Centralized Trading, Transparency and Interest Rate Swap Market Market Liquidity: Evidence from the Implementation of the Dodd-Frank Act

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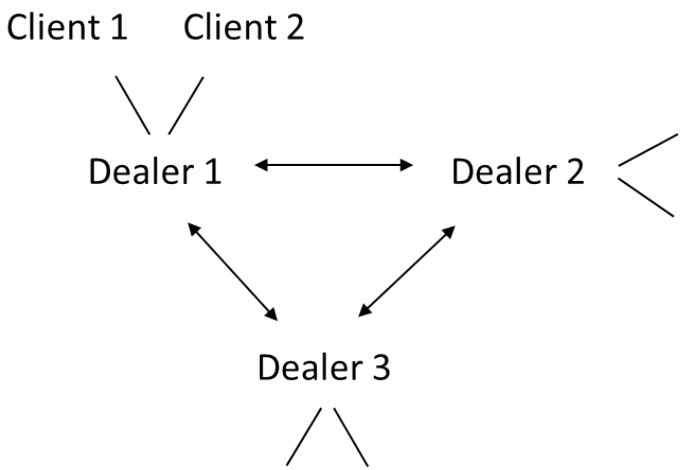
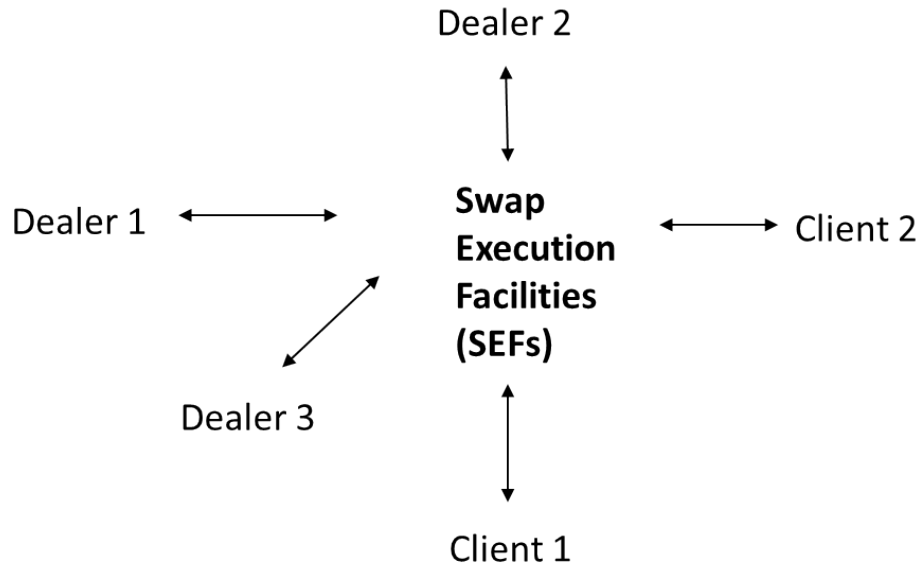
The views expressed in this presentation are those of the authors and not necessarily those of the Bank of England or any of its policy committees.

The Dodd-Frank Trade Mandate in a Nutshell (1)

Before: Traditional OTCD structure

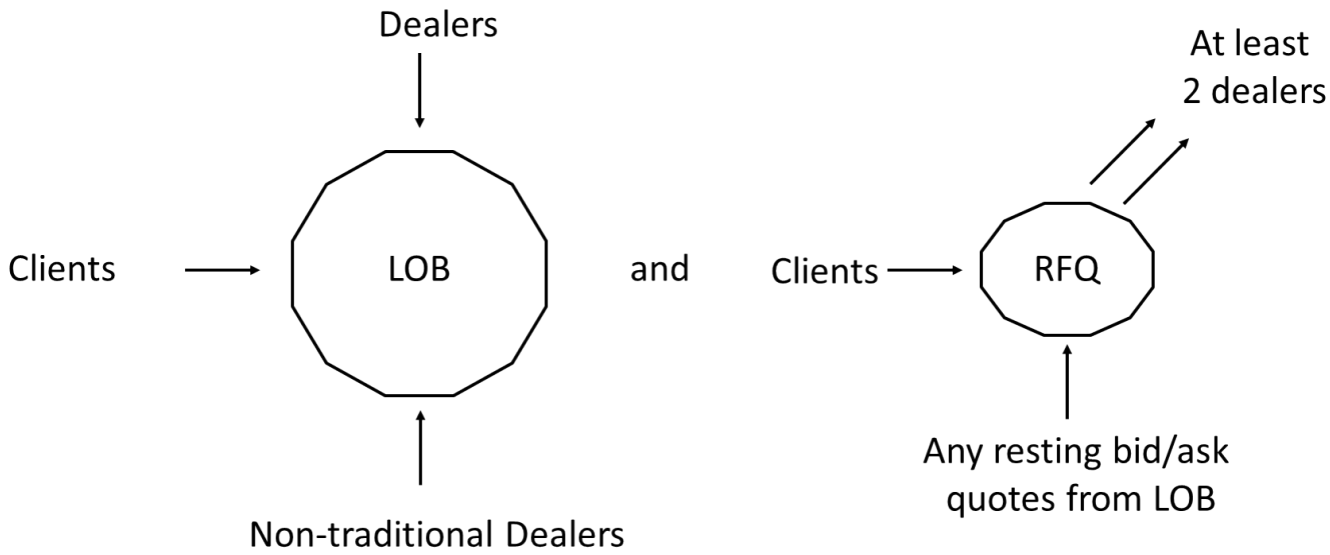


After Feb 2014: Dodd-Frank OTCD structure



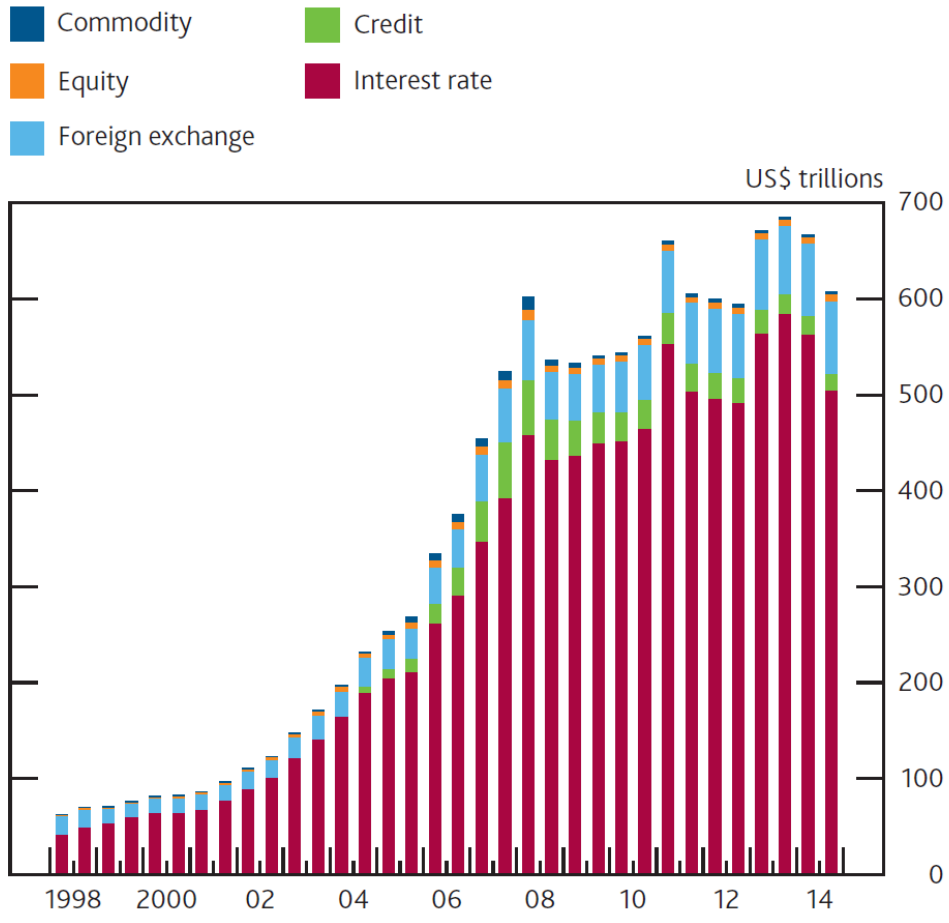
The Dodd-Frank Trade Mandate in a Nutshell (2)

- Swap execution facilities (SEFs) are multiple-to-multiple venues.
- They must offer the **minimum trading functionality**:
  1. Limit order book (LOB)
  2. Multi-dealer Request-for-Quote (RFQ) functionality



- New exchanges or platforms (i) make it easy to compare prices, (ii) facilitate competition, (iii) allow end-users to bypass dealers, (iv) abolishe single-dealer platform model.

Why do we care? (1) Because of the size of the OTCD market



Outstanding Gross Notional, BIS and Rahman (2015)

- The mandate affects Interest Rate Swaps (IRS) and Credit Default Swaps (CDS).

Why do we care? (2) Senior policy makers have mixed views too

- There is a hot policy debate on the efficacy of the reform:

1. CFTC Commissioner **Christopher Giancarlo** criticized the reform: "Liquidity has become more shallow and fragile" in a CFTC white paper.
2. CFTC **Chairman Timothy Massad** has publicly defended the reform in a number of speeches, see for example Massad (2016).

- More evidence is needed!

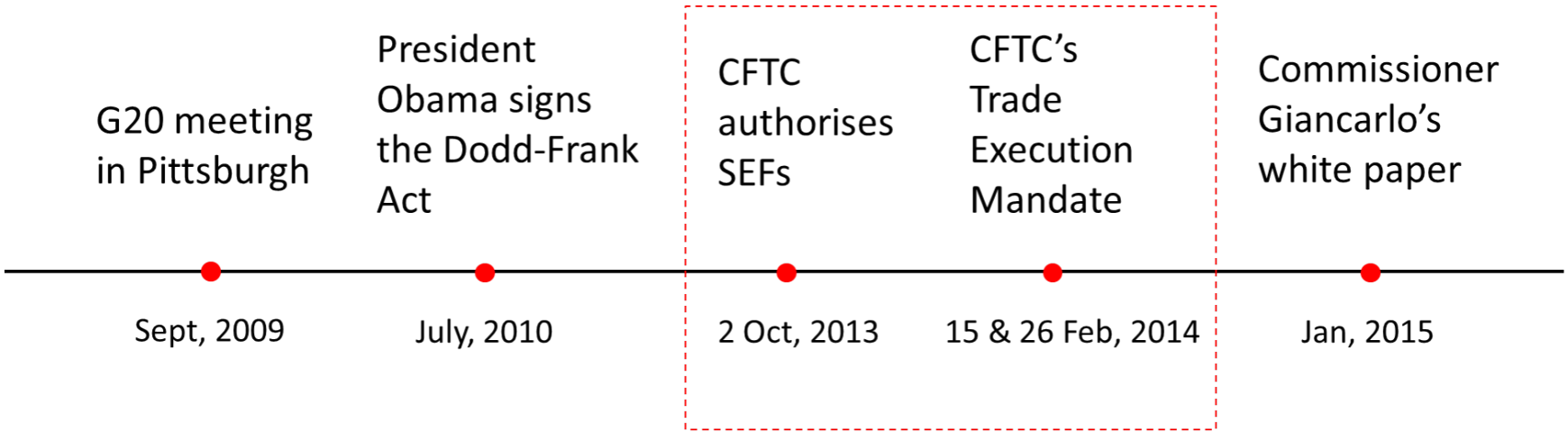
This Paper

- One of the first papers to quantify the impact of Dodd-Frank Act.
- We focus on the **Dodd-Frank trading mandate** and its impact on:
  (1) IRS market liquidity and activity.
  (2) Market fragmentation.
- Use proprietary data from a clearing house and a trade repository.

Key results:

- The mandate has improved IRS market liquidity, participation and activity.
- The drop in client daily execution costs for USD mandated contracts is **$2-4 million**.
- The EUR-denominated segment has geographically fragmented, however, there no evidence that liquidity is compromised.

Regulatory background



Implementation of the new framework for swaps:

- Facilitate trading on Swap Execution Facilities (SEFs).
- Mandate captures only "US persons".
- Specific contracts and maturities.

Regulatory background: What/who/when is captured

1. **SEF authorization**:
   - What: SEF trading can commence on a voluntary basis
   - Who: Anybody
   - When: October 2, 2013

2. **MAIN EVENT: CFTC swap trading mandate**:
   - What: Trading is now required to take place on SEFs for mandated contracts
   - Who: "US persons" (but its complicated)
   - When:

Currency	*Maturity*	*Effective date*
USD	2,3,5,7,10,12,15,20,30	15/02/2014
EUR	2,3,5,7,10,12,15,20,30	15/02/2014
USD	4,6	26/02/2014
EUR	4,6	26/02/2014

Literature Review

- **Positive relationship between pre- or post- trade transparency and market quality**.
  - For example, Duffie, Garleanu, and Pedersen (2005); Boehmer, Saar, Yu (2005); Bessembinder, Maxwell, Venkataraman (2006); Vayanos and Wang (2012); Hendershott and Madhavan (2015).
- **Impact of OTC derivatives regulation**:
  1. **Loon and Zhong (2014, 2016)**
     - The introduction of central clearing in the CDS market reduced counterparty risk and boosted liquidity.
     - CFTC real-time reporting improved CDS liquidity.
  2. **Fulop and Lescourret (2015)**
     - Liquidity in corporate single-name CDS contracts improved after the voluntary dissemination of post-trade data by DTCC in Nov 2008.

Data (1)

- **Transactions on centrally-cleared USD and EUR-denominated spot IRS**:
  - Time range: Jan 1, 2013 - Sep 15, 2014.
- **Main source - London Clearing House (LCH)**:
  - LCH is the leading clearing house in the global interest rate swap market.
  - Its services are used by more than 100 clearing members from over 30 countries, including all major dealers.
  - **LCH data include counterparty identities**, which allows for dealer/non-dealer & US/non-US classification.
- DTCC:
  - As part of the Dodd-Frank Act (CFTC Regulation Part 43), the CFTC required the submission of swap trade reports to SDRs, which in turn they make these data available to the public in real-time.
  - DTCC data include a SEF flag.

Data (2)

- **Extensive data cleaning**:
  - Keep centrally cleared fixed-for-floating swaps.
  - Keep spot starting swaps.
  - Remove non price-forming transactions.
    - Cancelations, compressions, portfolio trades, among others.
  - Remove bespoke swaps, eg. trades with additional price terms, non standard rates, non standard day conventions, legs with different notional or denominated in different currencies.
  - Remove LCH duplicates (two reports per trade).
  - Correct DTCC information using correction reports.
  - Remove erroneous reports ($\pm 5\%$ of BBG eod quotes), as in Loon and Zhong (2016).
  - Remove LCH/DTCC duplicates.
- **628,896 reports accounting for $58 trillion after filtering.**

Liquidity variables

- The selection of the liquidity variables is data and market driven:
  - Key limitations: the lack of any (i) good quality IRS firm bid-ask quotes data & (ii) intraday timestamps.
  - Hence, we rely on liquidity metrics that require only the use of execution prices.
  - Amihud (2002) price impact:

$$Amihud_{i,t} = \frac{1}{T}\sum_{j=0}^{T}\frac{|R_{i,t-j}|}{Vlm_{i,t-j}}, \quad \text{where} \quad T = 40.$$

  - Jankowitsch et al (2010) dispersion:

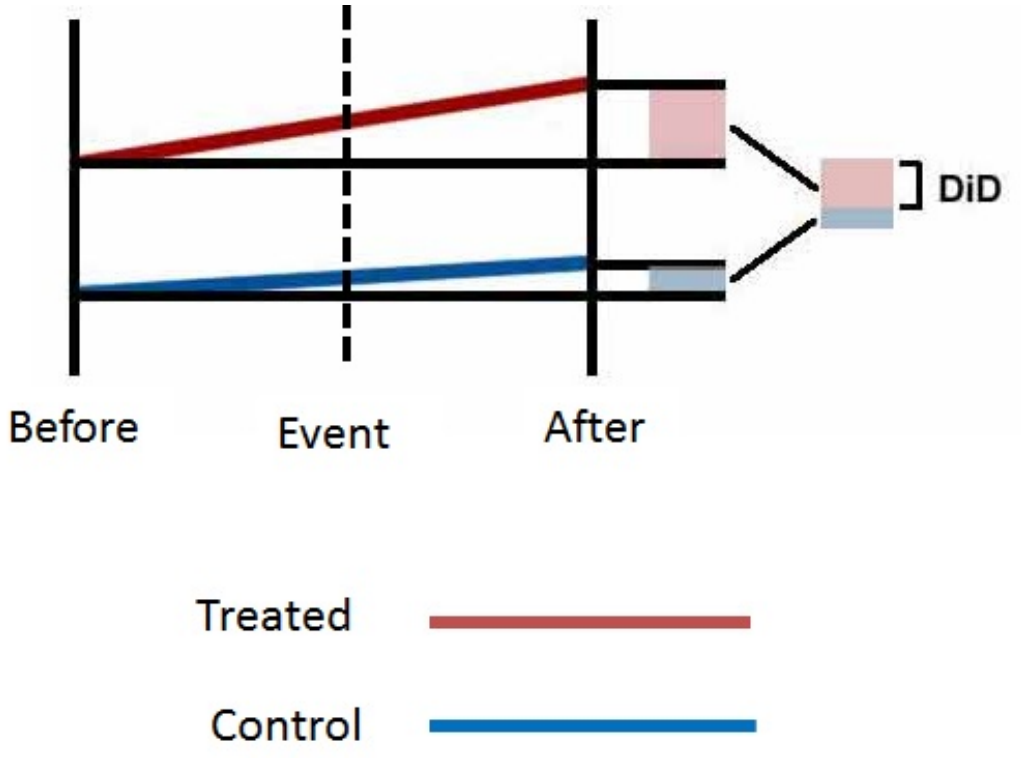
$$DispJNS_{i,t} = \sqrt{\sum_{k=1}^{N_{i,t}}\frac{Vlm_{k,i,t}}{Vlm_{i,t}}\left(\frac{P_{k,i,t} - m_{i,t}}{m_{i,t}}\right)^2}.$$

  - Volume-weighted dispersion:

$$DispVW_{i,t} = \sqrt{\sum_{k=1}^{N_{i,t}}\frac{Vlm_{k,i,t}}{Vlm_{i,t}}\left(\frac{P_{k,i,t} - \bar{P}_{i,t}}{\bar{P}_{i,t}}\right)^2}.$$

Empirical design

Difference-in-differences (DiD)



Empirical design

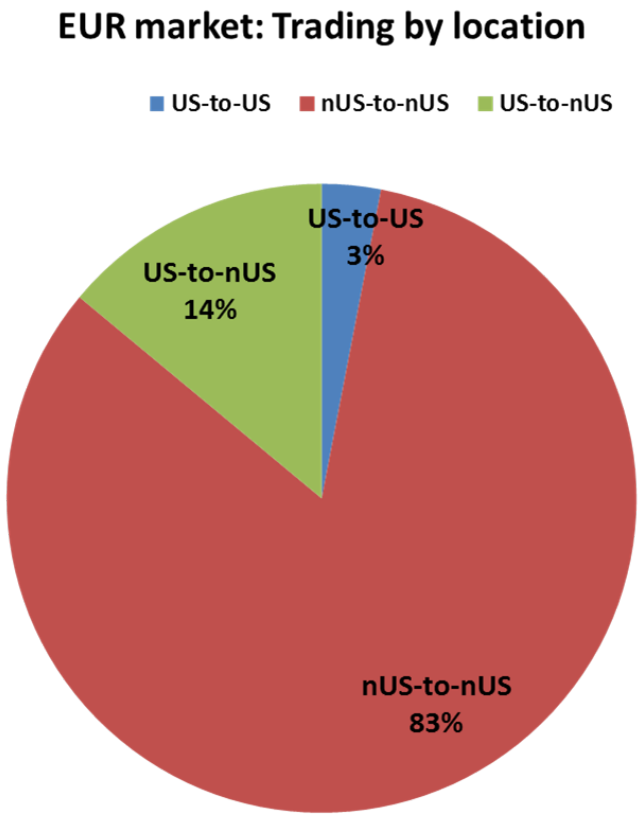
Difference-in-differences (DiD)

- Treated: USD mandated contracts.
- Control A: USD non-mandated contracts.
  - **Pros**: Obvious choice; both groups are denominated in the same currency.
- Control B: EUR mandated contracts.
  - **Rationale**: Although EUR contracts were mandated, they are primarily (approx. 85%) traded by non-US persons!
  - **Pros**: Both groups have similar liquidity and activity profiles; both groups are consists of mandated contracts; any evidence will be conservative.
  - We use a number of currency specific variables to control for different fundamentals.

Empirical design

Difference-in-differences (DiD)

- **Rationale**:



Empirical specifications (Test 1)

DiD Test 1:

- Treated: USD mandated (higher "US person" participation)
- Control: EUR mandated (lower "US person" participation)

Model:

$$L_{it} = \alpha + \beta_1 Date_t^{(1)} + \beta_2 Curr_j Date_t^{(1)} + \beta_3 Date_t^{(2)} + \beta_4 Curr_j Date_t^{(2)} + \gamma' X_t + u_i + \epsilon_{it}$$

where $Date_t^{(k)}$ is an event k date dummy, and $Curr_j$ is a currency dummy and X is the vector of control variables.

Empirical specifications (Test 1)

Results:

	Liquidity variables						Activity Variables					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
	Disp (vw)	**Disp (vw)**	**Disp (JNS)**	**Disp (JNS)**	**Amihud**	**Amihud**	**Vlm**	**Vlm**	**Ntrades**	**Ntrades**	**Nparties**	**Nparties**
***Date*[1]**	-0.2121***	-0.2907***	-0.3284***	-0.4242***	-2.0951***	-1.6761***	-0.3433**	-0.8100***	-4.2991***	-9.9779***	0.0583	-0.9382**
	(-10.98)	(-8.50)	(-12.44)	(-9.70)	(-5.86)	(-4.14)	(-2.61)	(-4.14)	(-2.91)	(-4.08)	(0.27)	(-2.53)
***Curr x Date*[1]**	0.0162	0.0125	0.0711*	0.0623	0.1214	0.1817	2.4496***	2.4203***	22.4662***	22.1282***	1.4968**	1.4418**
	(0.50)	(0.39)	(1.84)	(1.65)	(0.11)	(0.16)	(3.15)	(3.09)	(3.29)	(3.23)	(2.26)	(2.16)
***Date*[2]**	0.1061***	0.0820***	0.2056***	0.1155**	2.2344***	1.4314***	-0.7535**	-0.4165	-6.4935**	-8.7110**	-1.1243***	-1.1673**
	(4.40)	(2.95)	(5.05)	(2.46)	(5.12)	(3.22)	(-2.74)	(-1.21)	(-2.37)	(-2.13)	(-3.06)	(-2.62)
***Curr x Date*[2]**	-0.1345***	-0.1341***	-0.2178***	-0.2127***	-2.0705*	-2.0875*	0.3077	0.3078	4.0289	4.1796	1.1234**	1.1336**
	(-4.85)	(-4.78)	(-4.94)	(-4.83)	(-1.79)	(-1.82)	(0.77)	(0.74)	(1.16)	(1.14)	(2.11)	(2.10)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered S.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
***Within-R*[2]**	0.054	0.070	0.040	0.060	0.115	0.142	0.042	0.052	0.033	0.047	0.013	0.029
N	8821	8740	8821	8740	7843	7783	8821	8740	8821	8740	8821	8740

Controls: Stock market returns, stock index implied volatilities, overnight interest spreads, yield curve slopes.
Fixed effects: Currency & maturity
Clustering by: Currency & maturity

Empirical specifications (Test 1)

Results:

	Liquidity variables						Activity Variables					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
	Disp (vw)	**Disp (vw)**	**Disp (JNS)**	**Disp (JNS)**	**Amihud**	**Amihud**	**Vlm**	**Vlm**	**Ntrades**	**Ntrades**	**Nparties**	**Nparties**
***Date*[1]**	-0.2121***	-0.2907***	-0.3284***	-0.4242***	-2.0951***	-1.6761***						
	(-10.98)	(-8.50)	(-12.44)	(-9.70)	(-5.86)	(-4.14)						
***Curr x Date*[1]**	0.0162	0.0125	0.0711*	0.0623	0.1214	0.1817						
	(0.50)	(0.39)	(1.84)	(1.65)	(0.11)	(0.16)						
***Date*[2]**	0.1061***	0.0820***	0.2056***	0.1155**	2.2344***	1.4314***						
	(4.40)	(2.95)	(5.05)	(2.46)	(5.12)	(3.22)						
***Curr x Date*[2]**	-0.1345***	-0.1341***	-0.2178***	-0.2127***	-2.0705*	-2.0875*						
	(-4.85)	(-4.78)	(-4.94)	(-4.83)	(-1.79)	(-1.82)						
Total effect: *Sum of event dummies & interaction terms*	-0.22%	-0.33%	-0.27%	-0.52%	-1.91%	-2.25%						
Marginal Effect: *Sum of interaction terms*	-0.13%	-0.13%	-0.15%	-0.21%	-2.07%	-2.08%						

Controls: Stock market returns, stock index implied volatilities, overnight interest spreads, yield curve slopes.
Fixed effects: Currency & maturity
Clustering by: Currency & maturity

Empirical specifications (Test 1)

Results:

	Liquidity variables						Activity Variables					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
	Disp (vw)	**Disp (vw)**	**Disp (JNS)**	**Disp (JNS)**	**Amihud**	**Amihud**	**Vlm**	**Vlm**	**Ntrades**	**Ntrades**	**Nparties**	**Nparties**
***Date*[1]**	-0.2121***	-0.2907***	-0.3284***	-0.4242***	-2.0951***	-1.6761***						
	(-10.98)	(-8.50)	(-12.44)	(-9.70)	(-5.86)	(-4.14)						
***Curr x Date*[1]**	0.0162	0.0125	0.0711*	0.0623	0.1214	0.1817						
	(0.50)	(0.39)	(1.84)	(1.65)	(0.11)	(0.16)						
***Date*[2]**	0.1061***	0.0820***	0.2056***	0.1155**	2.2344***	1.4314***						
	(4.40)	(2.95)	(5.05)	(2.46)	(5.12)	(3.22)						
***Curr x Date*[2]**	-0.1345***	-0.1341***	-0.2178***	-0.2127***	-2.0705*	-2.0875*						
	(-4.85)	(-4.78)	(-4.94)	(-4.83)	(-1.79)	(-1.82)						
Total effect: *Sum of event dummies & interaction terms*	-0.22%	-0.33%	-0.27%	-0.52%	-1.91%	-2.25%						
Marginal Effect: *Sum of interaction terms*	-0.13%	-0.13%	-0.15%	-0.21%	-2.07%	-2.08%						

Economic significance / Reduction in execution costs

Disp (JNS):

Total Effect: (-0.27% x 1.7%) x $75bn x 7 years ≈ $20mn

Marg Effect: (-0.15% x 1.7%) x $75bn x 7 years ≈ $4mn

Intuitively, we calculate the present value of the reduced (because of the drop in transaction costs) future fixed payments of a swap whose notional equals the average daily total volume.

The benefit for end-users (vs dealers) is roughly 1/3 of the above numbers.

Controls: Stock market returns, stock index implied volatilities, overnight interest spreads, yield curve slopes.
Fixed effects: Currency & maturity
Clustering by: Currency & maturity

Empirical specifications (Test 1)

Results:

	Liquidity variables						Activity Variables					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
	Disp (vw)	**Disp (vw)**	**Disp (JNS)**	**Disp (JNS)**	**Amihud**	**Amihud**	**Vlm**	**Vlm**	**Ntrades**	**Ntrades**	**Nparties**	**Nparties**
***Date*[1]**							-0.3433**	-0.8100***	-4.2991***	-9.9779***	0.0583	-0.9382**
							(-2.61)	(-4.14)	(-2.91)	(-4.08)	(0.27)	(-2.53)
***Curr x Date*[1]**							2.4496***	2.4203***	22.4662***	22.1282***	1.4968**	1.4418**
							(3.15)	(3.09)	(3.29)	(3.23)	(2.26)	(2.16)
***Date*[2]**							-0.7535**	-0.4165	-6.4935**	-8.7110**	-1.1243***	-1.1673**
							(-2.74)	(-1.21)	(-2.37)	(-2.13)	(-3.06)	(-2.62)
***Curr x Date*[2]**							0.3077	0.3078	4.0289	4.1796	1.1234**	1.1336**
							(0.77)	(0.74)	(1.16)	(1.14)	(2.11)	(2.10)
Controls							No	Yes	No	Yes	No	Yes
Fixed Effects							Yes	Yes	Yes	Yes	Yes	Yes
Clustered S.E.							Yes	Yes	Yes	Yes	Yes	Yes
***Within-R*[2]**							0.042	0.052	0.033	0.047	0.013	0.029
N							8821	8740	8821	8740	8821	8740

Key findings

- There was an **increase in activity** for USD contracts mainly after SEF trading become available.
- SEF trading and the mandate **boosted market participation**.
- **EUR activity declined**, but interestingly without affecting liquidity.
  - Could be the result of the shortening of the intermediation chain?

Controls: Stock market returns, stock index implied volatilities, overnight interest spreads, yield curve slopes.
Fixed effects: Currency & maturity
Clustering by: Currency & maturity

Empirical specifications (Test 2)

DiD Test 2:

- Treated: USD mandated
- Control: USD non-mandated

Model:

$$L_{it} = \alpha + \beta_1 Date_t^{(1)} + \beta_2 MAT_i Date_t^{(1)} + \beta_3 Date_t^{(2)} + \beta_4 MAT_i Date_t^{(2)} + \gamma' X_t + u_i + \epsilon_{it}$$

where $Date_t^{(k)}$ is an event k date dummy, and MAT_i a mandated contract dummy and X is the vector of control variables.

Empirical specifications (Test 2)

Results:

	Liquidity variables						Activity Variables					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
	Disp (vw)	**Disp (vw)**	**Disp (JNS)**	**Disp (JNS)**	**Amihud**	**Amihud**	**Vlm**	**Vlm**	**Ntrades**	**Ntrades**	**Nparties**	**Nparties**
***Date*^{1}**	-0.2220***	-0.2718***	-0.3372***	-0.3858***	-10.7954**	-10.0313*	0.1963	-0.4615	0.5327	-8.9976**	-0.5161***	-2.3533***
	(-3.87)	(-5.06)	(-6.37)	(-8.18)	(-2.24)	(-2.07)	(1.64)	(-1.69)	(1.24)	(-2.91)	(-3.91)	(-6.63)
***MAT x Date*^{1}**	0.0261	0.0256	0.0799	0.0807	8.8217*	8.7467*	1.9100**	1.9205**	17.6343**	17.7548**	2.0712***	2.0866***
	(0.41)	(0.41)	(1.33)	(1.42)	(1.79)	(1.80)	(2.43)	(2.42)	(2.61)	(2.60)	(3.20)	(3.20)
***Date*^{2}**	0.0304	0.0492*	0.0582**	0.0501	3.7241*	2.0466	-0.0645	0.2128	0.2127	-3.6371	-0.1081	-0.5662
	(1.73)	(2.10)	(2.18)	(1.32)	(1.94)	(1.68)	(-0.30)	(0.64)	(0.41)	(-0.89)	(-0.45)	(-1.21)
***MAT x Date*^{2}**	-0.0589**	-0.0624**	-0.0704**	-0.0753**	-3.5602	-3.6145	-0.3813	-0.4125	-2.6773	-3.0616	0.1072	0.0530
	(-2.63)	(-2.69)	(-2.23)	(-2.24)	(-1.62)	(-1.62)	(-1.05)	(-1.11)	(-1.20)	(-1.32)	(0.23)	(0.12)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered S.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
***Within-R*^{2}**	0.065	0.094	0.065	0.089	0.137	0.151	0.049	0.066	0.031	0.052	0.013	0.029
N	5875	5812	5875	5812	5090	5041	5875	5812	5875	5812	5875	8740

Controls: Stock market returns, stock index implied volatilities, overnight interest spreads, yield curve slopes.
Fixed effects: Maturity
Clustering by: Maturity

Empirical specifications (Test 2)

Results:

	Liquidity variables						Activity Variables					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
	Disp (vw)	**Disp (vw)**	**Disp (JNS)**	**Disp (JNS)**	**Amihud**	**Amihud**	**Vlm**	**Vlm**	**Ntrades**	**Ntrades**	**Nparties**	**Nparties**
***Date*^{1}**	-0.2220***	-0.2718***	-0.3372***	-0.3858***	-10.7954**	-10.0313*	0.1963	-0.4615	0.5327	-8.9976**	-0.5161***	-2.3533***
	(-3.87)	(-5.06)	(-6.37)	(-8.18)	(-2.24)	(-2.07)	(1.64)	(-1.69)	(1.24)	(-2.91)	(-3.91)	(-6.63)
***MAT x Date*^{1}**	0.0261	0.0256	0.0799	0.0807	8.8217*	8.7467*	1.9100**	1.9205**	17.6343**	17.7548**	2.0712***	2.0866***
	(0.41)	(0.41)	(1.33)	(1.42)	(1.79)	(1.80)	(2.43)	(2.42)	(2.61)	(2.60)	(3.20)	(3.20)
***Date*^{2}**	0.0304	0.0492*	0.0582**	0.0501	3.7241*	2.0466	-0.0645	0.2128	0.2127	-3.6371	-0.1081	-0.5662
	(1.73)	(2.10)	(2.18)	(1.32)	(1.94)	(1.68)	(-0.30)	(0.64)	(0.41)	(-0.89)	(-0.45)	(-1.21)
***MAT x Date*^{2}**	-0.0589**	-0.0624**	-0.0704**	-0.0753**	-3.5602	-3.6145	-0.3813	-0.4125	-2.6773	-3.0616	0.1072	0.0530
	(-2.63)	(-2.69)	(-2.23)	(-2.24)	(-1.62)	(-1.62)	(-1.05)	(-1.11)	(-1.20)	(-1.32)	(0.23)	(0.12)

Same picture:

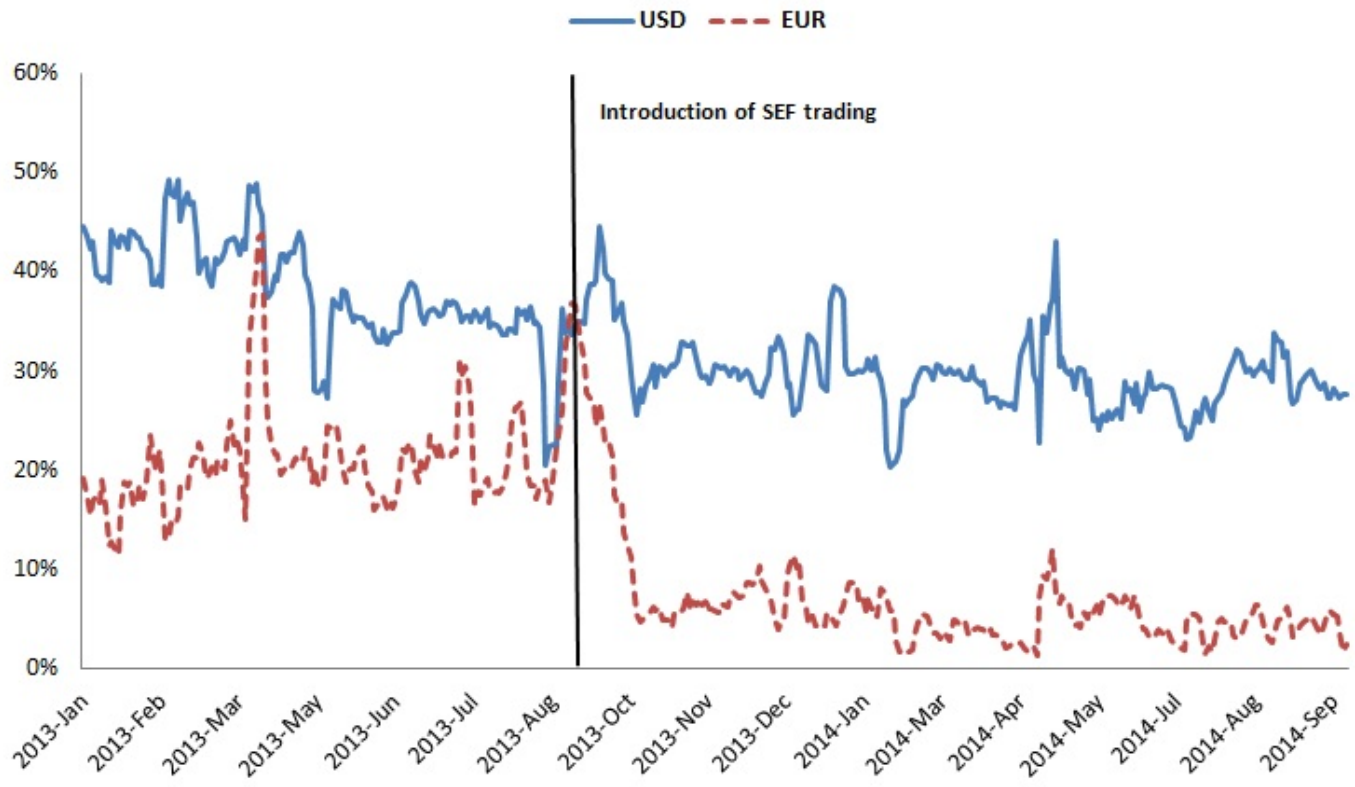
- The introduction of SEF trading brought about an improvement in liquidity across currencies and maturities.
- The liquidity of the USD MAT contracts benefited the most → Effects is statistically and economically significant.
- There was an increase in activity for USD MAT contracts mainly after SEF trading become available.

Fragmentation and liquidity

The issue:

- Due to the trading mandate capturing US persons only, there have been concerns of market fragmentation if EU counterparties refuse to trade on SEFs with US counterparties. See ISDA (2014).
- *Critique*: Market fragmentation might have a negative impact on liquidity.
- **What does the data tell us**?

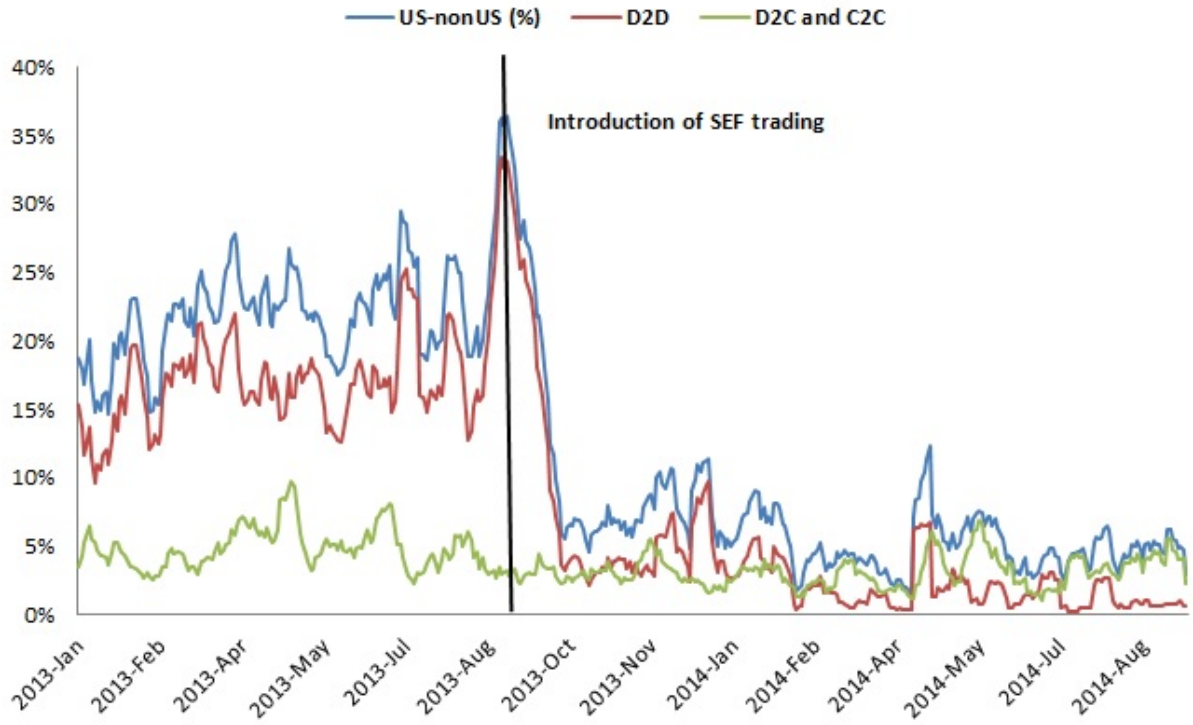
Fragmentation and liquidity



Fraction of US-to-nonUS trading in USD and EUR-denominated contracts

- Clear evidence of fragmentation in the EUR segment of the IRS market.
- No visible effect in the USD segment.

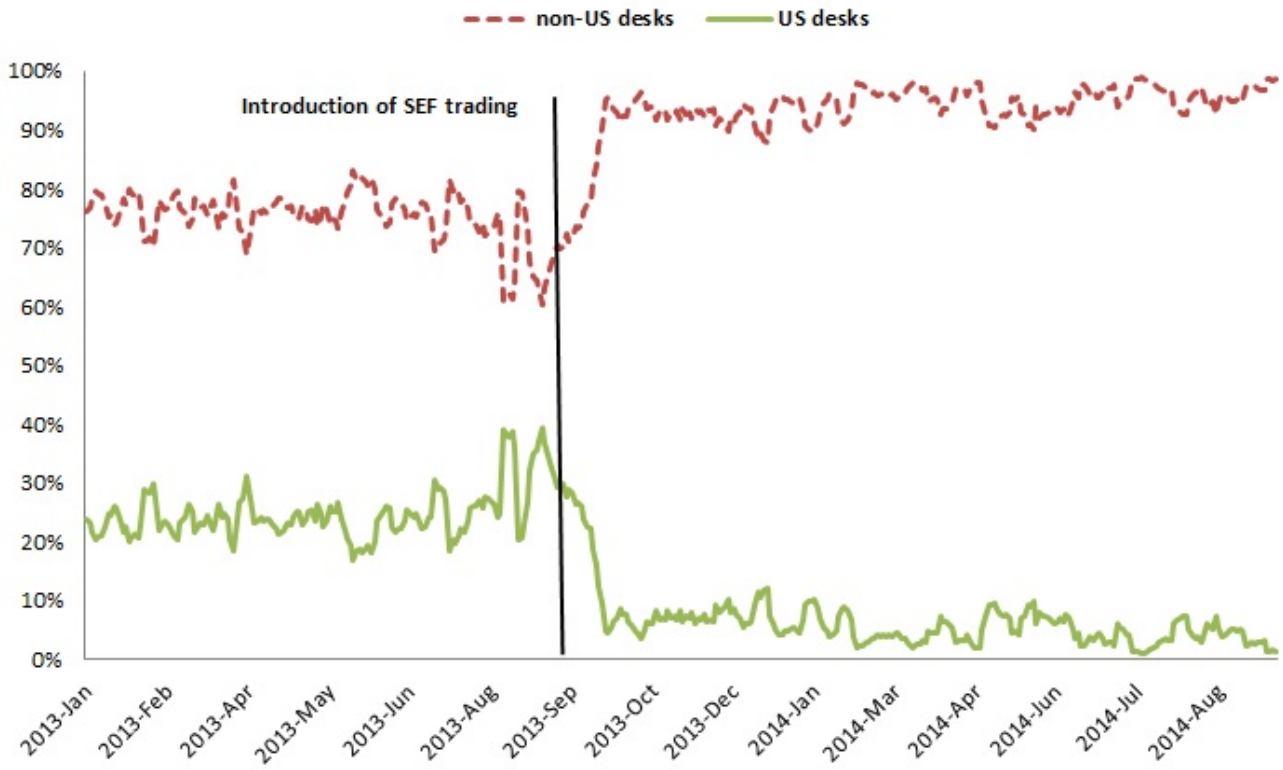
Fragmentation and liquidity



Breakdown of US-to-nonUS trading

- Fragmentation is driven by inter-dealer activity, not end-users!

Fragmentation and liquidity



Breakdown of inter-dealer volume by trading desk location

- There is a shift in inter-dealer activity from the US desks to the non-US ones.
- This implies that the observed fragmentation is artificial in the sense that it is entirely driven by a change of the trading desk location of those dealers with desks in multiple jurisdictions.

What's the story behind? CFTC Impartial Access guidance, 2013

1. Restrictions Relating to Intended-To-Be-Cleared Swaps

The Divisions understand that some market participants'[2] ability to interact on a SEF's trading systems or platforms for ITBC Swaps is restricted by the use of so-called "enablement mechanisms." The Divisions use the term "enablement mechanism" broadly to refer to any mechanism, scheme, functionality, counterparty filter, or other arrangement that prevents a market participant from interacting or trading with, or viewing the bids and offers (firm or indicative) displayed by any other market participant on that SEF, whether by means of any condition or restriction on its ability or authority to display a quote to any other market participant or to respond to any quote issued by any other market participant on that SEF, or otherwise. For example, some SEFs establish that any two market participants may only execute an ITBC Swap on a SEF's trading systems or platforms if the market participants have a pre-execution agreement, such as a breakage agreement.[3] Some SEFs limit the ability to stream indicative bids and offers to a subset of market participants, while other SEFs require that a market participant be a swap dealer or a clearing member in order to respond to a RFQ for an ITBC Swap, thus disallowing non-dealers from participating in the RFQ process as liquidity providers.[4]

Such restrictions are inconsistent with the impartial access requirement set forth in the Commodity Exchange Act ("CEA") and Commission regulation 37.202.[5] These provisions

- The CFTC has been aware of "enablement mechanisms" which can be used to block access to the inter-dealer market.
- The inter-dealer segment is crucial for liquidity provision as it is used by dealers to manage their inventories.
- Regulatory arbitrage.

Concluding Remarks: The facts

- The CFTC trading mandate has improved liquidity in the (plain vanilla) IRS market (particularly its USD segment) and has reduced execution costs.
- Drop in execution costs is substantial!
- The mandate has geographically fragmented the EUR segment of the market. However the observed fragmentation is artificial, in the sense that is is driven by few dealers shifting activity from their US desk to the nonUS one.
- Findings are important given similar upcoming European regulation (MiFIR).

Concluding Remarks: Beyond the facts

Remco Lenterman (former chairman of the FIA European Principal Traders Association):

"Remember how Dodd-Frank was widely opposed by the oligopoly of swap traders. This $7m to $13m is money that goes from the pockets of traditional swap bank dealers straight into end-users pockets"

Appendix

Fragmentation and liquidity (Empirical evidence)

Model & Results:

$$L_{it} = \alpha + \beta fragm_{it} + \gamma Date_t^{(1)} + \delta' X_{it} + u_i + \epsilon_{it},$$

- where $fragm = 1 - \frac{US-EU\ Vlm}{Total\ Vlm}$
- Estimated for EUR-denominated mandated contracts

	Disp (vw)	Disp (JNS)	Amihud	Vlm	Ntrades	Nparties
fragm	-0.5964	-0.4729	0.1609	-2.0472***	-3.2927**	-1.3109**
	(-0.90)	(-0.81)	(0.39)	(-4.69)	(-2.97)	(-2.63)
$Date^{(1)}$	-0.3866***	-0.8235*	-2.0481***	0.0016	-3.3319**	0.2955
	(-3.94)	(-2.14)	(-5.56)	(0.01)	(-2.95)	(1.05)
log R_{SP500}	-3.9949	0.4508	10.0129*	6.8007	107.6561***	27.0525***
	(-0.60)	(0.35)	(2.09)	(1.38)	(3.33)	(3.10)
log R_{DAX}	-9.8511	-19.2031	3.9104	-2.3227	-56.2627	-7.5684
	(-1.06)	(-1.70)	(1.19)	(-0.54)	(-1.43)	(-1.01)
VIX	0.1112	0.1714	0.0911	0.0666**	0.8843***	0.1538***
	(1.27)	(1.13)	(1.52)	(2.53)	(3.11)	(3.24)
VDAX	-0.1058	-0.1859	0.0257	-0.0369*	-0.3495	0.0391
	(-1.21)	(-1.00)	(0.40)	(-2.04)	(-1.62)	(0.68)
O/N_Spread_USD	0.4546	3.2035	0.0971	-3.2532***	-24.0778***	-6.5624**
	(0.90)	(1.67)	(0.08)	(-3.39)	(-3.07)	(-2.76)
O/N_Spread_EUR	0.3861***	0.7816***	-0.2917	1.7321**	10.4110	1.7546
	(3.30)	(3.65)	(-0.68)	(2.51)	(1.76)	(1.05)
Slope_USD	-0.4361	-0.1518	0.9323	-1.3911**	-10.0635*	-1.6763**
	(-1.15)	(-1.61)	(1.02)	(-2.34)	(-2.06)	(-2.35)
Slope_EUR	1.5835	1.8480	0.1223	1.3761**	7.7884	1.2913
	(1.23)	(1.56)	(0.11)	(2.47)	(1.73)	(1.00)
Constant	2.7965**	8.1578*	15.2246***	6.3808***	42.0813***	17.7457***
	(2.15)	(1.91)	(6.09)	(8.77)	(14.51)	(22.58)
R^2	0.003	0.010	0.215	0.036	0.041	0.024
N	5749	5749	5178	5749	5749	5749

- Reduction in trading activity. However, no adverse effect of fragmentation on liquidity

Literature: Empirical Evidence

Boehmer, Saar, Yu (2005)

- NYSE allowed traders not located on the exchange to see the contents of the limit order book.
- Resulted in a significant improvement in liquidity.

Bessembinder, Maxwell, Venkataraman (2006)

- Introducing post-trade transparency in the US corporate bond markets had, on balance, a positive effect on liquidity.
- But exceptions were found for very thinly-traded bonds and for the largest trades.

Loon and Zhong (2014, 2016)

- The introduction of central clearing in the CDS market reduced counterparty risk and boosted liquidity.
- CFTC real-time reporting improved CDS liquidity.

Fulop and Lescourret (2015)

- Liquidity in corporate single-name CDS contracts improves after the voluntary dissemination of post-trade data by DTCC in November 2008 and the European "Small Bang" in June 2009

Literature: Theory

Duffie, Garleanu, and Pedersen (2005)

- "Bidask spreads are lower if investors can more easily find other investors or have easier access to multiple market-makers"

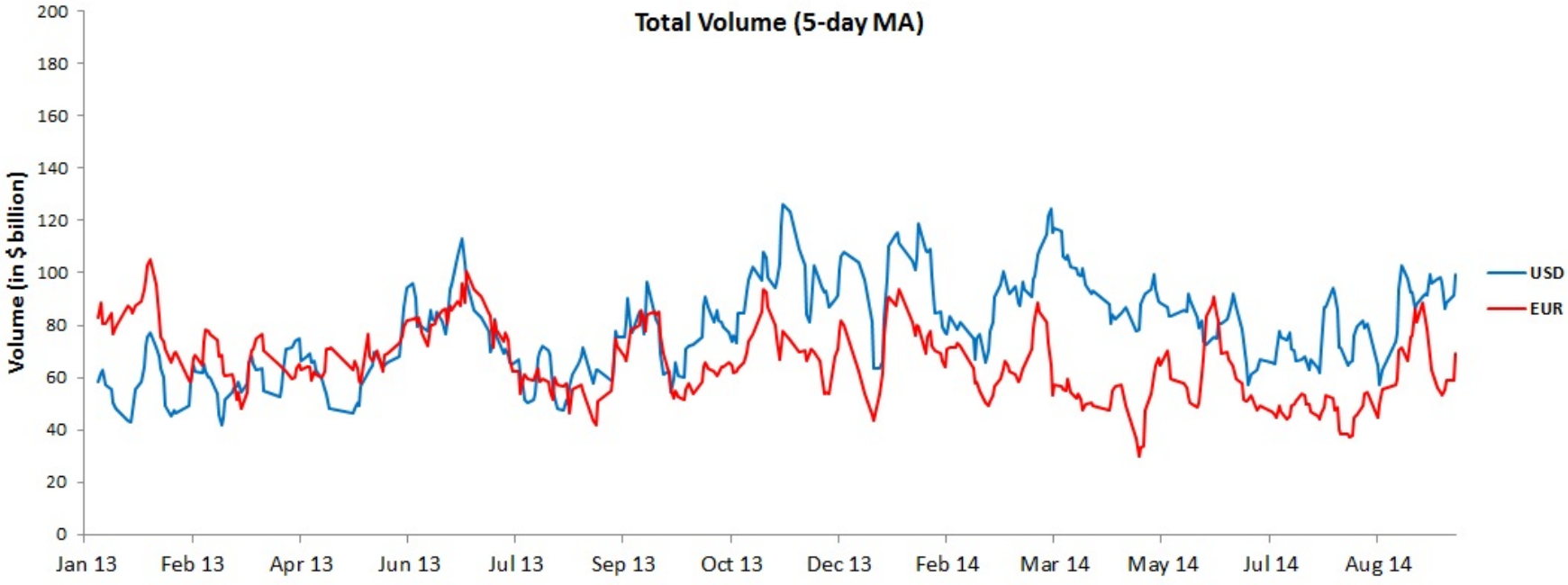
Vayanos and Wang (2012)

- Market imperfections have a negative impact on market liquidity.
- (a) Participation costs, (b) Imperfect competition, (c) Search frictions etc.

Hendershott and Madhavan (2015)

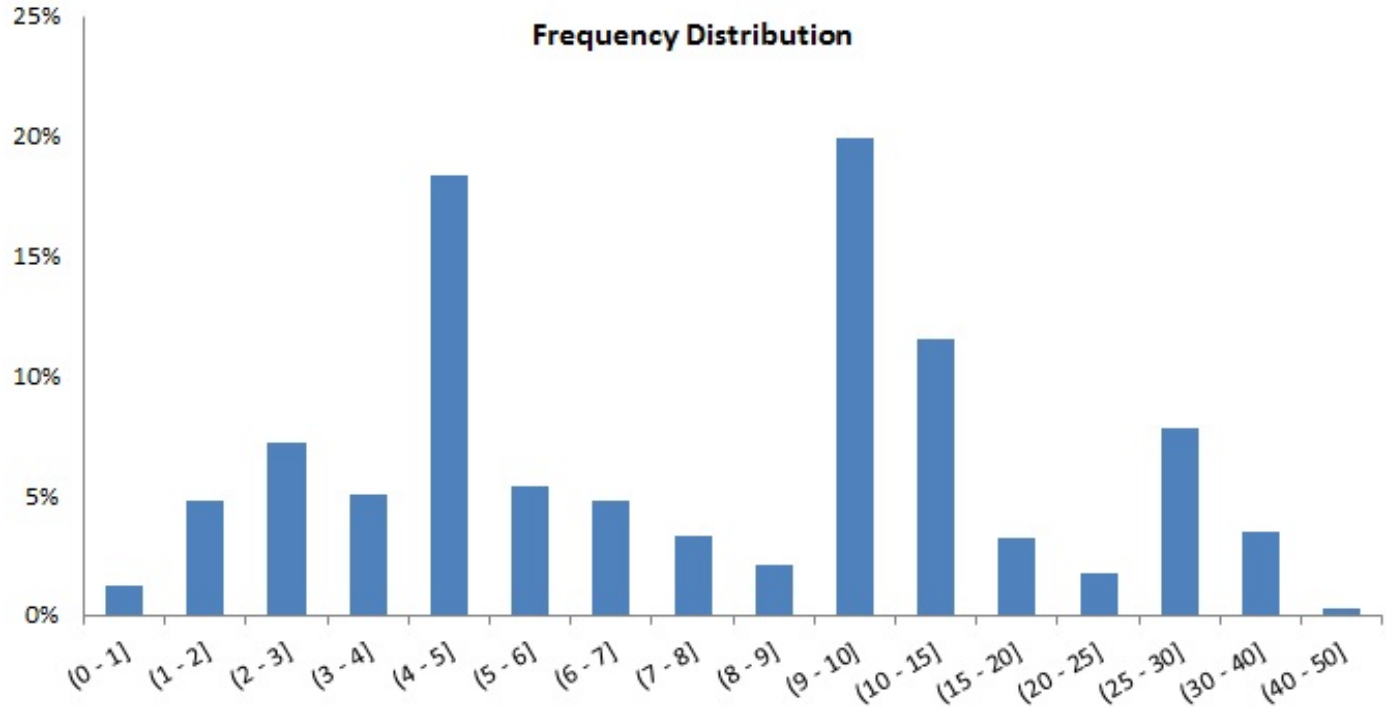
- Electronic one-sided auctions are a viable and important source of liquidity for inactively traded instruments (such as bonds, OTC derivatives, etc.) and are a natural compromise between pure bilateral search in OTC markets and continuous double auctions in CLOBs.

Summary statistics: Traded volume



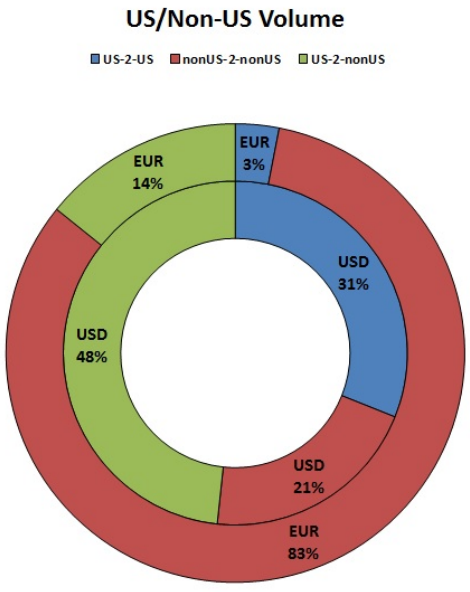
Traded volume by currency (in $ billion), Jan 2013 - Sept 2014

Summary statistics: Trades by contract maturity

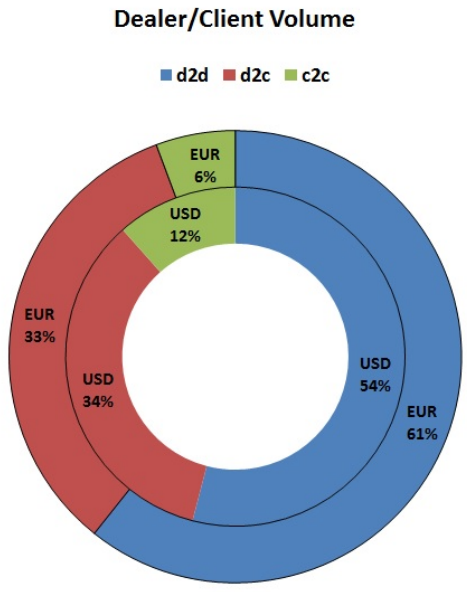


% of trades by maturity

Summary statistics: Counterparty type and location



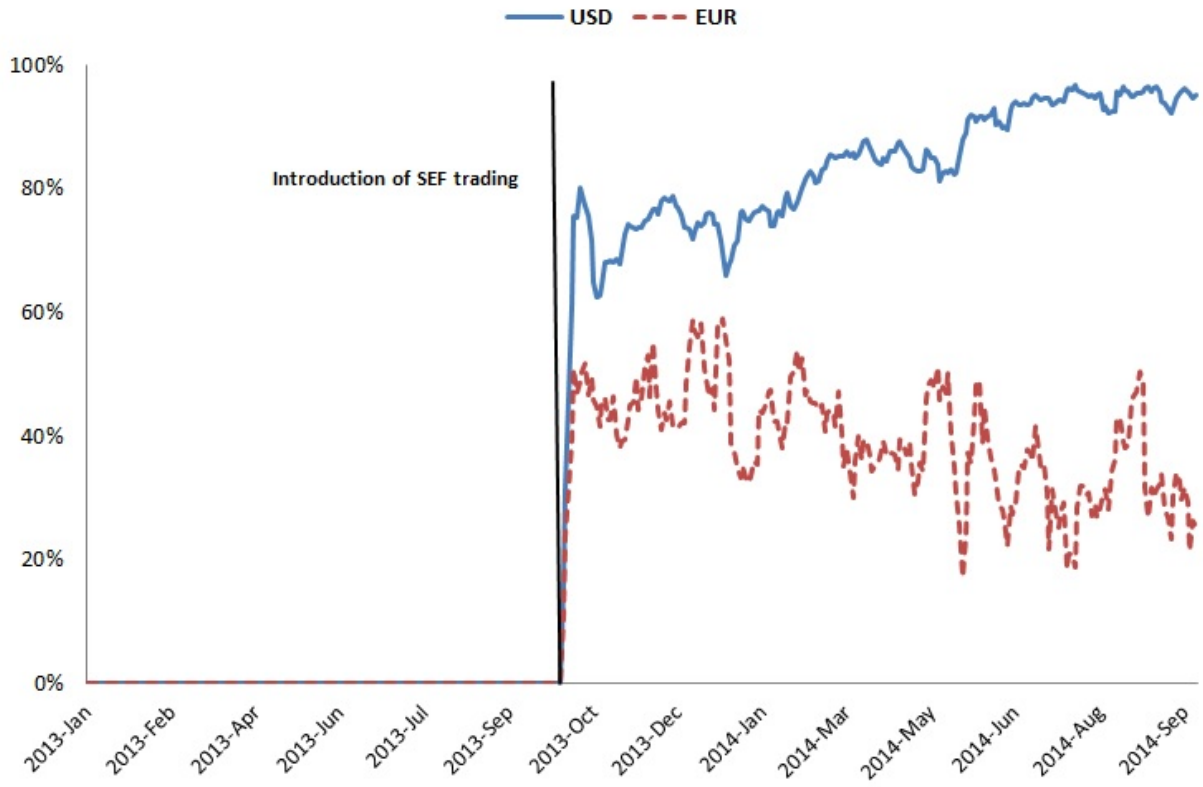
(a) % of trading volume by counterparty location



(b) % of trading volume by counterparty type

- More intra-EU activity for EUR contracts
- Much larger US party presence and less D2D volume in USD contracts

Summary statistics: SEF trading



% of SEF trading for USD and EUR denominated contracts

- Larger fraction of SEF trading in USD contracts