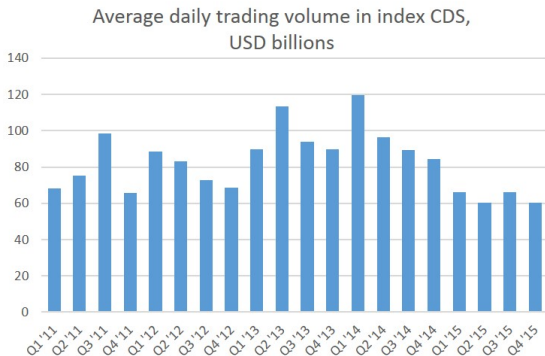# Market Structure and Transaction Costs of Index Credit Default Swaps

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SOFIE 2018

Index CDSs

- Index CDS: corporate credit risk insurance contract
- Very large market (source DTCC):

Average daily trading volume in index CDS, USD billions

- Yet, transaction costs largely unknown!

A two-tiered market structure

- ► Interesting test case of the impact of recent regulation on the structure of swap markets

- ► Since inception, a two-tiered over-the-counter (OTC) market
  - ► Dealer-to-client (D2C) and interdealer (D2D) segments

- ► Trade execution requirement of Dodd-Frank Act
  - ► Mandates trading on swap execution facilities (SEFs)...
  - ► ...via order book or request for quote (RFQ)

- ► Post Dodd-Frank, still two-tiered: little All-to-All trading!
  - → D2C SEFs (via name-disclosed RFQ) and interdealer SEFs (via anonymous trading protocols)

- ► Why?
  - → Optimal market structure (Giancarlo 2015)
  - → Dealers prevent all-to-all trading (Managed Fund Assoc. 2015)

Main Questions

- Characterize two-tiered post-Dodd-Frank index CDS market:
    - How large are transaction costs of D2C trades?
    - How do they compare to D2D t-costs?
    - How do they compare across different trading protocols (mid-market matching, workups, CLOB, RFQ)?
    - Could clients get better execution by trading on dealer platforms?
    - Do we observe dispersion in trading costs across clients in non-anonymous RFQ protocol?

- Broader economic questions:
    - What is the optimal structure of Swap markets?
        - → *All-to-All trading as envisioned by Dodd-Frank and CFTC?*
    - What is the role of Dealers?
        - → *Excessive rents due to collusion (e.g., EU investigation and US class action with $1.87bn settlement in 2015)?*

Agenda

Contracts, market structure, and data

Cost and price impact of D2C versus D2D trades

Cost and price impact across trading protocols

Market Quality

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Contracts, market structure, and data

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Market Quality

Credit Default Swap Indices

- Main indices in North America:
    - CDX.IG: Default protection on 125 investment-grade names (focus of presentation)
    - CDX.HY: Default protection on 100 high-yield names

- Maturities from 1Y to 10Y
    - 5Y most liquid

- Every 6 months, new index (new series) is launched
    - Set of index constituents revised according to rating and liquidity criteria
    - On-the-run index most liquid

- Focus on 5Y on-the-run

Index CDSs, cont'd

- ▶ Time series of par spread on 5Y on-the-run CDX.IG
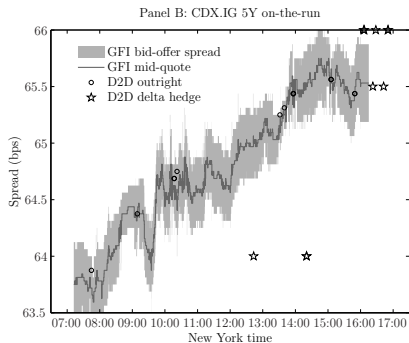
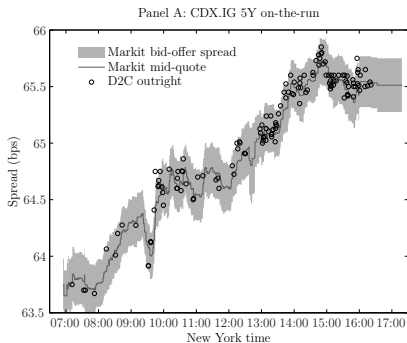# Current market structure

- D2C and D2D SEFs:

Transaction data

- Sample period: Oct. 2, 2013 (SEFs went live) to Oct. 16, 2015

- Transaction data from Swap Data Repositories (SDRs):
    - Contain timestamp, price, size
    - Do not specify SEF
    - Do not distinguish outright vs. package trades (curve trade, roll trades, delta hedges,...)

- Develop algorithms that identify
    - SEFs from format used for trade reporting (in turn identify D2C and D2D trades)
    - Package trades from simultaneous trade execution in several contracts

Quote data

- ▶ D2C segment:
    - ▶ Mid-point of composite dealer quotes from Markit
    - ▶ From "dealer runs" sent to clients
    - ▶ 443 CDX.IG 5Y OTR quotes per day

- ▶ D2D segment:
    - ▶ Mid-point of bid/offer quotes on GFI order book
    - ▶ 1,136 CDX.IG 5Y OTR quotes per day

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Transaction cost decomposition

▶ Decompose effective half-spread

$$\underbrace{q_t(p_t - m_t)}_{=\text{EffcSprd}} = \underbrace{q_t(p_t - m_{t+\Delta})}_{=\text{RlzdSprd}} + \underbrace{q_t(m_{t+\Delta} - m_t)}_{=\text{PrcImp}}$$

with transaction price p_t, mid-quote m_t, 15-minute Δ, and $q_t = \pm 1$ inferred by Lee and Ready (1991) algorithm

▶ In D2C segment:
$$m_t = m_t^{MARKIT}$$

▶ In D2D segment:
$$m_t = m_t^{GFI}$$

Transaction cost decomposition

Trade Size	Dealer-To-Client			Dealer-To-Dealer			D2C-D2D		
	Effc Sprd	Rlzd Sprd	Prc Imp	Effc Sprd	Rlzd Sprd	Prc Imp	Effc Sprd	Rlzd Sprd	Prc Imp
				Panel A: CDX.IG					
≤ 25	0.121	0.035	0.087	0.088	0.031	0.057	0.033**	0.004	0.030**
25–50	0.131	0.025	0.107	0.106	0.026	0.079	0.025**	-0.002	0.027**
50–100	0.143	0.024	0.119	0.114	0.076	0.037	0.029**	-0.052**	0.081**
> 100	0.169	0.054	0.115	0.152	0.143	0.008	0.017	-0.089**	0.106**
Total	0.137	0.034	0.103	0.098	0.036	0.063	0.039**	-0.002	0.041**

- ▶ Effective spreads an order of magnitude smaller than corporate bonds (Harris 2015) or single-name CDS (Biswas et al. 2014)

- ▶ Higher transaction costs for D2C trades than D2D

- ▶ Reflect higher price impact of D2C trades

Transaction cost decomposition

	Dealer-To-Client			Dealer-To-Dealer			D2C-D2D		
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Permanent or transitory price impact? VAR system

- What is the interrelation between D2C and D2D segments?

- Is price impact permanent (information-driven) or transitory (inventory driven)?

  - Let x_t^{D2C} (x_t^{D2D}) denote number of signed D2C (D2D) trades that occur between D2C quote revisions

  - VECM for $\Delta X_t = (\Delta m_t^{\mathrm{D2C}}, \Delta m_t^{\mathrm{D2D}}, x_t^{\mathrm{D2C}}, x_t^{\mathrm{D2D}})'$

$$\Delta X_t = \alpha(Z_{t-1} - \mu_Z) + \sum_{j=1}^{p} \Gamma_j \Delta X_{t-j} + u_t,$$

  with cointegrating relation $Z_t = m_t^{\mathrm{D2C}} - m_t^{\mathrm{D2D}}$ and adjustment coefficients α

Impulse Response Price impacts

- Estimated cumulative quote revision in response to single D2C/D2D trade:
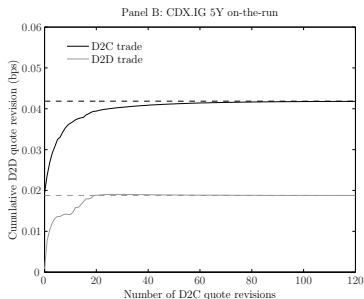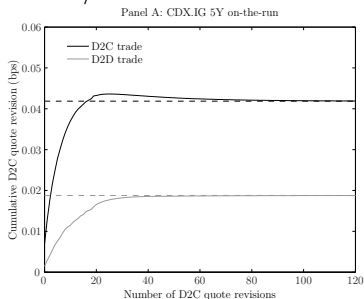
- Confirms that price impact larger for D2C trades
- Price impact is permanent
- More price discovery in DTC segment.
- → Suggest clients have information advantage over dealers:
  - Genuine private information about index constituents
  - Advantage in processing public information

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Size-discovery trading protocols

- Size-discovery: Fixed price, uncertain size (Duffie&Zhu 2016)

- Mid-market matching:
  - Price ("mid-market level") set by broker between bid and offer on limit order book

- Work-up:
  - Initiated by trade in limit order book
  - Trade additional quantity at price of initial trade

- Execution risk

Use of trading protocols on GFI

- Focus on GFI (the main interdealer SEF)

- Additional data on mid-market level for matching

- Identify trades in limit order book, mid-market matches, and workups

Trading Protocol	% of Trds	% of Vlm
Panel A: CDX.IG		
Limit order book	19.1	19.2
Workup protocol	18.4	19.9
Mid-market matching	54.8	52.2
Unidentified protocol	7.7	8.8

Transaction cost decomposition

Trading Protocol	Effc Sprd	Rlzd Sprd	Prc Imp
Panel A: CDX.IG			
Limit order book	0.132	-0.020	0.152
Workup protocol	0.131	-0.019	0.150
Mid-market matching	0.055**	0.019**	0.036**
Unidentified protocol	0.151	0.132**	0.019**

▶ CLOB trade: Expensive, high price impact, execution certainty

▶ Mid-market match: Cheap, low price impact, execution risk

▶ Partial segmentation of order flow
  ▶ consistent with model of strategic venue selection (Zhu 2014)

Transaction cost decomposition

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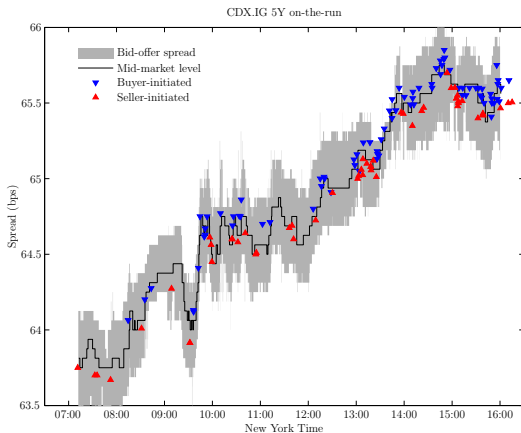 - ▶ consistent with model of strategic venue selection (Zhu 2014)

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Client execution

- 96% of D2C trades are within bid-offer spread on GFI limit order book
- $\rightarrow$ Clients who value immediacy, could not improve execution by trading in DTD limit order book.

CDX.IG 5Y on-the-run

D2C spread dispersion reflects client heterogeneity

D2C Transaction Costs and Price Impacts by Effective Half-Spread Quartiles

Trade Size	Effc Sprd				Rlzd Sprd				Prc Imp			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
					Panel A: CDX.IG							
≤ 25	0.022	0.066	0.121	0.278**	0.005	0.027	0.038	0.074**	0.017	0.040	0.083	0.204**
25–50	0.025	0.075	0.134	0.294**	0.013	0.020	0.024	0.046**	0.012	0.055	0.110	0.248**
50–100	0.029	0.084	0.146	0.313**	0.013	0.019	0.024	0.043**	0.017	0.065	0.122	0.270**
> 100	0.033	0.096	0.167	0.388**	0.013	0.030	0.042	0.143**	0.020	0.066	0.124	0.245**
					Panel B: CDX.HY							

- ▶ Strong positive correlation between effective spread and price impact of DTC trades
- → Suggests non-anonymity of RFQ benefits uninformed clients.
- ▶ Consistent with 'separating equilibrium' models of two-tiered markets (e.g., Seppi (1990))

Conclusion

- Characterize two-tiered post-Dodd-Frank index CDS market.

- Transaction costs of D2C trades larger than D2D, but due to differences in price impact rather than dealer profits

- Lower D2D transaction costs largely due to specific trading protocols (mid-market matching, workups) with lower degree of immediacy.

- D2C prices improve significantly upon contemporaneous executable D2D quotes.

- Dispersion of trading costs across clients in D2C markets largely driven by price-impact, suggests price-discrimination.

→ May explain endurance of two-tiered Swap-market structure despite Dodd-Frank 'impetus' towards All-to-All trading.