

Relationships versus Competition in OTC Markets

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This paper...

Research question:

- ▶ Why is competition low on platforms and why do clients enter exclusive relationships with dealers?

Summary:

- ▶ Clients form **exclusive client-dealer relationships** to alleviate the pervasive effects from **low competition**.
- ▶ Competition is low because of a **settlement friction** in FX markets.

Novel data:

- ▶ Detailed quote-level data from market leading request for quotes (RFQ) platform.
- ▶ Non-financial corporations use platform to trade FX products with dealer banks.

Intuition



Back

Data

Discriminatory pricing

Relationship discounts

Loyalty

This paper....:

1. Settlement friction impairs competition:

- ▶ Settlement of two currencies is difficult because it requires two different payment systems. Central clearing not practicable.
- ▶ Credit relationship required: firms entertain costly credit lines to guarantee settlement of transactions.
- ⇒ Conjecture: Settlement requirements limit firm's dealer networks and impair competition.

2. Relationship alleviates consequences frictions:

- ▶ Theories of long-run relationships: dealer (agent) provides discounts against client's (principal) patronage ([Bernhardt et al.](#), *RFS*, 2005; [Board](#), *AER*, 2011).
- ▶ Relationships are managed on an institutional level ([Qi](#), *RoF*, 2024; [Bak-Hansen and Sloth](#), *WP*, 2023) and FX trades are only a fraction of activity within the relationship.
- ⇒ Evidence from FX trading confirms that neither party wants to provide incentive for other party to leave relationship.

Main findings:

1. Discriminatory pricing:

- ▶ 45% of firms concentrate at least half of their trades on one dealer.
- ▶ These firms pay 3-4 bps wider spreads (discriminatory pricing).
- ⇒ Conjecture: Settlement requirements limit firm's dealer networks.

2. Relationship discounts:

- ▶ Outside dealers widen spreads by up to 9 bps and relationship dealers provide discounts of up to 6 bps.
- ▶ If trade size is large, outside dealer narrow their spread and quote more competitively.
- ⇒ Relationship provides dealer long-run incentive to keep their customers loyal by providing them discounts.

3. Clients' loyalty:

- ▶ In 10% of trades, firms execute quotes from relationship dealer even though outside dealer sends more favorable prices.
- ▶ If trade size and price differentials between relationship and outside dealers are large, client is less likely to be loyal.
- ⇒ Consistent with theories of long-run relationships, if loyalty is too costly, firms are tempted to execute best price from outside dealers.

Contribution/Literature

1. Novel evidence of anatomy of relationship

- ▶ Theory: Board, *AER*, 2011; Bernhardt et al., *RFS*, 2005; Desgranges and Foucault, *JEB*, 2005
- ▶ Zoom-in quote-level: Hau et al., *MS*, 2021; Allen and Wittwer, *JPE*, 2023
- ▶ Benefits of relationship: Di Maggio, Kermani, and Song, *JFE*, 2017; Hendershott et al., *JF*, 2020; Jurkatis et al., *WP*, 2022; Bak-Hansen and Sloth, *WP*, 2023

2. Settlement friction

- ▶ Search friction Duffie, Gârleanu, and Pedersen, *Econometrica*, 2005
- ▶ Informational friction Kondor and Pintér, *JF*, 2022; Baldauf and Mollner, *JPE*, forthcoming

3. Size discount

- ▶ Pinter, Wang, and Zou, *RFS*, 2024; Bernhardt et al., *RFS*, 2005

4. Improve understanding of RFQ platforms

- ▶ Riggs et al., *JFE*, 2020
- ▶ Wang, *JFE*, 2023; Yueshen and Zou, *WP*, 2022

Data

1. Proprietary data

- ▶ 2.9 mio FX platform trades
 - ▶ restricted to 5 currency pairs
 - ▶ different products: spot, forward, swap, forward swap
- ▶ Over 24 mio requests for quotes
- ▶ January 2018 to June 2021
- ▶ Anonymized requester identifier for non-financial firms (N=1,478) and bank identifier (N=371)
- ▶ Compared to BIS Triennial Survey: Global market share of non-financial corporate sector: 6.5%

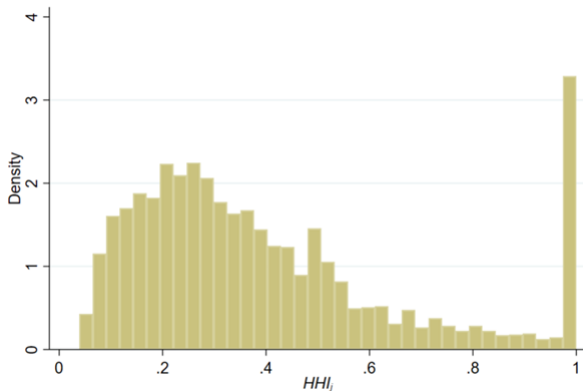
2. Refinitiv tick history

- ▶ Inter-bank high-frequency spot prices (minute level)
- ▶ For currency pairs: EURUSD, EURGBP, EURCHF, GBPUSD, USDCHF

Sum Stats

Intuition

Clients' network usage

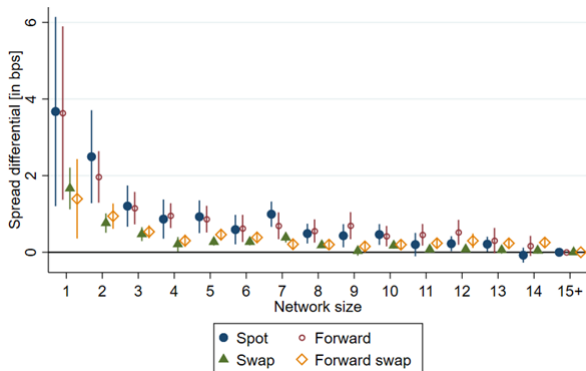


- ▶ 8% of clients are locked-in ($HHI_j = 1$).
- ▶ 45% of clients concentrate at least 50% of trades on one dealer.

Distribution Connections

Trade-level evidence: Discriminatory pricing

$$\text{Spread}_{j,i,t} = \sum_{n=1,\dots,14} \delta_n \times \mathbb{1}_{N_t=n} + \beta \ln(\text{Notional}_r) \\ + \alpha_{\text{dealer}} \times \alpha_{\text{date}} \times \alpha_{\text{currency}} \times \alpha_{\text{direction}} \times \alpha_{\text{tenor}}$$



- ▶ Back-of-the-envelope calculation: EUR 36 million yearly.
- ▶ Only tip of the iceberg.

Trade-level evidence: Discriminatory pricing

$$\text{Spread}_{j,i,r} = \delta \times HHI_j + \beta \times \ln(\text{Notional}_r) \\ + \alpha_{dealer} \times \alpha_{date} \times \alpha_{currency} \times \alpha_{direction} \times \alpha_{tenor}$$

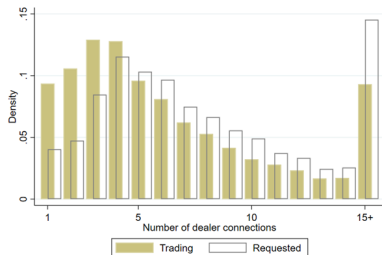
Table: Dealer competition and spreads

	(1) Spot	(2) Forward	(3) Fwd $\tau \geq 90$	(4) Swap	(5) Fwd swap
HHI_j	3.029*** (0.521)	3.871*** (0.627)	14.339*** (2.787)	1.235*** (0.152)	0.661*** (0.099)
Notional_r	0.011 (0.011)	0.008 (0.008)	-0.015 (0.031)	-0.016 (0.010)	-0.012** (0.006)
Obs	365,684	245,433	77,103	84,107	266,356
R ²	0.43	0.84	0.85	0.96	0.79
Within-R ²	0.02	0.02	0.04	0.01	0.01
FE: $i \times t \times c \times d \times \tau$	Yes	Yes	Yes	Yes	Yes

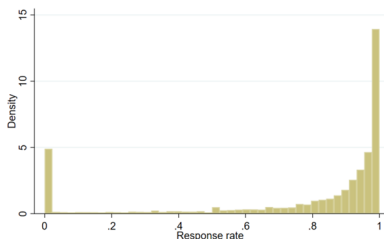
Measuring Spreads

Spread Sumstat

Limits to competition: credit risk



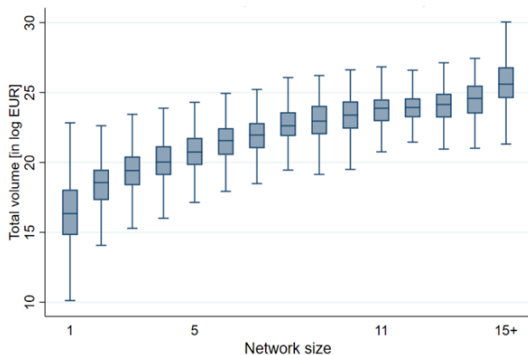
- Firms request more dealer than they trade with. Two reasons:
 1. Quotes are not competitive.
 2. Dealer refuse to quote.



- Firms near distress are turned-off from automated quoting.
- Less connected firms ($HHI_j > .5$) have 23% of never-quoting dealer connections and well connected firm ($HHI_j \leq .5$) only 10%.

Distribution HHI

Limits to competition: size-cost trade-off



- Typically, credit lines represent 16% of total book assets ([Sufi, RFS, 2009](#)), which cost 61 bps in upfront fee and 32 bps annually if undrawn ([Berg, Saunders, and Steffen, JF, 2016](#)).
- ⇒ Monotonic relationship between network size and trade intensity is consistent with fixed costs of dealer connections.

Relationships discount

$$Spread_{j,i,t} = \sum_{b=0,0.1,\dots,1} \delta_b \times \mathbb{1}_{|HHI_j - b| < .05} + \beta \ln(Notional_r) + \alpha_{i \times t \times c \times d \times \tau}$$

Figure: Spot

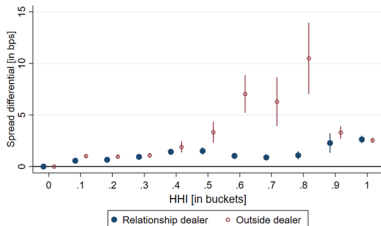
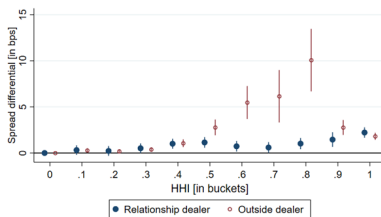


Figure: Forward with tenure < 30



Spread Sumstat

Competition Index

Within-request: discount

Other products

Table

Relationship premium

Relationship and response rates

Intuition

Trade size and competition

Table: Competition and trade size

	Spot		Forward	
	(1) RelD	(2) OutD	(3) RelD	(4) OutD
HHI_j	4.788*** (1.695)	65.806*** (17.999)	3.319*** (1.059)	48.804*** (10.288)
$Notional_r$	0.056* (0.031)	0.540*** (0.179)	-0.010 (0.020)	0.318** (0.119)
$HHI_j \times Notional_r$	-0.202* (0.114)	-4.524*** (1.175)	0.038 (0.049)	-3.146*** (0.610)
Obs	255,230	2,483,023	273,224	2,134,379
R ²	0.45	0.41	0.77	0.71
Within-R ²	0.01	0.12	0.01	0.07
FE: $i \times t \times c \times d \times \tau$	Yes	Yes	Yes	Yes

- Outside dealer: Short-run profit maximization.

Swap products

When do potential competitors quote?

$$Y_{r,i} = \alpha_r + \beta_1 RelD + \beta_2 RelD \times \ln(notional)$$

Sample: $HHL_j > .336$

Table: Within-request dealer competition and trade size

	Forward			Forward $\tau > 90$		
	(1)	(2)	(3)	(4)	(5)	(6)
	$P(Quote_i)$	$P(Exec_i)$	$Quote_i$	$P(Quote_i)$	$P(Exec_i)$	$Quote_i$
RelD	0.111*** (0.006)	1.076*** (0.007)	-22.798*** (0.161)	0.308*** (0.010)	1.137*** (0.013)	-9.807*** (0.232)
RelD $\times$ Notional _r	0.001 (0.000)	-0.050*** (0.001)	1.629*** (0.013)	-0.014*** (0.001)	-0.055*** (0.001)	0.624*** (0.018)
Obs	928,875	928,875	333,164	373,639	373,639	154,687
R ²	0.32	0.25	0.54	0.34	0.25	0.39
Within-R ²	0.03	0.21	0.11	0.04	0.20	0.05
Request FE:	Yes	Yes	Yes	Yes	Yes	Yes

- Competition intensifies with trade size.
- Relationship dealers follow long-run relationship strategy and outside dealer maximizes short-run profits.

Figure: Single-dealer trades

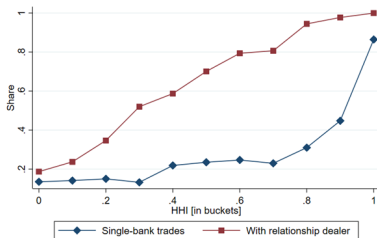
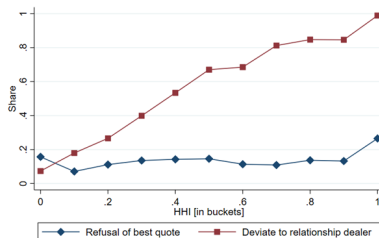


Figure: Multi-dealer trades



- ▶ Less connected firms are loyal to their dealers.

Intuition

$$\mathbb{1}_{Exec_i | Not\ Best} = \gamma \times X_r + \beta \times \log(Tenor_r) + \alpha_j$$

Table: Determinants of refusal to execute best quote

	(1)	(2)	(3)
<i>Notional_r</i>	-0.023** (0.010)		
Quote distance _r		-0.012*** (0.003)	
Cost _r			-0.047*** (0.013)
<i>Tenure_r</i>	-0.014 (0.013)	-0.010 (0.013)	-0.005 (0.013)
Obs	31,130	31,137	31,128
R ²	0.38	0.38	0.41
Within-R ²	0.01	0.01	0.06
FE: <i>j</i>	Yes	Yes	Yes

Conclusion

- ▶ Credit lines are a prerequisite to guarantee settlement which poses a friction to dealer competition.
- ▶ Relationships alleviate friction.
 - ▶ Dealers provide discounts to relationship clients.
 - ▶ Clients are loyal to relationship dealers.
- ▶ Likely affects smaller and financially constrained firms more.

Policy implication:

- ▶ Widening access to multiple dealers is first step towards more competitive markets.
- ▶ Clients would deliberately move onto platform if competition was high.

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Appendix

Summary statistics I

Table: Trade level summary statistics

	N	Mean	Med	SD	Min	Max
Spot						
Notional [in mio EUR]	669,123	3.2	0.89	12.71	0.00	1,401.02
Tenure [in days]	669,097	2.9	2.00	1.10	0.00	115.00
#banks requested	669,172	7.4	4.00	8.16	1.00	42.00
Response rate	669,172	.93	1.00	0.13	0.03	1.00
Forward						
Notional [in mio EUR]	1,487,736	2.7	0.42	11.56	0.00	2,844.11
Tenure [in days]	1,487,830	140	58.00	211.68	0.00	7,304.00
#banks requested	1,487,830	7.8	6.00	6.35	1.00	65.00
Response rate	1,487,830	.85	0.94	0.19	0.04	1.00
Observations	2,924,883					

Back

Summary statistics II

Table: Trade level summary statistics

	N	Mean	Med	SD	Min	Max
Swap						
Notional [in mio EUR]	213,483	23	4.06	50.12	0.00	2,259.79
Tenure [in days]	213,497	77	35.00	113.73	1.00	3,655.00
#banks requested	213,497	10	9.00	7.39	1.00	65.00
Response rate	213,497	.87	0.93	0.16	0.04	1.00
(Forward-Swap						
Notional [in mio EUR]	554,334	23	5.74	47.81	0.00	2,628.18
Tenure [in days]	554,384	44	14.00	109.10	1.00	4,759.00
#banks requested	554,384	9.9	8.00	8.42	1.00	64.00
Response rate	554,384	.86	0.92	0.18	0.03	1.00
Observations	2,924,883					

Back

Measuring spreads

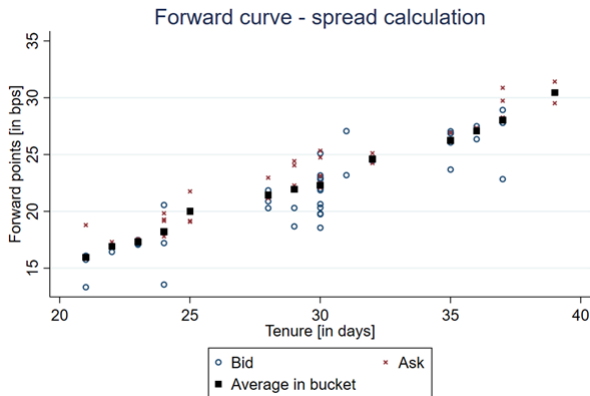
- ▶ $Spot\ Spread = \frac{S_{j,i} - S}{S} \times 10,000$ (in bps)
- ▶ (*Cleaned*) spreads of forward similar to [Abbassi and Bräuning, RFS, 2021](#)
- ▶ Idea: extract forward curve ($F = S \frac{1+i^{foreign}}{1+i^{domestic}}$)
- ▶ Residuals ε from regression

$$\frac{F - S}{S} = \alpha_{currency\ pair} \times \alpha_{tenure} \times \alpha_{date} + \varepsilon$$

- ▶ F is the quoted forward rate and S is the high-frequency interbank spot rate
 - ▶ Swaps and forward swaps are quoted in swap rate ($F - S$)
- ⇒ (*Cleaned*) spread = $\varepsilon \times 10,000$ (in bps)
- ⇒ Effective (*cleaned*) spread = $\begin{cases} + (\text{Cleaned})\ spread & \text{if ask} \\ - (\text{Cleaned})\ spread & \text{if bid} \end{cases}$

back

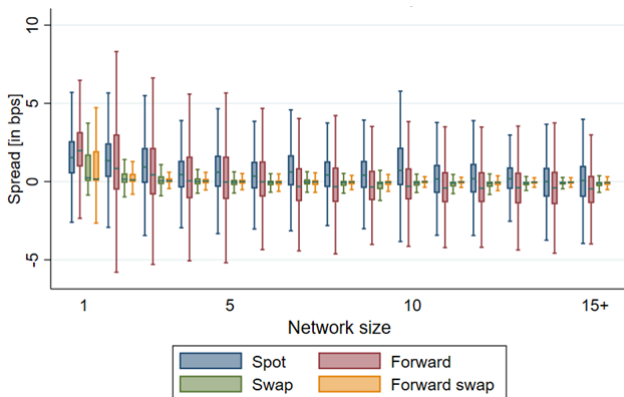
Illustration: Spread Calculation



Random day in EURUSD

back

Spread Calculation: Summary Statistics

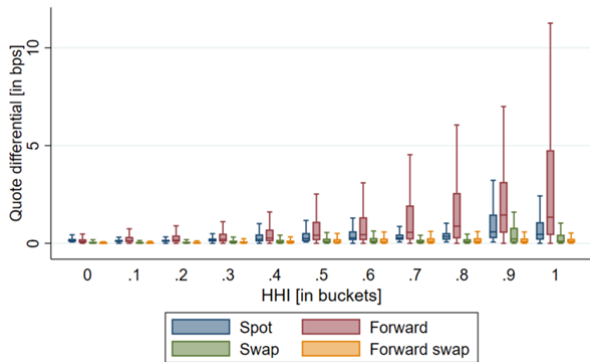


Discriminatory Pricing

Relationship Discount

Competition Index

- ▶ Following Riggs et al. (2020): Difference between best and second best quote in bps



Discriminatory Pricing

Relationship Discount

Relationships and response rates

Definition: Relationship dealer with largest trade share of client during year (*RelD*).

$$\text{Quoting}_{j,i,r} = \delta_1 \times HHI_j + \delta_2 \times RelD_{j,i} + \delta_3 \times HHI_j \times RelD_{j,i} + \beta_1 \ln(\text{Notional}_r) + \beta_2 \ln(\text{Tenor}_r) + \alpha_n + \alpha_{i \times t \times c \times d}$$

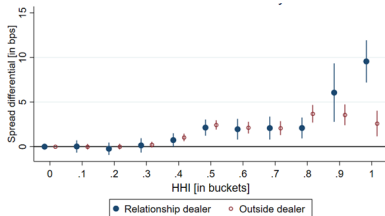
Relationship Discount

Table: Response rates, dealer competition and relationships

	Spot		Forward	
	(1) All	(2) Restricted	(3) All	(4) Restricted
HHI_j	-0.406*** (0.045)	-0.096*** (0.024)	-0.297*** (0.043)	-0.128*** (0.035)
$HHI_j \times RelD_{j,i}$	0.341*** (0.041)	0.078*** (0.025)	0.241*** (0.033)	0.107*** (0.026)
$RelD_{j,i}$	-0.018** (0.007)	0.005 (0.005)	0.016* (0.008)	0.026*** (0.007)
$Notional_r$	-0.002 (0.001)	-0.000 (0.001)	0.001 (0.003)	0.002 (0.003)
$Tenor_r$			-0.018*** (0.002)	-0.019*** (0.002)
Obs	3,082,485	2,970,859	7,373,168	7,133,592
R ²	0.44	0.38	0.41	0.37
Within-R ²	0.02	0.00	0.02	0.01
FE: $n + i \times t \times c \times d$	Yes	Yes	Yes	Yes

Relationships discount II

Figure: Forward with tenure ≥ 30



► Pricing of credit risk?

Figure: Swap

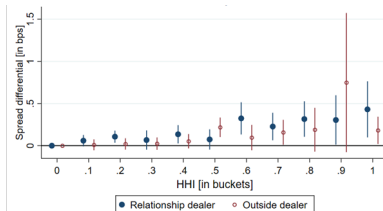
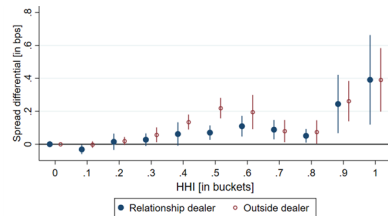


Figure: Forward swap



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Relationships discount III

$$\text{Spread}_{j,i,t} = \delta_1 \times HHI_j + \delta_2 \times \text{RelD}_{j,i} + \delta_3 \times HHI_j \times \text{RelD}_{j,i} \\ + \beta \ln(\text{Notional}_r) + \alpha_{i \times t \times c \times d \times \tau}$$

Table: Relationship discounts

	(1) Spot	(2) Forward	(3) Fwd $\tau \geq 90$	(4) Swap	(5) Fwd swap
HHI_j	9.244*** (0.816)	9.375*** (0.708)	7.936*** (0.492)	0.337*** (0.070)	0.449*** (0.038)
$\text{RelD}_{j,i}$	0.408*** (0.093)	0.704*** (0.138)	-1.610*** (0.226)	-0.092*** (0.018)	-0.002 (0.008)
$HHI_j \times \text{RelD}_{j,i}$	-6.432*** (0.829)	-6.156*** (0.747)	4.226*** (0.935)	0.453*** (0.103)	-0.170*** (0.048)
Notional_r	-0.153*** (0.020)	-0.162*** (0.015)	-0.166*** (0.023)	-0.049*** (0.004)	-0.038*** (0.003)
Obs	2,801,761	2,523,278	763,019	546,398	1,298,819
R ²	0.35	0.68	0.78	0.91	0.84
Within-R ²	0.05	0.04	0.03	0.01	0.01
FE: $i \times t \times c \times d \times \tau$	Yes	Yes	Yes	Yes	Yes

Relationships premium or discount?

Table: Relationship premium for long-tenor forwards

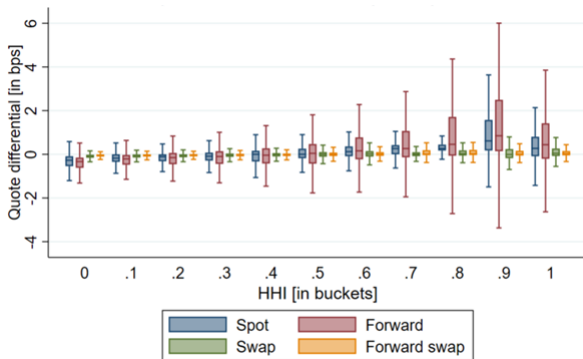
	USD lending		USD funding	
	(1)	(2)	(3)	(4)
HHI_j	8.435*** (0.619)	12.497*** (2.895)	7.029*** (0.731)	9.607*** (2.264)
RelD	-0.914*** (0.248)	-0.349 (0.572)	-2.279*** (0.356)	-1.665* (0.888)
$HHI_j \times \text{RelD}$	0.990 (1.022)	-0.389 (3.080)	7.492*** (1.434)	6.205** (2.859)
Notional _r	-0.192*** (0.027)	0.003 (0.020)	-0.087*** (0.030)	-0.029 (0.074)
Obs	555,545	56,473	207,474	20,189
R ²	0.77	0.85	0.79	0.85
Within-R ²	0.03	0.04	0.04	0.06
FE: $i \times t \times c \times d \times \tau$	Yes	Yes	Yes	Yes

Relationship premium:

- ▶ Outside dealer offers more favorable prices.
- ▶ Evidence suggests that client is not able to locate best dealer.

Within-request: Relationship discount

- Difference between quote by relationship dealer and best competing quote in bps



Discriminatory Pricing

Relationship Discount

Trade size and competition

Table: Competition and volume

	Swap		Forward swap	
	(1) RelD	(2) OutD	(3) RelD	(4) OutD
HHI_j	1.884*** (0.622)	1.440 (1.306)	0.882* (0.456)	6.616*** (1.693)
Volume	0.011** (0.005)	-0.046*** (0.015)	0.002 (0.005)	0.009 (0.013)
$HHI_j \times \text{Volume}$	-0.078** (0.036)	-0.079 (0.085)	-0.040 (0.031)	-0.405*** (0.109)
Tenure	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
Obs	42,823	486,989	82,790	1,136,995
R^2	0.97	0.91	0.89	0.85
Within- R^2	0.01	0.01	0.00	0.01
FE: $i \times t \times c \times d$	Yes	Yes	Yes	Yes

- Competition intensifies with trade size.