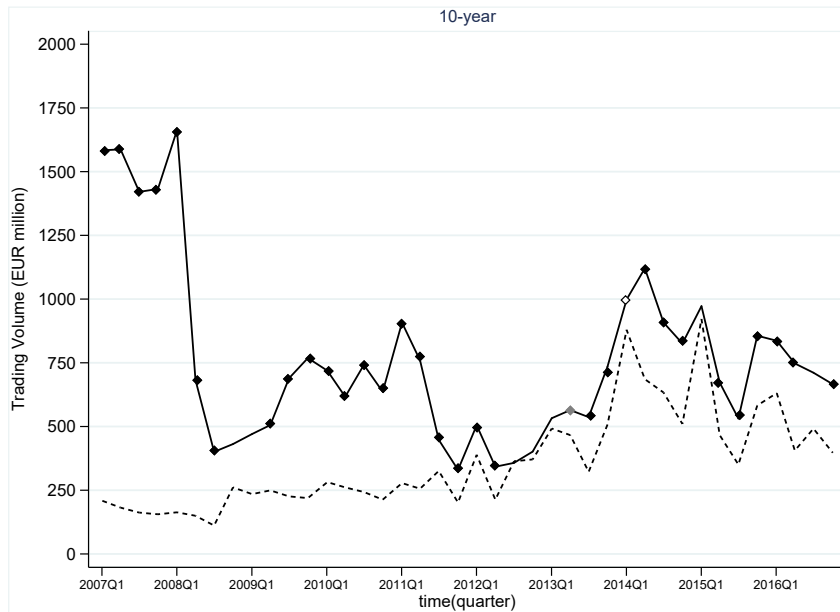
Data

- BTPs with an original 3, 5 and 10-year maturity traded on the MTS and BondVision platforms.
- In the government debt breakdown by instrument, BTPs accounted for around 70% of the total at the end of January 2017.
- We include only days with at least one trade common to both platforms, across the three maturities.
- Our investigation sample covers the period from January 2007 to December 2016, for a total of 2,538 trading days.
- MTS covers around half of all the inter-dealer trading in the European bond market.
- MTS Italy has a market share close to 100%.
- BondVision is the most representative dealer-to-customer platform for Italy.

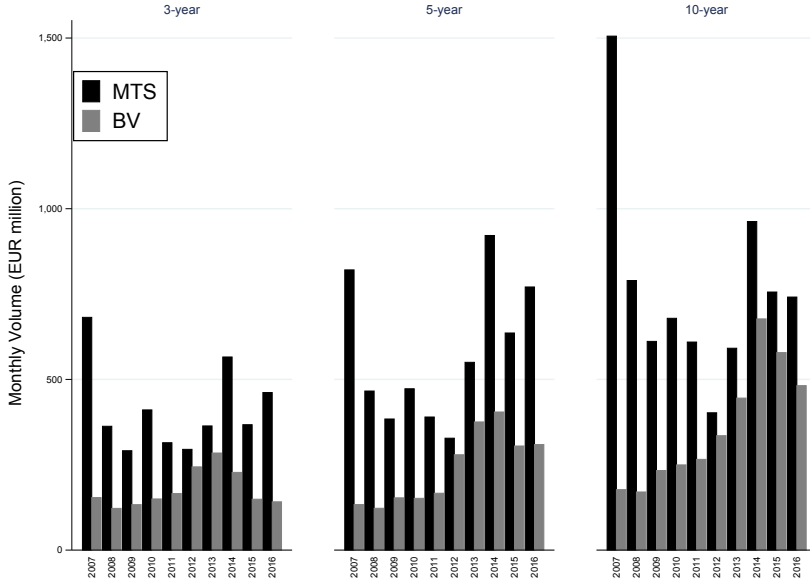
Transaction liquidity measures

- Trading Volume: average daily trading volume on each platform.
- Trading Frequency: average daily number of the total trades on each platform.
- Market Participants: average daily number of participants.
- Market Providers: average daily number of providers.
- Signed Order Flow: average buy-sell daily imbalance on each platform.

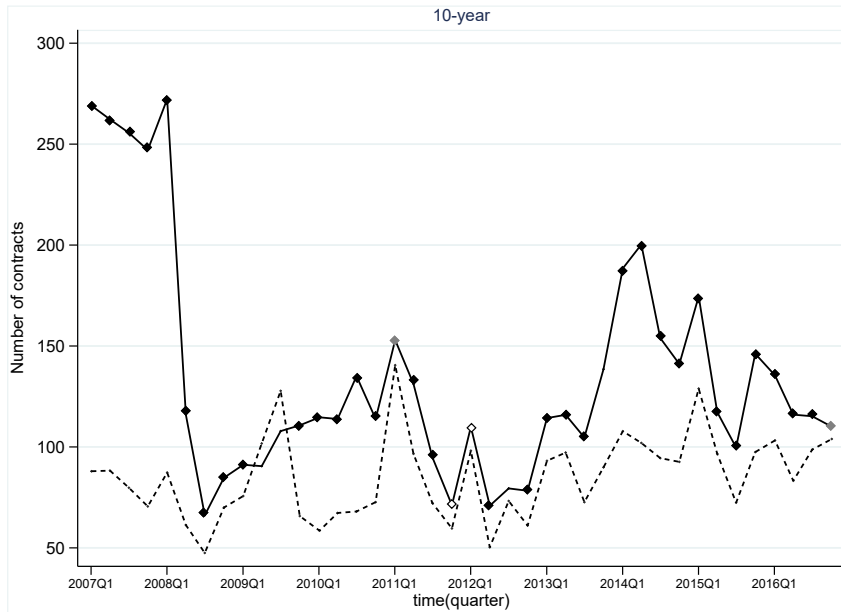
Trading Volume



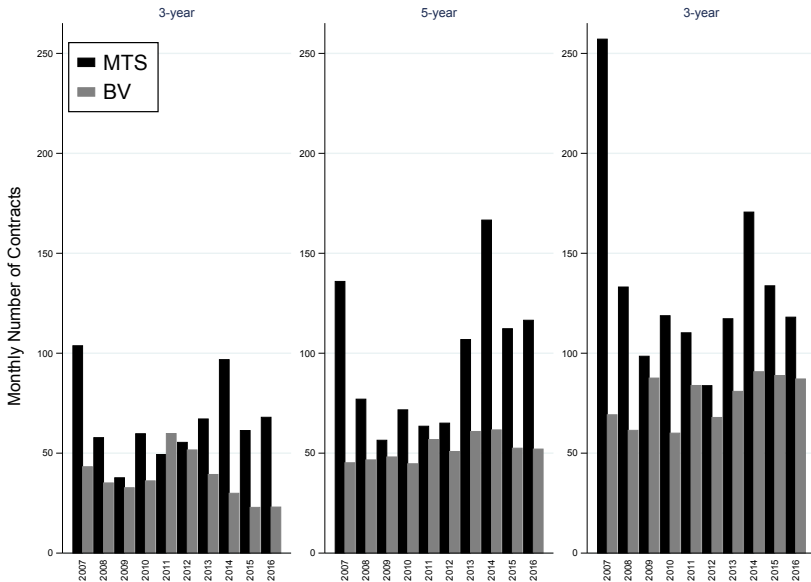
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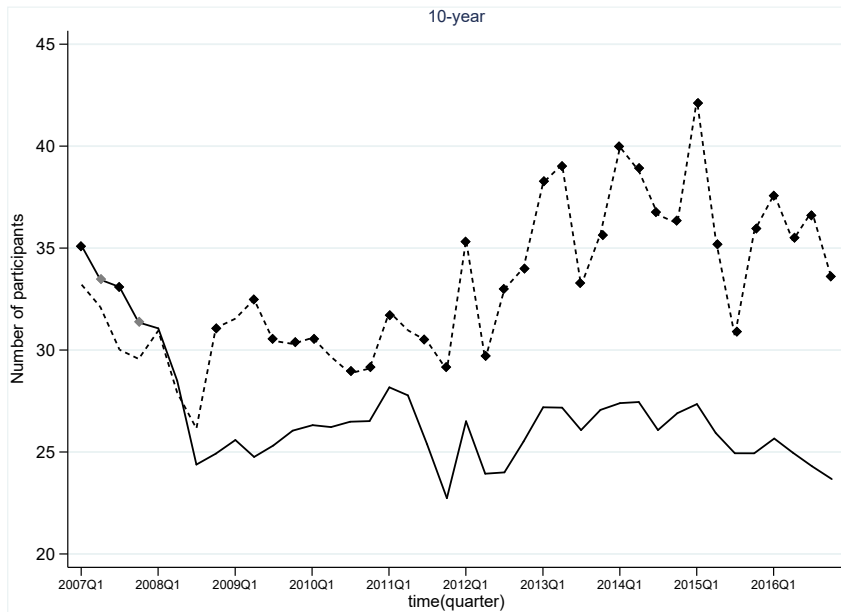
Trading Frequency



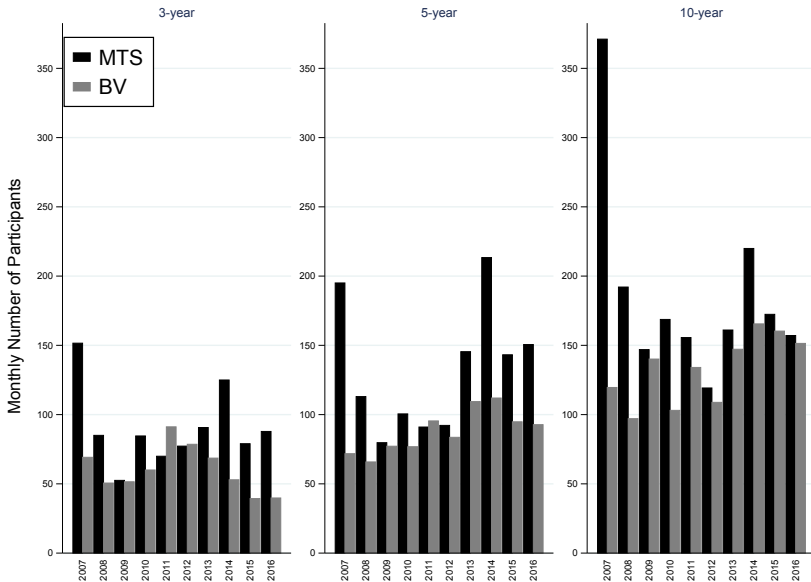
Trading Frequency



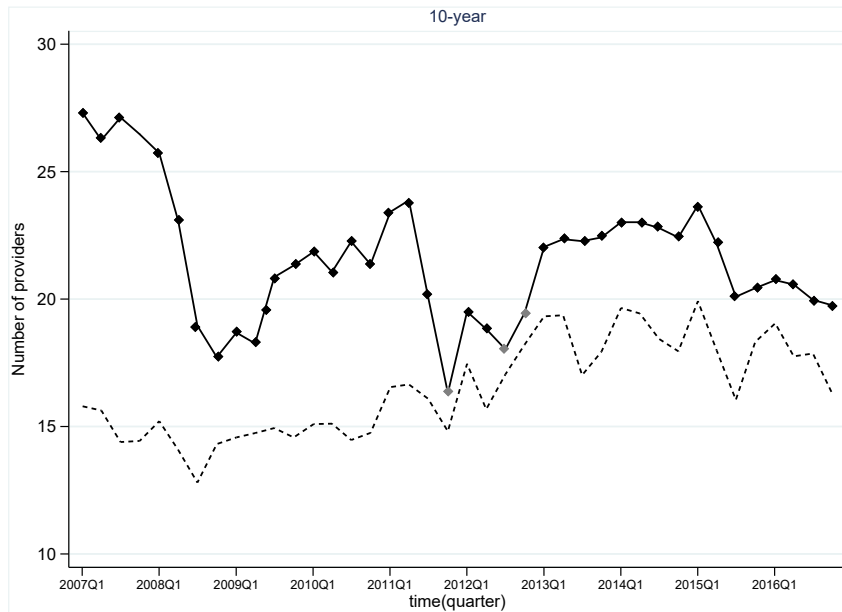
Market Participants



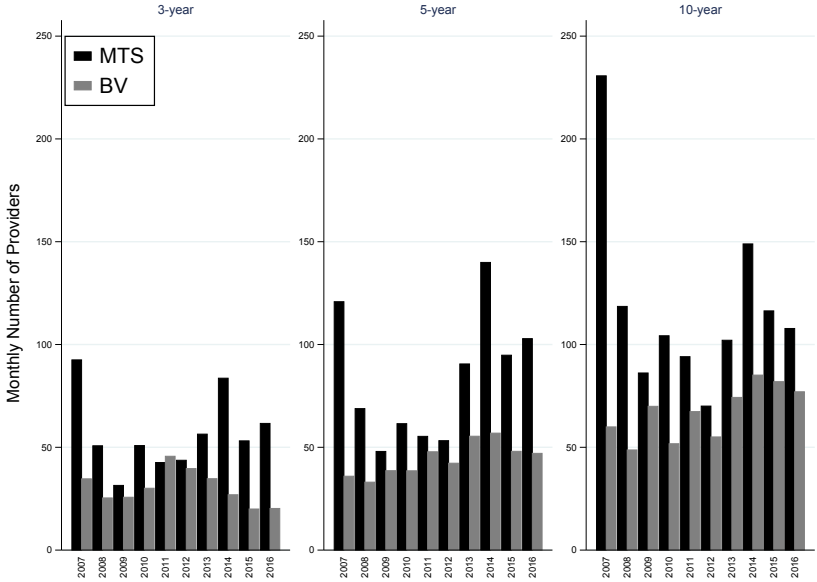
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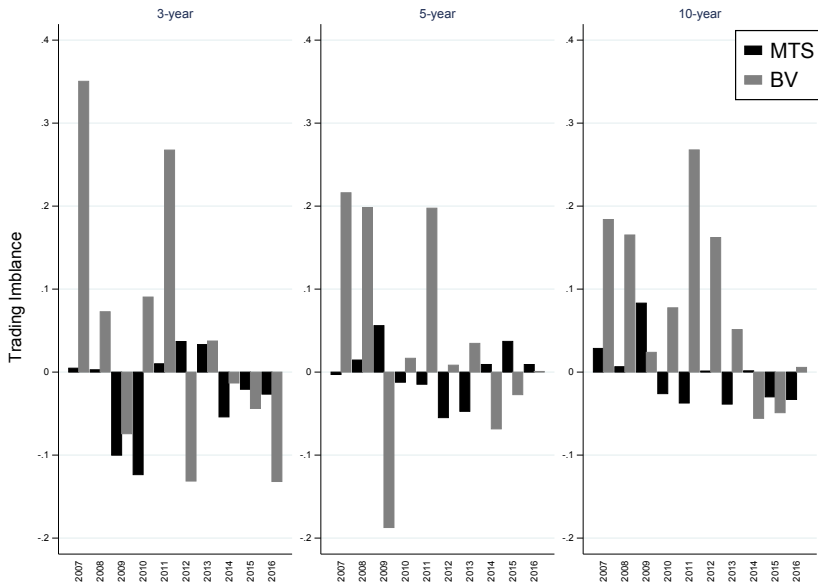
Market Providers



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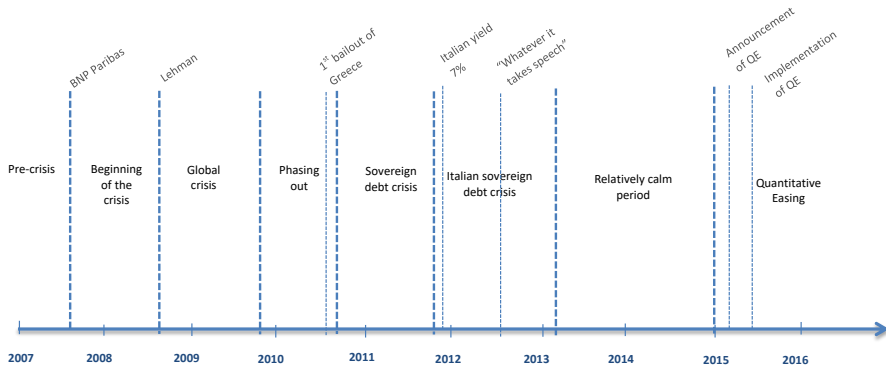
Signed Order Flow



Selected literature on liquidity and transparency

- Grammig et al. (2001) and Theissen (2003) find that market anonymity and informed trading are positively interrelated.
- Foucault et al. (2007) and Comerton-Forde and Tang (2009) document an improvement in market liquidity when exchanges adopt a more pre-trade anonymous market structure.
- Rindi (2008) shows that what matters for pre-trade transparency is the structure of the market.
- Paiardini (2015) finds that the presence of informed traders is higher in the anonymous inter-dealer segment of the market than in the dealer-to-customer one.
- Dunne et al. (2015) show that the two-tier structure of the European sovereign bond market, has proven to be very fragile in the recent European sovereign bond crisis.

Timeline

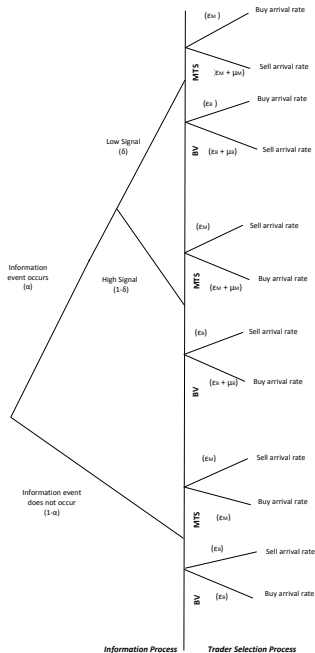


Sequential Trade Model

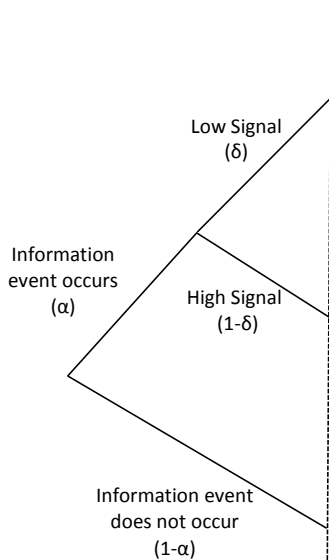
What is asymmetric information in this context?

Investors have different abilities to interpret past economic data or to understand the current state of economy (Balduzzi, Elton and Green 2001; Brandt and Kavajecz 2004; Green 2004)

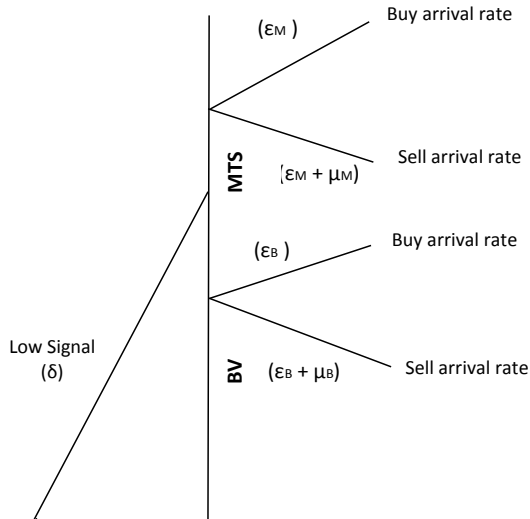
- Each trading day, before trading begins, nature selects whether or not an information event will occur.
- Trades arise because the interaction of three economic agents:
 - ① Uninformed Traders
 - ② Informed Traders
 - ③ Market Maker
- Trades depend on the arrival rates of informed and uninformed traders.



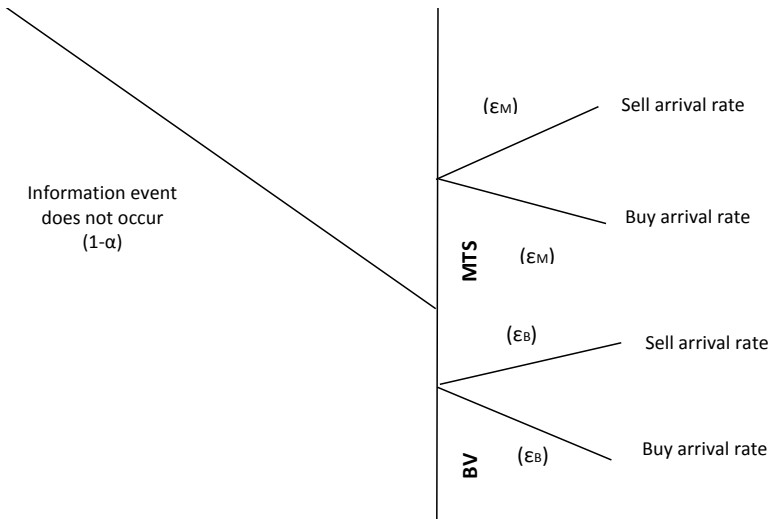
The Information Process



Trader selection process in case of a low signal (δ)



Trader selection process in case of no event ($1 - \alpha$)



The Probability of Informed Trading

- Probability of an information event: α
- Probability of informed traders: μ_j
- Probability of uninformed buys: ϵ_{bj}
- Probability of uninformed sales: ϵ_{sj}

$$PIN_j = \frac{\alpha \mu_j}{\alpha \mu_j + \epsilon_{bj} + \epsilon_{sj}}$$

where $j = \{MTS, BV\}$

Estimated parameters

Period	α	δ	μ_M	μ_B	ϵ_{bM}	ϵ_{bB}	ϵ_{sM}	ϵ_{sB}	PIN_{MTS}	PIN_{BV}
Full Sample	0.348 (0.010)	0.503 (0.018)	79.453 (0.491)	17.091 (0.346)	53.582 (0.209)	33.036 (0.215)	52.690 (0.143)	38.873 (0.133)	0.206 (0.005)	0.080 (0.003)
Pre-crisis	0.483 (0.010)	0.550 (0.034)	102.182 (1.576)	3.849 (0.548)	103.398 (0.331)	28.986 (0.294)	111.324 (0.139)	44.455 (0.100)	0.187 (0.004)	0.020 (0.004)
Beginning of Crisis	0.364 (0.011)	0.3713 (0.023)	121.707 (0.824)	10.207 (0.15)	74.9738 (0.244)	23.8893 (0.26)	68.1646 (0.101)	32.0272 (0.078)	0.2363 (0.005)	0.06 (0.001)
Global Crisis	0.389 (0.025)	0.579 (0.045)	28.507 (1.941)	42.326 (3.579)	38.582 (0.18)	30.836 (1.669)	44.807 (0.813)	36.951 (0.525)	0.117 (0.015)	0.196 (0.006)
Phasing out	0.502 (0.01)	0.448 (0.038)	49.021 (0.27)	8.556 (0.23)	42.307 (1.222)	23.013 (1.14)	40.302 (0.267)	26.652 (0.205)	0.23 (0.004)	0.08 (0.003)
Sovereign debt crisis	0.4378 (0.01)	0.3975 (0.015)	45.64 (0.345)	31.583 (0.336)	56.7575 (0.193)	28.406 (0.194)	52.3945 (0.149)	39.0263 (0.131)	0.1547 (0.003)	0.17 (0.004)
Italian Sovereign Debt Crisis	0.26 (0.007)	0.493 (0.015)	34.987 (0.262)	53.461 (0.505)	40.196 (0.157)	21.456 (0.185)	37.556 (0.157)	32.417 (0.128)	0.105 (0.003)	0.21 (0.004)
Relatively Calm Period	0.461 (0.011)	0.463 (0.018)	64.42 (0.573)	8.522 (1.126)	60.782 (0.242)	41.389 (0.256)	55.439 (0.286)	40.272 (0.23)	0.203 (0.004)	0.05 (0.006)
Quantitative Easing	0.4052 (0.010)	0.517 (0.017)	65.827 (0.401)	13.264 (0.498)	51.1221 (0.257)	42.397 (0.251)	48.040 (0.193)	40.203 (0.165)	0.212 (0.004)	0.06 (0.003)

Estimated parameters

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Concluding remarks and further analysis

- We focus on Italian government bonds from January 2007 to December 2016, spanning periods of financial distress, sovereign debts crisis and various interventions by the ECB trying to mitigate the consequences of the crisis.
- The gap in terms of liquidity measures between the two platforms narrows. This is especially true during the sovereign debt crisis.
- When we consider the full sample the PIN on MTS is higher than the one on BondVision.
- However, during some sub-periods the PIN on BondVision is actually higher than the one on MTS.
- Further analysis:
 - ▶ Link liquidity measures and the PIN.


Thank you!

p.paiardini@bham.ac.uk

The MTS Screen Based Procedure



powered by **SoftSolutions!**



Cash Repo BondVision Auction

MTSITISS4 - REGULATOR

WDA Market Data Trading Data Static Data Info Logout

Cash Best Prices

Filter

Refresh Now Every30s Never

Current filter **SectionCode = MTS AND InstrumentClassCode = BTP**

Market Section MTS Instrument Class BTP Instrument Type ☐ Only Quoted

Apply Filter Reset Filter

Click a label for help

Server: **Up View: Aligned** Snapshot: Feb, 13 2007 16:48:46 CET Page: 1 of 1 Export

Bid Size	Bid Yield	Bid Price	Section	Instrument Class	Instrument Code	Instrument Description	Ask Price	Ask Yield	Ask Size	Instrument Type	Last Deal Trend	Last Deal Side	Last Deal Price	Last Deal Yield	Last Deal Size	Last Deal Time
17.5		100.029	MTS	BTP	IT0003171946	BTPS 4.500 01/03/07	100.031		22.5	Bond	=	Buy	100.03	0	4	16:31:24,877
20		99.775	MTS	BTP	IT0003674238	BTPS 3.000 01/06/07	99.779		10	Bond	=	Sell	99.777	0	5	16:38:53,768
2.5		101.065	MTS	BTP	IT0001132098	BTPS 6.750 01/07/07	101.066		2.5	Bond	=	Buy	101.065	0	5	15:38:36,476
10		100.696	MTS	BTP	IT0003271019	BTPS 5.000 15/10/07	100.7		10	Bond	=	Buy	100.699	0	5	15:07:07,146
10		101.42	MTS	BTP	IT0001170007	BTPS 6.000 01/11/07	101.424		2.5	Bond	↑	Sell	101.421	0	15	16:14:38,067
10		99.631	MTS	BTP	IT0003413892	BTPS 3.500 15/01/08	99.635		10	Bond	↓	Sell	99.631	0	10	16:39:46,666
10		98.882	MTS	BTP	IT0003804850	BTPS 2.750 01/02/08	98.886		10	Bond	↓	Buy				
10		101.191	MTS	BTP	IT0001224309	BTPS 5.000 01/05/08	101.195		5	Bond	↑	Buy				
10		98.133	MTS	BTP	IT0003877708	BTPS 2.500 15/06/08	98.139		10	Bond	=	Sell				
25		99.44	MTS	BTP	IT0003532097	BTPS 3.500 15/09/08	99.46		25	Bond	=	Buy				
15		98.15	MTS	BTP	IT0004008121	BTPS 3.000 01/02/09	98.17		25	Bond	=	Buy				
40		98	MTS	BTP	IT0003652077	BTPS 3.000 15/04/09	98.02		15	Bond	=	Buy				
32.5		101.04	MTS	BTP	IT0001273363	BTPS 4.500 01/05/09	101.06		20	Bond	↑	Buy				
5		99.45	MTS	BTP	IT0004085244	BTPS 3.750 15/06/09	99.46		10	Bond	=	Buy				
5		100.63	MTS	BTP	IT0001338612	BTPS 4.250 01/11/09	100.64		2.5	Bond	=	Buy				
35		97.27	MTS	BTP	IT0003799597	BTPS 3.000 15/01/10	97.3		50	Bond	↓	Sell				
50		96.03	MTS	BTP	IT0003872923	BTPS 2.750 15/06/10	96.06		60	Bond	↓	Buy				
55		104.95	MTS	BTP	IT0001448619	BTPS 5.500 01/11/10	104.97		10	Bond	=	Buy				
30		97.88	MTS	BTP	IT0004026297	BTPS 3.500 15/03/11	97.9		15	Bond	↑	Buy				

Details: cmf_best_prices_detail - Micro...

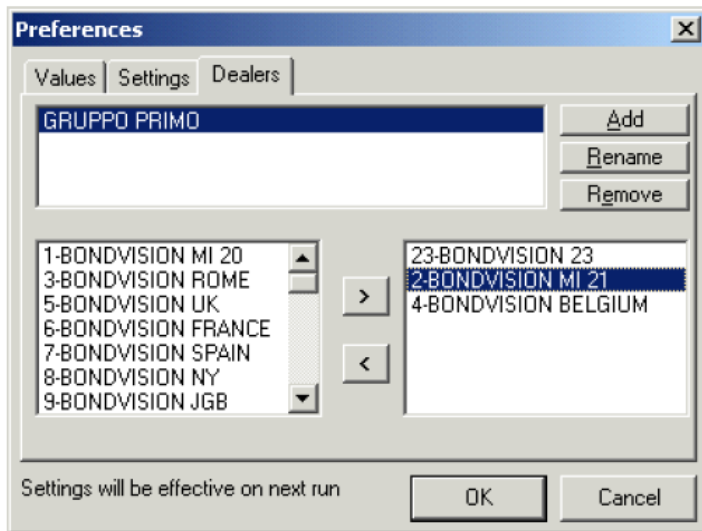
Refresh Now 15 30 60 Never

BTPS 4.000 01/02/17
MTS - IT0004164775

	Bid	Ask			
Qty	Yield	Price	Price	Yield	Qty
5.00		97.61	97.63		20.00
30.00		97.6	97.64		35.00
20.00		97.59	97.8		2.50
2.50		96			

◀ click here

1. The Request Phase



2. The Proposal Phase

Trade Negotiation

SELL

BTPS 4.75 07/05
BTP - IT0001413936

Quantity 10.0 (MI)
Nominal 10,000,000.0

Settl. Date 30/06/2005
Currency EUR

Dealer	Price	Yield	Qty	Settl. Cash	Time	Status	Action
2-BONDVISION MI 21	100.007	2.1884	10.0	10,236,887.85		INDICATIVE QUOTE	ACCEPT
1-BONDVISION MI 20	100.007	2.1884	10.0	10,236,887.85		INDICATIVE QUOTE	ACCEPT
5-BONDVISION UK	105.107	0.0000	10.0	10,746,887.85	1	LIVE QUOTE	ACCEPT
4-BONDVISION MI 23	100.005	2.9137	10.0	10,236,887.85		INDICATIVE QUOTE	ACCEPT
3-BONDVISION ROME	0.000	0.0000				Waiting...	

Message to

AI Dealers

Send

Resend

Close

Reject

70

RFC0000537614

Dealer proposal(s) received

3. The Acceptance Phase

SELL		BTPS 4.75 07/05 BTP - IT0001413936		Quantity 10.0 Nominal 10,000,000.0	(MI)	Settl. Date 30/06/2005 Currency EUR
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Dealer	Price	Yield	Qty	Settl. Cash	Time	Status	Action
2-BONDVISION MI 21	100.007	2.1884	10.0	10,236,887.85		END	
1-BONDVISION MI 20	100.007	2.1884	10.0	10,236,887.85		DONE	
5-BONDVISION UK	105.107	0.0000	10.0	10,746,887.85		END	
4-BONDVISION MI 23	100.005	2.9137	10.0	10,236,687.85		END	
3-BONDVISION ROME	0.000	0.0000				END	

Message to: AI Dealers Send

Resend Print Close Reject

TRADE DONE Dealer 1-BONDVISION MI 20 Trade Date 27/06/2005 Time 17:13:07

Bond BTPS 4.75 07/05 IT0001413936	Nom 10,000,000.0	Price 100.007	Acc N.A.
Prn* 10,000,700.0	Acr* 236,187.85	Stl* 10,236,887.85	ID
RFC0000537614		Auto accepted	

◀ click here

Trading outcome on a bad news day

$$P_b(B_j, S_j | \Omega) = e^{-\epsilon_{bM}} \cdot \frac{(\epsilon_{bM})^{B_M}}{B_M!} \cdot e^{-(\mu_M + \epsilon_{sM})} \cdot \frac{(\mu_M + \epsilon_{sM})^{S_M}}{S_M!} \\ \cdot e^{-\epsilon_{bB}} \cdot \frac{(\epsilon_{bB})^{B_B}}{B_B!} \cdot e^{-(\mu_B + \epsilon_{sB})} \cdot \frac{(\mu_B + \epsilon_{sB})^{S_B}}{S_B!}$$

- B_M =number of buys on MTS
- B_B =number of buys on BV
- S_M =number of sales on MTS
- S_B =number of sales on BV
- μ_j = probability of an informed trader on each platform;
- ϵ_{bj} = probability that an uninformed trader buys on each platform;
- ϵ_{sj} = probability that an uninformed trader sells on each platform

Trading outcome on a good news day

$$P_g(B_j, S_j || \Omega) = e^{-(\mu_M + \epsilon_{bM})} \cdot \frac{(\mu_M + \epsilon_{bM})^{B_M}}{B_M!} \cdot e^{-\epsilon_{sM}} \cdot \frac{(\epsilon_{sM})^{S_M}}{S_M!} \\ \cdot e^{-(\mu_B + \epsilon_{bB})} \cdot \frac{(\mu_B + \epsilon_{bB})^{B_B}}{B_B!} \cdot e^{-\epsilon_{sB}} \cdot \frac{(\epsilon_{sB})^{S_B}}{S_B!}$$

- B_M =number of buys on MTS
- B_B =number of buys on BV
- S_M =number of sales on MTS
- S_B =number of sales on BV
- μ_j = probability of an informed trader on each platform;
- ϵ_{bj} = probability that an uninformed trader buys on each platform;
- ϵ_{sj} = probability that an uninformed trader sells on each platform

Trading outcome on a no-event day

$$P_n(B_j, S_j || \Omega) = e^{-\epsilon_{bM}} \cdot \frac{(\epsilon_{bM})^{B_M}}{B_M!} \cdot e^{-\epsilon_{sM}} \cdot \frac{(\epsilon_{sM})^{S_M}}{S_M!} \\ \cdot e^{-\epsilon_{bB}} \cdot \frac{(\epsilon_{bB})^{B_B}}{B_B!} \cdot e^{-\epsilon_{sB}} \cdot \frac{(\epsilon_{sB})^{S_B}}{S_B!}$$

- B_M =number of buys on MTS
- B_B =number of buys on BV
- S_M =number of sales on MTS
- S_B =number of sales on BV
- ϵ_{bj} = probability that an uninformed trader buys on each platform;
- ϵ_{sj} = probability that an uninformed trader sells on each platform

Maximum Likelihood Estimation on a trading day i

$$L(B_j, S_j | \Omega) = \alpha(1 - \delta) \cdot P_g(B_j, S_j | \Omega) + \\ \alpha\delta \cdot P_b(B_j, S_j | \Omega) + \\ (1 - \alpha) \cdot P_n(B_j, S_j | \Omega)$$

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