U.S. Banks and Global Liquidity

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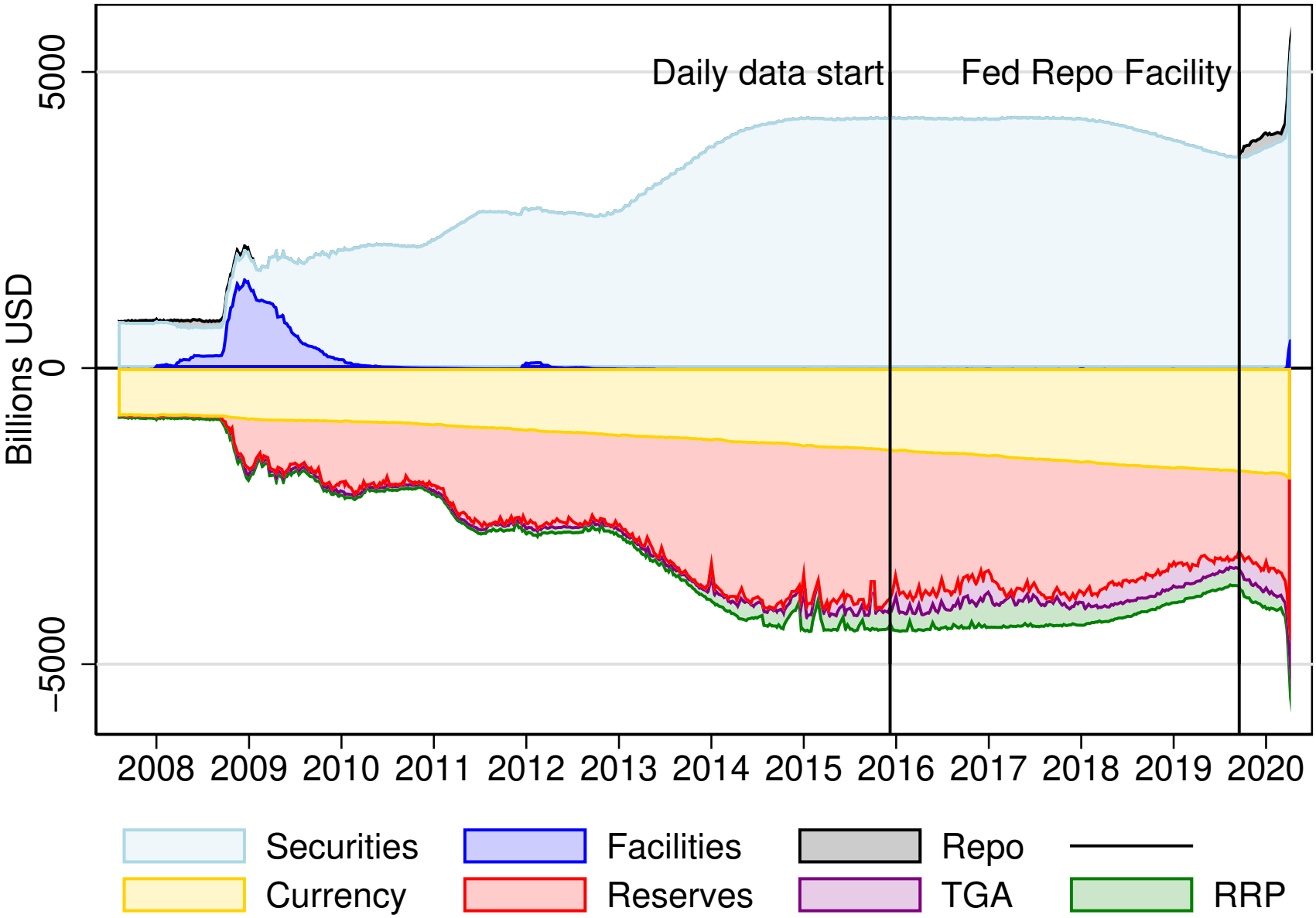
Overview

- How do global banks intermediate dollar funding during funding shortages?
  - **Reserve-based intermediation** became dominant post-GFC.
  - Intra-firm transfer from commercial banks (holding reserves) to affiliated broker-dealers (lending repo) within the same bank holding company is the key.
- Three types of dollar funding shortages:
  - Quarter-ends
  - Treasury General Account (TGA) balance increases
  - Fed's SOMA portfolio reduction (i.e. QE taper)
- In response, U.S. banks supply additional liquidity by
  - (1) lending in repo markets (i.e. reverse repos)
  - (2) lending in the FX swap markets

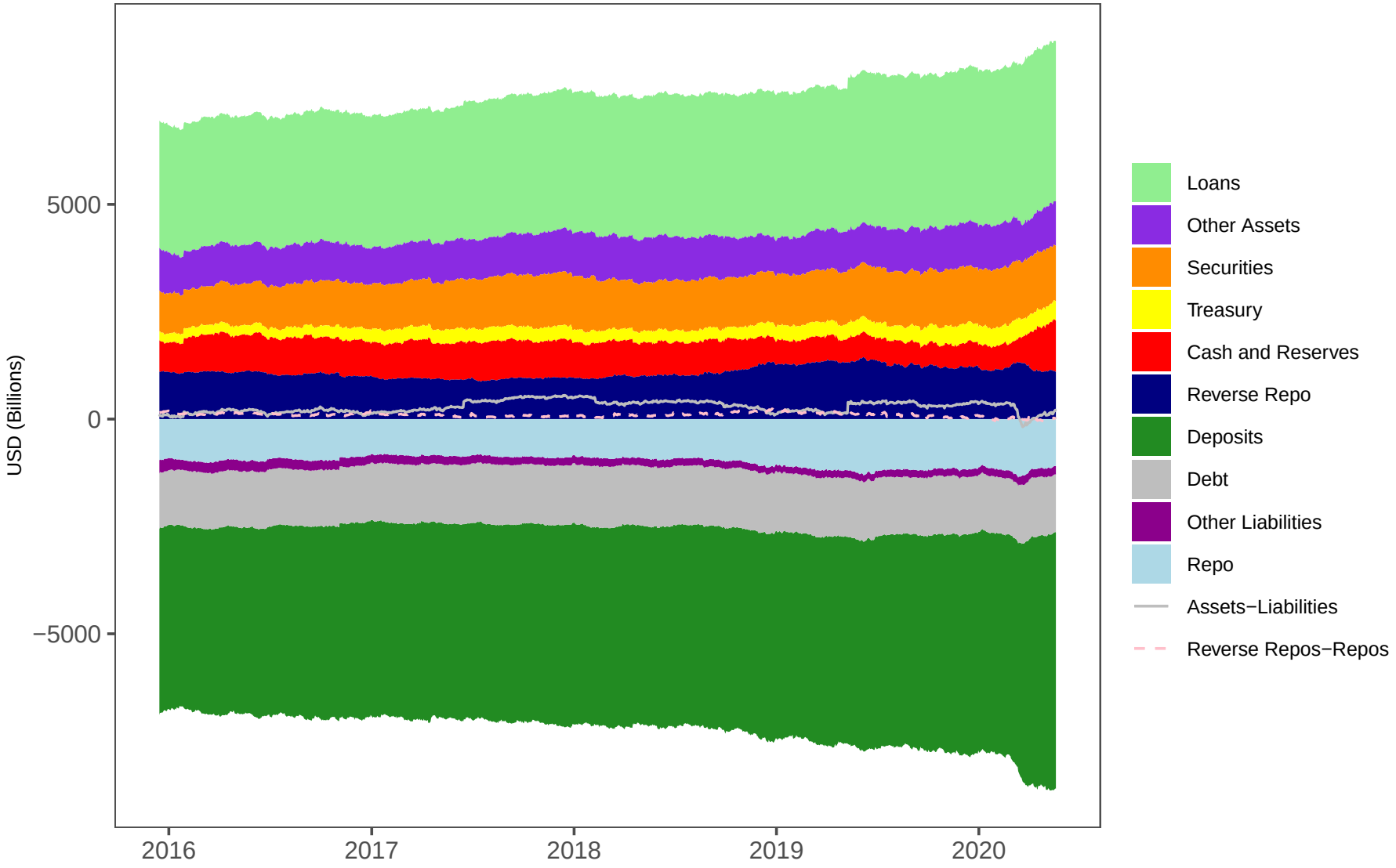
Data and Sample

- FR 2052a: regulatory filings for the Basel III Liquidity Coverage Ratio
  - A detailed daily snapshot of individual banks' asset inflows and liability outflows by currency on a consolidated basis, as well as by material subsidiary.
  - We manually map inflows and outflows in the FR 2052a to asset and liability line items in the FR Y-9C *Consolidated Financial Statements for Holding Companies*. ▸ 2052a-Y9c Comparison
- Sample Period: December 2015 to May 2020
- Six banks (GSIBs): Bank of America, Citi, Goldman Sachs, JP Morgan, Morgan Stanley, Wells Fargo

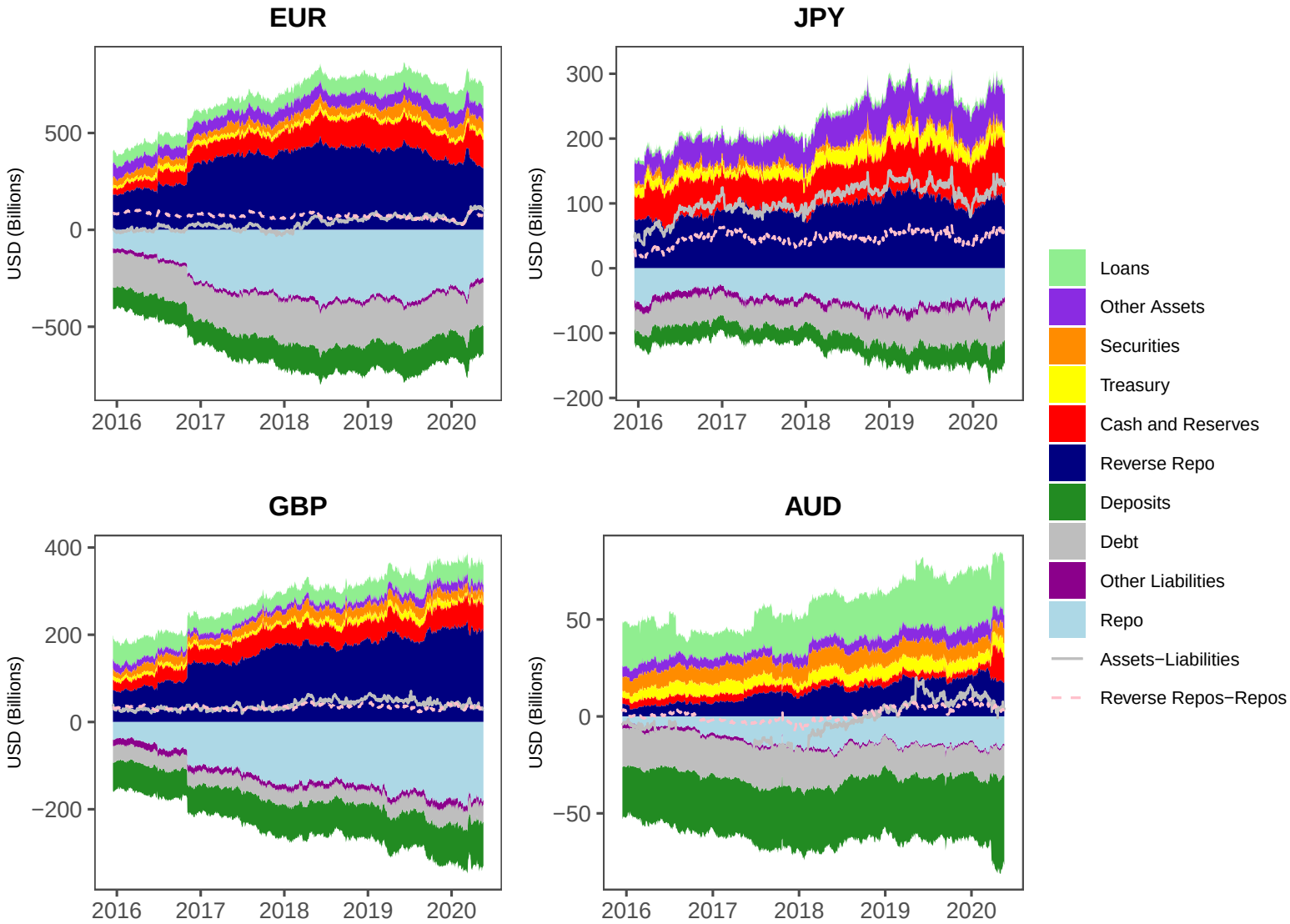
Evolution of the Fed Balance Sheet



USD-Denominated Balance Sheet

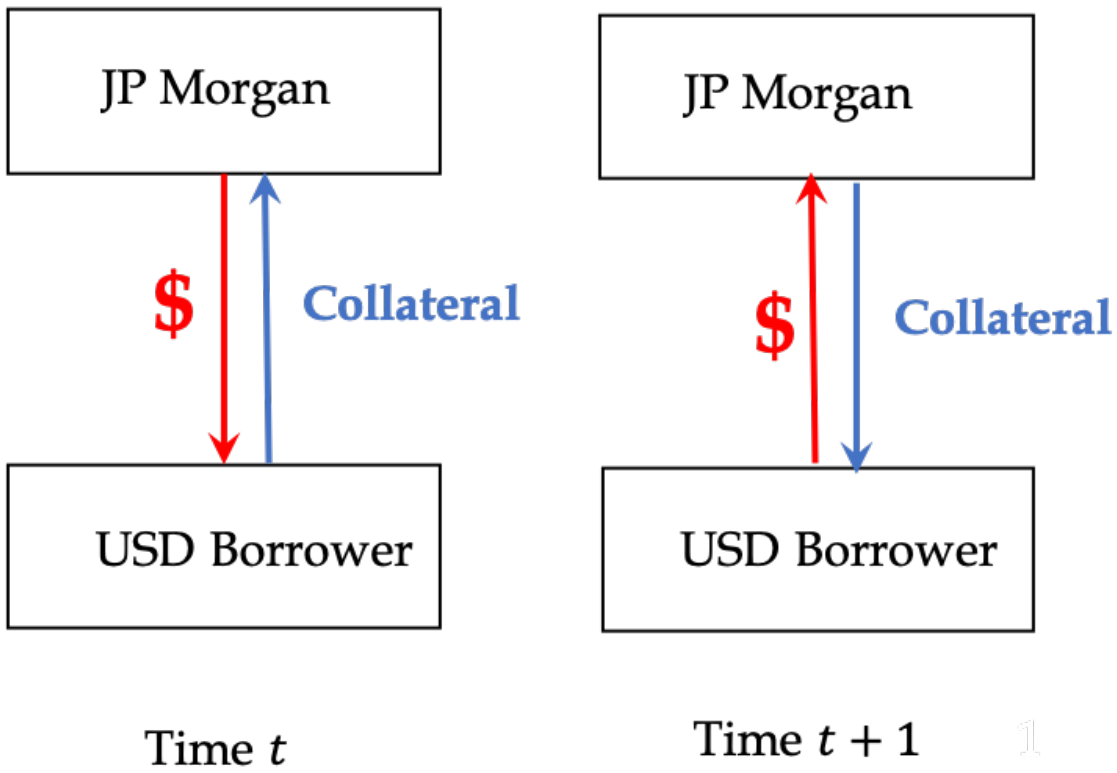


Foreign Currency-Denominated Balance Sheet



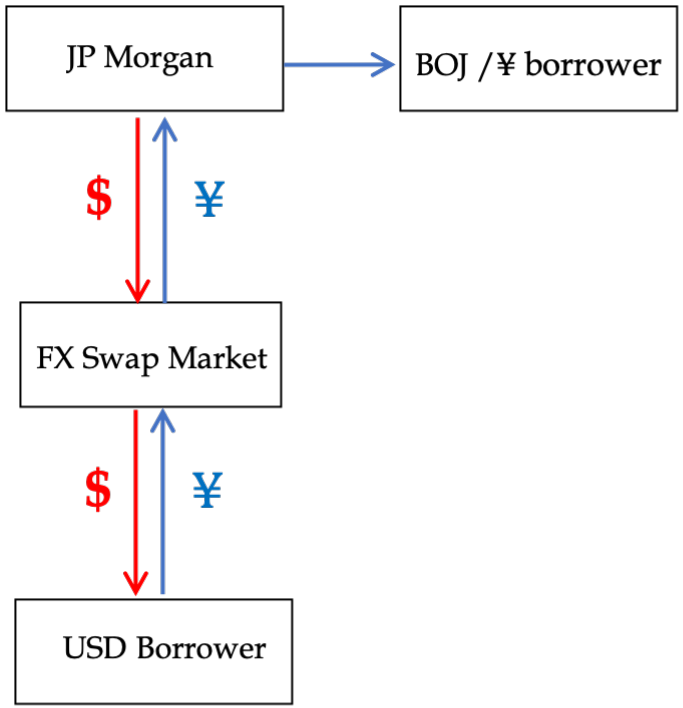
▸ Foreign Currency Funding Gap

Dollar Lending in the **Repo Market**

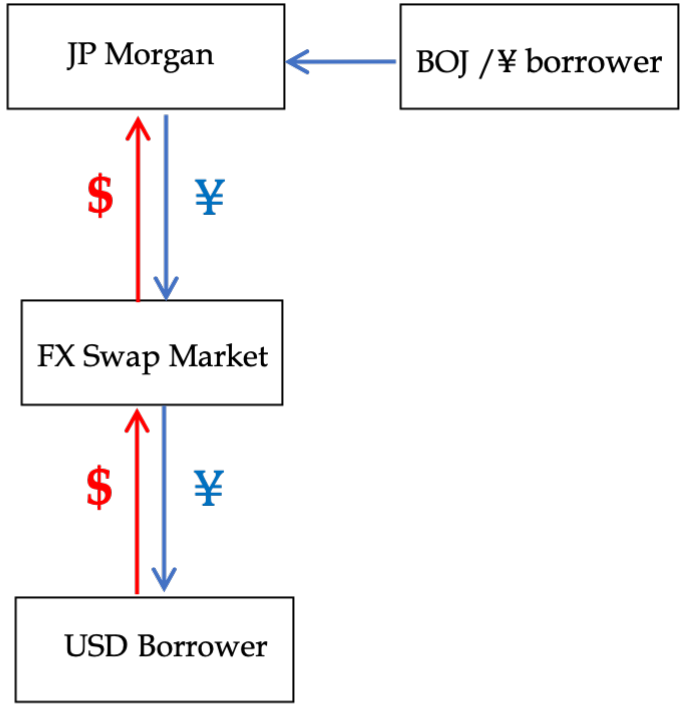


- Measurement: $ reverse repo (RRP) position from the U.S. GSIBs' balance sheet.

Dollar Lending in the **FX Swap Market**



Time t

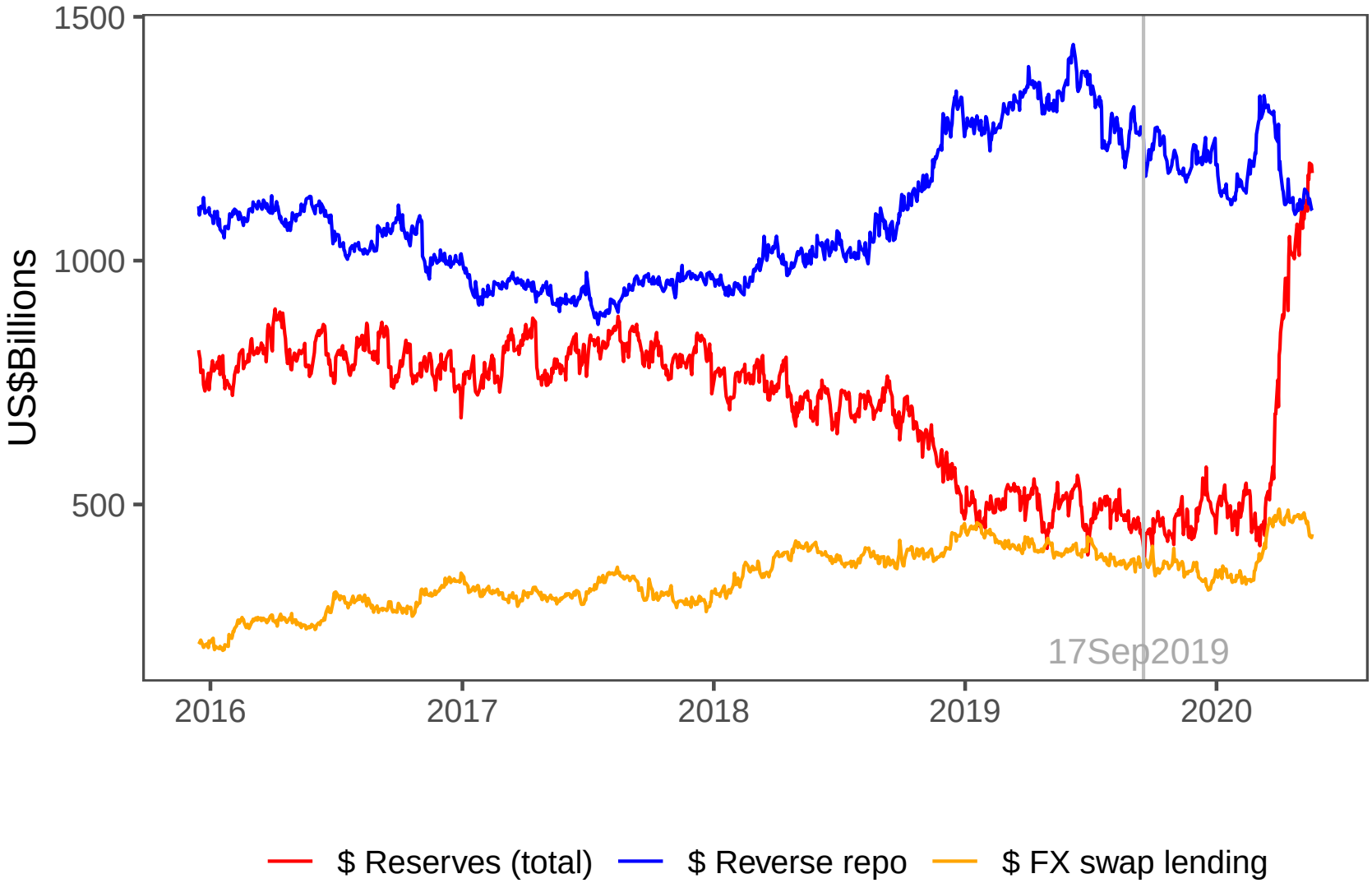


Time $t+1$

- Empirical Challenge: FX swap dollar lending is off-balance-sheet. Only the JPY deposit/on-lending is observed.

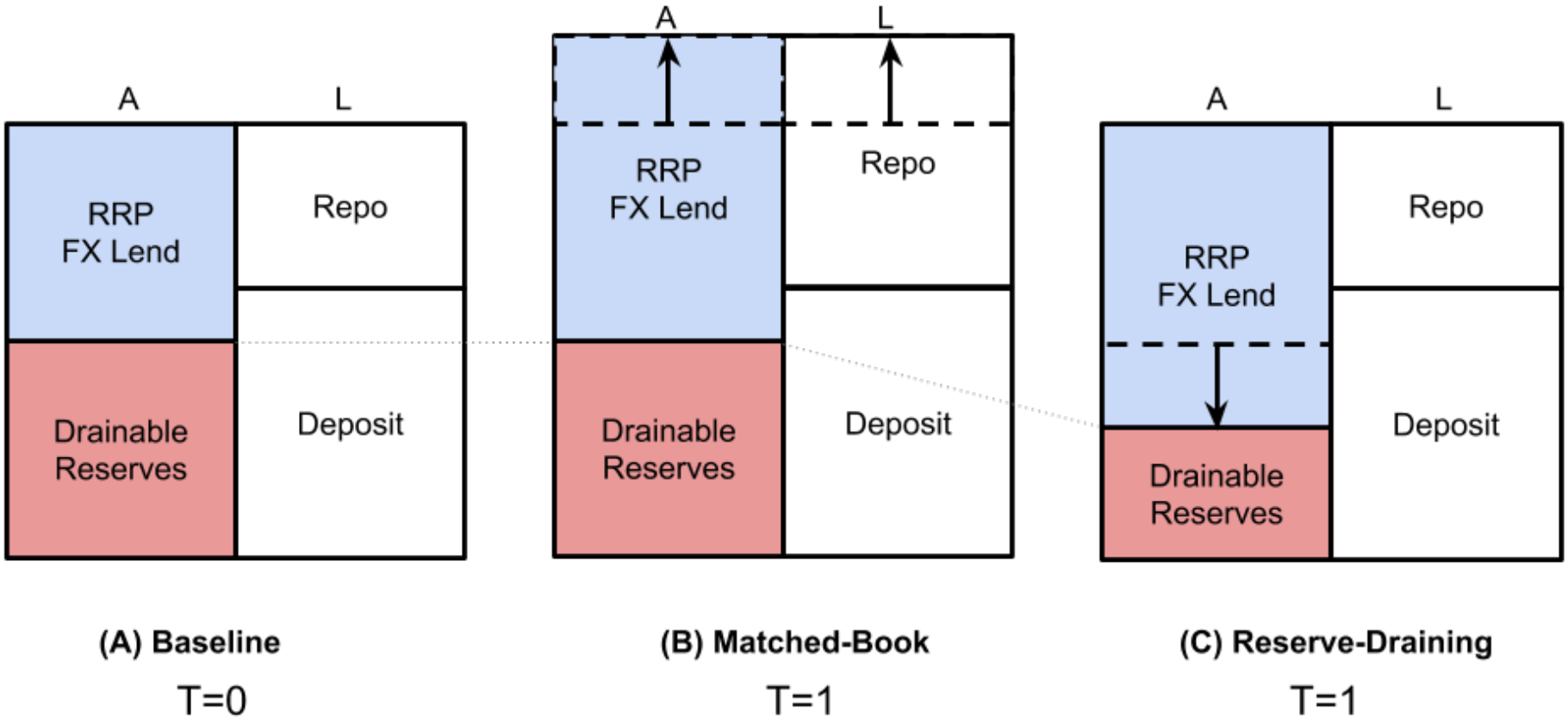
  Proxy for Short-term FX Swap Lending
  = Foreign Currency Excess Reverses
  +Foreign Currency Reverse Repos − Foreign Currency Repos.

Short-term Dollar Liquidity Provision

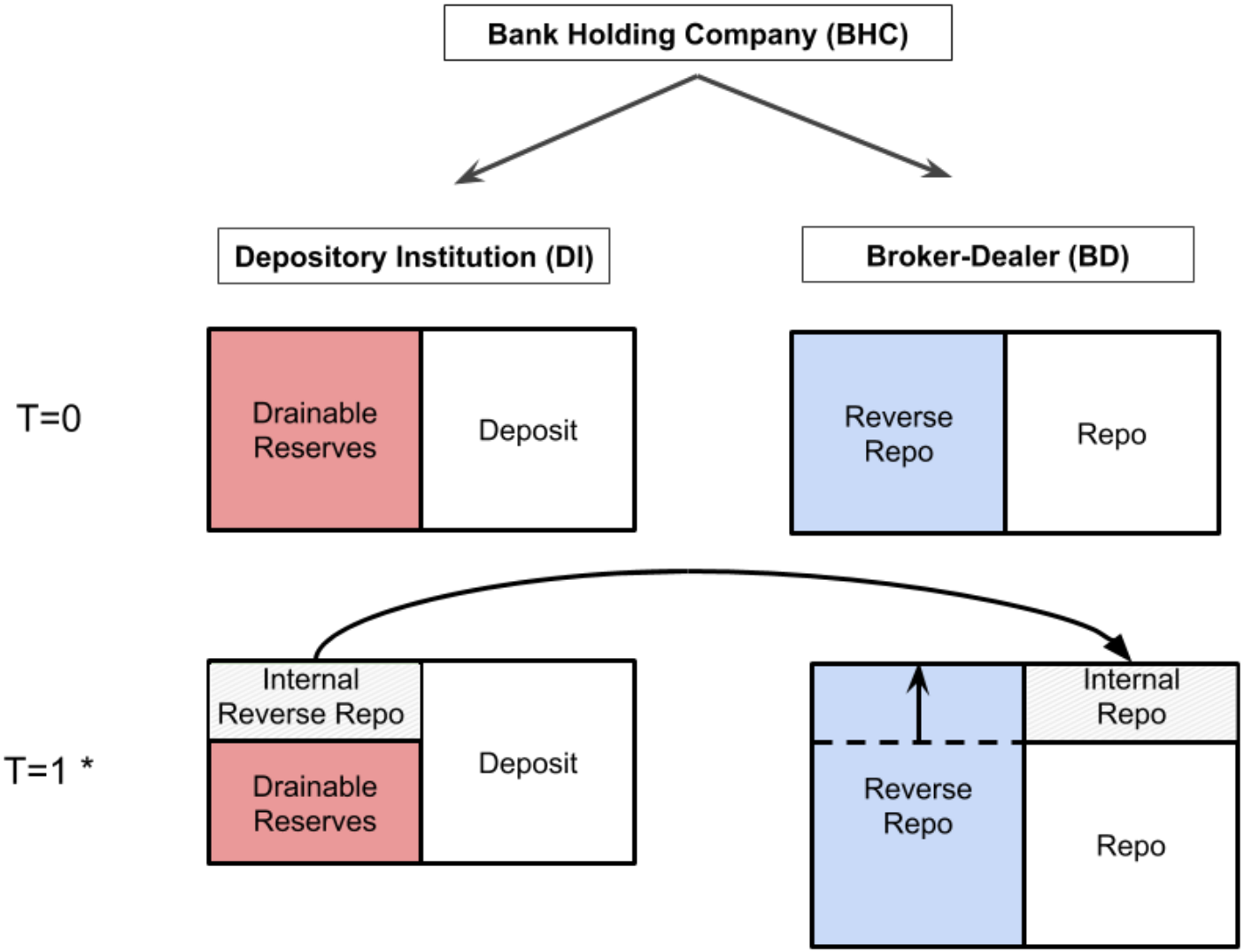


How is the short-term dollar lending financed?

- Two types of intermediation: **Matched-book** vs. **Reserve-draining**



Intra-bank Transfer for Reserve-Draining Intermediation



* BHC and DI balance sheet size unchanged
BD balance sheet expands at T=1

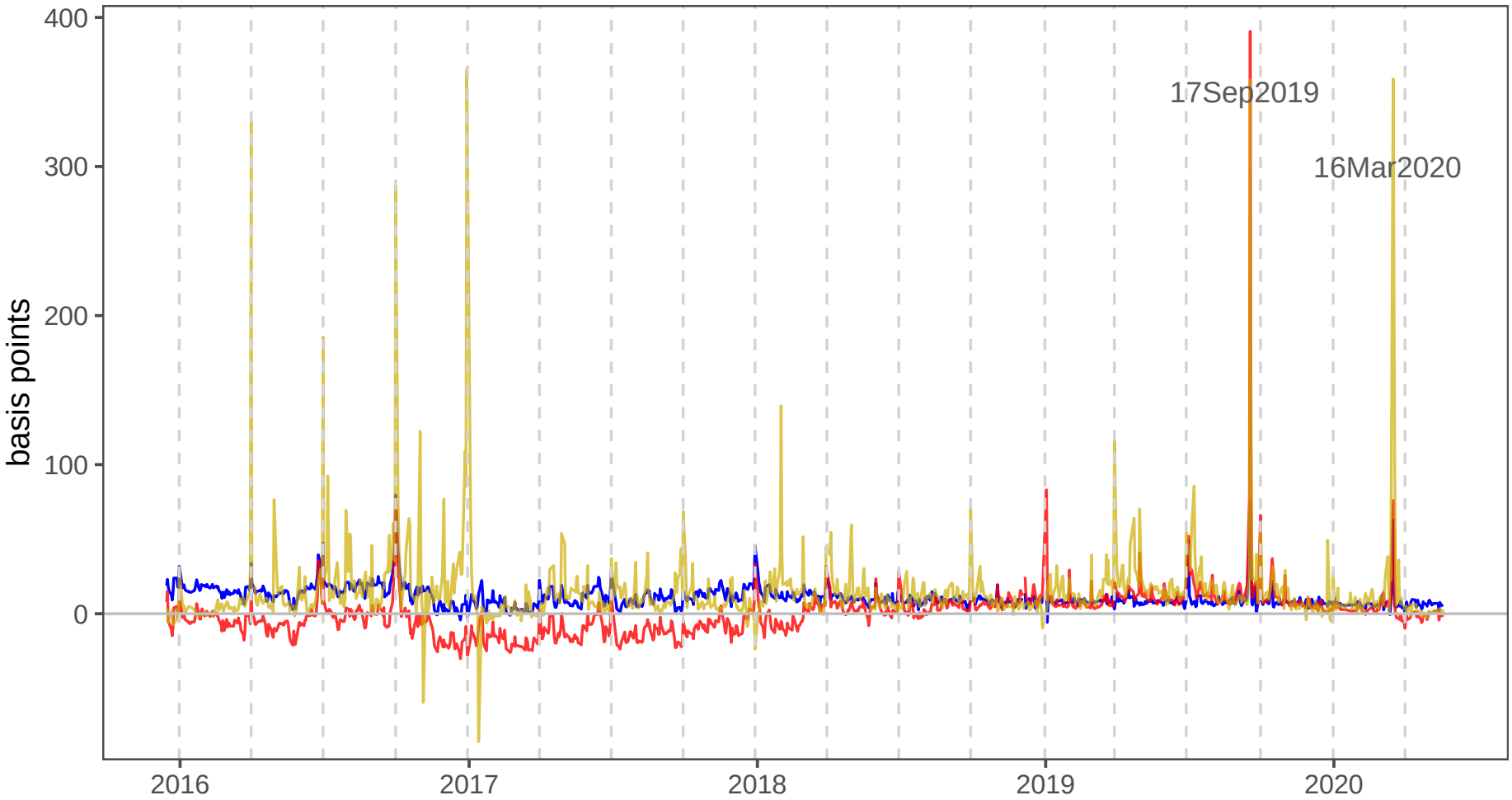
Regulatory Constraints for Two Types of Intermediation

- Matched-book and reserve-draining intermediation tighten different regulatory constraints.

1. **Matched-book**: increases the size of the bank balance sheet, worsening the leverage ratio.
2. **Reserve-draining:** limited by banks' considerations of intraday liquidity and how liquidity can be allocated across material entities and jurisdictions.
   - Within the BHC, depositary institutions hold reserves and the broker-dealers lend in repo and FX swap markets.
   - Resolution planning rules require U.S. G-SIBs to hold sufficient amount of liquidity in material entities at the time of bankruptcy filing to ensure a successful resolution.

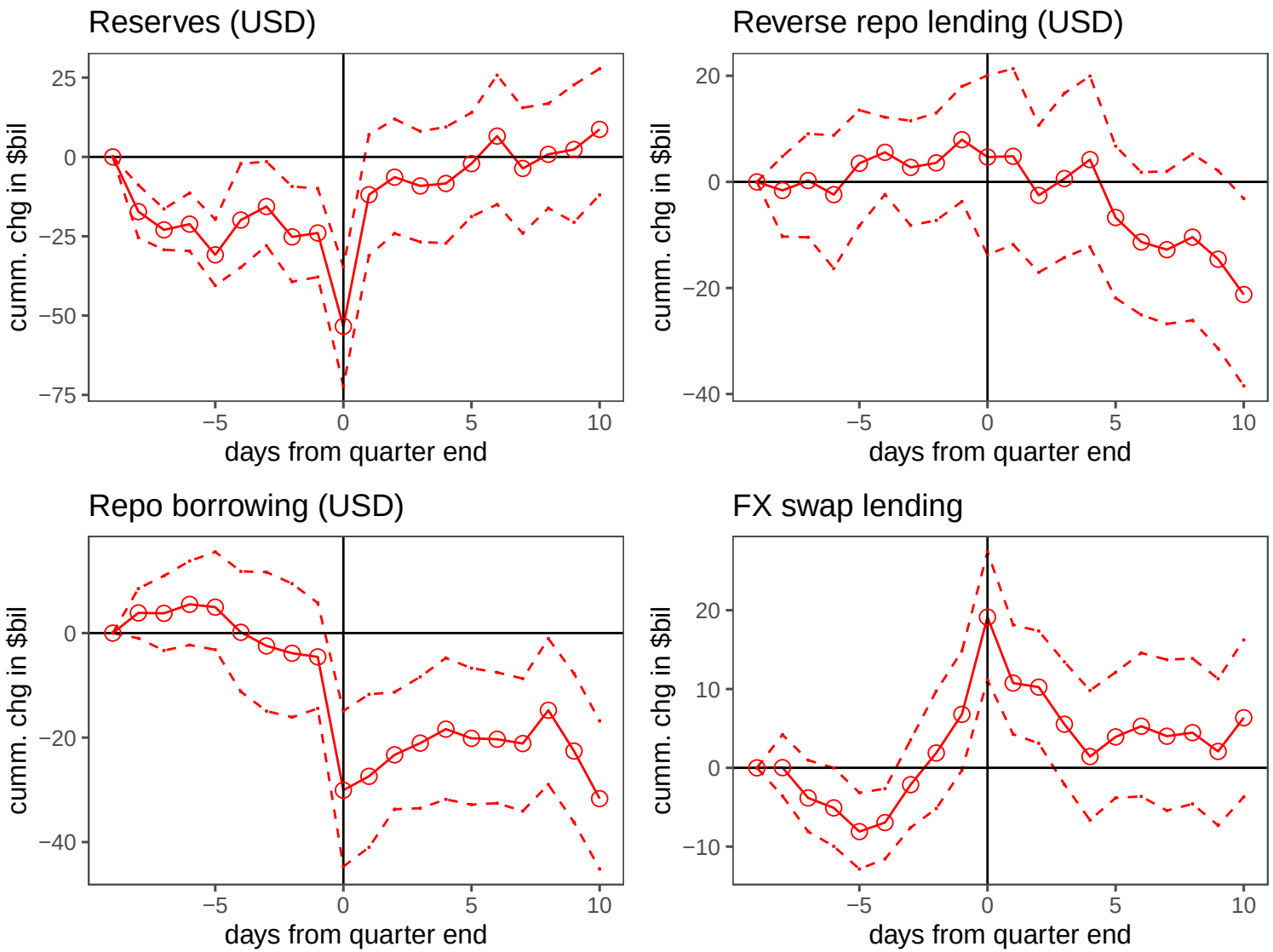
Intermediation Spread

- GCF-Triparty repo spread: overnight repo lending financed by repo borrowing
- GCF-IOR spread: overnight repo lending financed by draining reserves
- FX IOR basis: overnight FX-swap dollar lending financed by reserves; o/n CIP deviation between interests on excess reserves between the Fed and ECB



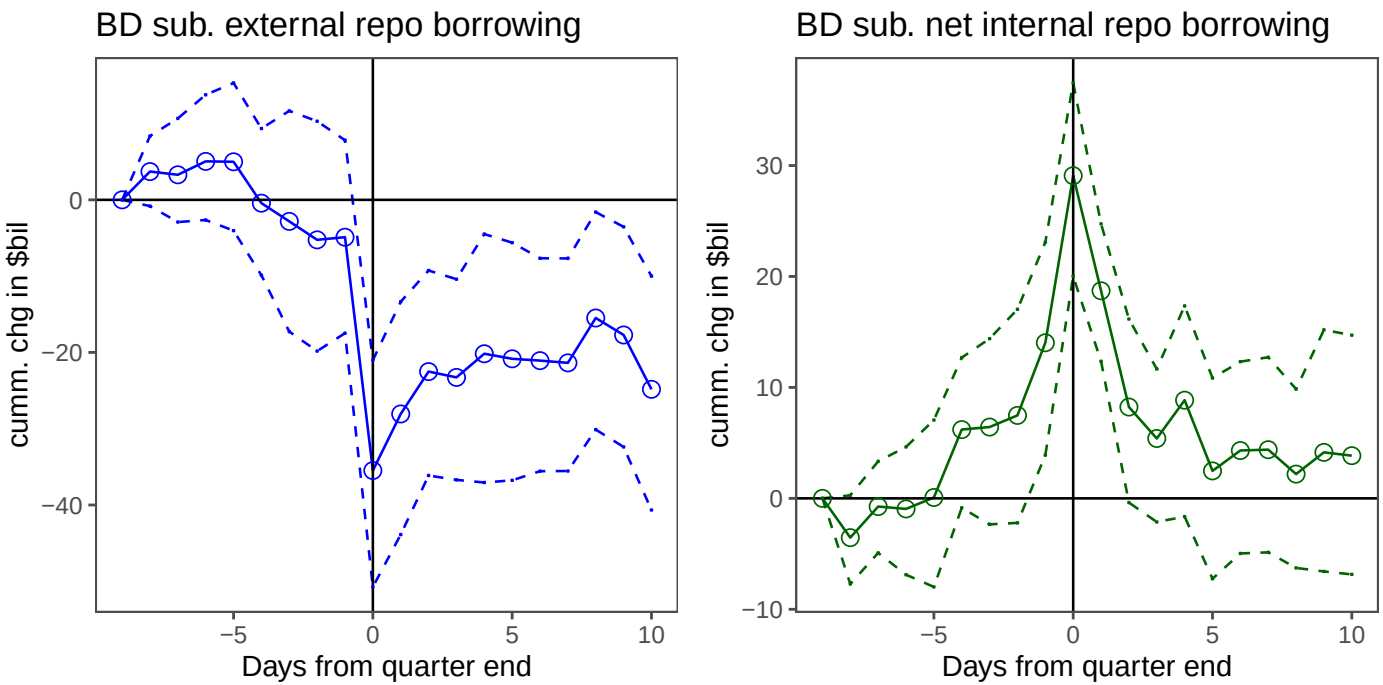
Quarter-end changes in dollar liquidity provision

- U.S. G-SIBs maintain $ reverse repos, increase FX swap lending and reduces $ repo borrowing. Reserves are used to finance dollar liquidity provision.



Quarter-end: BD and non-BD subsidiaries

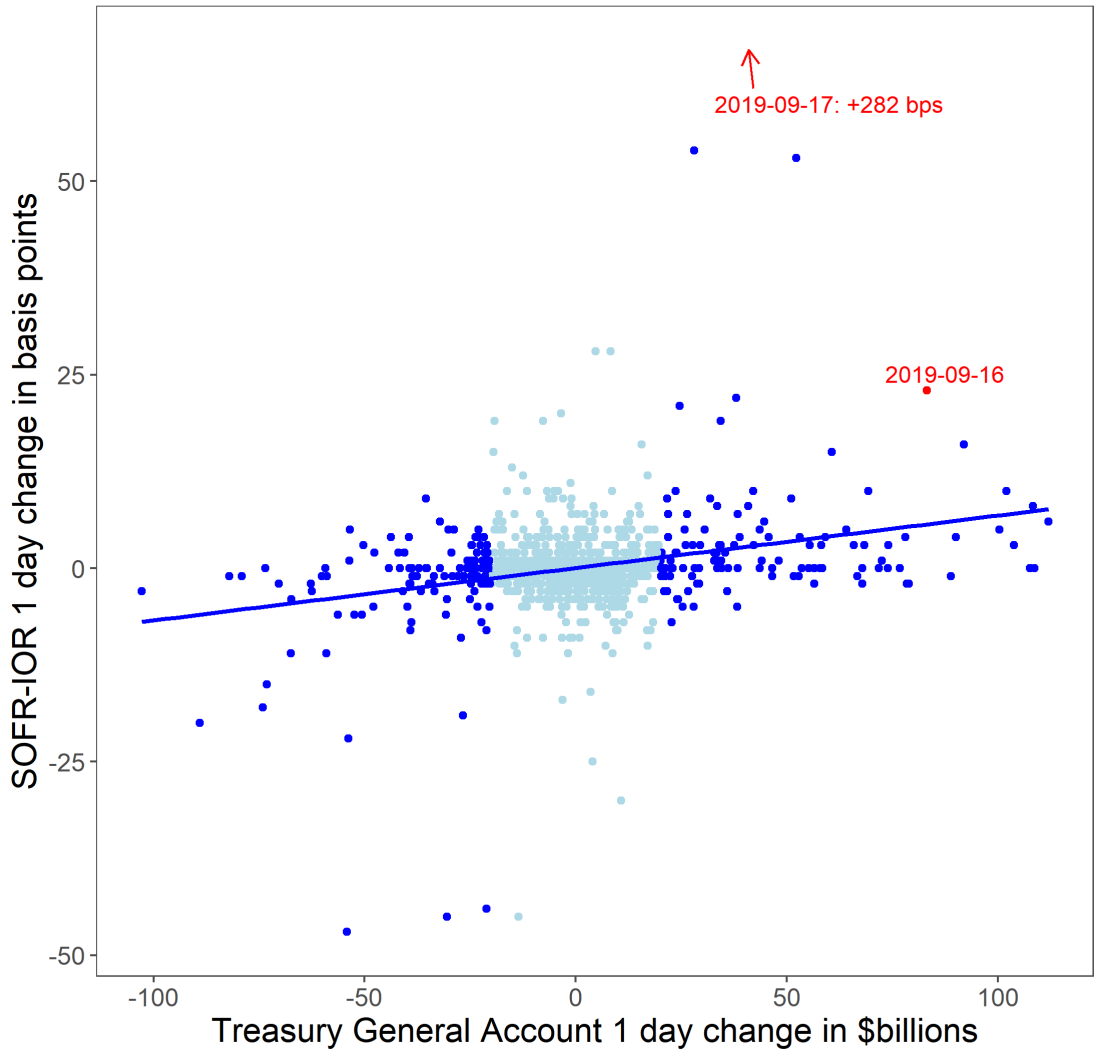
- Broker-dealer (BD) subsidiaries reduce their external repo borrowing and increase their internal borrowing from commercial bank subsidiaries that drain reserves.
  - Liquidity sharing between traditional banking and shadow banking



- Constraints on intra-firm liquidity sharing are frictions to funding markets
  - e.g. Resolution planning rules

TGA fluctuations and the Repo Spread

- TGA is the checking account of the U.S. Treasury held at the Fed.
- An increase in TGA reduces overall cash for banks, raising the repo spread.

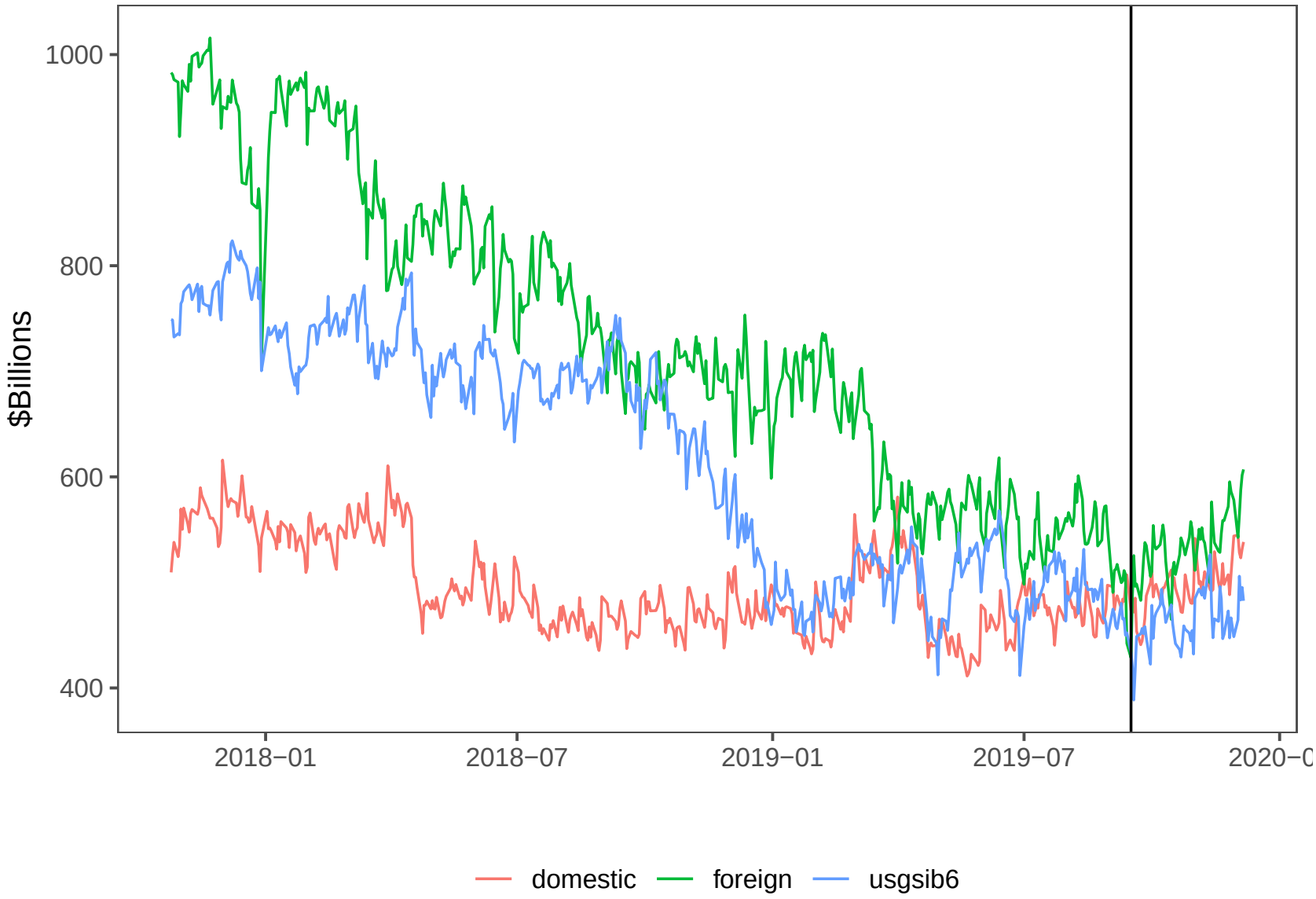


Intermediation Activities during Funding Crunches

- U.S. GSIBs increase intermediation activities in response to TGA increase, SOMA decrease, and quarter-ends. ▸ TGA Decomposition

	(1) $\Delta Reserves_t$	(2) ΔRRP_t	(3) ΔRP_t	(4) $\Delta NRRP_t$	(5) ΔFX_t
ΔTGA_t	**-0.181*** **	**-0.0407***	**-0.0781*** **	**0.0374***	**0.0308*** **
	(0.0362)	**(0.0246)**	**(0.0215)**	**(0.0222)**	**(0.0117)**
$\Delta SOMA_t$	0.492	-1.153***	-0.359	-0.794***	-0.178
	(0.305)	(0.302)	(0.257)	(0.249)	(0.116)
$Qend_t$	-26.25***	-6.573	-29.54***	22.97***	10.60***
	(7.422)	(7.269)	(4.811)	(5.194)	(3.147)
$Qstart_t$	42.03***	-6.781	0.916	-7.697*	-8.424**
	(5.483)	(5.320)	(4.201)	(4.251)	(3.267)
R^2	0.142	0.044	0.104	0.086	0.067

Distribution of Reserves



Distribution of Reserves and Dollar Intermediation

	$\Delta RSV_t^{USGISBs}$	$\Delta RSV_t^{Foreign}$	$\Delta RSV_t^{Domestic}$	$\Delta ONRRP_t$
	(1)	(2)	(3)	(4)
$Qend_t$	-28.000^{***}	-101.000^{***}	25.500^{***}	95.000^{***}
	(7.240)	(20.200)	(4.510)	(16.800)
$Qstart_t$	42.900^{***}	82.800^{***}	1.050	-119.000^{***}
	(5.460)	(18.700)	(6.380)	(19.000)
ΔTGA_t	-0.186^{***}	-0.406^{***}	-0.406^{***}	0.055
	(0.035)	(0.044)	(0.033)	(0.043)
$\Delta SOMA_t$	0.573^{**}	2.570^{***}	-0.692^{***}	-1.230^{**}
	(0.286)	(0.613)	(0.203)	(0.537)
Constant	-0.363	0.688	-0.893^{*}	-0.198
	(0.590)	(0.717)	(0.488)	(0.644)
N	931	931	931	931
R^2	0.159	0.384	0.268	0.425

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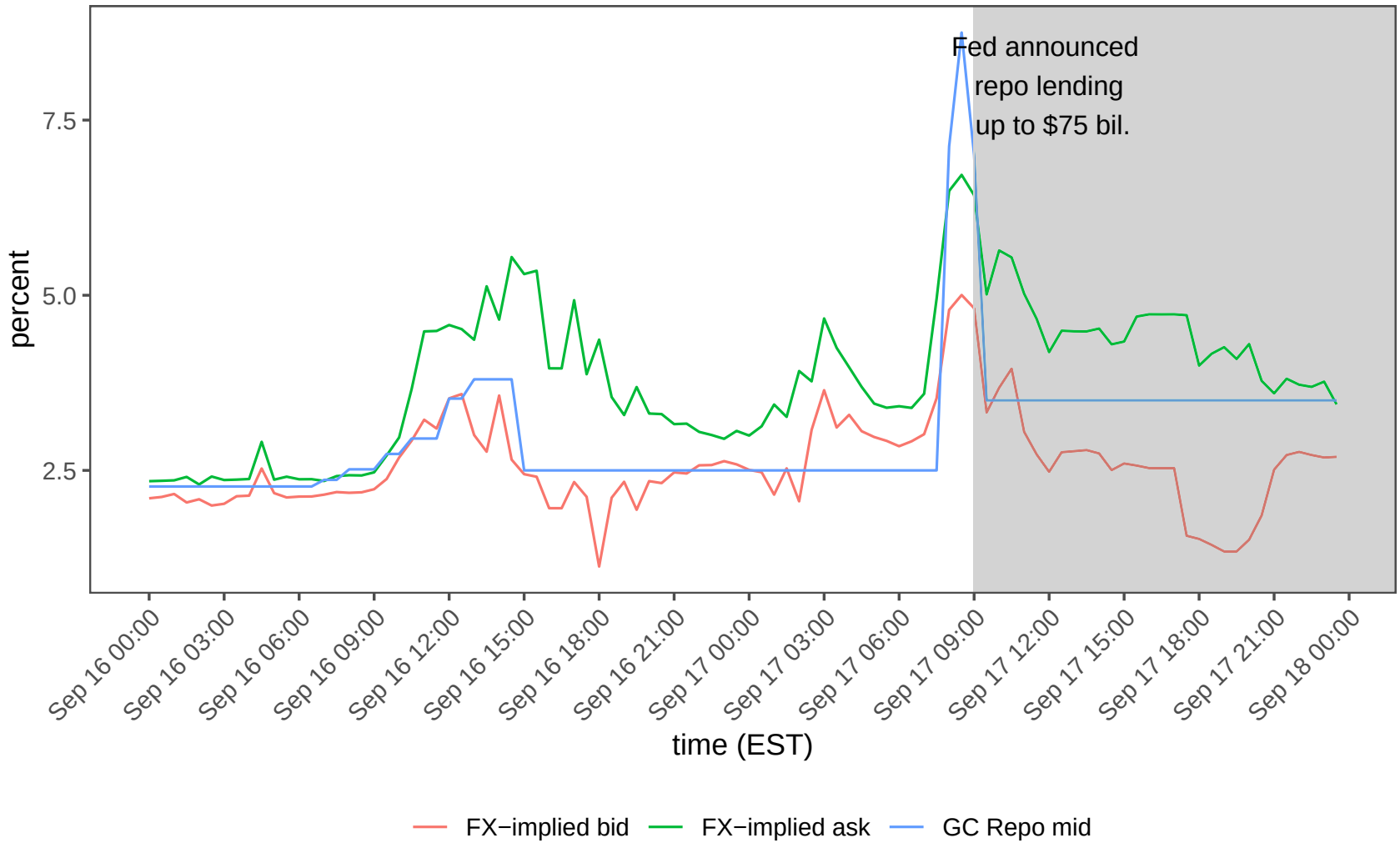
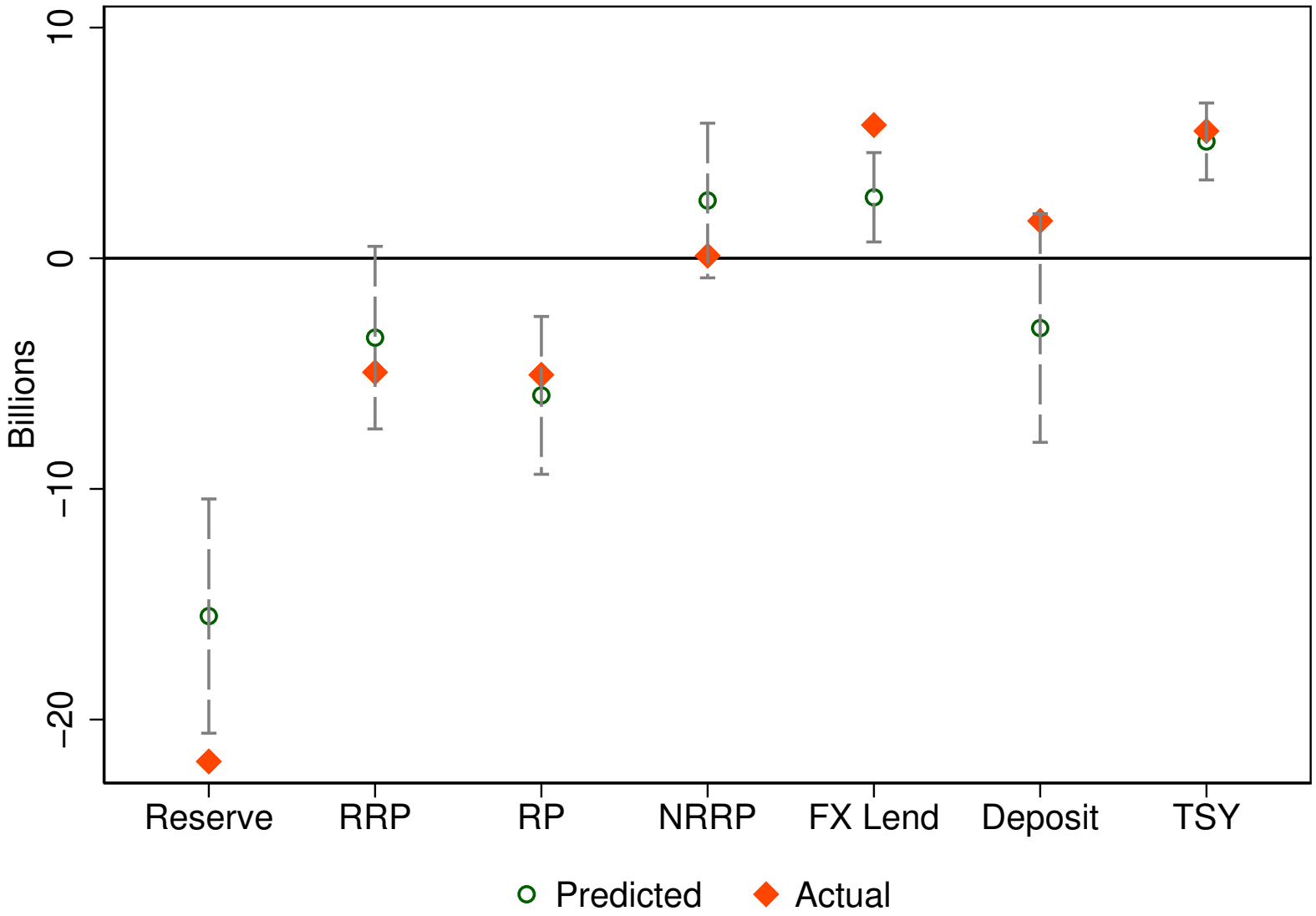
September 2019 Funding Market

- September 16, 2019
  - TGA balance increased by $83 billion on the day
  - Repo and FX swap implied dollar funding rates increased in lockstep



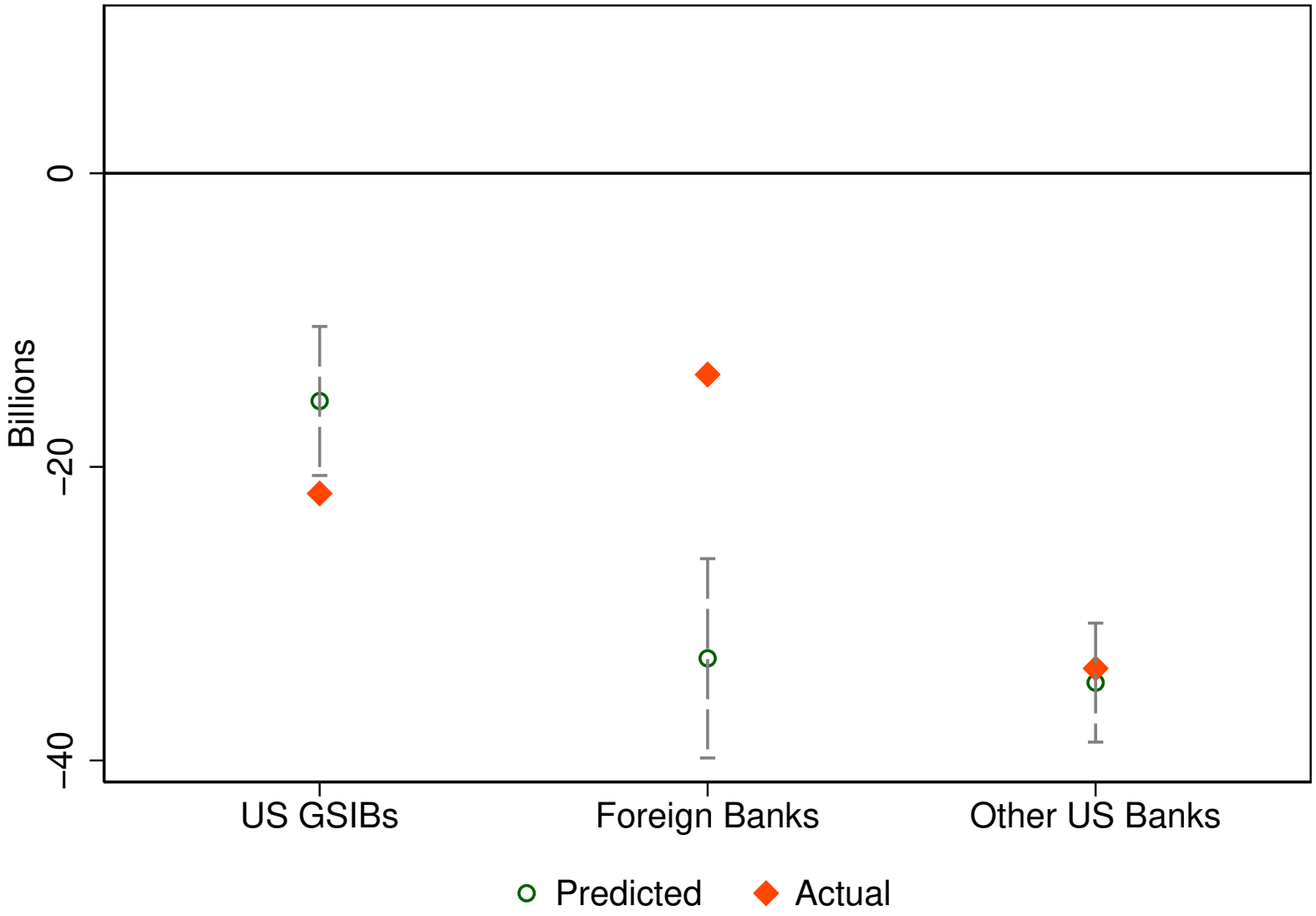
Predicted and actual one-day change on Sept 16, 2019

- U.S. banks' response was in line with predicted change based on TGA increase



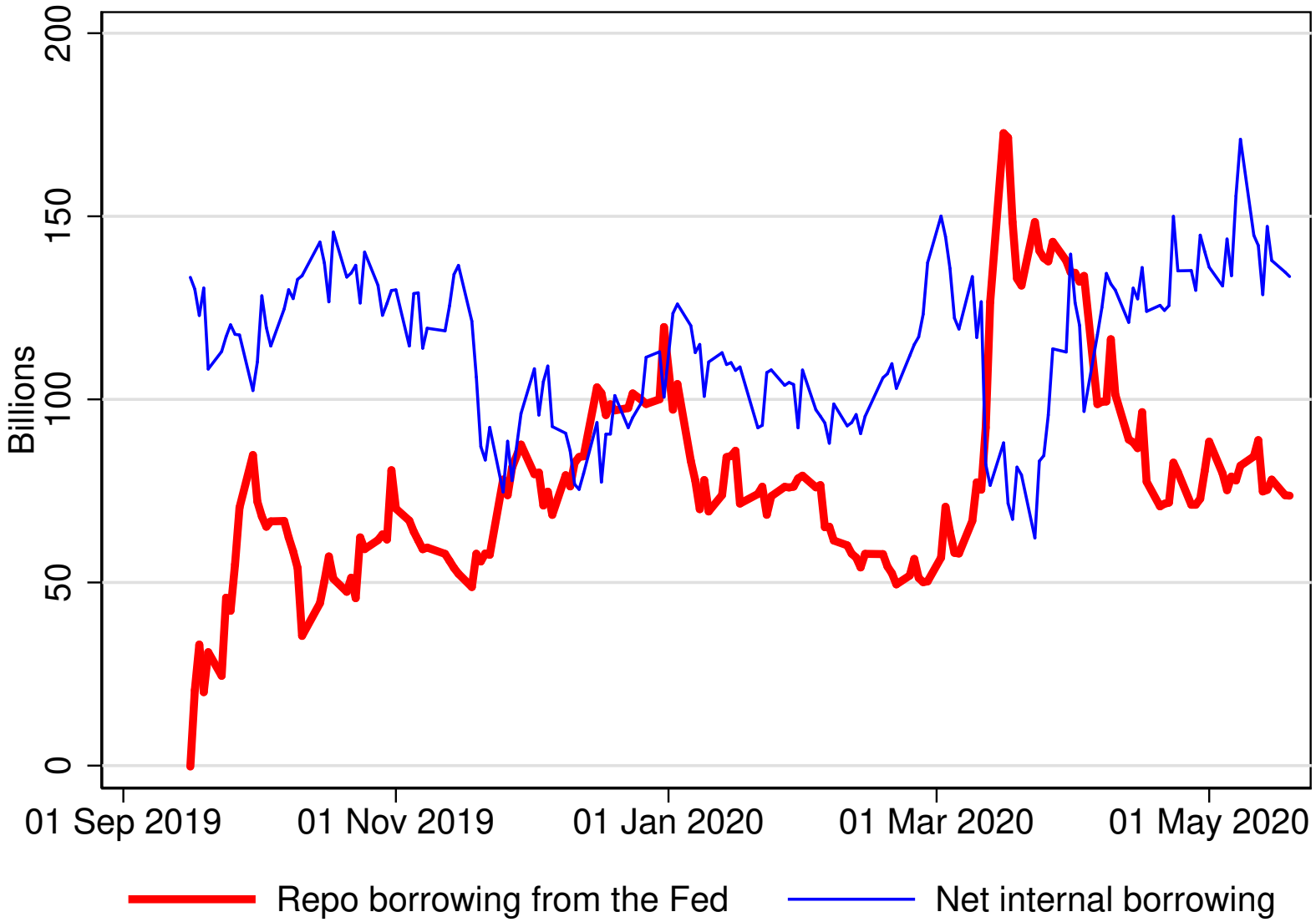
Predicted and actual one-day change in reserves

- Foreign banks reduced reserves less than expected Reserve Distribution



BD take-up at the Fed repo facility

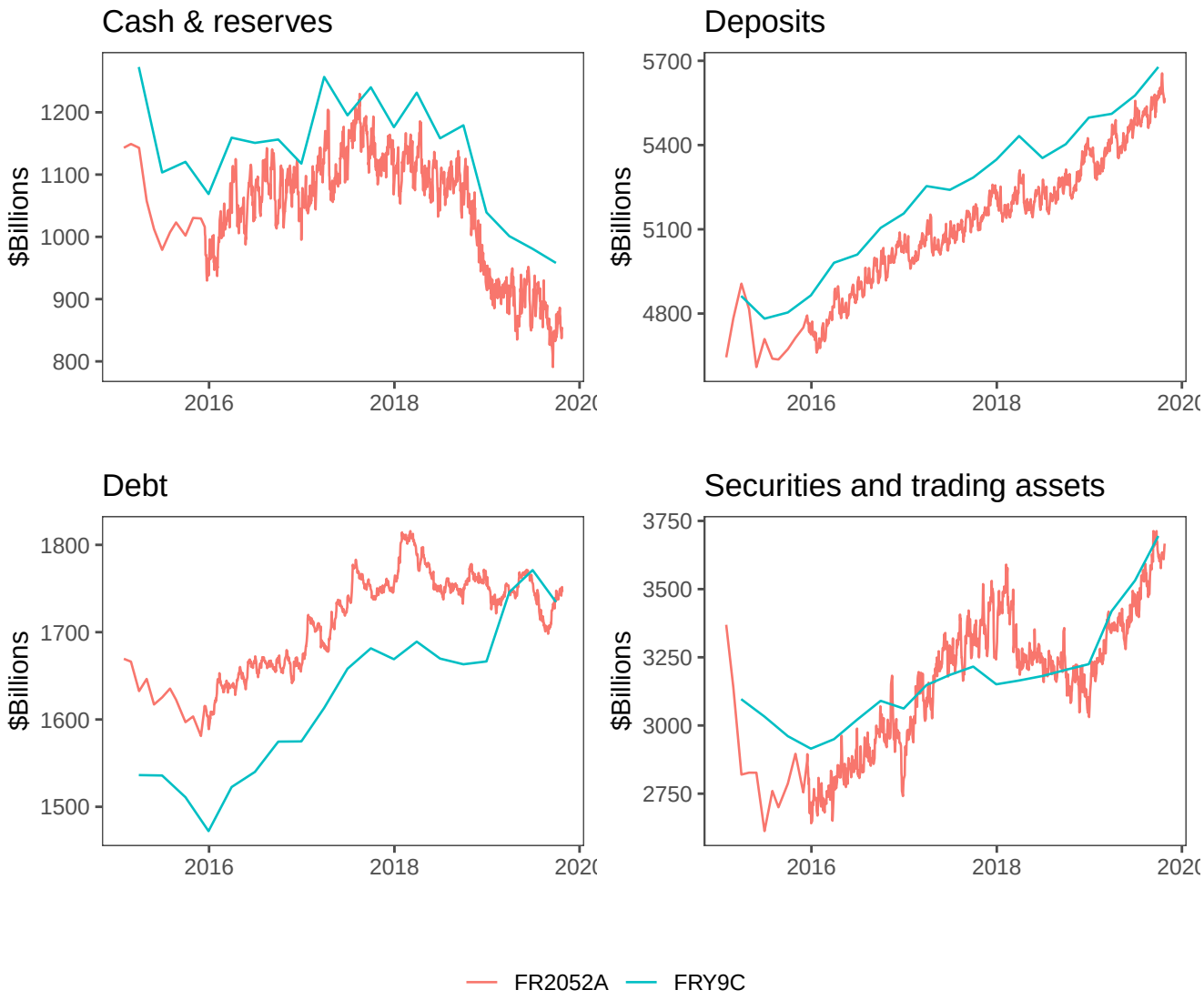
- For BDs, liquidity from the Fed and internal repo borrowing from commercial banks (financed via reserve draining) are substitutes.



Conclusion

- Maintaining ample excess reserve balances is important to facilitate liquidity provision.
- Internal transfers between BD and non-BD subsidiaries within the BHC are crucial.
  - Synergy between traditional banking and shadow banking
  - Frictions that prevent intra-firm transfers and trap excess reserves are also constraints to funding markets.

Appendix Slides: FR 2052a - Y9C Comparison



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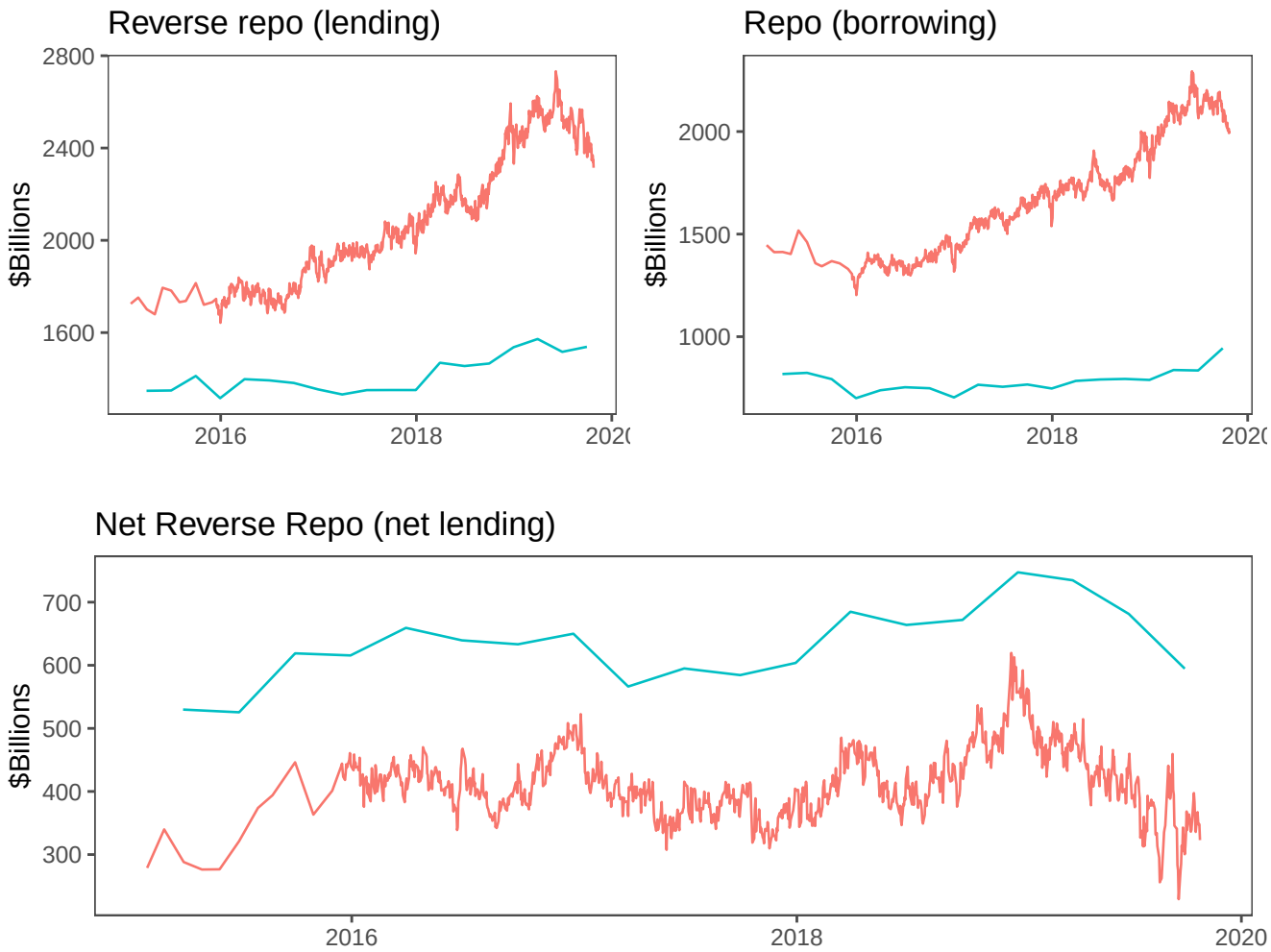
FR 2052a - Y9C Comparison



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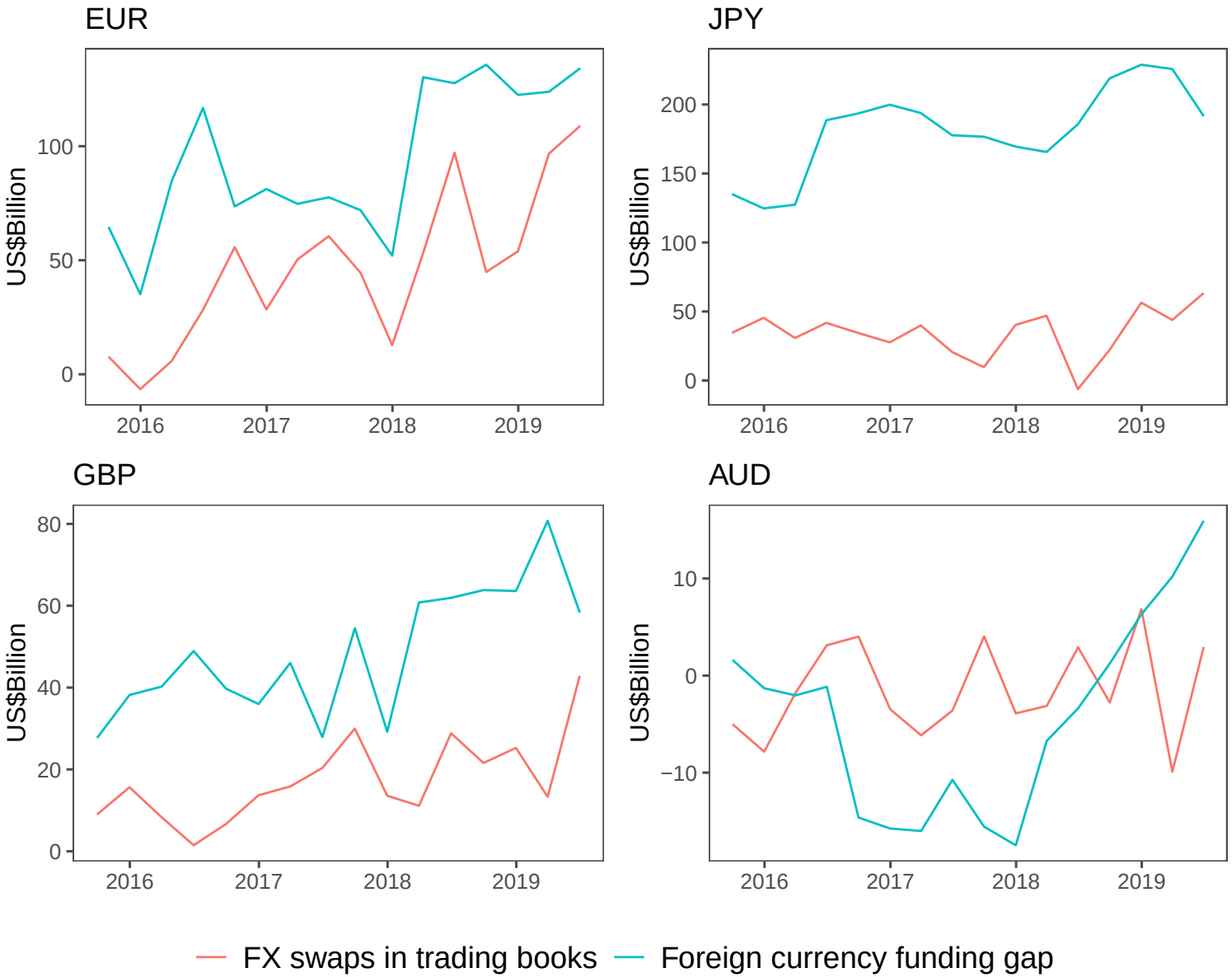
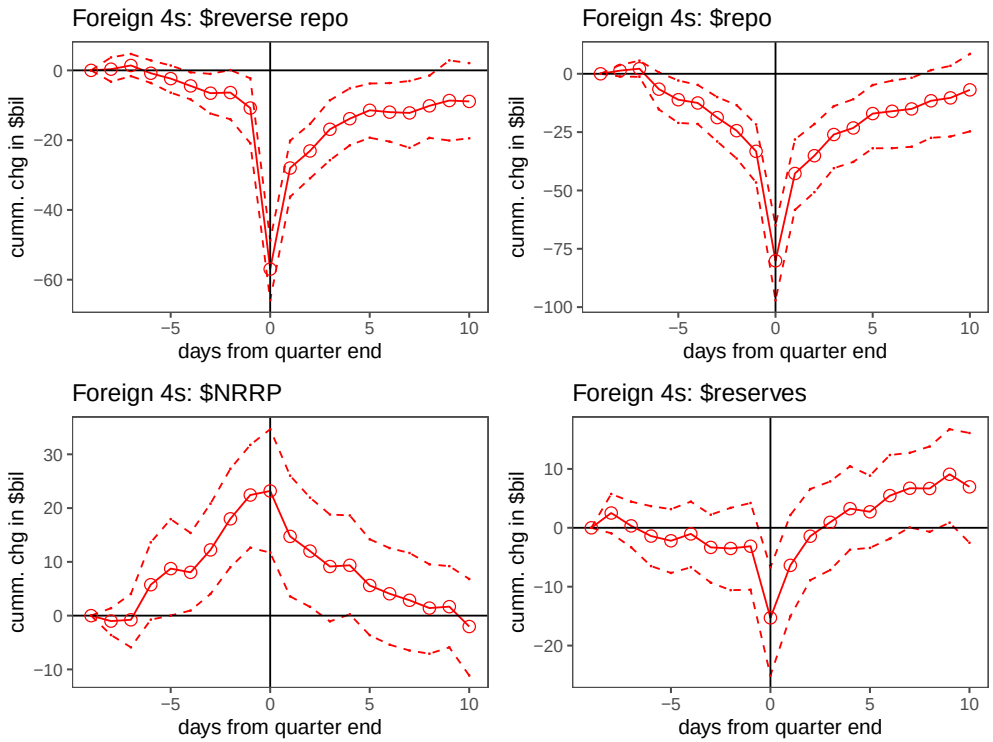
Foreign Currency Overall Funding Gap



Quarter-end contraction in FBO repo intermediation

- Foreign banking organizations (FBOs) reduce matched-book $ repo intermediation and drains reserves to make up the difference (net reverse repo, NRRP)
- 4 LISCC FBOs (UBS, Barclays, CS, DB) with daily data:



- Estimated contraction in repo lending across all FBOs using monthly data is around $125 billion at quarter-ends.

TGA Decomposition vs. Intermediation Spreads

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	(1) $\Delta SOFR - IOR$	(2) $\Delta GCF - IOR$	(3) $\Delta TGCR - IOR$	(4) $\Delta GCF - \Delta TGCR$	(4) $\Delta EUR\ IOR$	(5) $\Delta JPY\ IOR$
$Qend_t$	11.20***	29.19**	7.112***	22.05*	146.7**	424.8***
	(2.720)	(14.21)	(2.707)	(12.01)	(60.27)	(118.2)
$Qstart_t$	-11.22***	-32.03**	-6.524**	-25.52*	-166.3*	-284.7***
	(3.674)	(13.16)	(2.580)	(14.35)	(85.24)	(98.02)
ΔTGA_t^{Other}	0.0255**	0.0506*	0.0229**	0.0276	0.404***	0.544***
	(0.0102)	(0.0259)	(0.00976)	(0.0215)	(0.0927)	(0.208)
ΔTSY_t^{Issue}	0.0859***	0.111***	0.0687***	0.0424**	-0.0218	0.158
	(0.0106)	(0.0203)	(0.00949)	(0.0166)	(0.0719)	(0.145)
$\Delta SOMA_t$	-0.523***	-1.456**	-0.436***	-1.019*	-3.348**	1.338
	(0.152)	(0.688)	(0.160)	(0.612)	(1.523)	(2.391)
Constant	-0.391***	-0.738***	-0.313***	-0.415***	0.643	-1.052
	(0.119)	(0.195)	(0.0988)	(0.159)	(0.651)	(2.094)
N	933	930	933	930	901	835
R^2	0.311	0.288	0.242	0.198	0.255	0.378

TGA Decomposition vs. Intermediation Activities

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	ΔRSV_t	ΔRRP_t	ΔRP_t	$\Delta NRRP_t$	ΔFX_t	$\Delta Deposit_t$	$\Delta TSY_t^{outright}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ΔTGA_t^{Other}	-0.232^{***}	-0.127^{***}	-0.116^{***}	-0.011	0.045^{***}	-0.128^{***}	0.071^{***}
	(0.045)	(0.029)	(0.027)	(0.027)	(0.015)	(0.045)	(0.012)
ΔTSY_t^{Issue}	-0.087^{*}	0.118^{***}	-0.008	0.126^{***}	0.004	0.139^{***}	0.039^{***}
	(0.053)	(0.040)	(0.033)	(0.037)	(0.018)	(0.046)	(0.014)
$\Delta SOMA_t$	0.627^{**}	-0.926^{***}	-0.258	-0.667^{***}	-0.217^{*}	-0.647^{***}	-0.120^{**}
	(0.308)	(0.284)	(0.256)	(0.240)	(0.118)	(0.220)	(0.060)
$Qend_t$	-29.100^{***}	-11.400	-31.700^{***}	20.300^{***}	11.400^{***}	-3.440	3.850
	(7.470)	(7.180)	(4.960)	(5.130)	(3.170)	(4.260)	(2.870)
$Qstart_t$	41.500^{***}	-7.690	0.515	-8.200^{**}	-8.270^{**}	28.900^{***}	-0.626
	(5.450)	(5.110)	(4.170)	(4.150)	(3.290)	(4.410)	(1.500)
Constant	-0.848	-0.673	0.279	-0.952^{**}	0.188	-0.874	0.182
	(0.628)	(0.480)	(0.421)	(0.408)	(0.233)	(0.647)	(0.207)
N	932	932	932	932	932	932	932
R^2	0.148	0.074	0.111	0.098	0.070	0.096	0.048