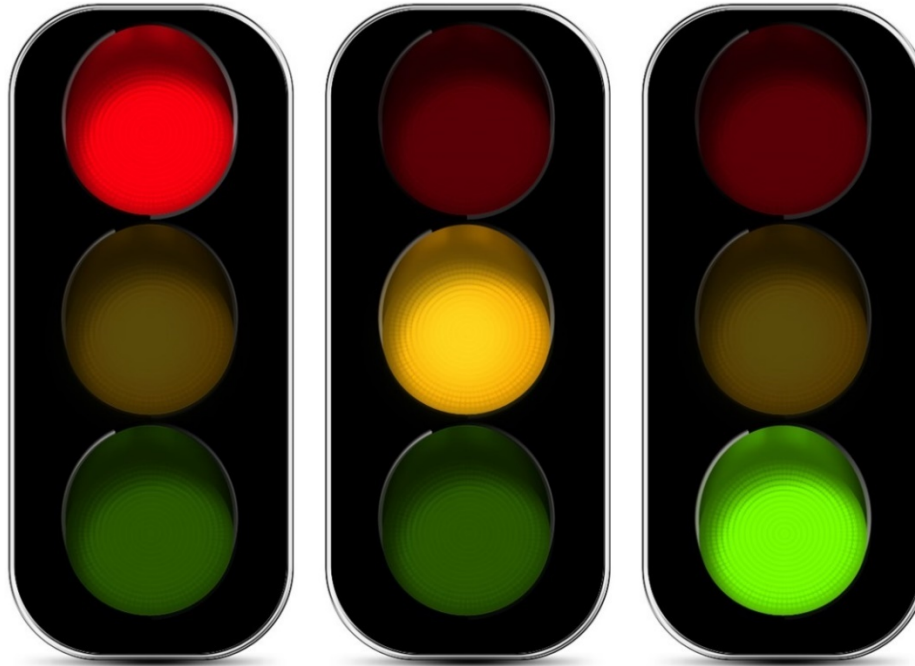


# Stop or go?

## The reform agenda in OTC derivatives markets



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Disclaimer: views herein are those of the authors, and do not implicate their affiliated institutions

Acknowledgement: thanks to Martin Neychev for excellent research assistance

# How critics understood derivatives in 2009



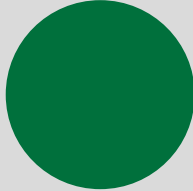
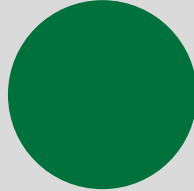
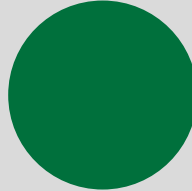
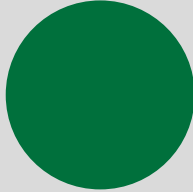

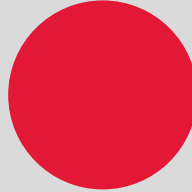



***“OTC derivatives contributed significantly to the crisis”***  
US Financial Crisis Inquiry Commission

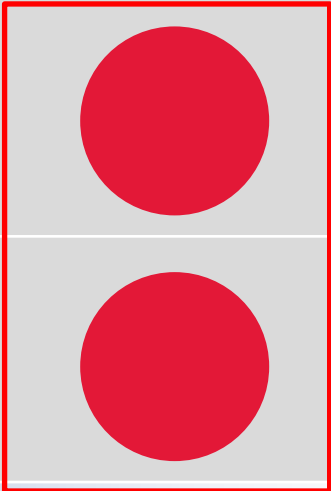
# G20 commitment



- **Trade reporting to authorities**
- **Central clearing for standard trades**
- **Trading on exchanges or platforms**

# Where do we stand in Europe in 2016?

	Interest Rates	Credit	FX
Notional	€250tn	€8tn	€40tn
Reporting			
Central clearing			
Exchange trading			



**Focus of Analysis**

# Issues with the implementation shortfall

---

- **Direct costs of inefficient OTC market structure**
  - Who pays and how much?
  - Do high transaction costs inhibit efficient risk management?
- **Inefficient risk allocation?**
  - Is counterparty risk borne by highly leveraged institutions which are least apt to assume this risk (Glass-Steagall Act logic)?
  - Is “Too Big to Fail” re-enforced?

**Good news:** *new reporting allows us to evaluate the costs of partial reform...*

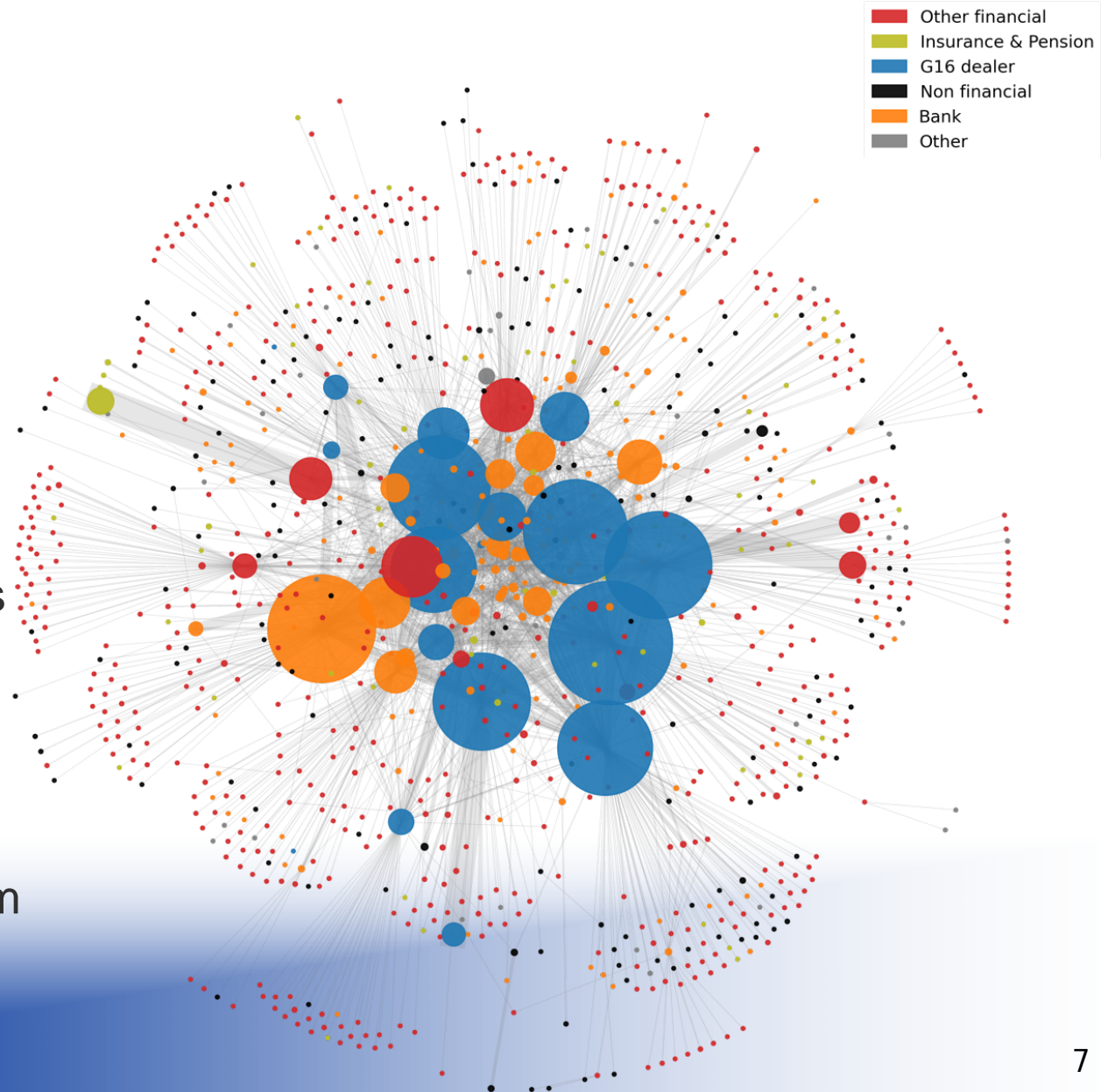
# Transactions-level data

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- EMIR requires all EU-resident entities to report derivatives transactions to trade repositories
- “Big data”: approximately 20 billion observations per year on 100 variables
- Work started at the ESRB in 2015:
  - Extract clean data on transactions from raw data
  - Summarized in new ESRB Occasional Paper no.11
- Subsample of FX derivatives:
  - EUR/USD forwards executed between 15 Jan and 15 Feb 2016
  - Focus on FXD trades between 170 banks and 3,000 firms (“clients”)

# FX derivative trading in OTC markets

- Core-periphery network structure in which firms transact with few banks
- Search costs imply that “shopping” is costly and unsophisticated firms may face high transaction costs
- Banks earn information rents from the OTC structure



# Main findings

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- Transactional market efficiency
  - High spread dispersion across clients
  - Price discrimination by client sophistication rather than client risk
  - High average transaction costs
- Inefficiency of risk allocation
  - Information rents concentrated in big dealer banks:
    - 85% of profits go to 20 dealer banks
    - Profits increase convexly in trading volume
  - Overlap between banks' systemic importance, high leverage and derivatives activity



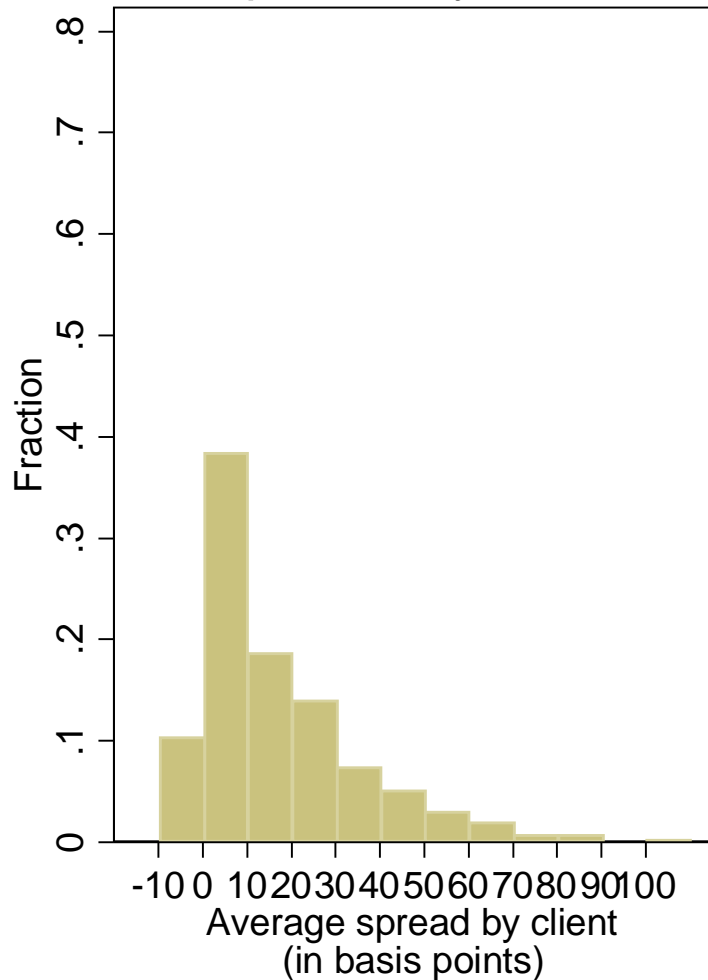
# Spread and cost calculation

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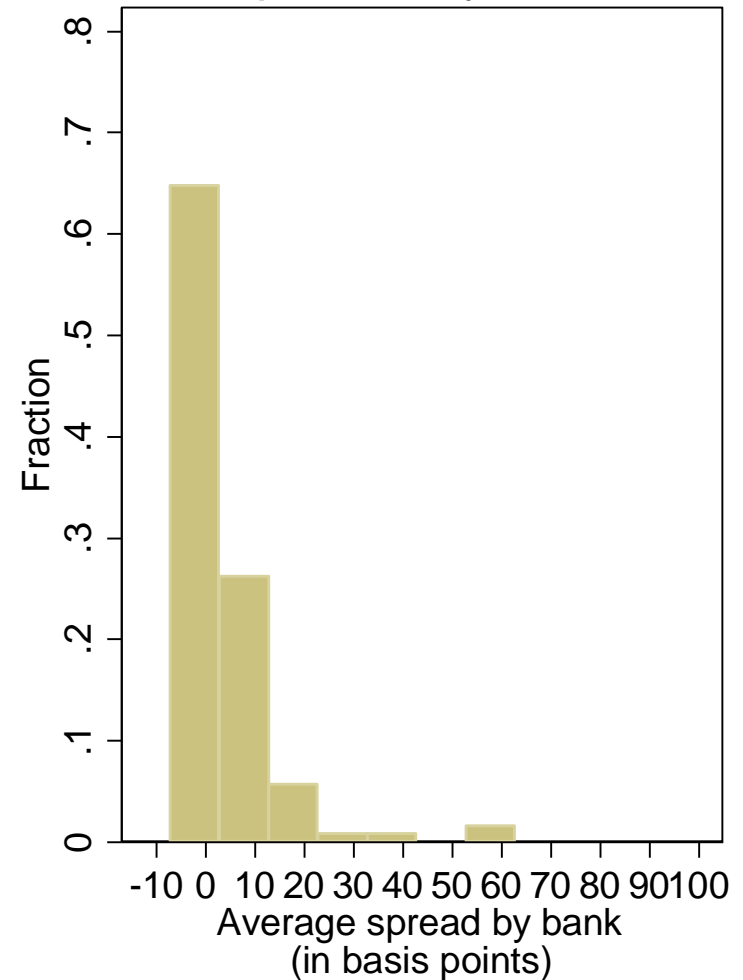
- $Spread = d \times (m_t - f_t)$
- $d = 1$  when firm buys euro;  $d = -1$  when firm sells
- $m_t$ : mid-market forward rate from Reuters
- $f_t$ : contracted forward rate
  
- $Cost = Spread \times Notional$

# Spread dispersion by firm

## Spreads by client

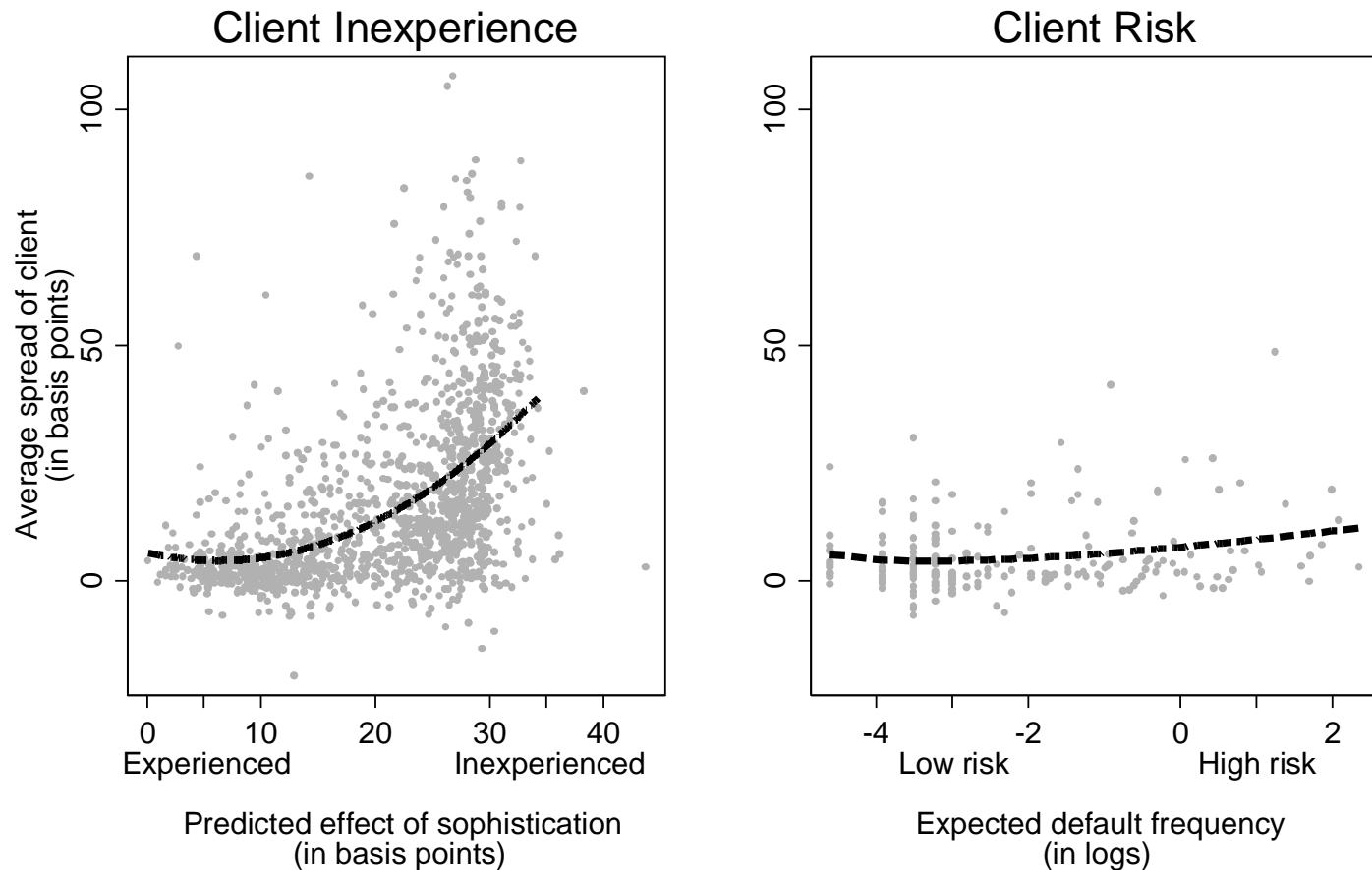


## Spreads by bank



# Price discrimination by client sophistication

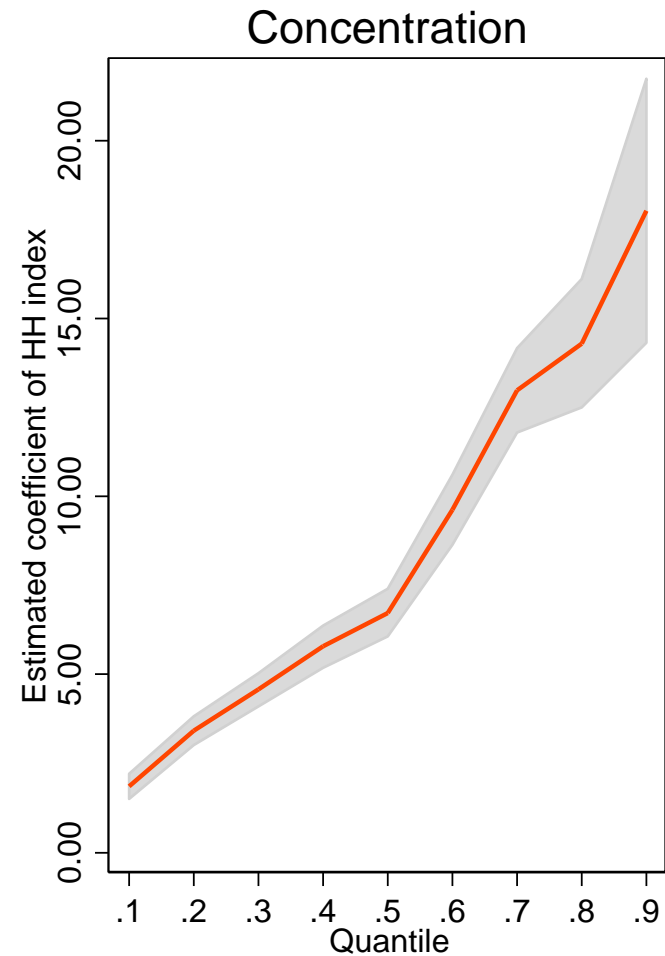
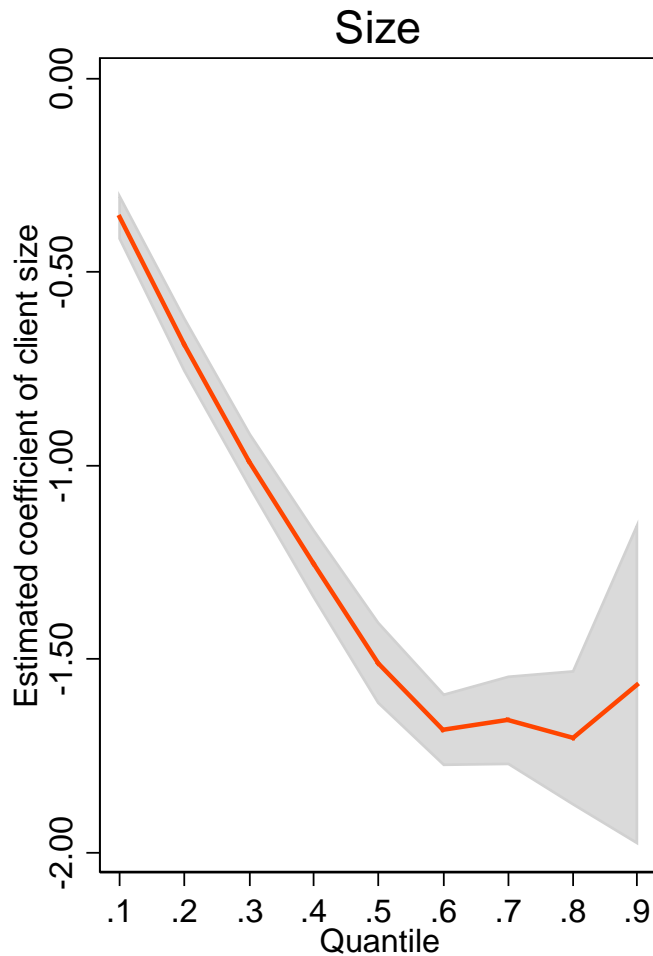
Inexperienced clients pay higher spreads, but not risky clients



• Estimated values    - - - - - Fitted polynomial

# Quantile regressions

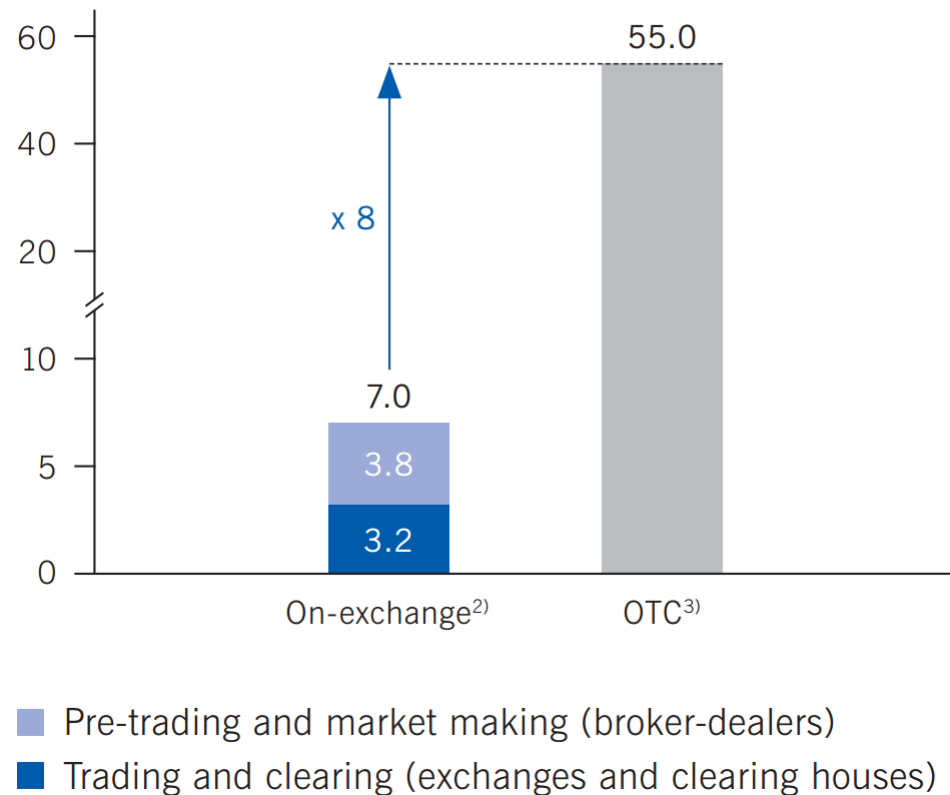
**Spread rises with client inexperience**  
(measured by size or concentration in dealers)



# OTC market structure and price discrimination

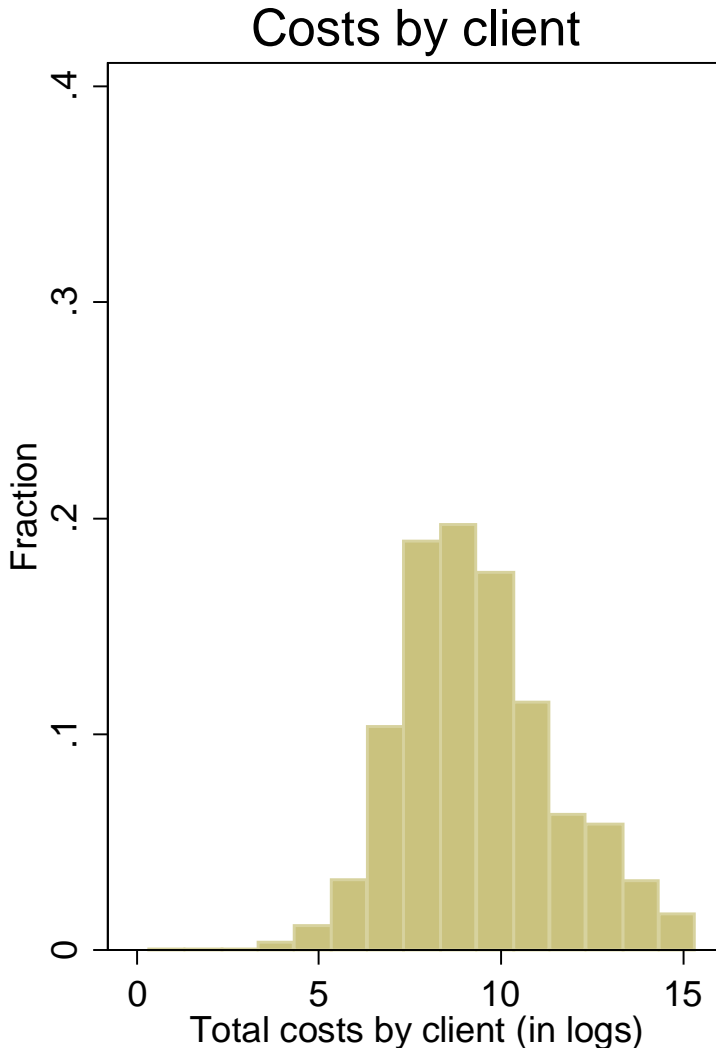
- Premium paid by inexperienced clients is inherent in OTC market structure
  - Banks extract information rents
- Exchange-based structures reduce spreads
  - Enhanced pre-trade price transparency removes banks' information rents
  - Also see Li and Schürhoff (2015)

€ per €1 million notional amount traded<sup>1)</sup>



Source: Deutsche Börse (2008)

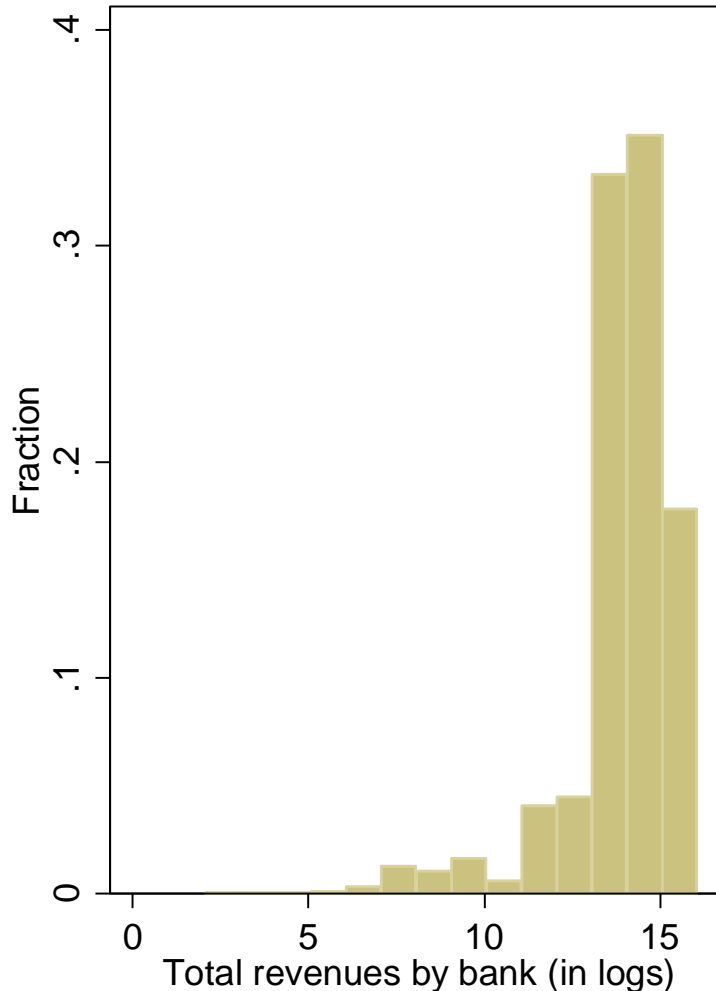
# Cost dispersion by client



- Total costs paid by clients: approximately **€3.2bn** per year in FXD
  - Costs inhibit firms' risk management
  - Inefficient risk transfer may have real effects, particularly for export-oriented firms

# Revenue dispersion by bank

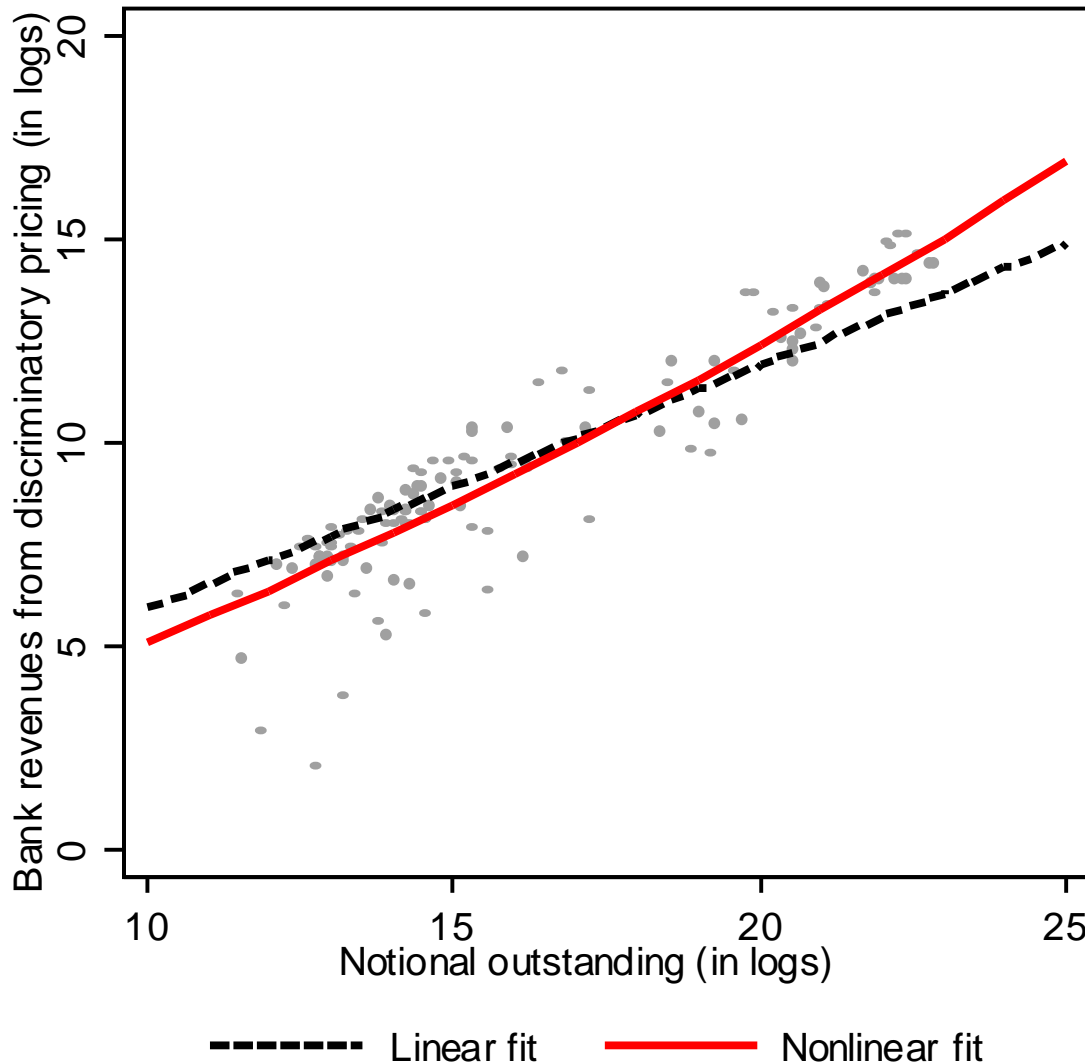
Revenues by bank



- OTC market structure concentrates information rents in a few banks
- This entrenches TBTF

# Revenue concentration in few dealer banks

Revenues increase convexly in market share of notional





# SIFI status, leverage, and derivatives activity

The 13 G-SIFI banks in EU account for **75%** of total **€3.2bn** yearly revenues from discriminatory pricing in FXD

Key questions:

- How much risk compression?
- How much risk flows to low leverage institutions?
- How can we get other intermediaries into the market?

SIFI	Book leverage ratio
Barclays	4.5%
BNP Paribas	4.0%
BPCE	4.5%
Crédit Agricole	5.3%
Deutsche Bank	3.5%
HSBC	5.0%
ING Bank	3.9%
Nordea	4.5%
RBS	5.6%
Santander	4.7%
Société Générale	3.8%
Standard Chartered	5.5%
Unicredit Group	4.4%

# Conclusions

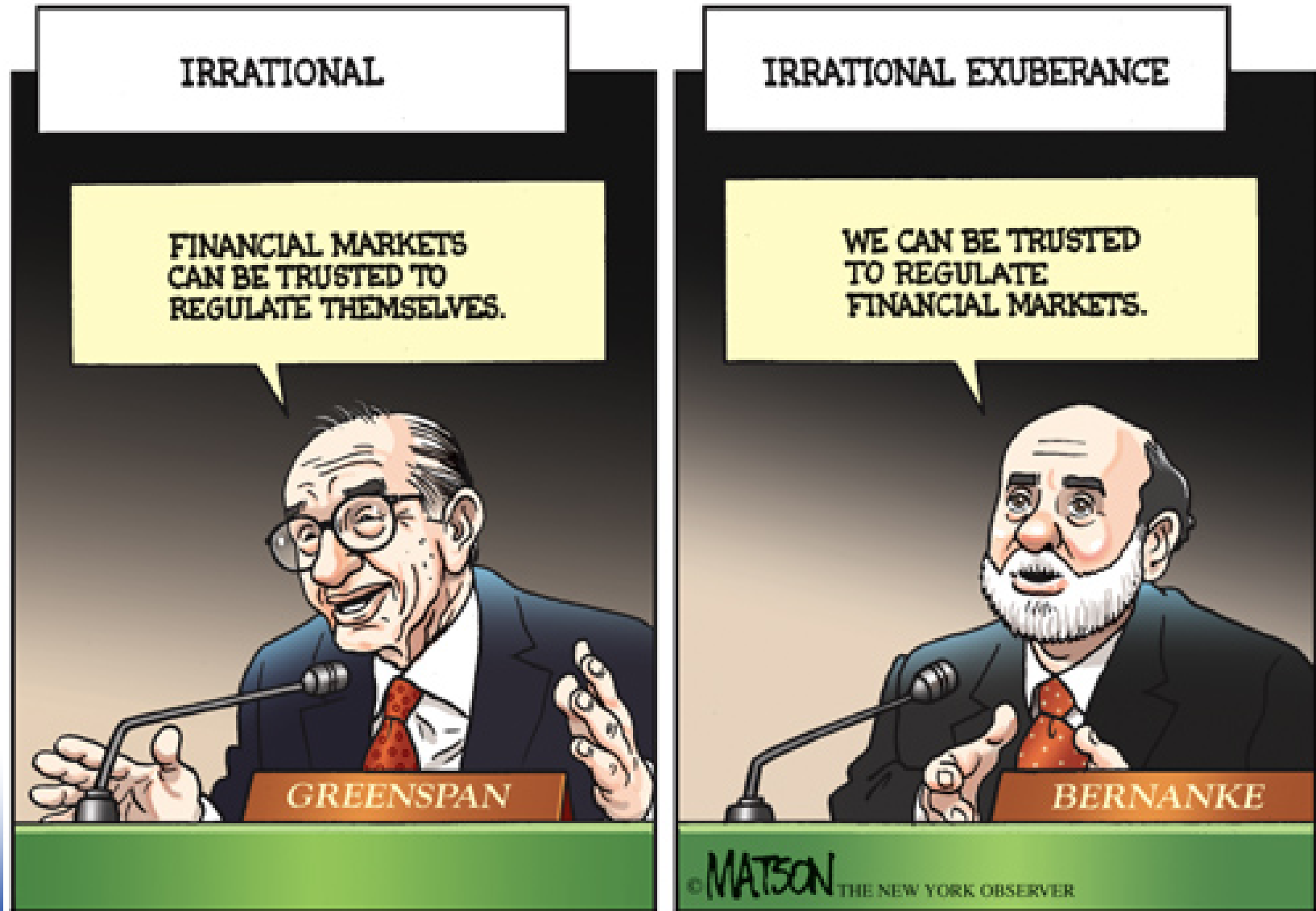
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## OTC market structure in FXD

- is costly for the export sector and particularly for unsophisticated firms
- entrenches TBTF by preventing non-banks from entering as intermediaries
- concentrates derivative risk in the least desirable place within the economy (G-SIFI)

Regulatory credibility is at stake in staying at **Stop**

...as this cartoon suggests...



# APPENDIX

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## Description of EU Derivatives Market Reform

The traffic-light matrix shown on slide 4 is intended to be an indicative summary of the state of play in OTC derivatives market reform in the EU.

The European Markets Infrastructure Regulation (EMIR) provides for a comprehensive reporting requirement for any EU-located legal person engaging in a derivative transaction to report the specified details of that transaction to an ESMA-authorized trade repository. The state of play with respect to the EU's legal implementation of the G20 commitment with respect to trade reporting is therefore unambiguously “green”.

With respect to central clearing, the situation is more nuanced. The EU Commission has adopted regulations that provide for a phasing-in of central clearing obligations for plain-vanilla interest rate derivatives (see [http://ec.europa.eu/finance/financial-markets/derivatives/index\\_en.htm](http://ec.europa.eu/finance/financial-markets/derivatives/index_en.htm)). The first phase of this central clearing obligation began in 21 June 2016, and applied to institutions that were already CCP members at the end of 2015 (mostly large banks); the second phase begins in 21 December 2016, when the obligation will be rolled out to other financial institutions meeting certain criteria related to trading volume. Eventually, the central clearing obligation will apply to all firms trading plain-vanilla interest rate derivatives. The Commission has also adopted a regulation that provides for a central clearing obligation with respect to index CDS products referenced on iTraxx; this obligation will be phased in from February 2017. No central clearing obligation is currently envisaged for single-name CDS products or any foreign exchange derivatives. This justifies the “green”, “amber” and “red” labels for interest rate, credit and foreign exchange derivatives respectively.

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## Description of EU Derivatives Market Reform (continued)

With respect to the G20 commitment to require “all standardized OTC derivative contracts” to be “traded on exchanges or electronic trading platforms”, the EU has made relatively little progress to date, in large part owing to delays until 2018 in the application of legislation pertaining to markets in financial instruments (MiFID II and MiFIR). A final report on technical standards drafted by ESMA

([https://www.esma.europa.eu/sites/default/files/library/2015/11/2015-esma-1464\\_-\\_final\\_report\\_-\\_draft\\_rts\\_and\\_its\\_on\\_mifid\\_ii\\_and\\_mifir.pdf](https://www.esma.europa.eu/sites/default/files/library/2015/11/2015-esma-1464_-_final_report_-_draft_rts_and_its_on_mifid_ii_and_mifir.pdf)), and endorsed by the Commission in April 2016 subject to certain amendments, sets out asset class specific thresholds for determining whether certain types of interest rate and credit derivatives may be exempt from pre-trade disclosure requirements. In the report, ESMA also “proposes to deem the whole class of foreign exchange derivatives as illiquid”, thereby exempting FXDs from various pre-trade disclosure requirements under MiFID/MIFIR.

For brevity, the traffic-light matrix does not contain information on other aspects of the G20 commitments (including margin and capital requirements for OTC derivatives that are not centrally cleared).

The notional values of EUR250tn, EUR8tn and EUR40tn for interest rate, credit and FX derivatives (respectively) are calculated based on the outstanding trades reported to DTCC as of 02/11/15. They therefore proxy the size of the EU-resident derivatives market, and contrast with global data for BIS, which point to market sizes of approximately EUR350tn, EUR11tn and EUR65tn for interest rate, credit and FX derivatives (respectively), as reported in Abad et al (2016).

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## Description of Transactions-Level EMIR Dataset

The transactions-level EMIR dataset is described in Abad et al (2016). According to EMIR, all EU-located legal persons (counterparties) entering into a derivative contract must report the details of that contract to a trade repository (TR) authorised by ESMA. There are six authorized TRs: CME, DTCC, ICE, KDPW, Regis-TR and UnaVista.

DTCC has the largest market share in FX derivatives, at 66%. Owing to EMIR's double-sided reporting obligation, DTCC's coverage of unique trades is even larger than this 66% suggests; as such, we deem it adequate to draw data only from DTCC for the purposes of this analysis.

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## Description of Data Processing

The data processing procedure is similar to that of Abad et al (2016) applied not to the *stock* of outstanding FX derivatives transactions, but rather to the *flow* of new transactions executed between 19 January 2016 and 19 February 2016 (except for the *HHI* variables, which are computed on the stock of outstanding trades on 19 January 2016). We start with the raw trade activity report pertaining to OTC FX derivatives provided by the Depository Trust & Clearing Corporation (DTCC) to the European Systemic Risk Board (ESRB). This daily dataset includes all OTC FX derivative transactions reported on that day to DTCC under the reporting requirements provided by the European Markets Infrastructure Regulation. We merge the daily files into a single file and proceed with the data processing procedure.

In particular, we keep only FX forward contracts referenced on EUR/USD. Whenever possible, we use paired reports (i.e. two reports pertaining to the same trade, but submitted by different counterparties) in order to complete missing information. We then discard transactions where at least one counterparty is not a valid Legal Entity Identifier (LEI), or information is missing on the notional amount, the contractual exchange rate, or the three key dates (execution date, effective date, and maturity date). Moreover, we discard contracts with a maturity of less than 7 days and more than 1 year. Finally, we use Orbis in order to map the LEIs to the NACE sector of the respective entity and obtain information on company characteristics (such as total assets). At this step, we restrict our dataset to trades involving a non-financial firm on one side of the trade, and a bank on the other side. Whenever possible, we consolidate firms and banks at the group level based on the ownership structure available in Orbis. In order to ensure that our coverage of a company's trading in FX derivatives is reasonably comprehensive, we restrict our sample to trades in which the non-financial counterparty is a firm or group that is headquartered in the European Union.

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## Summary of EUR/USD FX Derivatives Market

The total daily trading volume in the bank-to-customer segment of the EUR/USD FX forward market averages EUR8.1bn, with 1,353 individual transactions on average. More than half of all transactions (762 on average) pertain to contracts with an original maturity of between 30 and 180 days. Most contracts have an underlying notional of less than EUR1m, consistent with a significant number of relatively small non-financial firms. Only about 15% of all contracts (115) have a notional in excess of EUR10m. Naturally, the number of firms active on the average trading day (553) vastly exceeds the number of active banks (64).

*Information on the cross-section of banks:* Average trading frequency is around 8 times per day, with an average notional of EUR47m, and an average of 4 counterparties. As one would expect, concentration among dealers is very high; the largest dealers account for the bulk of dealer-client activity. While the median dealer is active on only around 21% of all trading days, the 95th percentile corresponds to a dealer that is active on every trading day. There is also a high correlation between market activity and balance sheet size. While the median dealer has a balance sheet of around EUR9bn, the mean size stands at EUR263bn.



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## Summary of EUR/USD FX Derivatives Market (continued)

*Information on the cross-section of client (i.e. non-financial firms):* On average, non-financial corporations (NFCs) trade a daily notional of EUR2m. This is split across 0.35 trades involving 0.18 counterparties, meaning that, on average, most non-financial corporations trade only infrequently: just 14% of trading days involve market activity for the average NFC. As with the dealers, these cross-sectional distributions are heavily skewed to the right, with relatively few firms accounting for a large fraction of the overall trading activity and interacting with more than one dealer on a given day. The same counts for the frequency with which firms are active in the market. While the median firm is only active on 8% of all trading days, the 95th percentile firm is active on roughly every second trading day. The median firm size is around EUR200m, and the average corresponds to EUR2.17m. The three largest countries account for close to two thirds of all firms in our sample, with German firms alone representing 35% of all firms. We also find that the firms active in the FX forward market are predominantly engaged in wholesale and retail trade (50.4%) or manufacturing (27.9%), which is in line with the bulk of the trading activity being related to the need for managing the risk of future costs and revenues denominated in foreign currency. This can also explain the preponderance of German and Dutch firms, since these two economies have large export sectors.

## Table 1: Description of Variables

Variable	Description
Spread	$d \times (m_t - f_t)$ , where $d = 1$ when firm buys euro; $d = -1$ when firm sells; $m_t$ is the mid-market forward rate from Reuters; and $f_t$ is the contracted forward rate. The spread is then multiplied by 10,000 such that it is expressed in basis points.
Client size	Total assets (in logs) of the global ultimate owner of the client (i.e. non-financial firm).
Client HHI	The generalized Herfindahl-Hirschman Index (HHI) of clients (i.e. non-financial firms) with respect to the concentration of their trades with dealers. The variable is calculated on the stock of all outstanding OTC FX derivatives transactions (including non-EUR/USD) on 15/01/16. We set <i>Client HHI</i> =1 for clients that have no outstanding FX derivative transactions on 15/01/16.
Bank size	Total assets (in logs) of the global ultimate owner of the bank.
Bank HHI	The generalized Herfindahl-Hirschman Index (HHI) of banks with respect to the concentration of their trades with clients. The variable is calculated on the stock of all outstanding OTC FX derivatives transactions (including non-EUR/USD) on 15/01/16.
Client EDF	The 1-year expected default frequency (in %) of the global ultimate owner of the client (i.e. non-financial firm), sourced from Moody's Analytics (CreditEdge). When the observation is missing, we set <i>Client EDF</i> =0, and define an <i>EDF missing dummy</i> to capture the fixed effect of these cases.
EDF missing dummy	A dummy that is equal to 1 when the <i>Client EDF</i> variable is missing (before it is set to 0), and 0 otherwise.
Notional log	Total notional (in logs) of each transaction.
Tenor log	Tenor (in logs) of each transaction (measured in days).
Realized volatility	The realized volatility of the spot exchange rate, measured as the sum of the 1-minute log changes in the preceding 30 minutes, annualized.

## Table 2: Summary Statistics

Variable	N	mean	sd	p10	p25	p50	p75	p90
Spread	18,340	17.97	19.50	1.122	3.176	10.69	27.46	44.94
Client Size	19,227	19.41	3.312	15.52	16.65	18.94	22.05	24.21
Client HHI	19,227	0.531	0.425	0.0365	0.0940	0.423	1	1
Bank Size	19,227	27.33	1.268	26.31	26.91	27.48	28.12	28.32
Bank HHI	19,227	0.0279	0.0670	0.00794	0.00919	0.0172	0.0246	0.0446
Client EDF	19,227	0.103	0.562	0	0	0	0	0.0700
EDF missing dummy	19,227	0.782	0.413	0	1	1	1	1
Notional log	19,227	12.26	2.245	9.835	10.72	11.86	13.48	15.42
Tenor log	19,227	4.175	1.017	2.708	3.466	4.248	5.004	5.497
Realized volatility	19,227	9.775	5.209	5.451	6.487	8.277	11.76	15.38

### Table 3: Benchmark OLS Regressions

Variable	Dependent variable: Spread			
	(1)	(2)	(3)	(4)
Client Size		-2.437*** (0.244)		-1.659*** (0.279)
Client HHI			15.52*** (1.330)	8.547*** (1.459)
Bank Size		-1.742*** (0.327)		-1.887*** (0.397)
Bank HHI			8.166* (4.406)	-9.104** (4.541)
Client EDF		-0.493 (0.408)	-0.205 (0.442)	-0.458 (0.402)
EDF missing dummy		-4.751*** (1.429)	-0.281 (1.320)	-4.787*** (1.451)
Notional log	-0.209** (0.101)	-0.326 (0.218)	-0.891*** (0.220)	-0.238 (0.219)
Tenor log	2.031*** (0.208)	3.130*** (0.368)	3.551*** (0.350)	3.233*** (0.356)
Realized volatility	0.273*** (0.0871)	0.278*** (0.0942)	0.294*** (0.100)	0.272*** (0.0951)
Client FE	Yes	No	No	No
Bank FE	Yes	No	No	No
Observations	18,340	18,340	18,340	18,340
R-squared	0.728	0.288	0.264	0.304
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

## Table 4: Quantile Regressions

Variables	Dependent variable: Spread								
	q10	q20	q30	q40	q50	q60	q70	q80	q90
Client Size	-0.358*** (0.0135)	-0.687*** (0.0309)	-0.989*** (0.0387)	-1.254*** (0.0528)	-1.511*** (0.0639)	-1.683*** (0.0488)	-1.658*** (0.0724)	-1.703*** (0.0987)	-1.567*** (0.198)
Client HHI	1.853*** (0.153)	3.426*** (0.179)	4.575*** (0.217)	5.781*** (0.264)	6.728*** (0.275)	9.624*** (0.524)	12.99*** (0.636)	14.31*** (0.805)	18.02*** (1.384)
Bank Size	-0.632*** (0.0629)	-1.201*** (0.0625)	-1.585*** (0.0943)	-1.894*** (0.0654)	-2.570*** (0.109)	-2.622*** (0.114)	-2.722*** (0.167)	-2.648*** (0.256)	-2.367*** (0.307)
Bank HHI	2.564*** (0.735)	3.702 (2.279)	2.960 (2.612)	0.195 (1.973)	-6.137*** (1.637)	-10.51*** (1.353)	-14.41*** (1.426)	-18.83*** (1.527)	-17.90*** (5.762)
Client EDF	0.0150 (0.0245)	-0.0780** (0.0362)	-0.173*** (0.0610)	-0.263*** (0.0901)	-0.304*** (0.0839)	-0.440*** (0.0634)	-0.398** (0.198)	-0.288* (0.171)	-1.115*** (0.303)
EDF missing dummy	-0.718*** (0.0809)	-1.511*** (0.103)	-2.379*** (0.136)	-3.409*** (0.225)	-4.192*** (0.251)	-4.615*** (0.252)	-4.704*** (0.296)	-4.628*** (0.523)	-4.262*** (1.333)
Notional log	-0.159*** (0.0171)	-0.114*** (0.0356)	-0.0657* (0.0386)	-0.0969** (0.0426)	-0.115*** (0.0386)	-0.144*** (0.0444)	-0.277*** (0.0616)	-0.478*** (0.0838)	-0.491*** (0.188)
Tenor log	1.133*** (0.0556)	1.669*** (0.0684)	1.982*** (0.0677)	2.176*** (0.0485)	2.252*** (0.0673)	2.370*** (0.0890)	2.621*** (0.118)	3.088*** (0.156)	5.246*** (0.264)
Realized volatility	0.0432*** (0.0127)	0.0876*** (0.0153)	0.116*** (0.0186)	0.177*** (0.0209)	0.275*** (0.0242)	0.402*** (0.0284)	0.538*** (0.0400)	0.809*** (0.0601)	1.367*** (0.0643)
Constant	23.88*** (1.753)	44.87*** (2.074)	61.43*** (2.997)	76.78*** (2.458)	102.3*** (3.306)	108.1*** (3.403)	112.1*** (5.413)	113.7*** (7.589)	98.60*** (9.774)
Observations	18,340	18,340	18,340	18,340	18,340	18,340	18,340	18,340	18,340

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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