

## Drivers of Corporate Bond Market Liquidity in the European Union

Presentation by Risk Control

Brussels, November 2017

- This report on corporate bond market liquidity in the European Union was prepared for the European Commission by Risk Control.
- The report aims to provide a thorough analysis of the factors that influence market liquidity in corporate bonds, both financial and non-financial.
- The report considers both cyclical factors that drive liquidity and changes underway in the European corporate bond market including the development of new trading mechanisms.

We use the following datasets:

1. MiFID 1 data from the UK's FCA provide extensive information on the time, size, venue, and counter-parties involved in individual trades and security identifiers such as the ISIN of the security in question for the period September 2011 to August 2016 with an average number of daily transactions equalling 9,190 and an average daily volume of €5.4 billion.
2. Bond settlement data from Euroclear reportedly covering more than 60% of the European bond market. The most substantial dataset comes from Euroclear's ESES subsidiary and comprises data on 769,570 corporate bond transactions in the period December 2014 to August 2016.
3. Transactions data from a major ETP between 2010 and 2016. The number of corporate bond ISINs included in the platform was 4,125 at the end of the sample period.
4. Bond quote data from Bloomberg, including daily quotes (bid and ask) since 1990 for 9,400 European corporate bonds.
5. Bond and issuer characteristic data from the Eikon database supplied by Thomson Reuters.

## Number of ISINs (ever appeared) by country

	Italy	Austria	UK	Spain	Germany	France	Netherlands	Luxembourg	Ireland	Sweden	Finland	Belgium	Denmark	Slovenia
Bloomberg	589	242	2,128	303	544	1,561	1,756	443	220	975	151	149	164	6
Euroclear	99	20	1,104	77	115	2,230	481	116	30	110	47	100	29	1
FCA	1,000	444	7,250	562	1,671	2,714	4,771	1,195	594	523	169	195	221	15
ETP	643	91	1,554	357	495	1,467	1,307	280	208	265	85	110	113	1
	Estonia	Greece	Hungary	Portugal	Bulgaria	Cyprus	Croatia	Czech Rep	Romania	Slovakia	Latvia	Malta	Poland	Total
Bloomberg	5	7	8	75	3	22	14	21	5	3	3	6	0	9,403
Euroclear	2	2	1	18	1	10	1	1	1	2	0	0	0	4,598
FCA	2	4	7	139	5	23	3	23	6	4	0	1	1	21,542
ETP	1	3	6	56	0	2	1	8	0	0	0	0	0	7,053

Data distribution (ever appeared) in different datasets

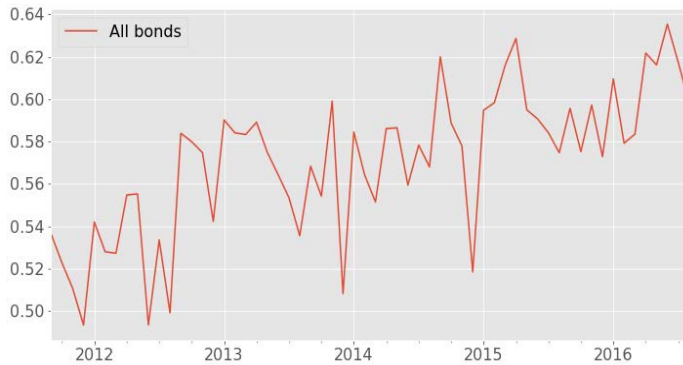
	Number of ISINs	Number of ISINs as of total (%)	Par Value (€ billion)	Par value as of total (%)
Bloomberg	9,403	32.53	4919.53	59.64
Euroclear	4,598	15.91	1529.01	18.54
FCA	21,542	74.53	5423.18	65.75
ETP	7,053	24.40	4870.02	59.04
Combination of all the datasets	28,902	100	8248.69	100

Data distribution (as of 2016-07-01) in different datasets

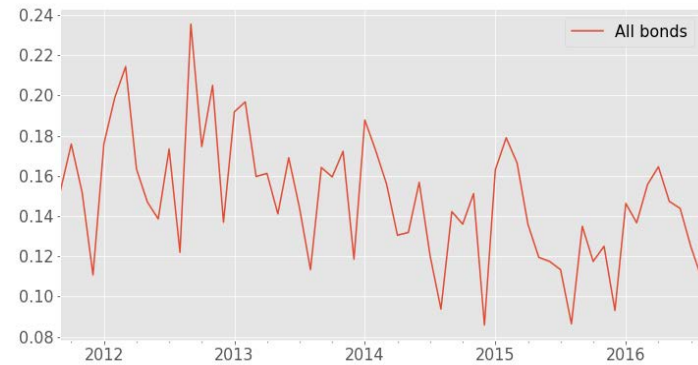
	Number of ISINs	Number of ISINs as of total (%)	Par Value (€ billion)	Par value as of total (%)
Bloomberg	6,844	40.83	3,399.28	78.91
Euroclear	3,388	20.21	1,062.89	24.68
FCA	12,244	73.05	2,885.50	66.99
ETP	4,054	24.19	2,607.59	60.54
Combination of all the datasets	16,761	100	4,307.53	100

# Activity Trends for Non-financials-FCA data

1 Mean ticket size (EUR millions)



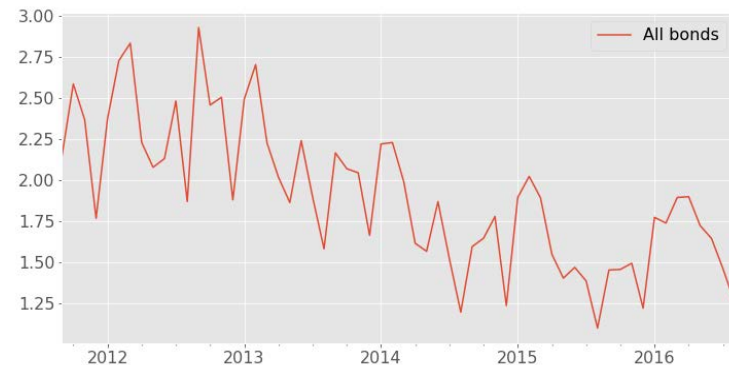
2 Mean daily turnover (%)



3 Fraction of bonds traded



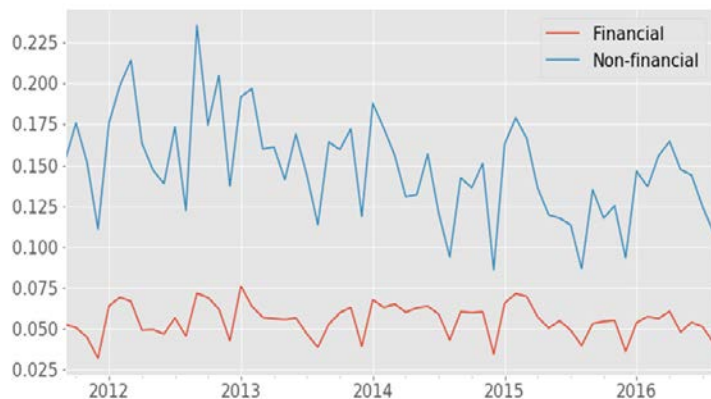
4 Mean number of daily transactions



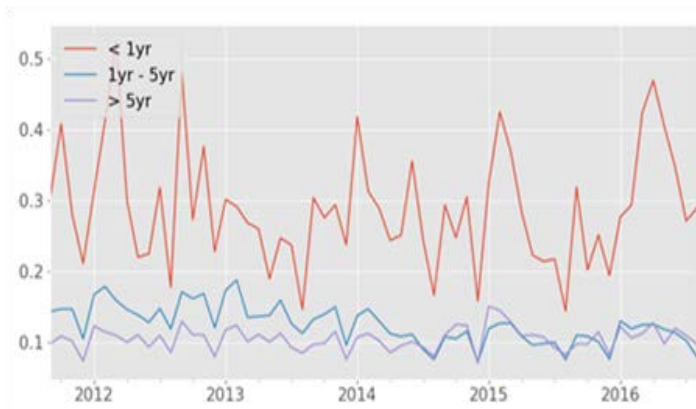
**Focussing on non-financials, again mean ticket sizes rise, and the universe of bonds traded contracts and mean number of daily transactions per ISIN falls. But turnover rates for non-financials exhibit a clearer downward trend by about a quarter over the 5 years.**

# Turnover rates broken down

Mean daily turnover for financials and non-financials (all bonds)

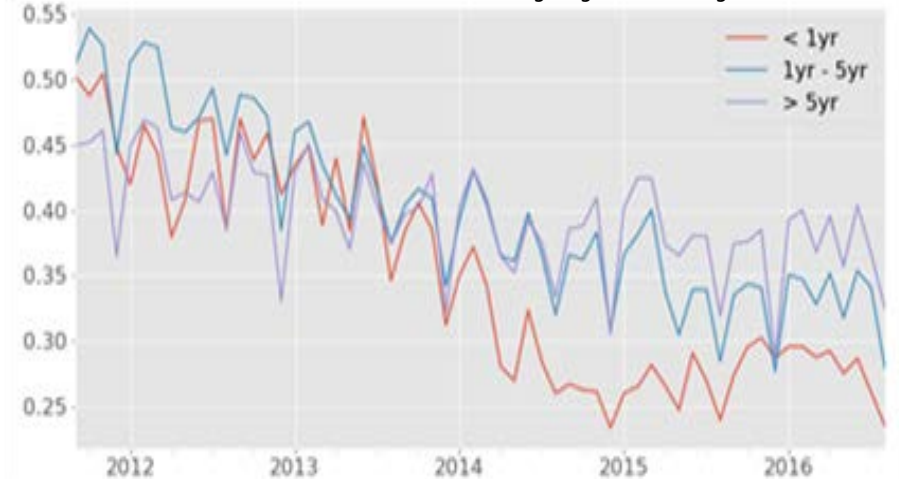


Mean daily turnover by age (non-financial bonds)

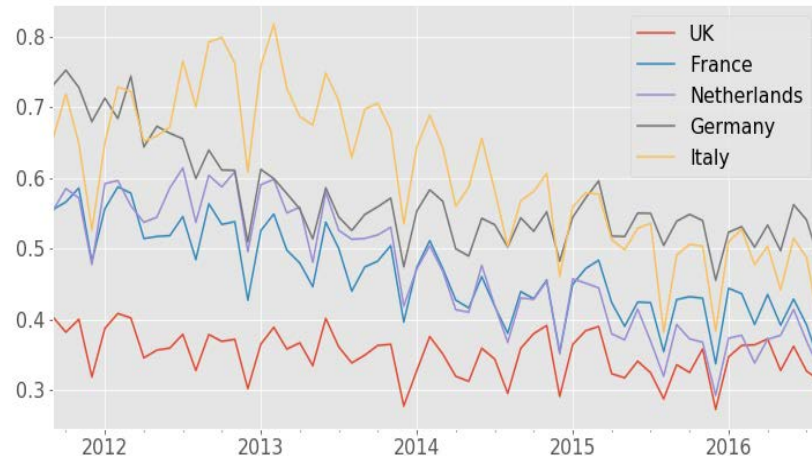


**Breaking down turnover rates, they appear reasonably flat for financials. The main drop is in turnover rates for bonds older than a year.**

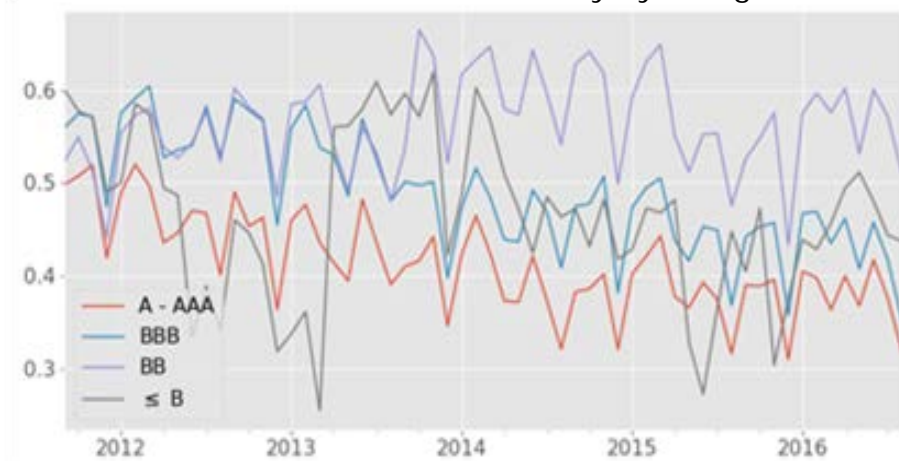
Fraction of bonds traded daily by maturity



Fraction of bonds traded daily by country



Fraction of bonds traded daily by rating



The fraction of bonds traded daily falls particularly for short maturity bonds and for German, Italian and French bonds, as well as for IG bonds.



## All bonds

Dependent variable	Turnover (%)		Number of transactions		Ticket size (EUR millions)		Transaction frequency	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Constant	0.208	52.2	2.374	54.3	0.666	198.9	0.510	126.0
Log age	-0.090	-16.2	-0.751	-15.7	-0.117	-30.6	-0.079	-26.0
Log size	0.035	19.0	1.040	14.4	0.304	66.2	0.161	53.3
High yield dummy	0.009	5.1	0.325	12.3	-0.052	-29.9	-0.002	-0.8
Financial dummy	0.027	8.6	0.295	10.5	0.075	9.9	0.003	1.0
Aggregate vol	-0.009	-2.7	-0.058	-1.4	-0.001	-0.6	-0.002	-0.5
Individual vol	0.003	4.4	0.039	4.7	-0.002	-3.0	0.000	-0.1
Time	-0.055	-3.0	-1.317	-6.3	0.164	13.0	-0.133	-6.9
Number observations	132,073	-	144,719	-	132,073	-	144,719	-
Number months	60	-	60	-	60	-	60	-
Adjusted R-sq.	0.09	-	0.10	-	0.16	-	0.21	-
F-stat.	108.9	-	51.7	-	2,278.0	-	807.4	-

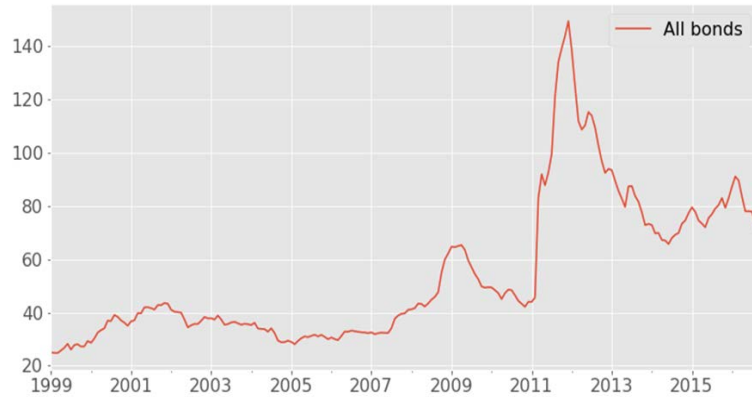
## Non-financials

Dependent variable	Turnover (%)		Number of transactions		Ticket size (EUR millions)		Transaction frequency	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Constant	0.187	44.7	2.141	49.9	0.601	165.3	0.499	96.5
Log age	-0.065	-17.3	-0.604	-12.4	-0.042	-8.8	-0.069	-31.1
Log size	0.033	11.9	1.262	16.5	0.198	43.3	0.240	61.2
High yield dummy	0.000	0.1	0.300	9.1	-0.064	-26.4	0.012	4.4
Aggregate vol	-0.004	-1.2	-0.033	-1.0	-0.006	-2.8	0.004	0.8
Individual vol	0.002	2.3	0.033	2.3	0.003	1.9	-0.001	-1.4
Time	-0.045	-2.6	-1.104	-6.1	0.057	3.9	-0.115	-6.1
Number observations	40,067	-	43,981	-	40,067	-	43,981	-
Number months	60	-	60	-	60	-	60	-
Adjusted R-sq.	0.06	-	0.09	-	0.09	-	0.31	-
F-stat.	89.3	-	73.5	-	517.6	-	1,412.6	-

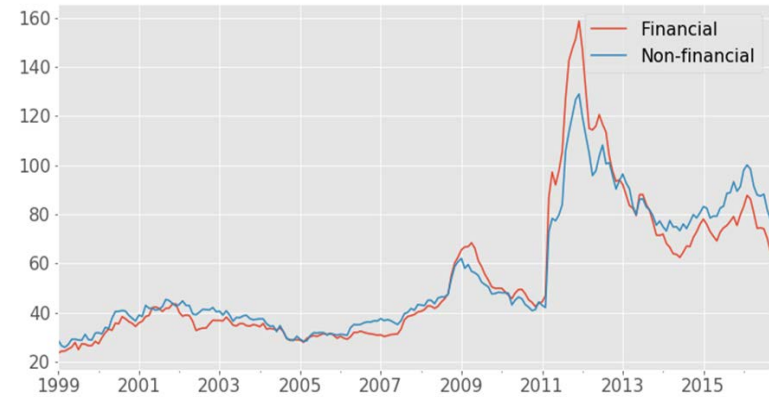
# Summary of Activity-based Liquidity Indicators

- FCA data suggest non-financial bond turnover rates have been falling while turnover rates for bonds overall are flat.
- Mean daily turnover rates fall in the Euroclear data and fall after 2013 in the ETP data (after having risen earlier).
- In the FCA data, the fraction of bonds traded declines for both financials and non-financials.
- The fractions traded decrease most for shorter maturity bonds and for bonds from Italy, France and Germany.
- Ticket sizes are up both in FCA, Euroclear and ETP datasets
- The number of transactions trends down in the FCA data.

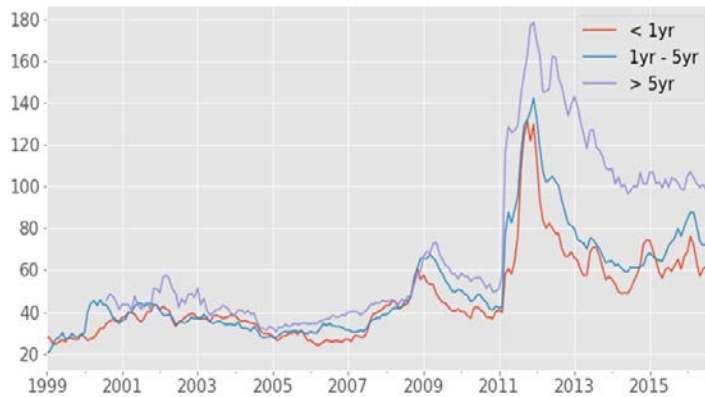
1 Spreads for all bonds in bps



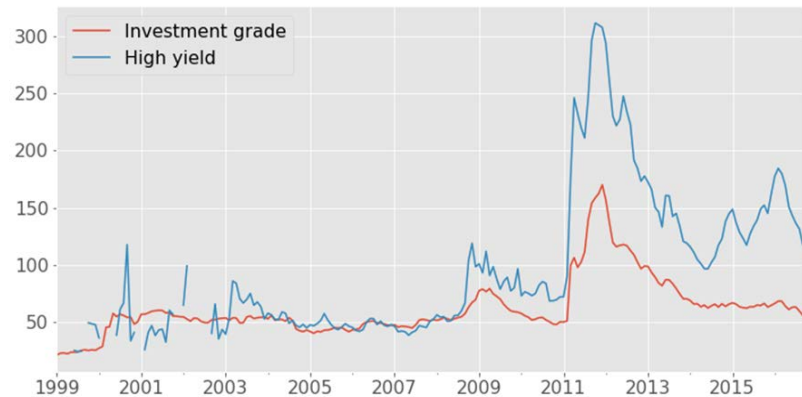
2 Spreads of Financials versus Non-financials in bps



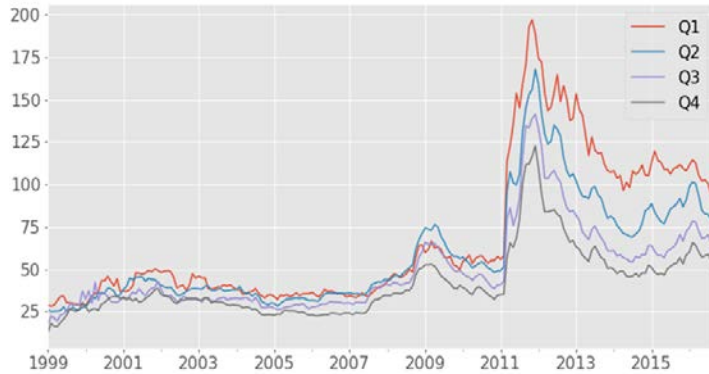
3 Spreads for bonds of different ages in bps



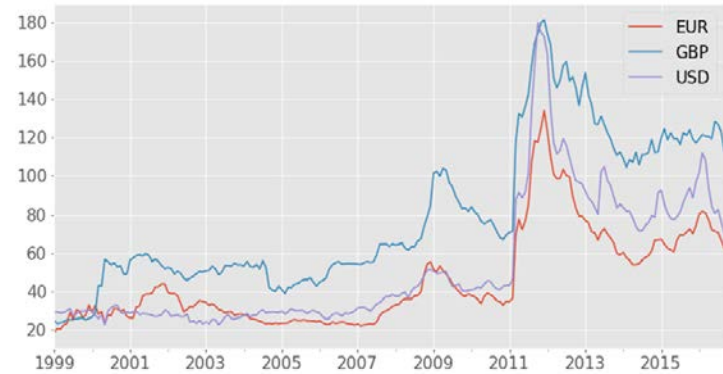
4 Spreads for High Yield and Investment Grade bonds in bps



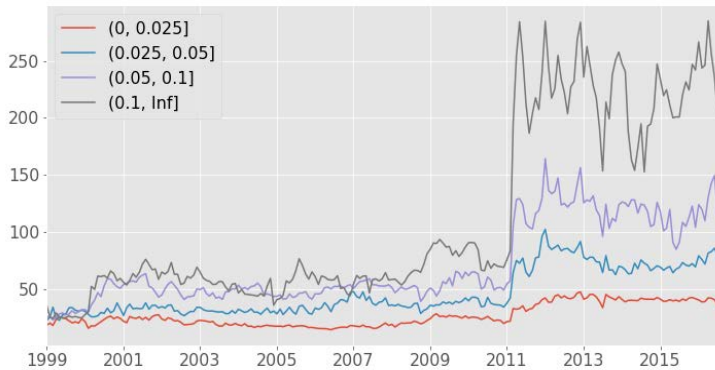
1 Spreads for bonds of different issues size in bps



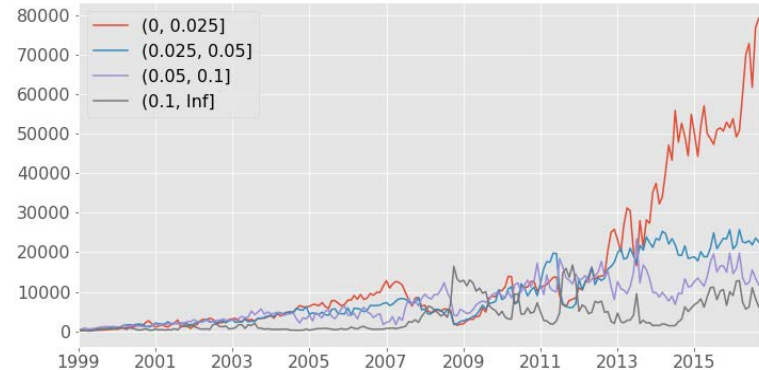
2 Spreads for bonds by currency in bps



3 Spreads for bonds by volatility buckets in bps



4 Counts by month of bonds by price volatility buckets



## Period 01/1999 to 09/2016

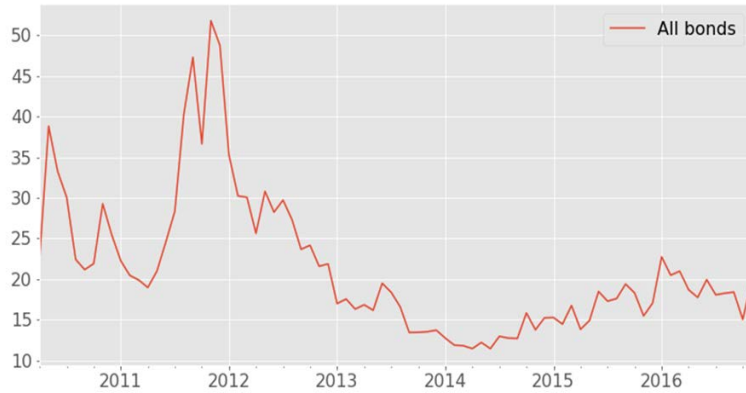
Dependent variable	All corp bonds		Non-financials	
	Coeff.	t-stat.	Coeff.	t-stat.
Constant	68.154	29.104	70.225	37.774
Log age	14.503	12.0	8.512	6.9
Log size	-10.290	-12.4	-20.153	-15.0
High yield dummy	-1.845	-1.0	-4.804	-4.0
Financial dummy	-1.573	-1.5	-	-
Aggregate Vol	-2.033	-2.9	-2.022	-1.7
Individual Vol	3.925	5.2	4.330	5.2
Time	67.623	14.1	66.405	14.2
Number observations	344,168	-	98,122	-
Number months	213	-	213	-
Adjusted R-sq.	0.24	-	0.31	-
F-stat.	129.5	-	143.2	-

## Period 01/2010 to 09/2016

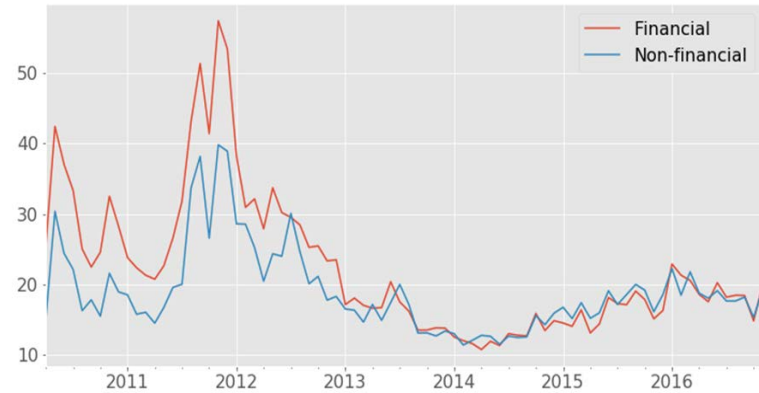
Dependent variable	All corp bonds		Non-financials	
	Coeff.	t-stat.	Coeff.	t-stat.
Constant	78.134	32.742	79.933	40.758
Log age	18.709	17.0	12.055	11.0
Log size	-14.216	-12.8	-25.621	-15.8
High yield dummy	-1.132	-0.6	-6.689	-4.9
Financial dummy	2.183	1.8	-	-
Aggregate Vol	1.182	0.5	0.922	0.5
Individual Vol	6.588	8.9	5.695	4.5
Time	15.137	1.3	17.185	1.8
Number observations	253,477	-	73,816	-
Number months	81	-	81	-
Adjusted R-sq.	0.33	-	0.35	-
F-stat.	305.7	-	214.4	-

# ETP Effective Spreads (1/2)

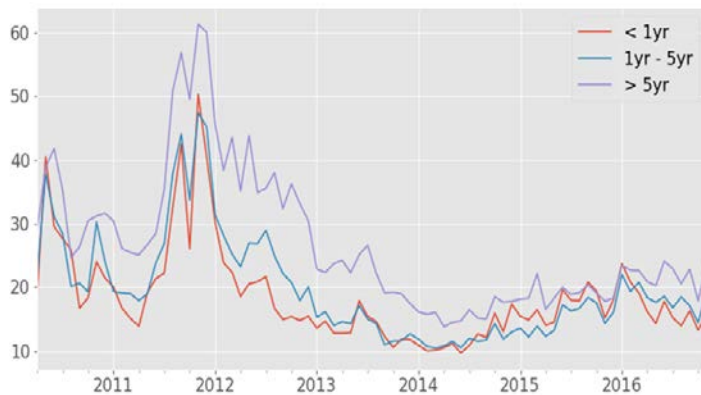
1 Spreads for all bonds in bps



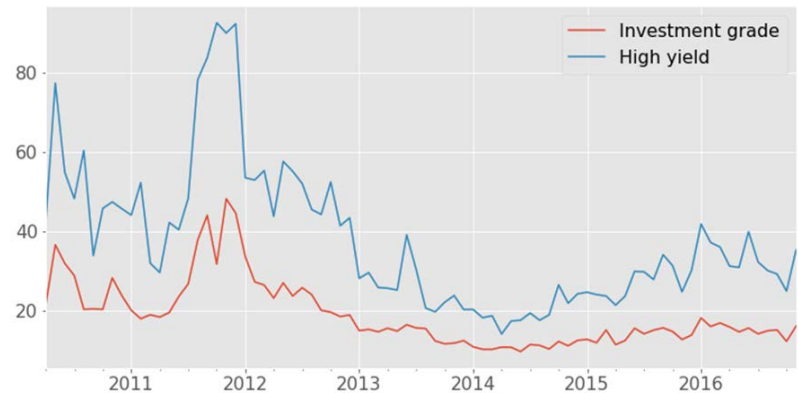
2 Spreads for Financials versus Non-financials in bps



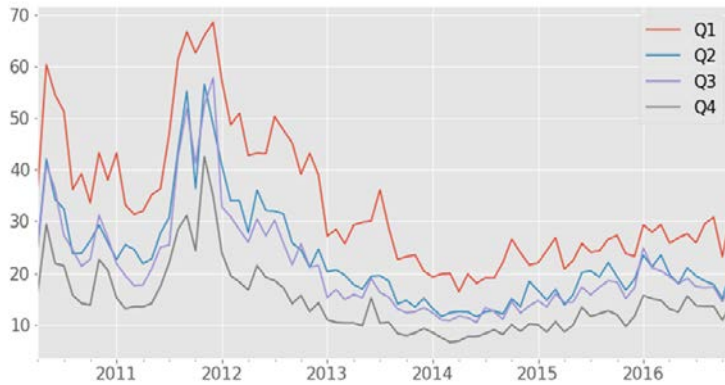
3 Spreads for bonds of different ages in bps



4 Spreads for High Yield and Investment Grade bonds in bps



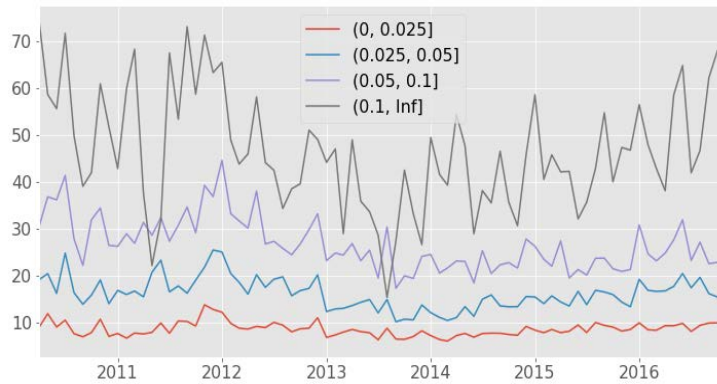
1 Spreads for bonds of different issues size in bps



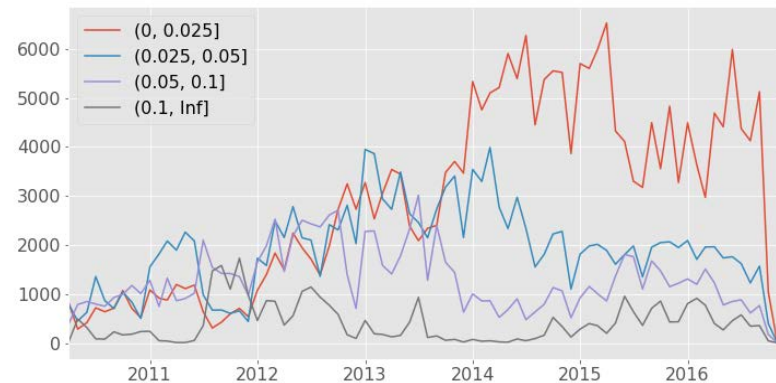
2 Spreads for bonds in different currencies in bps



3 Spreads for bonds bucketed by price volatility in bps



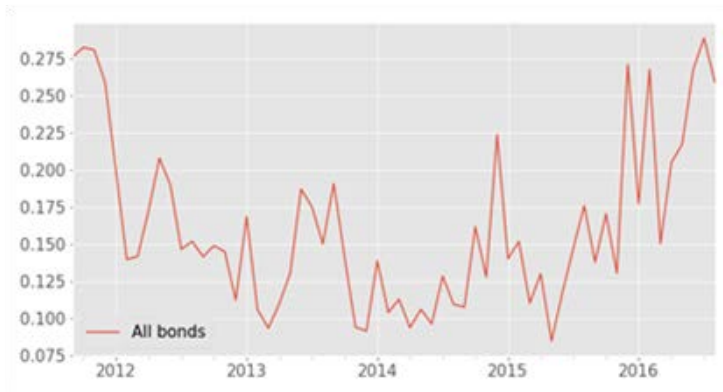
4 Counts by month of bonds in different price volatility buckets



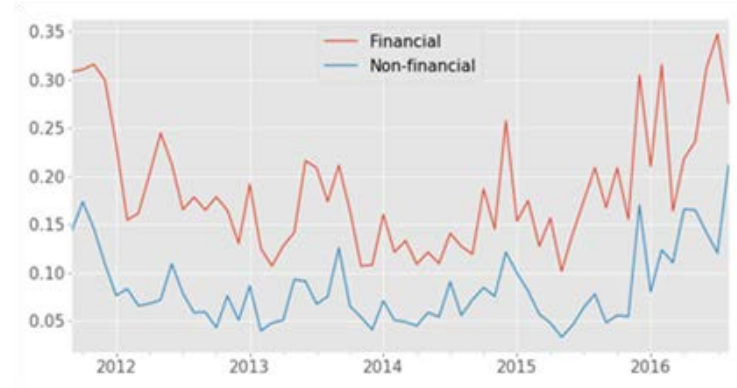
Dependent variable	All corp bonds		Non-financials	
	Coeff.	t-stat.	Coeff.	t-stat.
Constant	13.162	44.0	12.911	40.6
Log age	2.603	13.8	0.676	3.1
Log size	-4.468	-14.0	-4.723	-11.5
High yield dummy	3.371	12.7	1.729	5.7
Financial dummy	1.228	3.7	-	-
Aggregate Vol	1.083	3.0	1.105	2.9
Individual Vol	1.533	8.7	1.247	6.0
Time	-0.967	-0.8	1.325	1.3
Number observations	121,622	-	39,790	-
Number months	80	-	80	-
Adjusted R-sq.	0.07	-	0.05	-
F-stat.	91.4	-	94.3	-



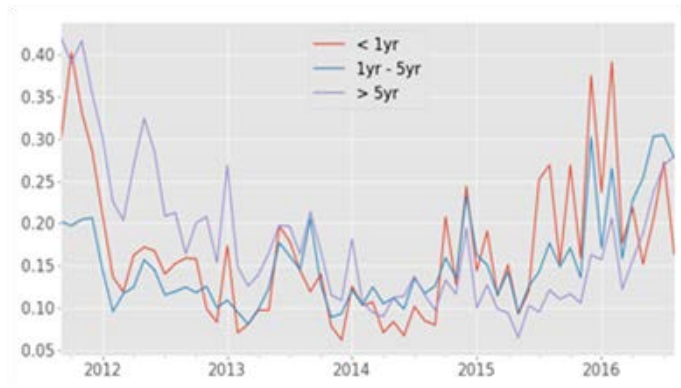
1 Amihud Ratio v2 for all bonds



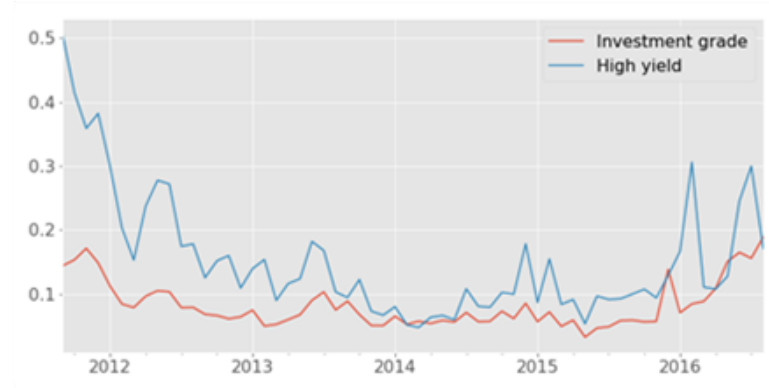
2 Amihud Ratio v2 for Financials versus Non-financials



3 Amihud Ratio v2 for bonds of different ages

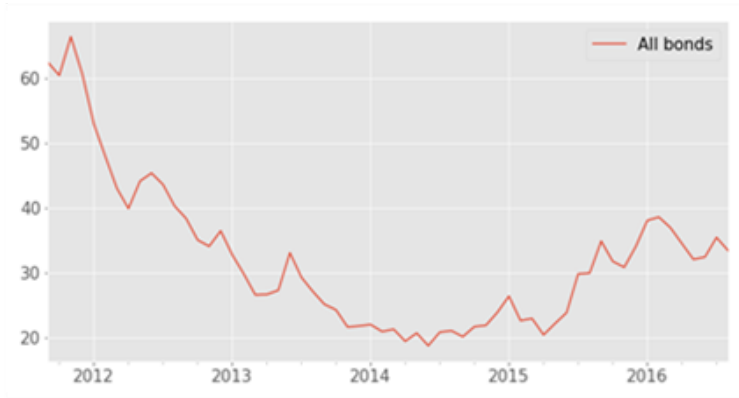


4 Amihud Ratio v2 for High Yield and Investment Grade bonds

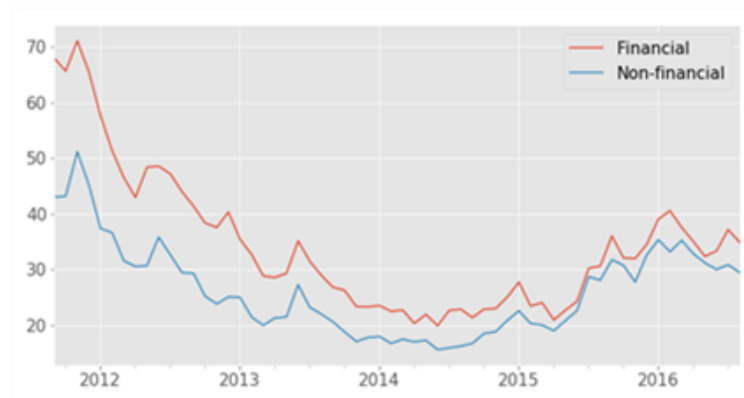


# Round Trip Liquidity Indicators

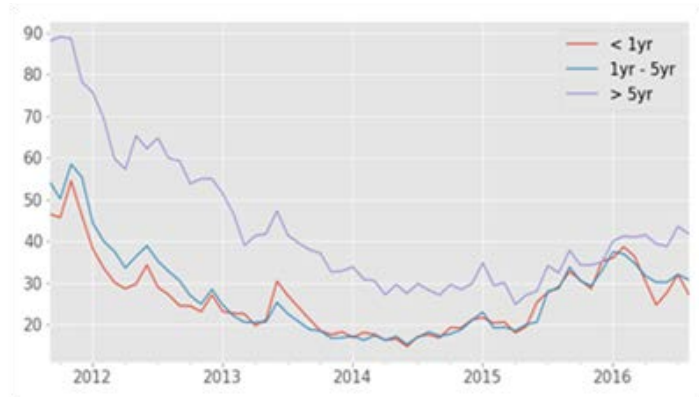
1 IRTC for all bond



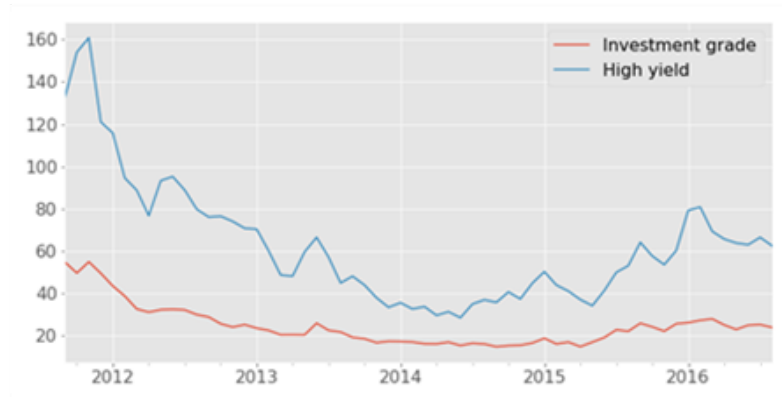
2 IRTC for Financials versus Non-financials



3 IRTC for bonds of different ages



4 IRTC for High Yield and Investment Grade bonds



# Summary of Price-based Liquidity Indicators

- Bloomberg spreads rise to largest peak in 2011 with much smaller peak in 2008. Spreads post 2014 rise. Current levels are higher than 2008.
- Clear, age, fin vs non-fin, issue size, IG vs IG and GBP vs EUR effects.
- Conditional on volatility buckets, Bloomberg spreads show little recovery post-crisis.
- ETP spreads show 2010 peak (start of data) followed by higher 2011-12 peak. Again, clear and intuitive category effects.
- Volatility-bucketed ETP spreads much flatter than non-bucketed but still show rise post 2014.
- Price impact (Amihud ratio) measures show u-shape signalling post 2014 deterioration to levels similar to those of 2011 crisis.
- Round trip measures show lop-sided u-shape with high crisis peak and partial return to high levels (especially for HY and non-financials) post 2014.

- We examine the issue of dealer profitability indirectly by studying proxy measures.
  1. Exact round trip returns from trading immunised for interest rate changes and hedging.
  2. Dealer inventories. The evolution of inventories reflects how profitable it is for banks to commit capital to dealing operations.
  3. Carry return of holding bonds net of financing costs. The financing costs reflect the funding costs faced by the bank plus managerial adjustments that bank treasury operations use to drive the balance sheets of their institutions.
- In each case, we calculate and evaluate possible candidate profitability drivers.

- What are the potential pressures on dealer profitability that would affect market-making profitability?
- During the period we study, major changes occurred in the regulatory environment that European bond market-makers face. The changes include the introduction of Basel 3 measures for bank capital, leverage and liquidity rules, and alterations in securities markets regulations.
- The period we examine also contains the aftermath of one crisis (the 2007-8 subprime collapse culminating in the failure of Lehman Brothers) and the occurrence of a second major crisis: the 2011-12 European sovereign debt crisis which brought with it concerns about the durability of the Eurozone itself. These shocks to the market environment clearly affected dealer profitability considerably.
- Other potential pressures on dealer profitability include the low interest rate environment that has prevailed in Europe since 2012 and, possibly, changes in the competitive environment.

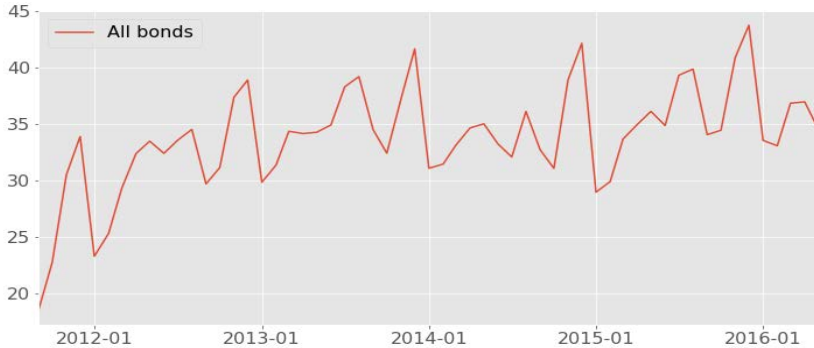
# Exact Round Trip Measures

Return on round trip (% , IR immunised, net of funding cost)



- We estimate round trip measures using a more elaborate methodology than the simplified IRTC approach shown above.
- This involves tracking individual bank purchases and sales to calculate true round trip measures and then immunising against interest rate changes.

Average number of days for roundtrip



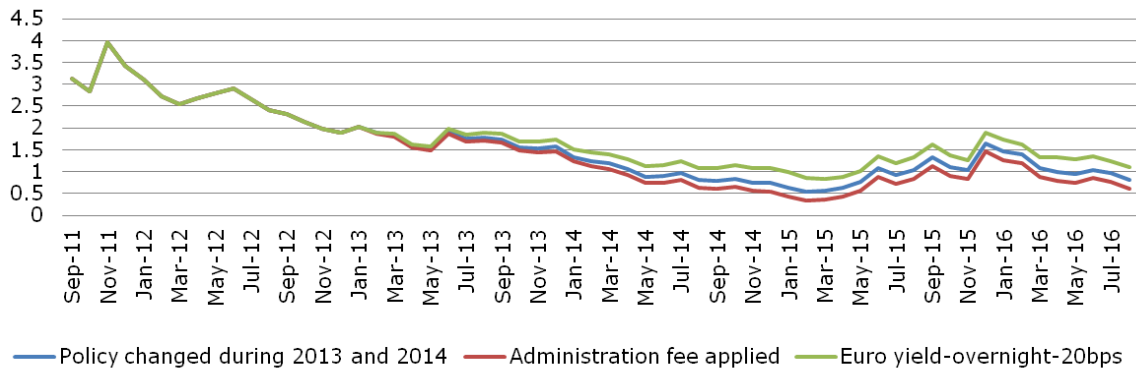
Average number of trades to complete roundtrip



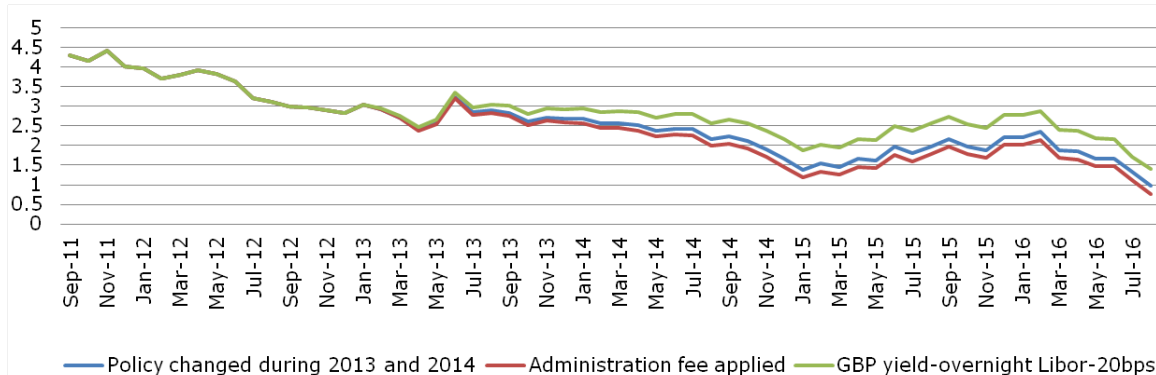
Time Period	2011 Sep. to 2016 Aug.						2011 Sep. to 2016 Jan.					
	Gross revenue		Net revenue		Revenue net adj		Gross revenue		Net revenue		Revenue net adj	
Dependent Variable	coef.	t-value	coef.	t-value	coef.	t-value	coef.	t-value	coef.	t-value	coef.	t-value
Constant	0.20	0.90	0.12	0.52	0.35	1.55	0.15	0.68	0.06	0.27	0.31	1.34
BBG EUR IG Corp bond price return in next month	0.99	3.92	0.99	3.90	0.64	2.50	0.88	3.44	0.87	3.42	0.54	2.05
Time	-2.86	-3.71	-2.69	-3.49	-2.03	-2.59	-3.72	-4.66	-3.57	-4.47	-2.70	-3.27

# Carry Spreads with Policy Changes

## EUR-denominated bonds



## GBP-denominated bonds



- We estimate the weighted average yields of data in the FCA dataset and calculate the spread over funding costs under different assumptions about how bank treasuries charge for dealer funding.

# Regression of Round Trip Return Adjusted for Funding Cost and Hedging

	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Constant	0.628	3.605	0.662	3.631	0.662	3.652
Time	-1.255	-1.7	-1.986	-2.1	-1.969	-2.1
IG Index Return	0.665	6.9	0.740	6.2	0.748	6.3
Aggregate Vol	-	-	-10.013	-1.1	-9.828	-1.1
Individual Vol	-	-	0.051	2.8	0.053	2.9
Log age	-	-	0.004	0.1	0.007	0.2
Log size	-	-	0.065	1.1	0.072	1.1
High yield	-	-	0.154	1.4	0.147	1.3
Financial	-	-	0.095	0.9	0.098	0.9
Upgrade	-	-	-	-	0.218	0.8
DownGrade	-	-	-	-	-0.649	-2.8
Number observations	520,433	-	390,293	-	390,293	-
Number months	60	-	60	-	60	-
Adjusted R-sq.	0.04	-	0.08	-	0.08	-
F-stat.	26.17	-	9.62	-	10.14	-



# Summary on Dealer Profitability

	2010	2011	2012	2013	2014	2015	2016
Dealer inventories fall sharply		█	█	█			
Carry spreads trend down		█	█	█	█	█	
Banks comply with LCR and NSFR		█	█	█	█	█	
Price-based illiquidity indicators rise				█	█	█	█
Quantity-based liquidity indicators fall	█	█	█	█	█	█	█

- It is difficult from these events to see a completely clear picture in which particular events generated unambiguous outcomes for corporate bond market liquidity.
- Corporate bond market-making is a flow business in which participants' perceptions of changes in viability of activities takes time to accumulate.
- In this case, the cumulative impact of different changes in the regulatory and market environment could impair liquidity in a gradual way.

- Our empirical analysis points to recent declines in key activity indicators such as turnover rates and the fractions of bonds that do not trade at all.
- We also show that, since 2014, price-based indicators of liquidity (such as effective and bid-ask spreads, round trip and market depth measures) have deteriorated markedly.
- When price-based measures of liquidity are adjusted for risk, the sharp rise in transactions costs that occurred in the 2011 crisis appears never to have been reversed.
- These empirical findings suggest the existence of a “liquidity problem” in European corporate bonds.

- **Attributing this “problem” to specific sources is challenging.**
- **One possible cause is regulatory changes placing pressure on market-maker profitability.**
- **Profitability is hard to observe directly but one may look at such proxies as round trip returns, dealer inventories and carry spreads over funding costs.**
- **Round trip returns trend down, dealer inventories of corporate bonds fell sharply in 2011 and early 2012, carry spreads (between bond yields and funding costs) appear to have drifted down between mid-2012 and early 2015.**
- **Can one relate these developments to regulatory changes?**

- The main regulatory pressures on profitability are capital and liquidity rules.
- The Basel 2.5 market risk capital rules are risk-insensitive and appear close to flat through the period in which we are interested.
- On liquidity, EBA QIS data suggest that European banks made efforts to be compliant with Basel 3 LCR and NSFR requirements between 2011 and 2014.
- These efforts affected carry spreads in that European banks (i) switched their dealing desks to financing positions with 1 year rather than overnight funding and (ii) in some cases increased managerial premiums between the cost of external funds and what was charged to dealers.

- One may question whether “the timing is right”.
- Bank compliance with liquidity rules was largely complete by 2015 whereas price-based illiquidity indicators rose after 2014 and quantity-based indicators deteriorated over a longer period.
- Obscuring connections between cause and effect is the fact that bond market-making is a flow business in which profitability changes may lead participants only gradually to follow strategies that involve supplying more or less liquidity.
- Even if liquidity supply had been reduced by regulatory changes, it remains a matter of judgment as to whether this is justified by reduced risk in the banking system.

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