

Repo Market Functioning : The Role of Capital Regulation

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Disclaimer: This presentation represents our own views and not necessarily those of the Bank of England or its staff.



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This paper

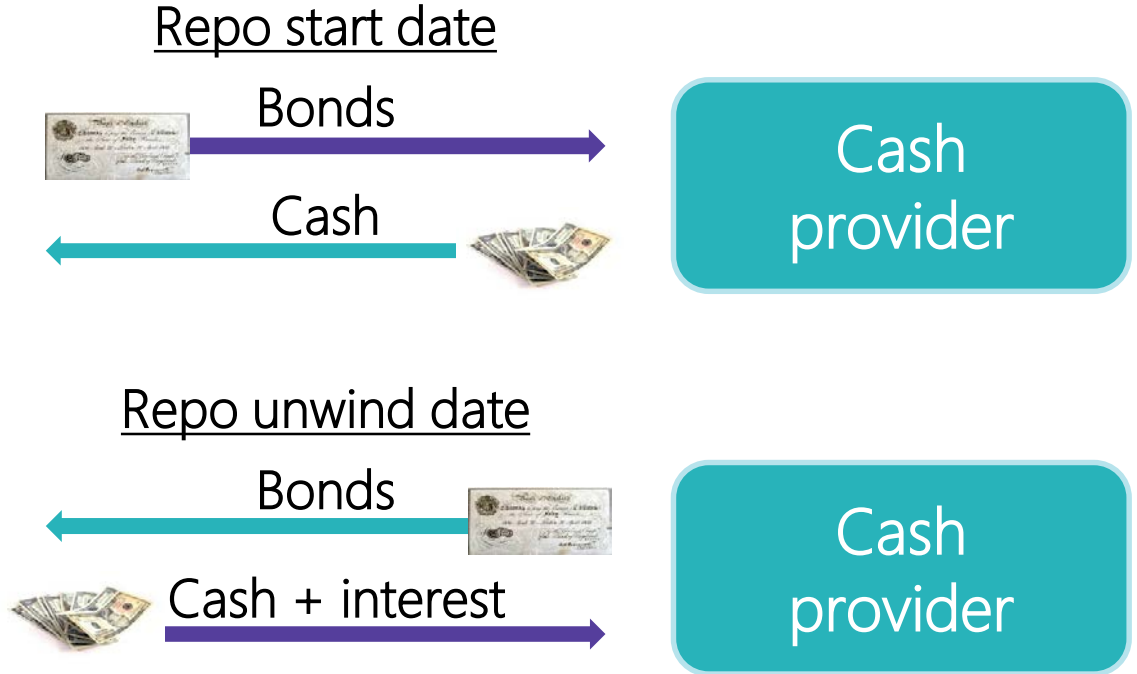
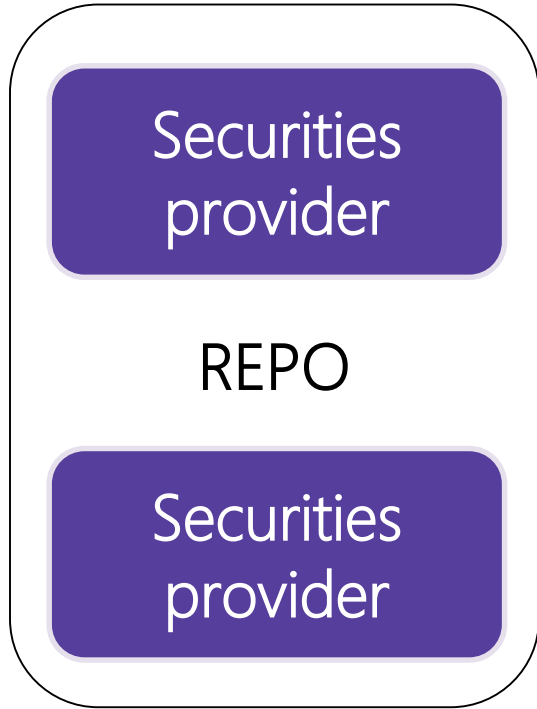
Leverage ratio



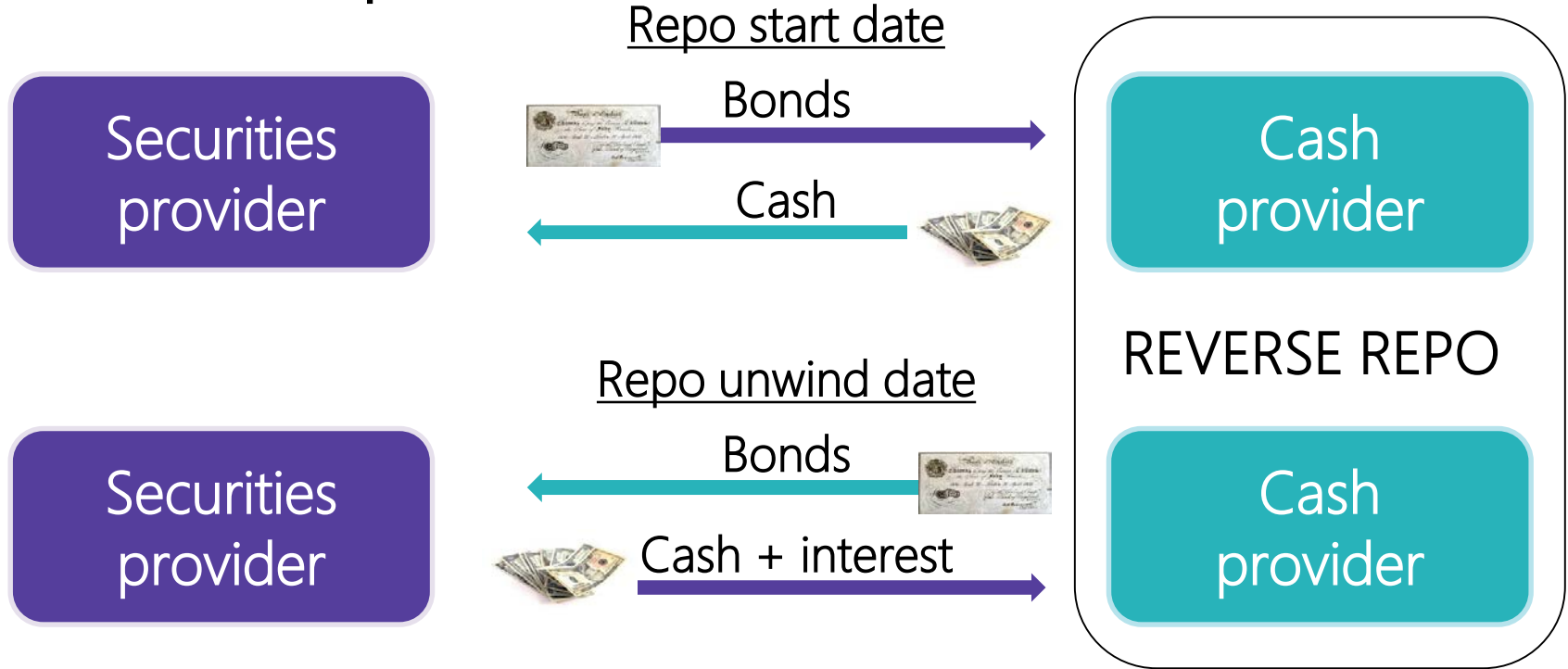
Repo market



What is repo?



What is repo?



Why do we care about the repo market?

Key source of short-term funding for banks

Low risk investment cash

Main vehicle sourcing and financing (government) bonds

Very large: \$12 trillion outstanding

Essential for financial stability and efficient transmission
monetary policy

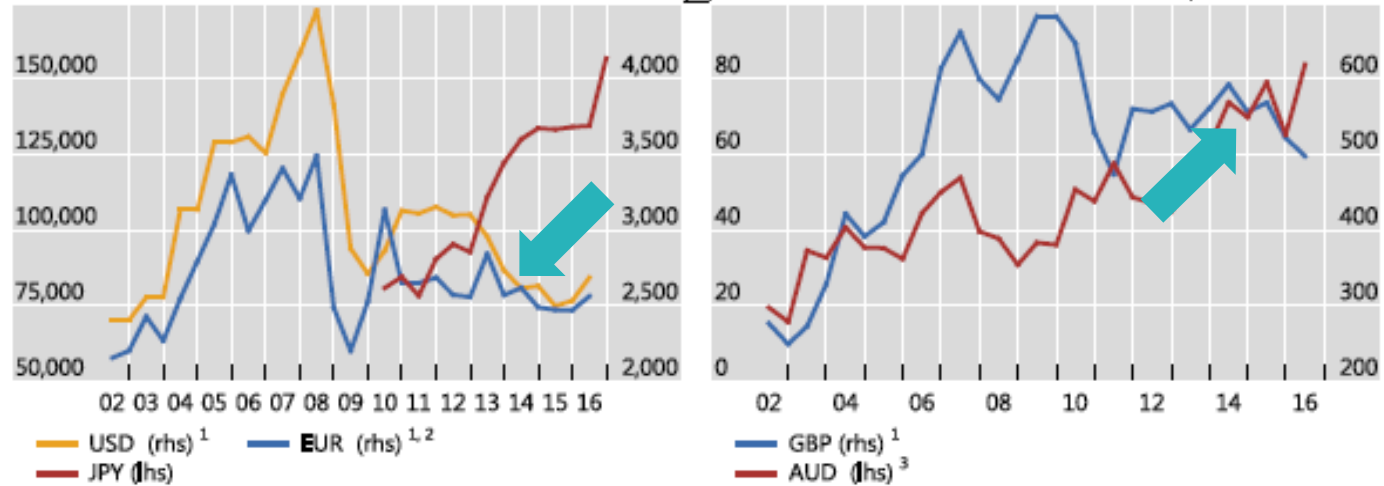


Reduction in repo activity

Repo market activity

Outstanding amount in billions of local currency

Graph 1



Source: CGFS report on Repo market functioning



Leverage ratio and repo market

Leverage ratio



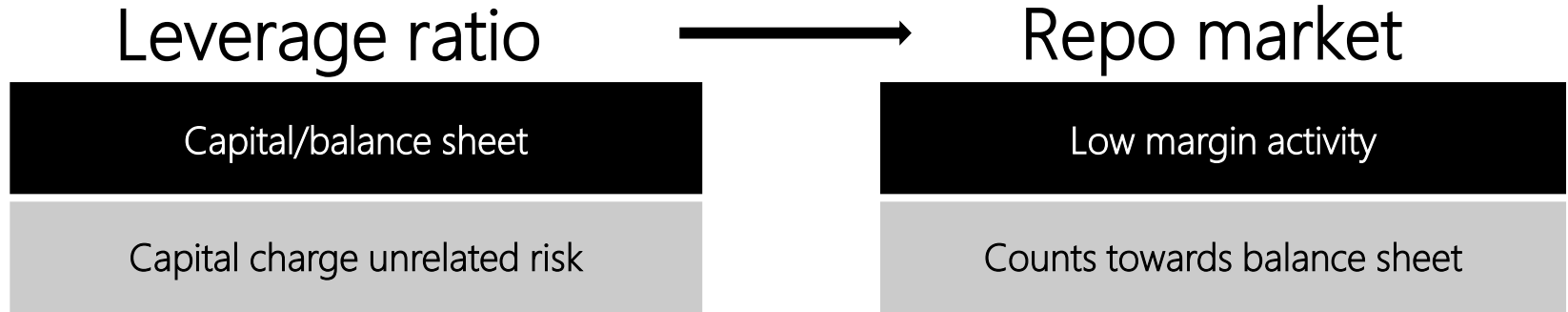
Repo market

Capital/balance sheet

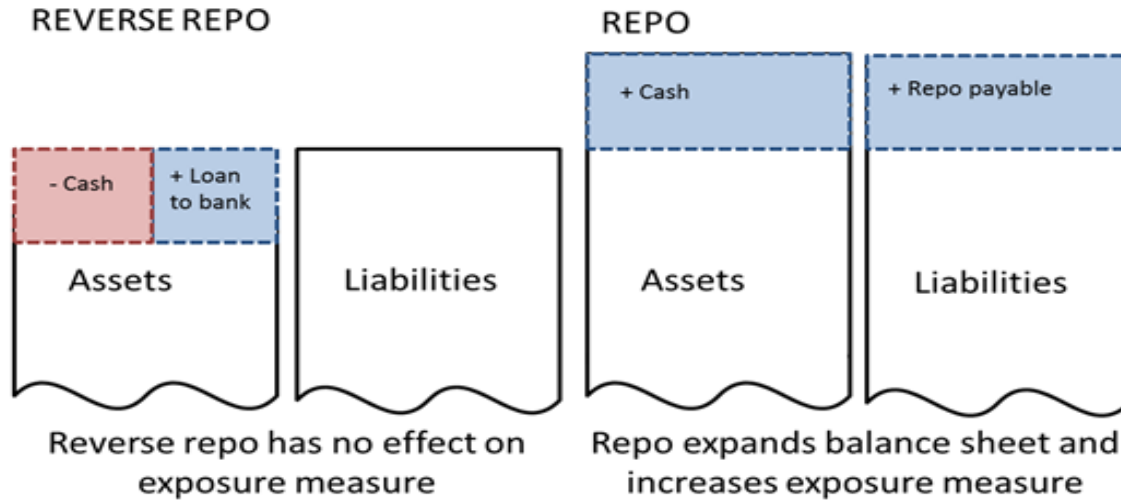
Capital charge unrelated risk



Leverage ratio and repo market



Leverage ratio and repo market



Leverage ratio and repo market

Leverage ratio

Capital/balance sheet

Capital charge unrelated risk



Repo market

Low margin activity

Counts towards balance sheet

Relative more costly



What do we know

- EU banks step out of triparty repo and cash surges in RRP at Q-ends
Munyan, 2017; Anbil & Senyuz, 2018
- Higher spreads between GCF and triparty repo
Duffie & Krishnamurthy, 2016
- Bank-affiliated broker-dealers reduced triparty repo borrowing after SLR
Allahrakha, Cetina & Munyan, 2016
- No impact of leverage ratio in EU/UK repo markets
Bicu, Chen and Elliot, 2017; Baldo, Bucalossi and Scalia, 2018
- CIP deviations increase towards Q-ends
Du, Tepper & Verdelhan, 2018



What we know

Indicate leverage ratio constraints repo activity

- Evidence mainly based on US MMF and triparty repo
- Focusing on differences across dealers, not cash investors
- Not clear to what extent leverage ratio constraints driving results



Open questions

Impact on more diverse set of cash investors?

Differential effects across types?

Competitive effects in repo market?

Impact on repo markets with different structure?

More complete picture of impact leverage ratio on repo markets



This paper

Impact leverage ratio on UK gilt repo market

Quasi-natural experiment: Policy change in UK

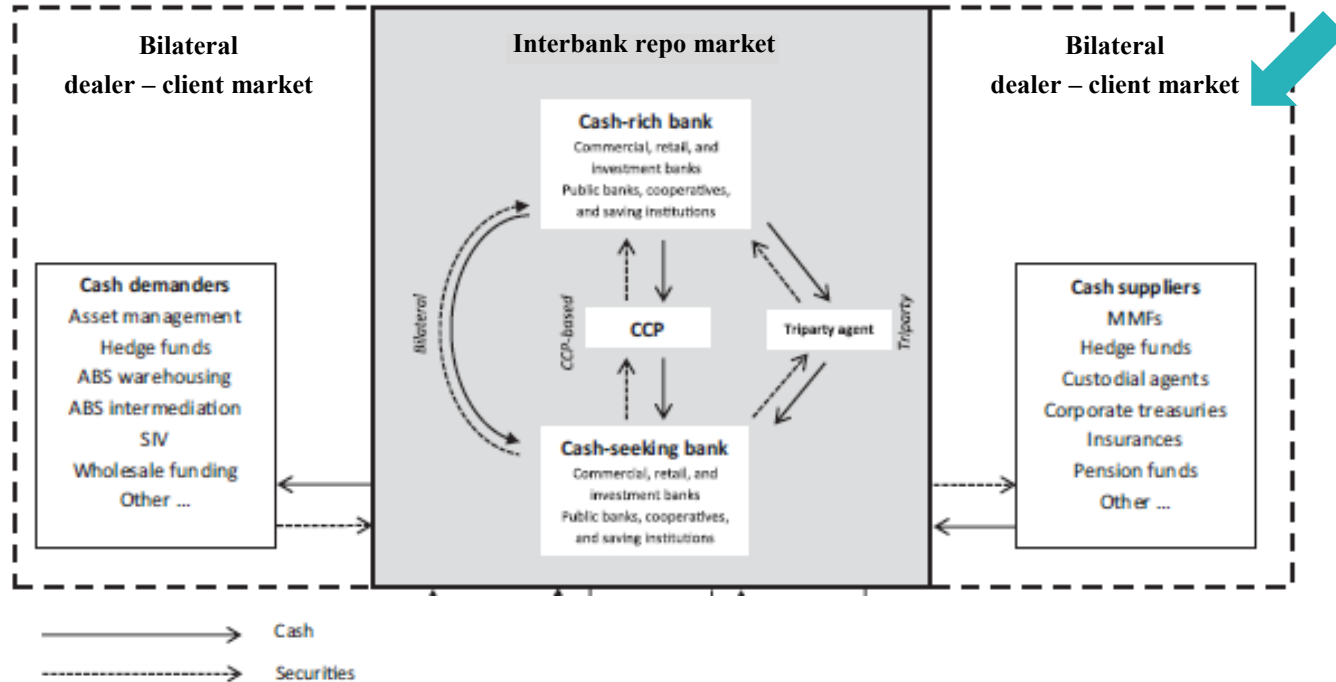
Transaction level data

Ability cash investors to invest cash low risk and access securities

Heterogeneous and competition effects



Focus: Bilateral dealer-client market



Bilateral dealer-client market

Directly affects balance sheet dealer

Not intermediated CCP → no netting

Important: 70% transaction volume



Main take-away

Leverage ratio reduces willingness dealers engage in repo

Mainly affects their small clients

Non-affected dealers step in and take market share

Causal evidence that leverage ratio affects repo market liquidity with important heterogeneous and competition effects



Quasi – natural experiment

Change in reporting requirements in UK

January 2016: Introduction 3% leverage ratio

7 stress-tested banks

January 2017: “monthly averaging” to “daily averaging”

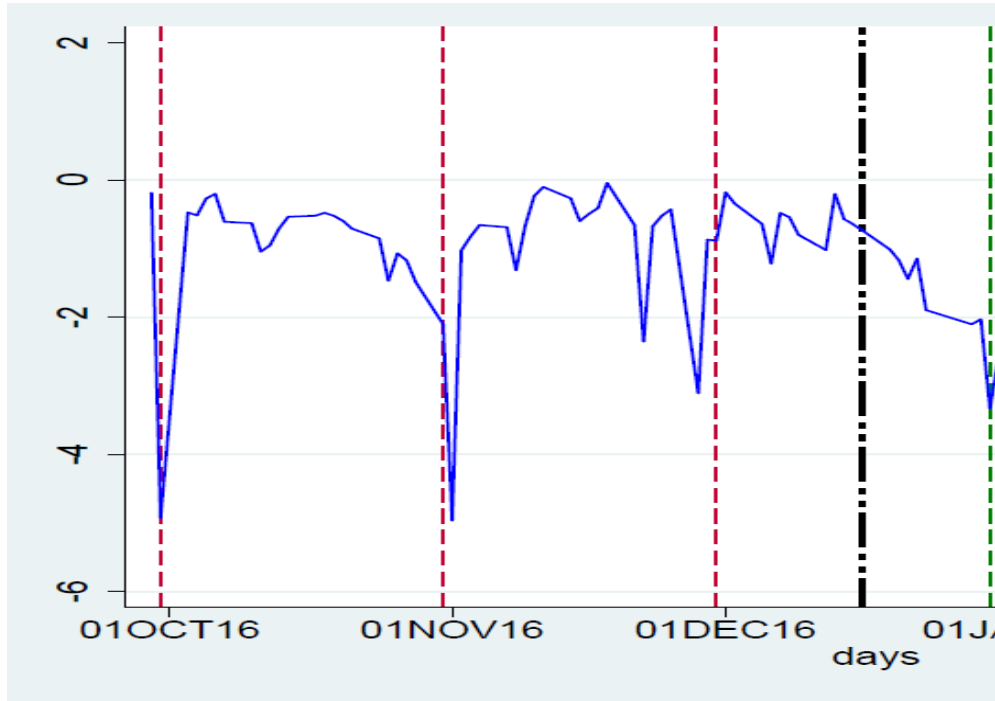
Reduces ability to window dress

Tightens leverage ratio

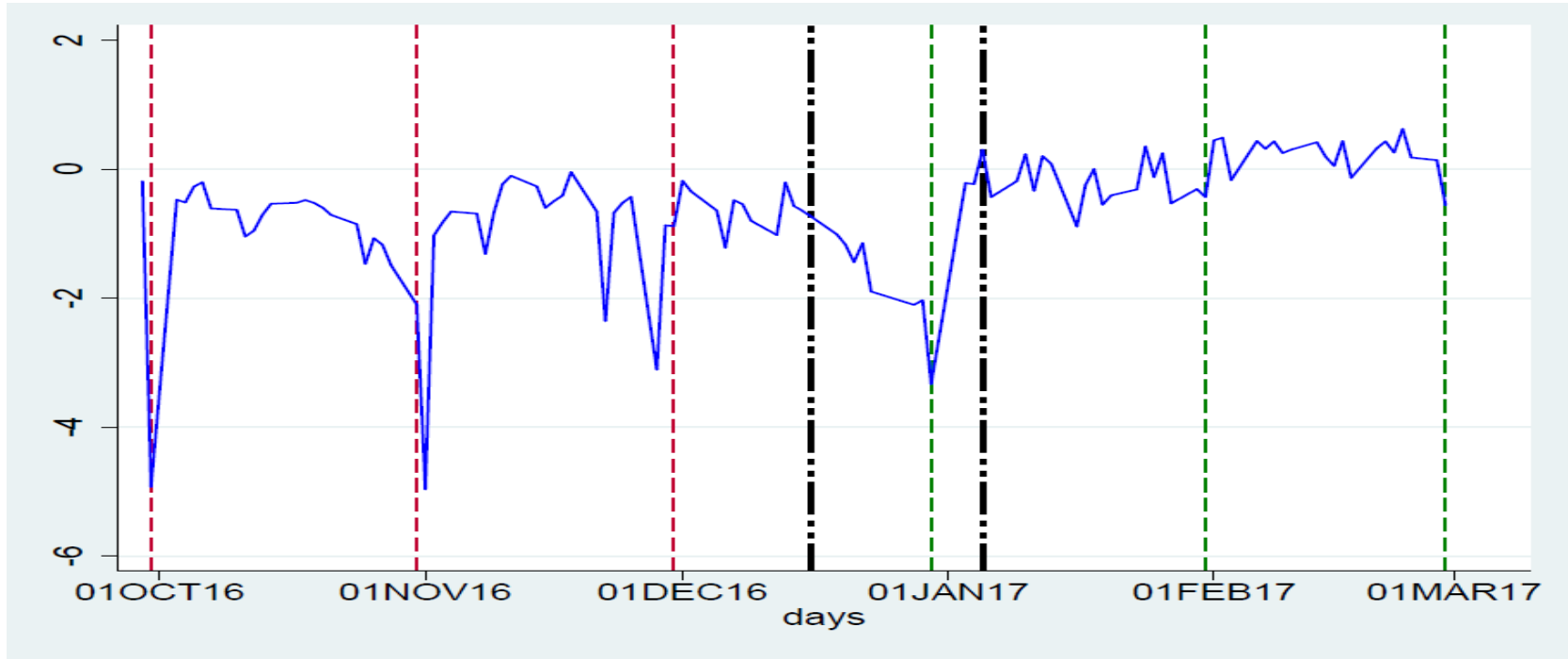
Affected 4 dealers in repo market, 12 unaffected



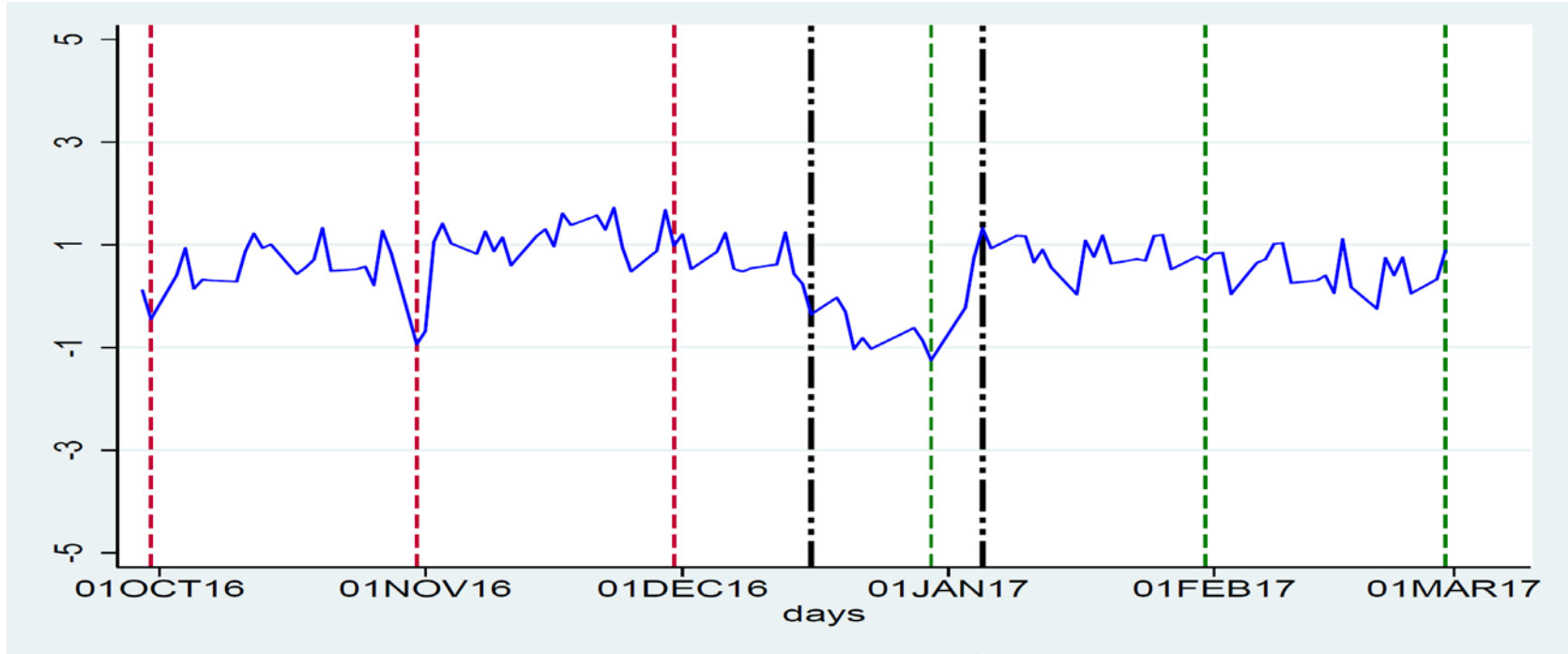
Affected dealers reacted to this shock



Affected dealers reacted to this shock



Non-affected dealers did not



Key advantages of policy shock

Natural control and treatment group

Isolated change

Limited anticipation effects

All affected dealers incentive to react

Exploit exogenous intensification of leverage ratio



Sterling Money Market Database (SMMD)

Near-universe gilt repo transactions

From February 2016 onward

23 reporting banks (95% market)

Term up to 1 year

Size, rate, maturity, collateral etc.



Sterling Money Market Database (SMMD)

Key feature I

Dealer and client known

Key feature II

All repo transactions

No reliance on algorithms (Furfine, 1999)



Sterling Money Market Database (SMMD)

Cleaning

Clients: Banks and non-bank financial institutions

Exclude if only sector known (privacy laws)

Aggregate legal entities into parent companies

Only clients with at least two dealers (>99% volume)

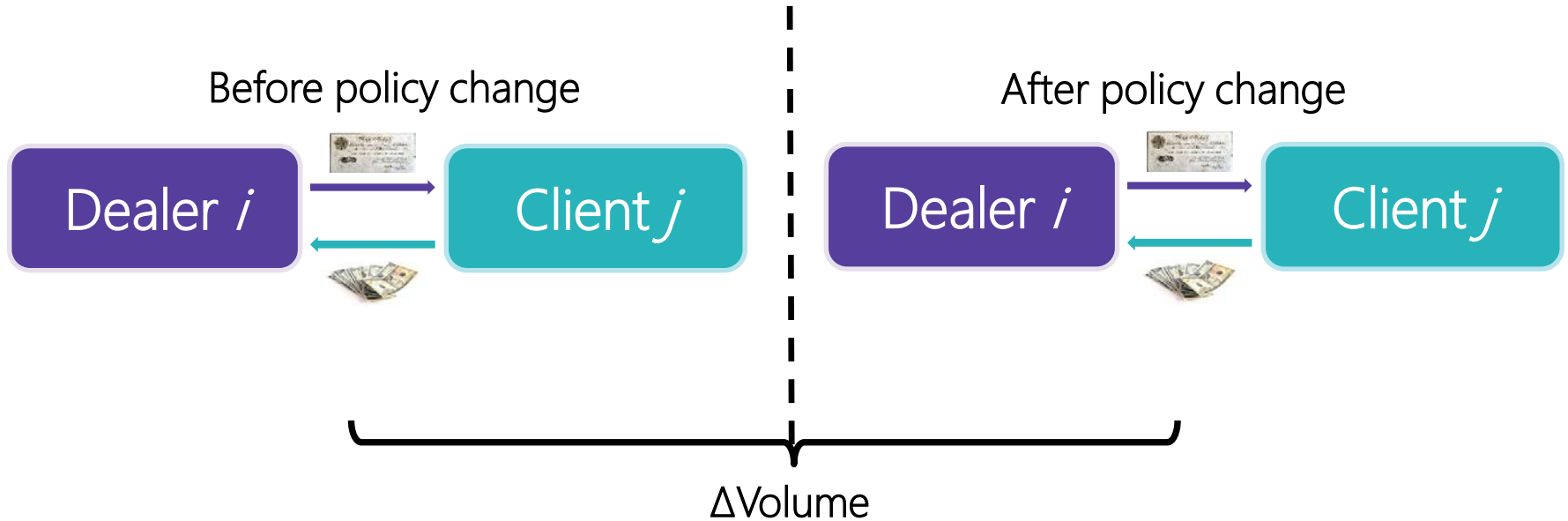
Our sample

15 dealers, 38 clients, 126 dealer–client pairs



Model

Change LR Reporting :
January 01, 2017



Model

Unit of observation: dealer-client pair

- Collapse transactions into pre-post

Sample period: 1 month before and after

- Pre = 21 Nov – 16 Dec; Post = 05 Jan – 01 Feb
- Avoid end-of-year adjustment

Rationale short sample period

- Market short-term with repeated interactions
- Reduce probability confounding factors



Baseline model

$$\Delta Y_{ij} = \beta_1 \textit{Affected}_i + \beta_2 \textit{Relationship}_{ij} + \mu_j + \varepsilon_{ij}$$

ΔY_{ij}	Pre-post change repo volume accepted by dealer i from client j
$\textit{Affected}_i$	D=1 if dealer affected by leverage ratio
$\textit{Relationship}_{ij}$	Frequency transactions ij in pre-period
μ_j	Client fixed effects

OLS, clustering at dealer level



Baseline effect

	$\Delta \log(\text{Volume})$			
	[1]	[2]	[3]	[4]
Affected Dealer	-0.404**	-0.431**	-0.446*	-0.664*
	0.179	0.174	0.231	0.312
Relationship		-0.767	-1.074	-1.705
		0.993	1.056	1.276
Constant	0.137	0.159		
	0.113	0.108		
Client's Sector FE	no	no	yes	no
Client FE	no	no	no	yes
N	126	126	126	126
R²	0.027	0.031	0.065	0.333

Significance Levels: .01***; .05**; .1*

Reduction repo volume

Baseline effect

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Accept 49 pp lower volume from same client

Heterogeneous effects

Large vs small clients (CGFS report)

- Ancillary business
- More profitable
- Nettable

Other characteristics

- Relationship in repo market
- Domestic vs foreign
- Sector



Heterogeneous effects

$$\Delta Y_{ij} = \beta_1 \textit{Affected}_i \times \textit{Small}_j + \beta_2 \textit{Relationship}_{ij} + \mu_j + \varphi_i + \varepsilon_{ij}$$

ΔY_{ij} Pre-post change repo volume accepted by dealer i from client j

$\textit{Affected}_i$ D=1 if dealer affected by leverage ratio

\textit{Small}_j D=1 if client below median repo activity pre - period

μ_j Client fixed effects

φ_i Dealer fixed effects



Heterogeneous effects: Small vs large

	$\Delta \log(\text{Volume})$				
	[1]	[2]	[3]	[4]	[5]
Affected Dealer * Small	-0.900***	-0.880***	-0.829*	-1.415**	-1.345***
	0.228	0.228	0.397	0.514	0.433
Affected Dealer	-0.139	-0.159	-0.196	-0.305	
	0.207	0.2	0.233	0.278	
Small	0.490**	0.446*	0.506**		
	0.19	0.204	0.195		
Relationship		-0.487	-0.575	-1.217	-1.101
		1.071	1.091	1.328	1.547
Constant	0.017	0.042			
	0.138	0.133			
Client's Sector FE	no	no	yes	no	no
Client FE	no	no	no	yes	yes
Dealer FE	no	no	no	no	yes
N	126	126	126	126	126
R²	0.057	0.058	0.089	0.378	0.463

Significance Levels: .01***; .05**; .1*

No impact large clients

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Significance Levels: .01***; .05**; .1*

Strong impact small clients

Heterogeneous effects: Small vs large

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Significance Levels: .01***; .05**; .1*

74 pp lower volumes small relative to large clients

Heterogeneous effects: Other client types

	$\Delta \log(\text{Volume})$							
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Affected Dealer * Relationship	1.259*	0.77						
	0.656	0.795						
Affected Dealer * Long-Term Repos			0.408	0.419				
			0.487	0.491				
Affected Dealer * Foreign					-0.483	-0.159		
					0.414	0.41		
Affected Dealer * Reverse Repo							-0.093	-0.300
							0.637	0.616
Affected Dealer * Small		-0.870**		-1.350**		-1.325**		-1.383***
		0.386		0.449		0.45		0.433
Client FE	yes	yes	yes	yes	yes	yes	yes	yes
Dealer FE	yes	yes	yes	yes	yes	yes	yes	yes
N	126	126	126	126	126	126	126	126
R²	0.459	0.469	0.429	0.468	0.427	0.464	0.425	0.465

Significance Levels: .01***; .05**; .1*

Relationship matters, but size more

Heterogeneous effects: Other client types

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R²	0.459	0.469	0.429	0.468	0.427	0.464	0.425	0.465

Significance Levels: .01***; .05**; .1*

No differential effect other client types

Persistence

Period: October - February

Pre-period: 21 Nov – 16 Dec

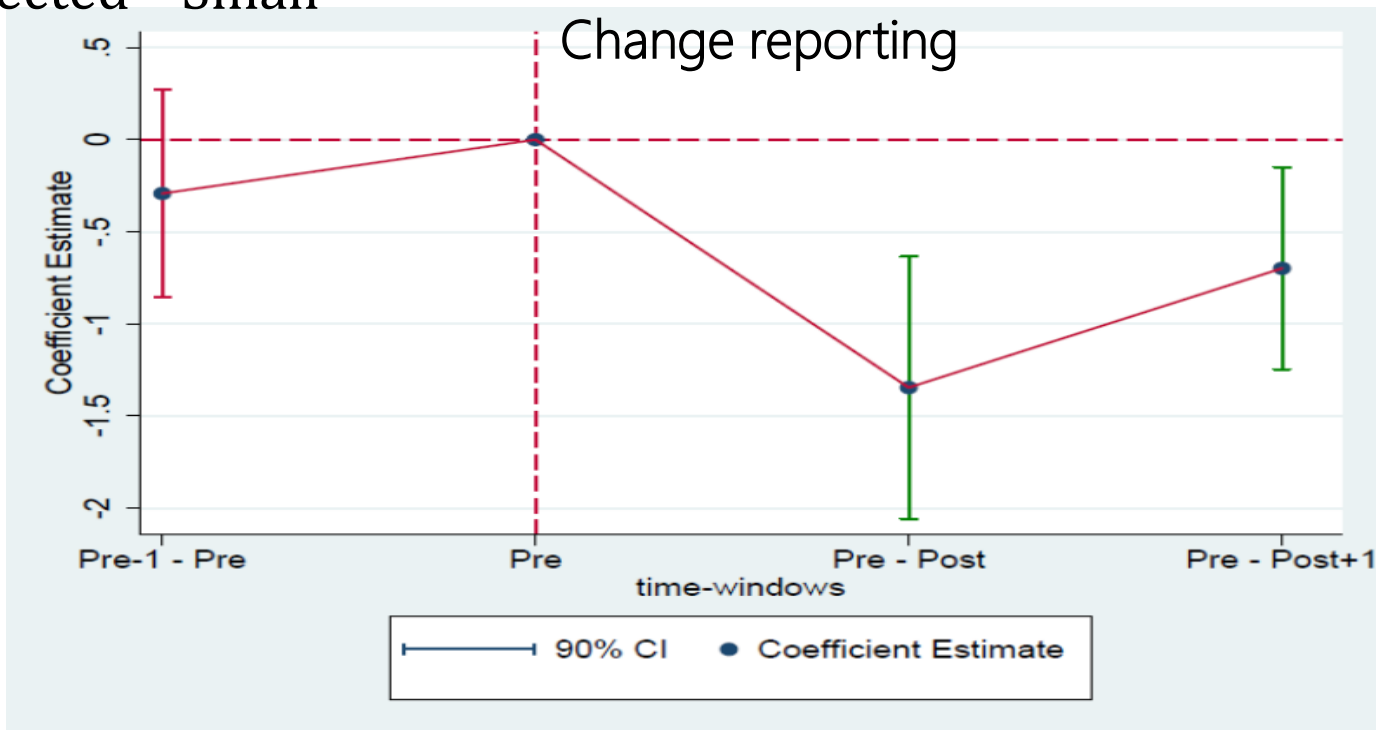
Compare to

- 24 Oct -18 Nov (placebo)
- January (original)
- February (next month)



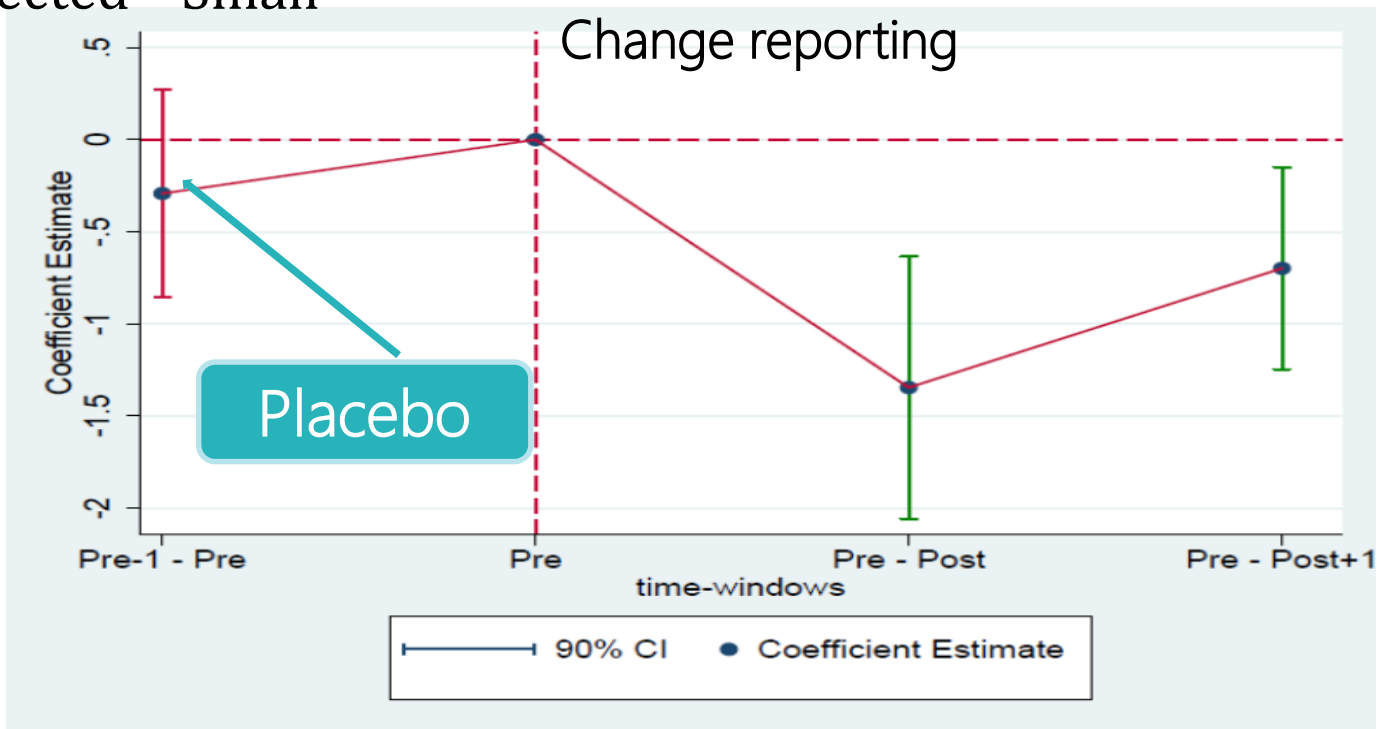
Persistence

Affected * Small



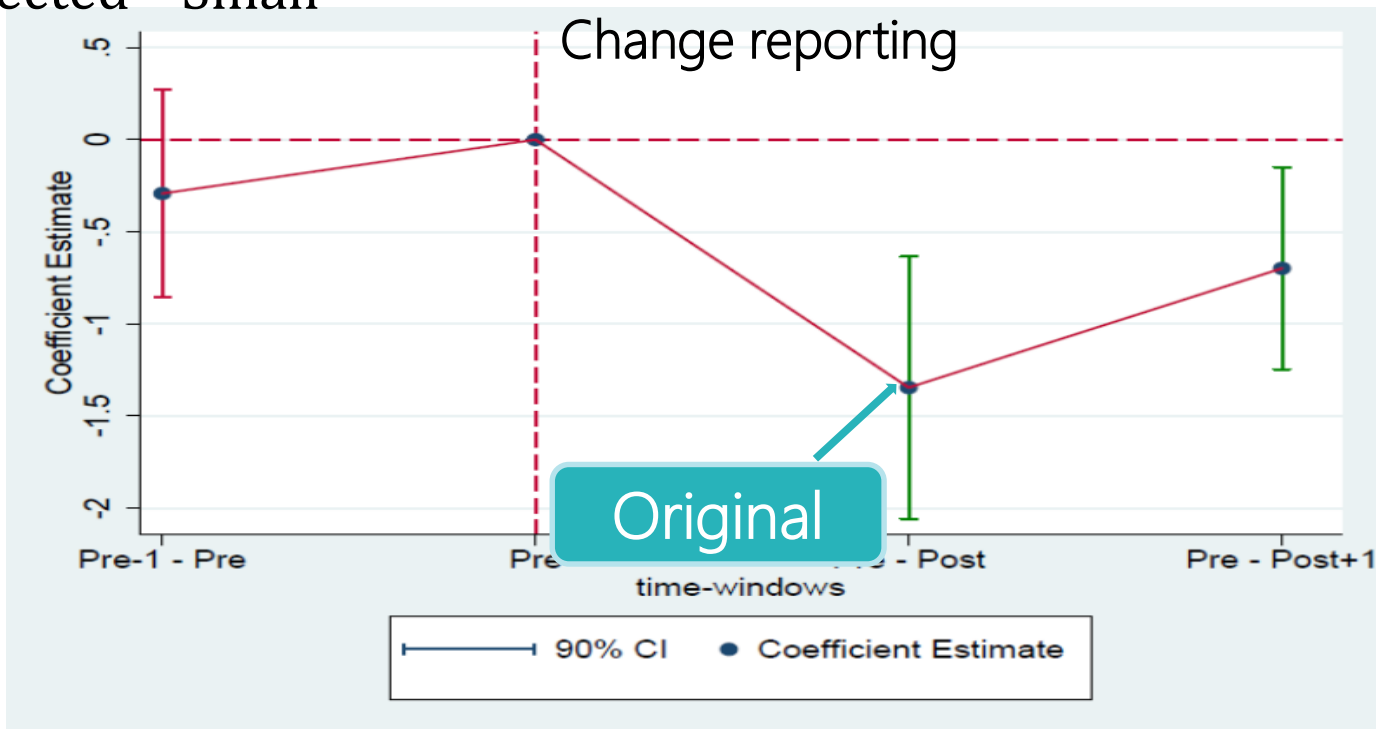
Persistence

Affected * Small



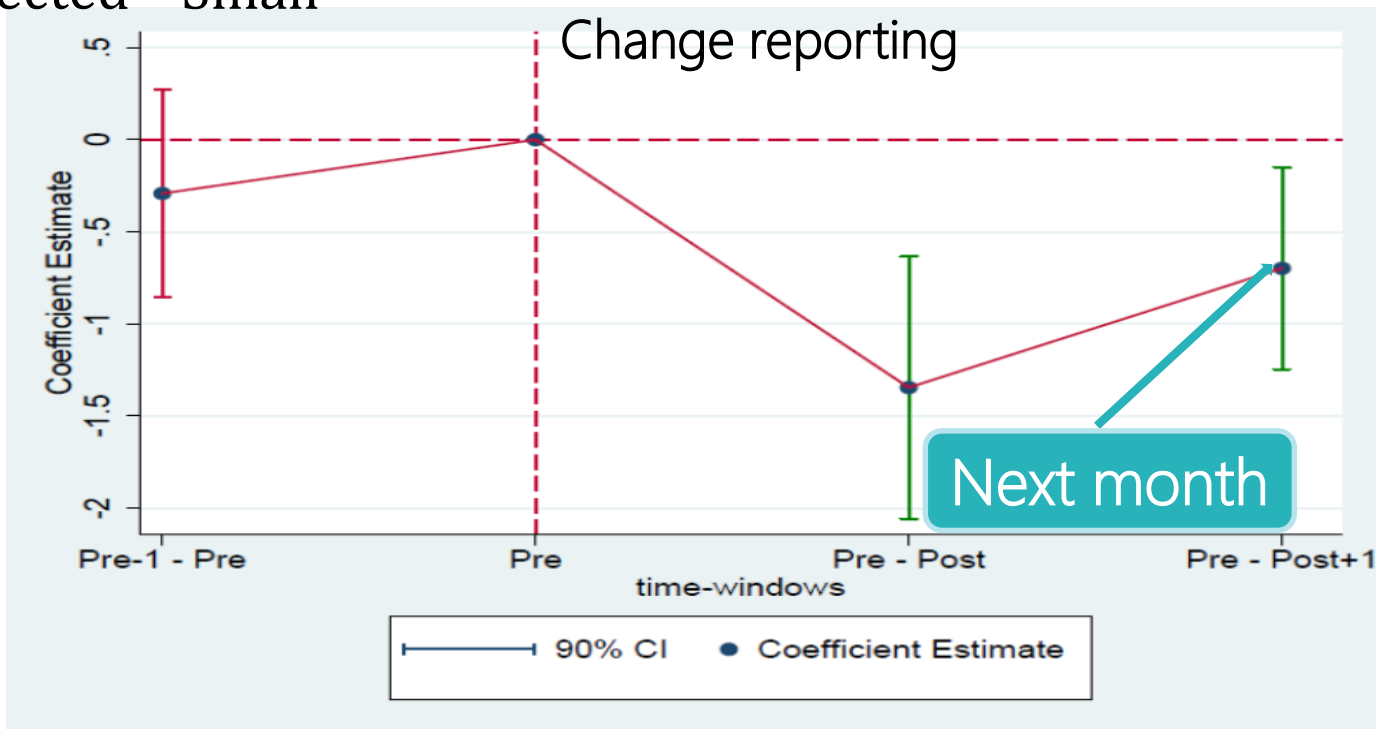
Persistence

Affected * Small



Persistence

Affected * Small



Extensive margin, other loan terms, reverse repo

Expect adjustment

- Number transactions (extensive margin) ↓
- Rates ↓

Expect no adjustment

- Haircut (credit risk) X
- Maturity (business model) X
- Reverse repo X

In line with supply side shock due to leverage ratio



Aggregate effect

Affected dealers step away from small clients

Assume: no change behaviour non-affected dealers

Small clients can place 32% (2.9 billion) less cash

Does market adjust?



Heterogeneous effects: Small vs large

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R²	0.057	0.058	0.089	0.378	0.463

Significance Levels: .01***; .05**; .1*

Non-constrained dealers stepping in

Market adjustment

$$\Delta Y_j = \beta_1 \text{High exposed}_j + \beta_2 \text{High exposed}_j \times \text{Small}_j + \beta_3 \text{Small}_j + \hat{\mu}_j + \varepsilon_{ij}$$

ΔY_j Pre-post change repo volume accepted by all dealers from client j

High exposed_j D=1 if client above median share of repos

Small_j D=1 if client below median repo activity pre - period

$\hat{\mu}_j$ Estimated client demand

OLS, wild cluster bootstrap (client sector)



Market adjustment

	$\Delta \log(\text{AggrVolume})$		New Repo Relationship	
	Baseline	Heterogeneous	Baseline	Heterogeneous
	[1]	[2]	[3]	[4]
Highly Exposed	-0.390	-0.136	-0.007	-0.093
	[0.273]	[0.889]	[0.971]	[0.452]
Highly Exposed * Small		-0.584*		0.165
		[0.088]		[0.3]
Small		-0.084		0.186
		[0.714]		[0.354]
Constant	0.285	0.371**	0.419	0.326
	[0.388]	[0.047]	[0.159]	[0.471]
Client Demand	yes	yes	yes	yes
N	38	38	38	38



Market adjustment

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Non-affected, foreign dealers step in

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Client Demand	yes	yes	yes	yes
N	38	38	38	38

Based on existing, not new relationships

Evidence partial substitution

No 1-on-1 decline total repo activity small clients

Non-affected dealers increased market share (39 to 49%)



Conclusion

Leverage ratio reduces willingness dealers engage in repo

Disproportionally affects marginal cash investors

Strengthens competitive position of foreign dealers



Policy implications - without substitution

More risky cash investment

Reduced access to securities

Drop liquidity in low-risk asset markets



Policy implications - with substitution

Higher dependence on foreigners for repo intermediation

More flighty in times of stress

Raises financial stability concerns



THANK YOU



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