



The Liquidity of Dual-Listed Corporate Bonds: Empirical Evidence from Italian Markets

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Motivation

- Liquidity is crucial for any investor to determine the size of orders as well as the timing, the mode, and the trading venue
- In the European framework, the choice of the trading venue has become relevant especially since the implementation of MiFID, which introduced a new classification of the trading venues (RM, MTF and SI) and abolished the concentration rule
- When implementing the MiFID, Italy opted for applying transparency requirements (more binding than those envisaged by the Directive) also to non-equity markets
- It is interesting to check whether, after MiFID implementation, ...
... the liquidity conditions of dual-listed bonds differ across Italian corporate bond markets (i.e. whether Italian bond markets may be regarded as integrated and competitive)
... fragmentation has an adverse impact on liquidity

Motivation

- The issues investigated in this work are particularly relevant in the Italian economy -financial system-, where direct retail holdings of corporate bonds, especially of bank bonds, are far more extensive than in other EU countries
 - At the end of 2013, Italian households' direct investment in corporate bonds accounted for about 14% of their financial wealth, equivalent to the figures referred to the Italian government bonds
 - Consob (the Italian securities regulator) dealt with the risks that illiquid products may rise for the investors' protection also by issuing a specific regulation aimed at granting investors the possibility of disinvesting within a reasonable period of time and at a fair price
- Italian retail investors can currently trade corporate bonds on the two markets managed by Borsa Italiana (DomesticMOT, a RM, and ExtraMOT, an MTF) and on the EuroTLX platform (a MTF majority owned by Borsa Italiana since September 2013 [later than our cut-off point]). Euro TLX is now operated and managed by an investment firm

Objectives

- We analyse liquidity conditions and the determinants of trading of dual-listed Italian non-government bonds from **January 1st, 2010 to June 30th, 2013**
 - The trading venues are paired as follows: **EuroTLX and DomesticMOT** or **EuroTLX and ExtraMOT**
(a bond traded in DomesticMOT cannot be traded in ExtraMOT)
 - We distinguish between bank bonds and non-financial issuers
- We also consider the impact of the sovereign debt crisis on the liquidity levels of the fragmented bonds
- Moreover, this paper investigates whether fragmentation impacted on bonds' liquidity levels through the comparison between fragmented bank bonds (i.e. traded across **DomesticMOT and EuroTLX**) and otherwise similar bank bonds traded only on DomesticMOT

Results

- **Liquidity conditions of fragmented bonds** Liquidity conditions of dual-listed bonds differ depending upon the issuer's industry and the trading venue (on some venues, bank bonds seem to be less liquid than non-financial securities)
- **Determinants of trading of fragmented bonds** The probability of trade occurrence across different trading venues can be explained by bonds' features, issuers' attributes, and market conditions
- **Impact of the sovereign debt crisis** Liquidity levels deteriorated on all trading venues during the time interval considered. The channels through which the crisis affected bonds' liquidity vary across trading venues. Bank bonds seem to have suffered more, in terms of lower liquidity, during the sovereign debt crisis
- **Impact of fragmentation** The comparison between bank bonds traded across **DomesticMOT and EuroTLX** and otherwise similar bank bonds traded only on DomesticMOT shows that fragmentation does not seem to have adversely affected liquidity

Contribution to the literature and to the policy debate

This paper adds to the existing literature by ...

- ... providing new empirical evidence on the liquidity developments of Italian non-government bonds
- ... exploring (to our knowledge, for the first time) the impact of fragmentation on the liquidity levels of non-government bonds

The evidence is also relevant to the current European policy debate on the implementation of the MiFID Review and, in particular, on the definition of transparency rules for non-equity markets

See the ESMA Discussion paper available at

http://www.esma.europa.eu/system/files/2014-548_discussion_paper_mifid-mifir.pdf

Liquidity of fragmented bonds

The sample

The sample includes bank bonds and non financial bonds, whose trading is fragmented across two trading venues, over the time period from January 1st, 2010 to June 30th, 2013

- Fragmentation is defined over **DomesticMOT and EuroTLX**, on the one hand, and **ExtraMOT and EuroTLX**, on the other hand, given that a bond listed on DomesticMOT cannot be traded on ExtraMot and vice versa
- Depending on the venue and the issuer's industry, the sample coverage (computed with respect to the turnover of all the securities admitted to trading) ranges from 17% for the bank bonds traded on EuroTLX to 98% for the bank bonds traded on ExtraMOT

Fragmented corporate bonds by exchange platform and issuer's industry

(January 2010 – June 2013)

Issuer	DomesticMot and EuroTlx	ExtraMot and EuroTlx
Non financial	13	205
Bank	87	104
Total	100	309

409 bonds overall

Source: our elaborations on CONSOB internal database on trading data.

Liquidity of fragmented bonds

The liquidity measures used

The selection of the liquidity measures was driven by the multidimensionality of liquidity (confirmed by the PC analysis) ...

Liquidity is captured by

- the turn-over ratio, accounting for depth

Illiquidity is measured by

- the Amihud (2002) indicator (price impact, resiliency)
- the Roll (1984) indicator (a proxy of the bid-ask spread accounting for tightness)
- the zero-trading statistics (percentage of zero-trading days, proxy for the [inverse of] trading frequency)

... and by data availability

- We have only data on executed trades (not on orders)
- Trading activity in the Italian corporate bond markets is low (due to massive participation of retail investors implementing *buy-and-hold* strategies)

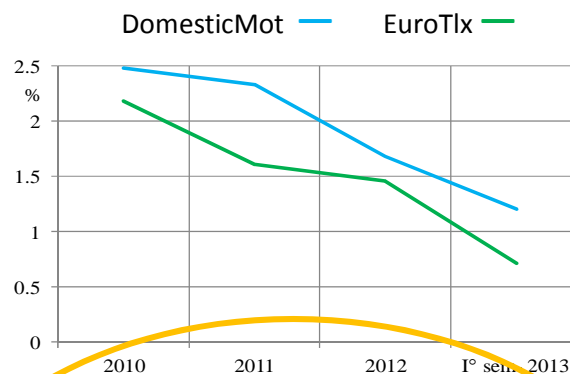
Liquidity of fragmented bonds

Average liquidity levels of bank bonds

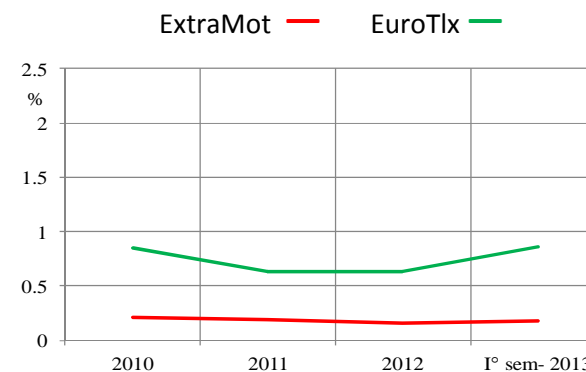
Fig. 1 (a) – Average liquidity levels of dual-listed bank bonds
(yearly averages)

Turn-over ratio

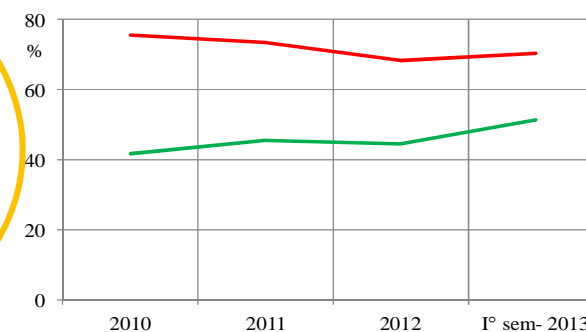
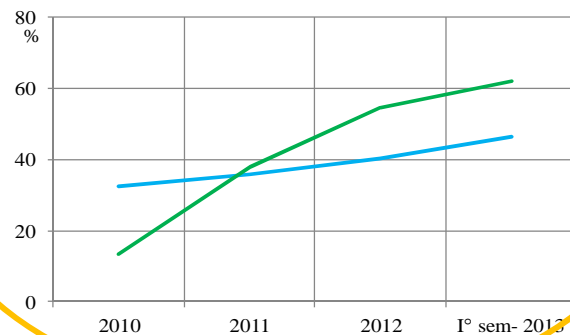
DomesticMOT and EuroTLX



ExtraMOT and EuroTLX



Zero trading



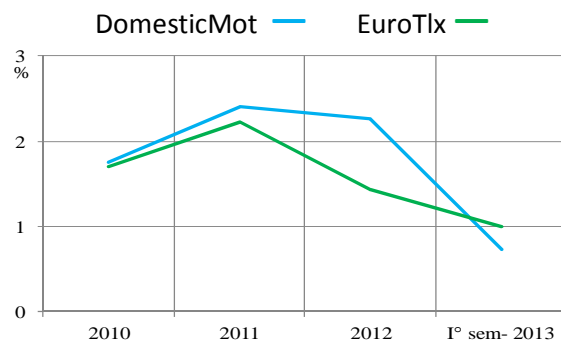
Liquidity of fragmented bonds

Average liquidity levels of bank bonds

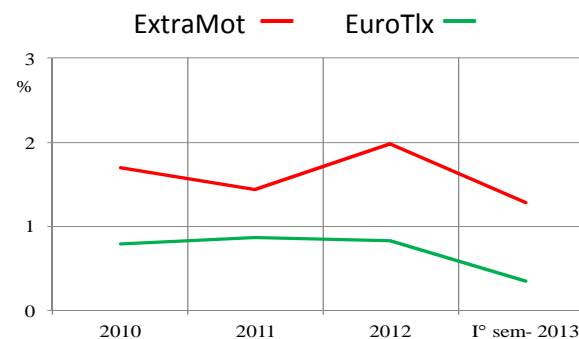
Fig. 1 (b) – Average liquidity levels of dual-listed bank bonds
(yearly averages)

Amihud ratio

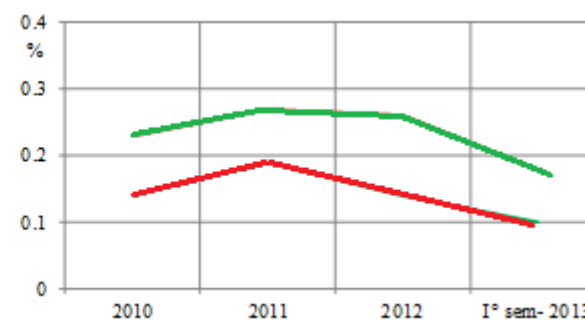
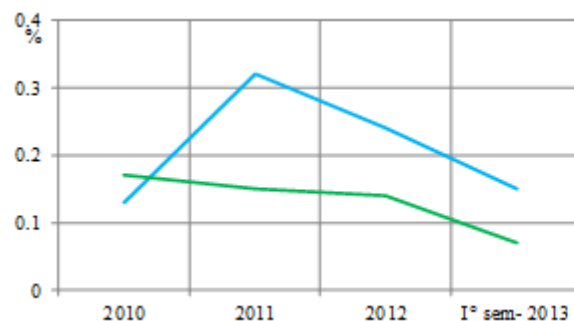
DomesticMOT and EuroTLX



ExtraMOT and EuroTLX



Roll





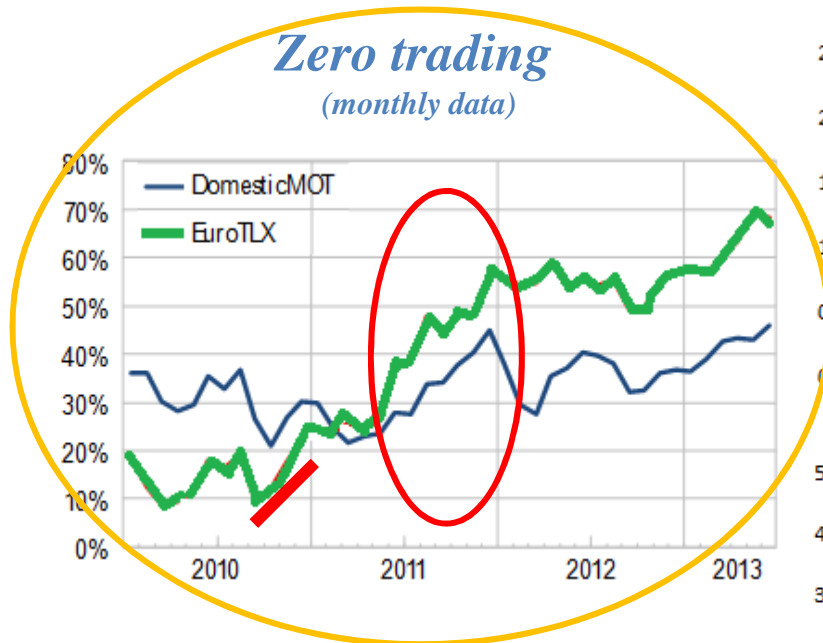
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Liquidity of fragmented bonds

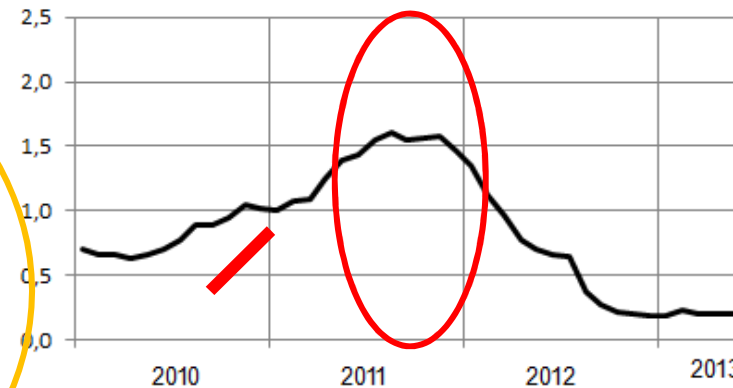
Average liquidity levels of bank bonds

DomesticMOT and EuroTLX

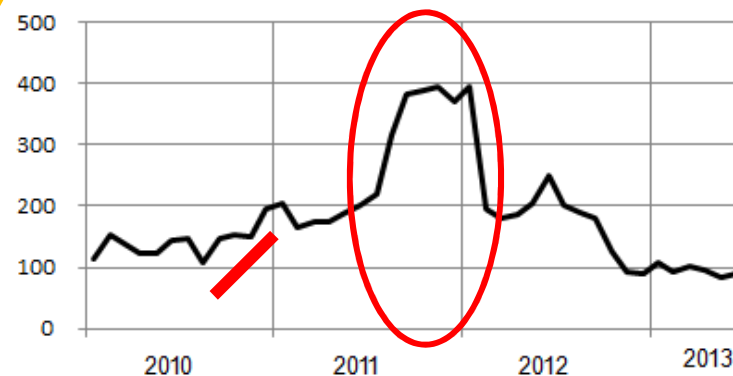
The sovereign debt crisis affected significantly trade of bank bonds on EuroTLX.



The zero-trade ascending trend characterizes the (fragmented) bank bonds included in our sample!



Euribor 3m

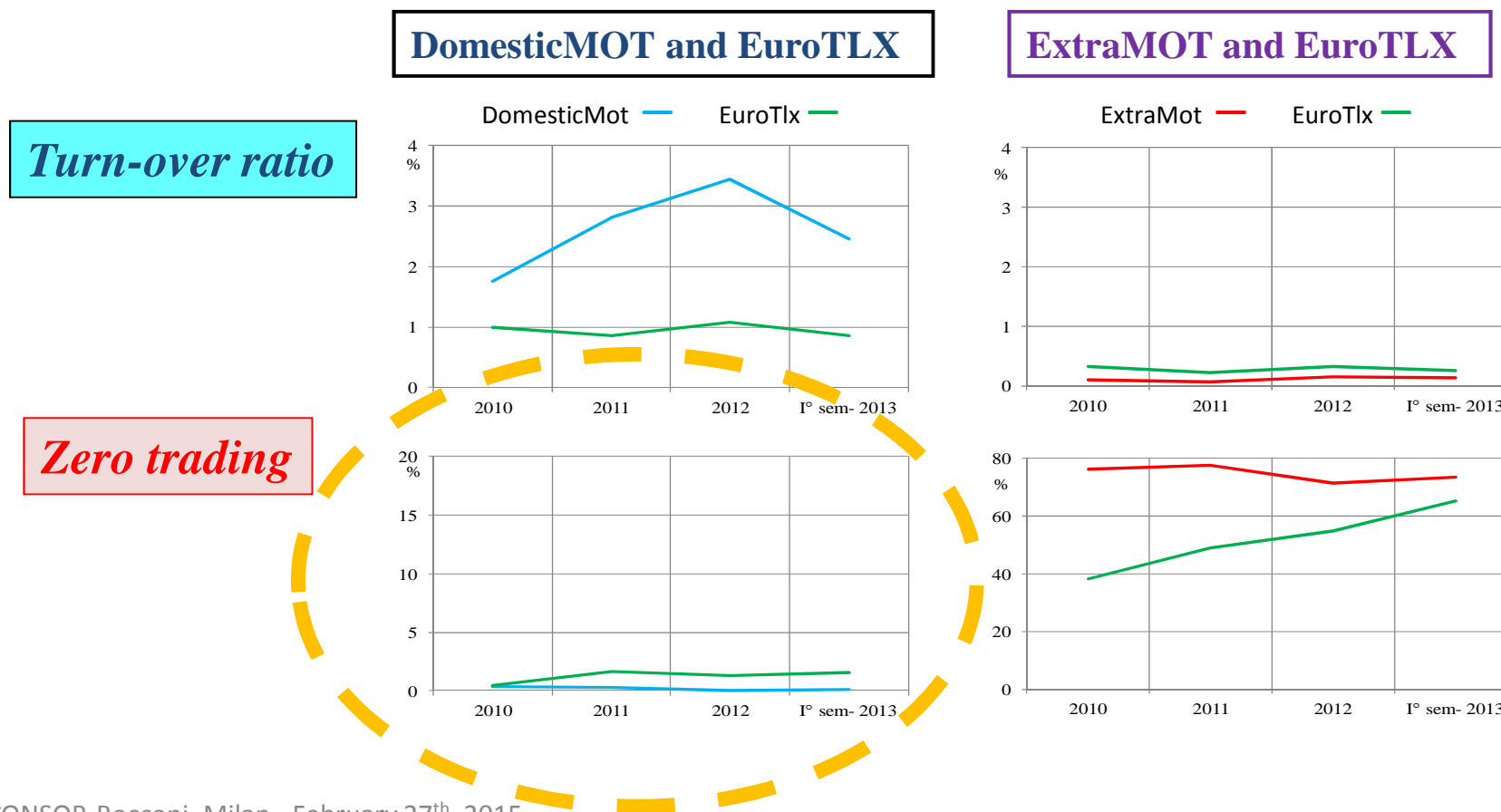


*EU 5-year
Sovereign CDS*

Liquidity of fragmented bonds

Average liquidity levels of non-financial bonds

Fig. 2 (a) – Average liquidity levels of dual-listed non-financial bonds
(yearly averages)



Liquidity of fragmented bonds

Average liquidity levels of non-financial bonds

Fig. 2 (b) – Average liquidity levels of dual-listed non-financial bonds
(yearly averages)

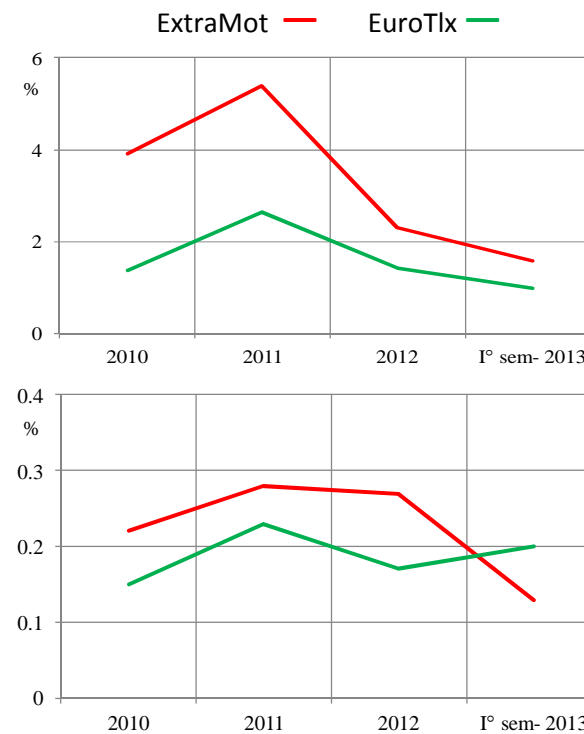
Amihud ratio

Roll

DomesticMOT and EuroTLX

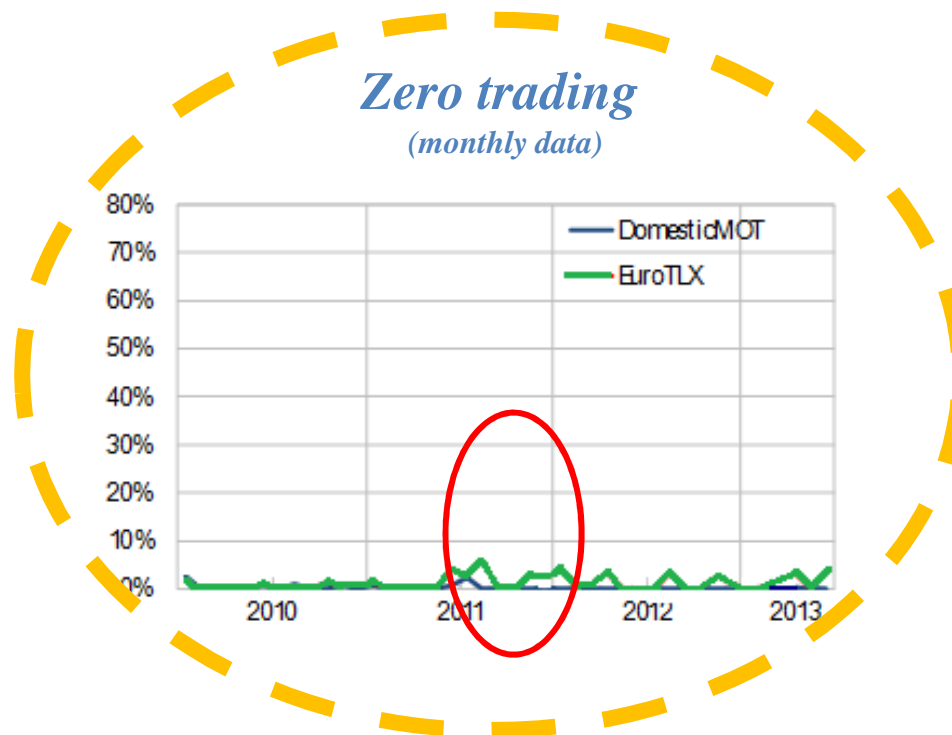


ExtraMOT and EuroTLX



Liquidity of fragmented bonds

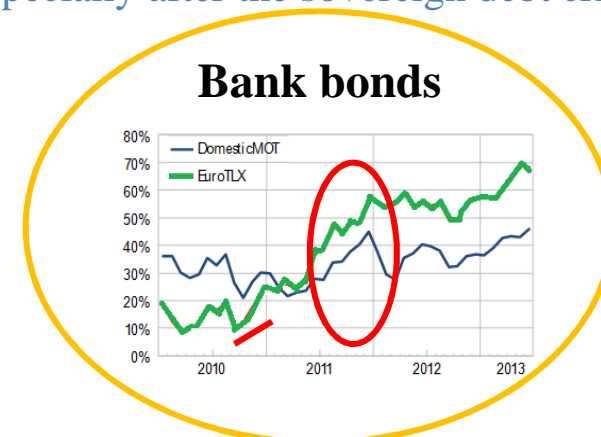
Average liquidity levels of non-financial bonds



DomesticMOT and EuroTLX

Basically, for non-financial bonds the zero-trade indicator has been *nought* on both markets

We recall that bank bonds turned out to be less traded and much more illiquid, especially after the sovereign debt crisis



Liquidity of fragmented bonds

Evidence

- Bank bonds traded across **DomesticMOT and EuroTLX** are less liquid than non-financial bonds (zero-trading indicator, Amihud statistics, and Roll bid-ask spread proxy). The opposite holds for the sample of securities fragmented across **EuroTLX and ExtraMOT** (bank bonds more liquid)
 - However, further investigation needed to check the extent to which this evidence is statistically significant and whether it is due to specific bonds' attributes
- During the sovereign debt crisis bank bonds and non-financial bonds behaved differently
 - Bank bonds exchanged across **DomesticMOT and EuroTLX** experienced a significant deterioration of the liquidity levels (in some cases at the end of June 2013 are still worse than in 2010) **[(*) see next page]**
 - Essentially, the liquidity of non-financial bonds (either across **DomesticMOT and EuroTLX** or across **EuroTLX and ExtraMOT**) levelled-off (some indicators, Amihud in particular, signal liquidity deterioration for non financial bonds)
 - During, or immediately after the crisis, trade of non-financial bonds (turnover ratio) increased on all the venues (looking at monthly figures) **[(*) see next page]**

Liquidity of fragmented bonds

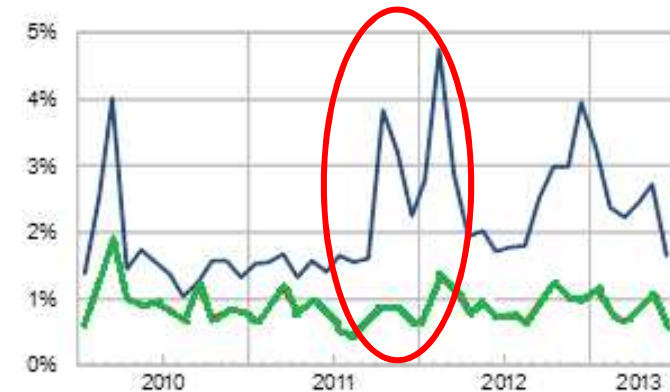
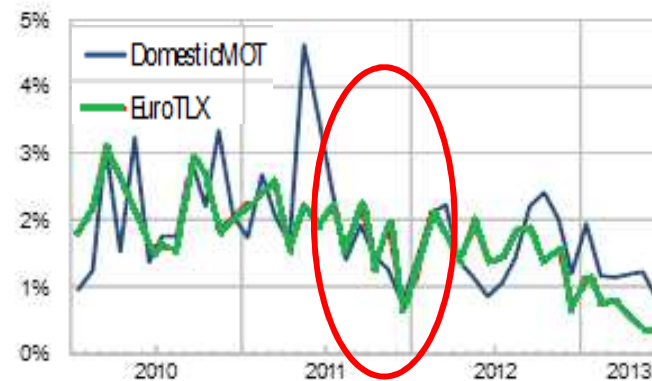
Evidence: bank vs non-financial bonds (1) (*)
(monthly figures)

DomesticMOT and EuroTLX

bank

non-financial

Turn-over ratio



As far as issuers' industry is concerned, data evidence highlights a sharp contrast during the sovereign crisis:

- the trading volume of bank bonds dropped
- vs
- the trading volume of non financial bonds rocketed

Liquidity of fragmented bonds

Evidence: bank vs non-financial bonds (2) (*)

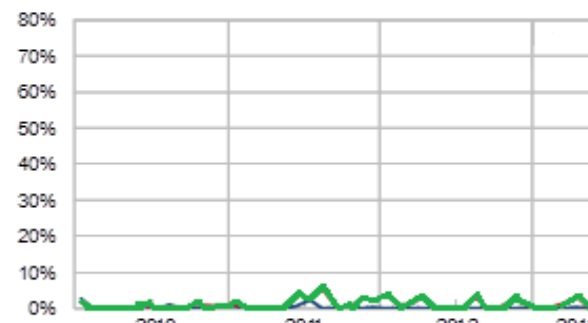
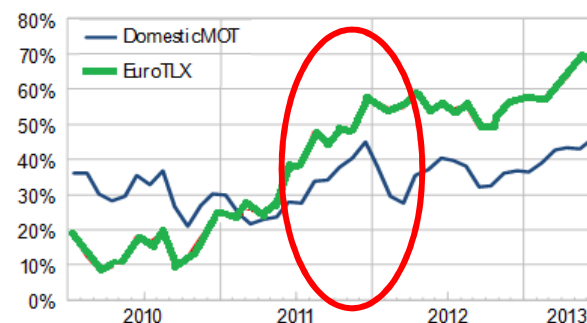
(monthly figures)

DomesticMOT and EuroTLX

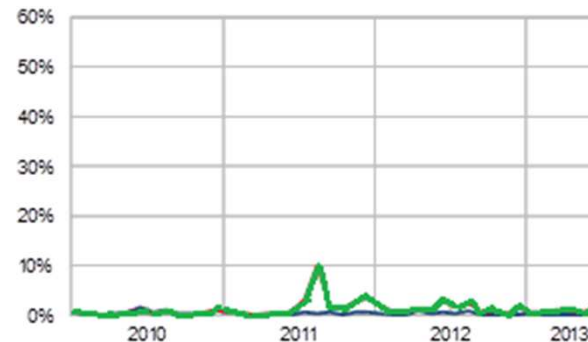
bank

non-financial

Zero trading



Amihud ratio



Bank bonds definitely more illiquid than non-financial bonds, especially during the sovereign debt crisis (t -test confirms such evidence, H_0 (mean equality across industry) rejected at any significance level)

Liquidity of fragmented bonds

Evidence

During the sample period:

- Bonds traded on **EuroTLX** turn out to be more liquid than those traded on **ExtraMOT** (all indicators supports this evidence)
- Infrequent trading seems to be a key feature of Italian corporate bonds (the zero-trade indicator is large on all venues, except for non-financial bonds fragmented across **DomesticMOT and EuroTLX**)
- More controversial the evidence regarding the first sub-sample, i.e. bonds traded across **DomesticMOT and EuroTLX**. Although, in general, **EuroTLX** displays slightly better liquidity conditions, non-financial bonds are more easily traded on **DomesticMOT** (important share of bank bonds in our sample drives the empirical findings)



Market microstructures differences may account for such results



What about bonds' characteristics?

Liquidity of fragmented bonds

Evidence (bonds' features: *Minimum Trading Size*)

As for MTS (*Minimum Trading Size*), our analysis focuses exclusively on the **EuroTLX and ExtraMOT** sub-sample, since almost all bonds traded on DomesticMOT and EuroTLX have MTS equal to 1,000 euros (retail bonds)

t-test for the mean:

- both the AMIHUD statistics and the TURNOVER ratio suggest bonds (both financial and non-financial) with greater lot size ($MTS > 1,000$ euros) being more liquid (**)
- the ROLL bid-ask spread and the ZERO-TRADE statistics (roughly) support the evidence of similar liquidity conditions in spite of the minimum lot size

(**) It can be rationalized by the massive participation of *buy-and-hold* retail investors targeting bonds with small lot size ($MTS < 1,000$ euros)

Liquidity of fragmented bonds

Evidence (bonds' features: *Nationality*)

With the only exception of non-financial bonds traded on EuroTLX (sample: **DomesticMOT and EuroTLX** - “same liquidity levels”), the *t*-test for the mean provides clear-cut evidence that bonds issued by Italian companies are characterized by better liquidity levels on all the other venues (only the Roll spread sometimes returns the “same liquidity levels” output)

→ Sort of Home-country-bias issue?

It remains an open issue; it may depend upon the type of market players (professional vs retail investors), trading strategies, diversification strategies

Available DATA: both in the markets and in our samples, Italian bonds represent a quite significant portion.

Liquidity of fragmented bonds

Evidence (bonds' features: *Coupon Structure*)

With the only exception of bank bonds traded on DomesticMOT (sample: **DomesticMOT and EuroTLX** - “plain bonds more liquid”), the *t*-test for the mean of liquidity indicators provides significant evidence of better liquidity conditions for structured bonds

→ Is such an evidence related to risk perception?

✓ Uncertainty and (unanticipated) shocks may affect complex products more heavily than plain ones.

Financial distress → short trading strategies

✓ Expectations of new economic and financial conditions call for hedging strategies to face incoming risks (it may change the probability structure adopted to weight future states of the world).

Hedging opportunities → long trading strategies

DomesticMOT: bank bonds are mainly represented by structured products (48% in terms of turnover), followed by fixed (30%) and floating (22%) rate securities; whereas, fixed coupon bonds prevail in the non-financial sector

Coupon structure looks more conservative on **ExtraMOT**: the greatest share of turnover is due to fixed rate coupon products (98% and 83% for bank and non-financial bonds, respectively)

In our sample, bonds traded on **EuroTLX** are mainly fixed coupon bonds

Liquidity of fragmented bonds

Determinants of trading of fragmented bonds

- Test whether bond features, issuer attributes, and market conditions influence trade occurrence on different trading venues
- Focus on trade occurrence^(*) rather than on other liquidity indicators, given that low-frequency trade is a core feature of Italian non-government bond markets
 - Over the period January 2010-June 2013, on average 40% of monthly trading days with no trade for the sample of bonds fragmented on **DomesticMOT and EuroTLX**; this figure rises to 70% on **ExtraMOT**
- Random effect panel logit model explaining the probability of trading each bond on each venue. Independent variables:
 - bond characteristics: issue size, complexity, age (time to maturity), minimum lot size
 - issuer attributes: nationality, industry, credit risk (rating released by Moody's, probability of default, issuer CDS quotation)
 - market conditions: stock market volatility, information risk (bond daily closing price variability), Italian sovereign CDS quotations, and a financial crisis indicator
 - The financial crisis indicator was computed following a data driven approach (see Galliani et al., 2013). In our sample crisis spans from July 2011 to July 2012

^(*) According to the principal component analysis, trade frequency is the most important liquidity driver, especially for bank bonds exchanged on ExtraMot and EuroTlx.



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Liquidity of fragmented bonds

Determinants of trading of fragmented bonds:

Literature review

- **Alexander, Edward and Ferri (JoFM, 2000)** trading volume is positively associated with issue size and negatively associated with age. Findings: larger issues (and issues less than two years old) are more heavily traded; the debt of firms without public equity trades more actively than the debt of firms with public equity
- **Hotchkiss and Jostova (2007)** issue size and age are the main determinants of corporate bonds trade. Trading volume declines substantially as bonds become seasoned and are absorbed into less active portfolios
- **Petrella and Resti (Bancaria, 2013)** positive relationship between bond liquidity and issues size: more liquid bonds are usually associated to large issues. Illiquidity increases with duration (a proxy for risk) and with age (newly-issued bonds are traded more frequently)
- **Houweling, Mentink, and Vorst (JoBF, 2005)**: illiquidity is priced. Small issues' bonds have higher yields due to an illiquidity premium. The highest premia are explained by the proxies of *age* and *yield dispersion*
- **Sarig and Warga (JoFQA, 1989), Amihud and Mendelson (JoFE, 1991)**: bonds with smaller issued amounts tend to get locked in buy-and-hold portfolios more easily. Alike, as bonds get older an increasing percentage of the issued amount tends to be absorbed in investors' buy-and-hold portfolios

Liquidity of fragmented bonds

Determinants of trading of fragmented bonds:

Literature review (2)

- **Hong and Warga (FAJ, 2000)**, the bid-ask spread (the wider the bid-ask spread, the more illiquid the security) is regressed onto different variables

- issue amount outstanding: negative effect
- trade volume: negative influence
- bond rating (credit risk): negative effect

exerted by an investment grade *dummy*

Inverse correlation

bid-ask spread
reduction \leftrightarrow liquidity

- time-to-maturity (duration, interest rate risk): positive impact
- age (corrected for callability): positive impact

Positive relationship

bid-ask spread
increase \leftrightarrow illiquidity

Liquidity of fragmented bonds

Determinants of trading of fragmented bonds

Determinants of trade occurrence on DomesticMOT and EuroTLX

Explanatory variables	Domestic MOT	EuroTlx
Bank bonds	Bank bonds estimated to trade less frequently than non-financial b.; greater impact on EuroTLX	
Nationality of bonds	Italian bonds estimated to trade more frequently than foreign bonds	
Complexity (structured bonds)	Structured bonds traded less frequently than plain vanilla ones	Structured bonds traded more frequently than plain vanilla ones
Time to maturity/age	Seasoned bonds estimated to trade less frequently	
Issuer Cds quotations	Positive, but almost negligible impact	Statistically insignificant
Issuer rating	Lower probability of trade for worse rated and downgraded bonds	Statistically insignificant
Issuer EDF	Statistically insignificant	
Information risk	Negative impact on bonds trade	Negative impact (greater magnitude)
Stock market volatility	Negative impact on bonds trade	Statistically insignificant

Liquidity of fragmented bonds

Impact of the sovereign debt crisis

The impact of the crisis on trade occurrence on **DomesticMOT** and **EuroTLX**

Explanatory variables interacted with the dummy Crisis	DomesticMOT	EuroTlx
Bank sector	No significant change during crisis time	Trade occurrence of bank bonds tends to lower during crisis
Nationality	No significant change during crisis time	Trade occurrence of Italian bonds tends to lower during crisis (even more when Italian sovereign Cds quotations rise)
Complexity	Statistically insignificant	
Age	Trade occurrence of seasoned products tends to rise	
Issuer Cds quotations	During crisis periods an increase of Cds quotations lowers the probability of trading	No significant change during crisis time
Issuer rating	Downgrade/upgrade tends to lower/enhance trade occurrence during crisis	No significant change during crisis time
Issuer expected default frequency	No significant changes during crisis time	
Information risk	No significant change during crisis time (larger impact)	
Italian stock market volatility	No significant changes during crisis time	

Liquidity of fragmented bonds

Determinants of trading of fragmented bonds

Determinants of trade occurrence on **EuroTLX** and **ExtraMOT**

Explanatory variables	ExtraMOT	EuroTlx
Age	Seasoned products are more frequently traded	Aged bonds less frequently traded
Bank bonds	Statistically insignificant	Bank bonds traded less frequently than non-financial bonds
Issuer nationality	Italian bonds traded more frequently than foreign ones	
Structured bonds	Statistically insignificant	
Lot size	Retail products more frequently traded	
Issue size	Bonds with higher amount outstanding more frequently traded	
Issuer Cds quotations	Positive impact	
Sovereign Cds quotations	Positive (marginal) impact	
Issuer rating	Downgrade marginally reduces trade occurrence	Downgrade increases trade occurrence
Issuer Expected Default Frequency	Trade occurrence more likely when EDF increase	
Information risk	Positive impact on trade occurrence	
Stock market volatility	Negative effect on trade frequency	

Liquidity of fragmented bonds

Impact of the sovereign debt crisis

The impact of the crisis on trade occurrence on **EuroTLX** and **ExtraMOT**

Explanatory variables interacted with the dummy Crisis	ExtraMOT	EuroTlx
Bank sector	No significant change during crisis time	Trade of bank bonds tends to lower during financial market turbulence
Nationality	Trade occurrence of Italian bonds tend to rise during financial market turbulence	No significant change during crisis time
Complexity	Trade significantly increases during crisis	No significant change during crisis time
Lot size	Trade occurrence of retail products tends to increase during crisis	Trade occurrence of retail products tends to lower during crisis
Issue size Age Issuer Cds quotations Issuer rating Issuer EDF Information risk Italian stock market volatility	Greater impact of the explanatory variables on trade occurrence during the sovereign debt crisis	

Liquidity of fragmented bonds

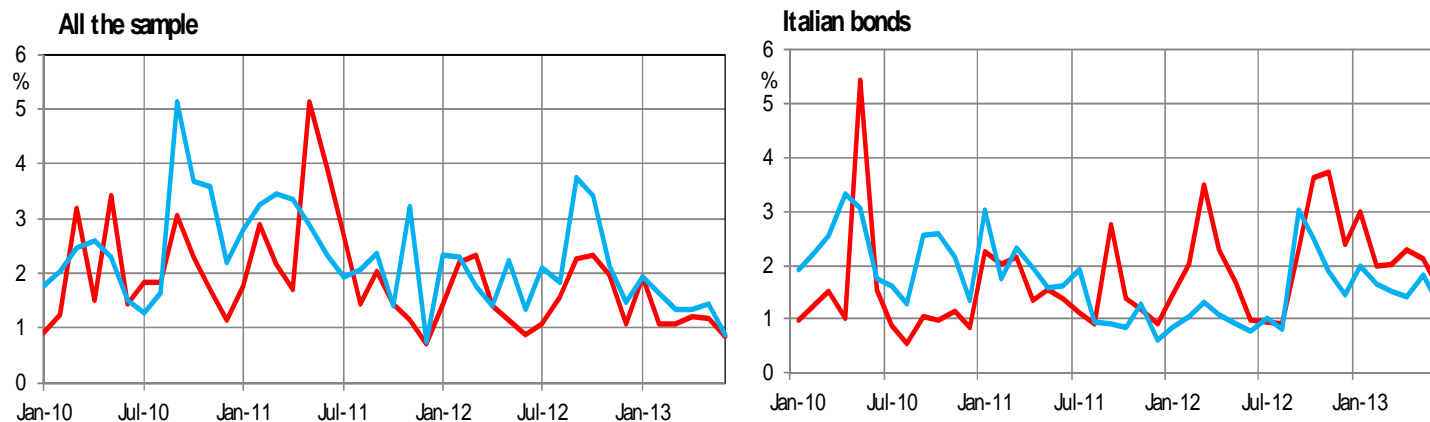
Impact of fragmentation (bank bonds)

- Comparison of the liquidity level of bank bonds fragmented across **DomesticMOT** and **EuroTlx** with otherwise similar bank bonds, which are traded only on DomesticMOT
- *Matched sample approach* (Davies and Kim, 2009)
 - Applied to 705 bank bonds traded only on **DomesticMOT** (from January 2010 till June 2013) and matched with the 87 securities negotiated both on **DomesticMOT** and **EuroTlx**
 - Nearest-neighbour approach minimizing the difference (matching error) between the two groups of bank bonds with respect to a set of criteria
 - Securities attributes (market value, complexity -plain vanilla vs structured bond- time-to-maturity, and lot size)
 - Issuers' attributes (nationality and rating -also rating changes occurred over the sample period-)
- Empirical evidence is not conclusive. However, although for the whole sample fragmented bonds turn out to be less liquid, dual-listed Italian bank bonds display better liquidity figures than foreign ones (Wilcoxon test)
- Multivariate analysis suggests dual-listed bank bonds and non-fragmented matched bonds having similar liquidity levels

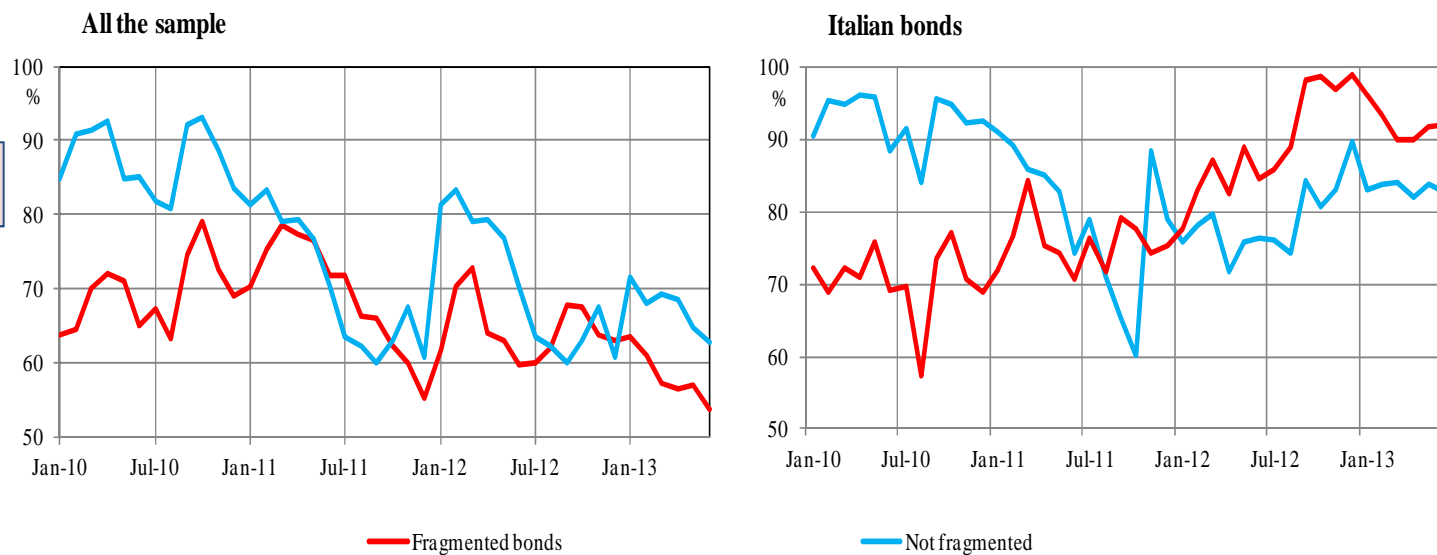
Liquidity of fragmented bonds

Impact of fragmentation (bank bonds)

Turn-over ratio



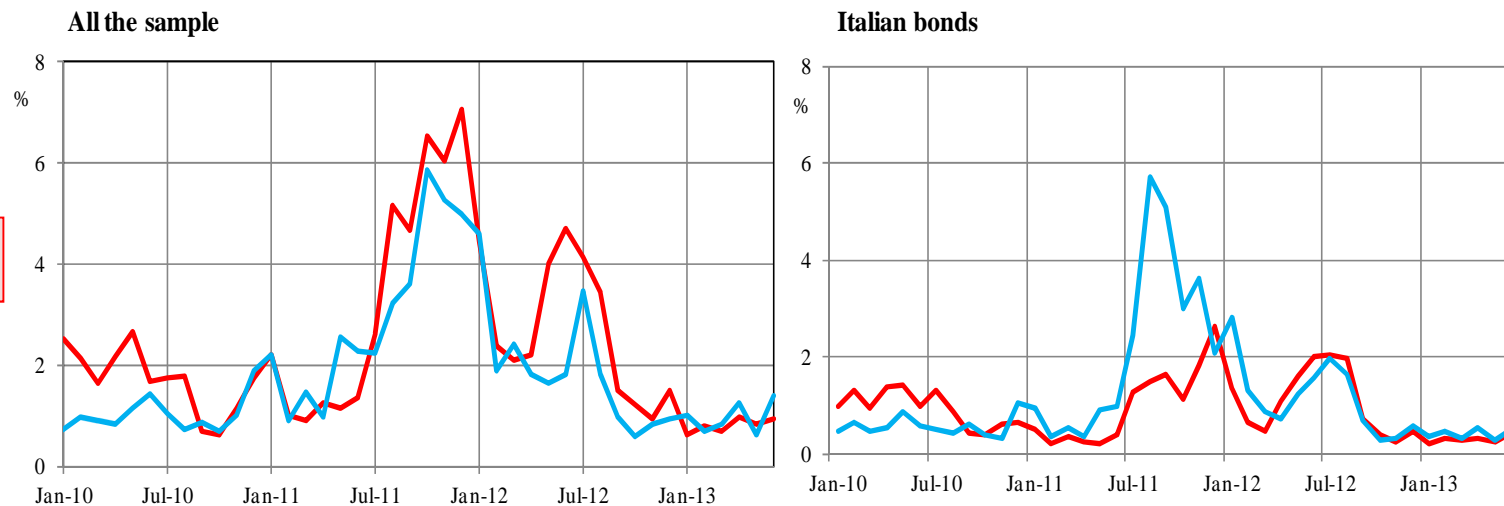
Trade frequency



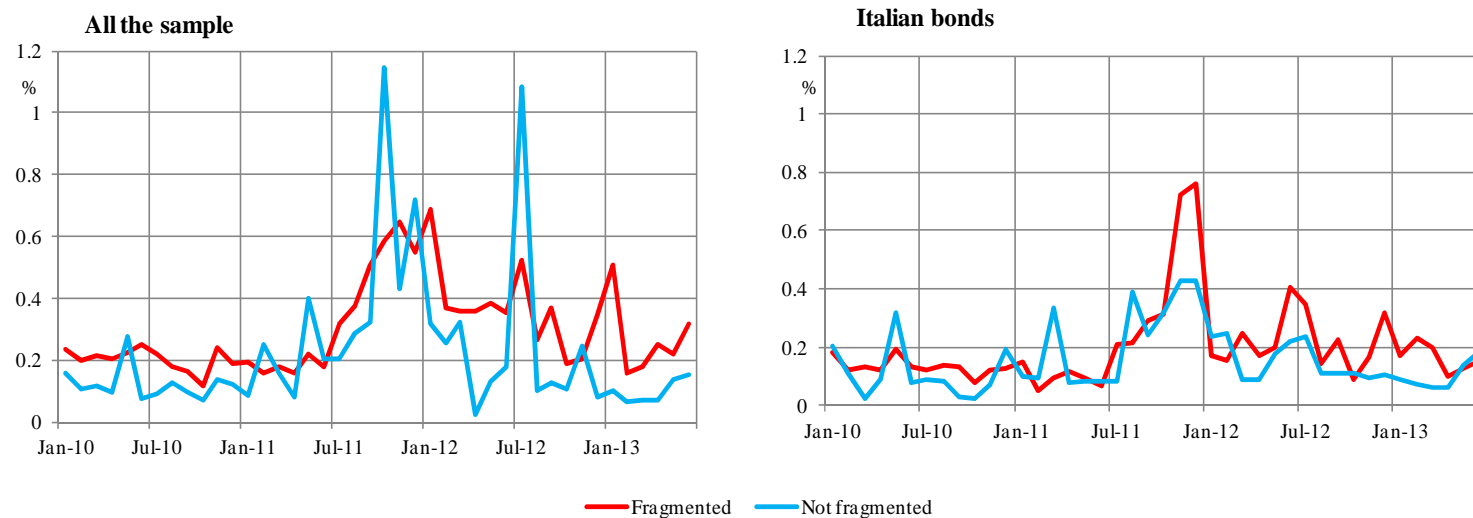
Liquidity of fragmented bonds

Impact of fragmentation (bank bonds)

Amihud ratio



Roll





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Extensions and future research

- *This contribution has pioneered research on dual-listed Italian corporate bonds:*
 - *Threshold analysis conditioning to different stages of the economic cycle*
 - *More recent data*
 - *Comparison with other European countries markets data*



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Thank you for your attention!

CONSOB-Bocconi,
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