



FEDERAL RESERVE BANK *of* NEW YORK

The Fed's International Dollar Liquidity Facilities: New Evidence on Effects

WE_ARE_IN Conference (BIS-CEPR-ECB, Basel) September 29 2022 Linda S. Goldberg

The views expressed are those of the author and do not necessarily represent those of the Federal Reserve Bank of New York or Federal Reserve System

Overview of Talk

- Backdrop
 - International roles of dollar in funding
 - Liquidity management within global banking organizations
 - important for international risk sharing
 - supports continued credit provision in stress periods.
- The central bank swap lines and new FIMA repo, the Fed dollar liquidity facilities
 - Operational structure
 - Play an important stabilizing role in offshore \$ funding markets
 - Help stabilize flows across borders, support credit provision at home and abroad



Key references

COVID Response: The Fed's Central Bank Swap Lines and FIMA Repo Facility

Mark Choi, Linda Goldberg, Robert Lerman, and Fabiola Ravazzolo

Federal Reserve Bank of New York Economic Policy Review SPECIAL ISSUE Volume 28, no. 1 June 2022

The Fed's International Dollar Liquidity Facilities: New Evidence on Effects

Linda Goldberg and Fabiola Ravazzolo.

- ✓ *Federal Reserve Bank of New York Staff Report* 997, December 2021. CEPR DP 17233 April 2022
- ✓ VoxEU column August 22, 2022

Cetorelli, Goldberg, Ravazzolo, 2020. How Fed Swap Lines Supported the U.S. Corporate Credit Market amid COVID-19 Strains *Federal Reserve Bank of New York Liberty Street Economics* June.

Backdrop Global dollar funding market developments pre-COVID

- 2008 Global financial crisis (and later euro area crisis)
 - euro area bank funding strains as US asset-backed commercial paper positions generate sharp losses and \$ supply contracts.
 - Banks turn to private markets and US branches to source extra dollar liquidity needs.
 - Key developments on Fed swap lines, dollars to foreign central banks.
 - Consequences for bank lending and monetary policy effectiveness (Cetorelli Goldberg 2011; 2012a,b);
 - Consequences for dollar funding conditions (Baba and Packer 2009; Goldberg Kennedy Miu 2011; Bahaj and Reis 2021)

Backdrop: Global dollar funding market developments pre-COVID

- Post GFC: significant shifts in structure of global \$ funding
 - Regulatory reforms on banks: reduced currency mismatches, global footprints of weaker banks; business models shift, more diversified.
 - Dollar funding flow activity tilts from European institutions toward ones in Japan and EMEs. Increased nonbank participation.
 - Some central banks increased foreign exchange (FX) reserves to better manage dollar funding needs if sizable capital outflows occur
 - Chinese and some banks of East Asia become significant suppliers of dollar-denominated credit, especially to other emerging markets.

What happened to global \$ funding markets in March 2020?

- ✓ Reduced supply of dollars to funding markets: lenders held dollars as a precaution, amid economic and financial disruption uncertainty
- ✓ Increased funding and hedging demand for dollars:
 - some foreign banks faced new funding needs from drawdowns of corporate credit lines and reduced access to other funding sources.
 - US branches of foreign banks sourced more net liquidity from their parents, including due to committed credit line drawdowns
- ✓ Premium to obtain dollar funding rose to highest levels since 2008. High strains dollar-yen (less in euro-dollar), reflecting growth in holdings of U.S. assets among Japanese entities and reduced European bank \$ activity post GFC
- ✓ Some central banks intervened in the FX market to support dollar needs of domestic entities and/or stabilize domestic currencies.

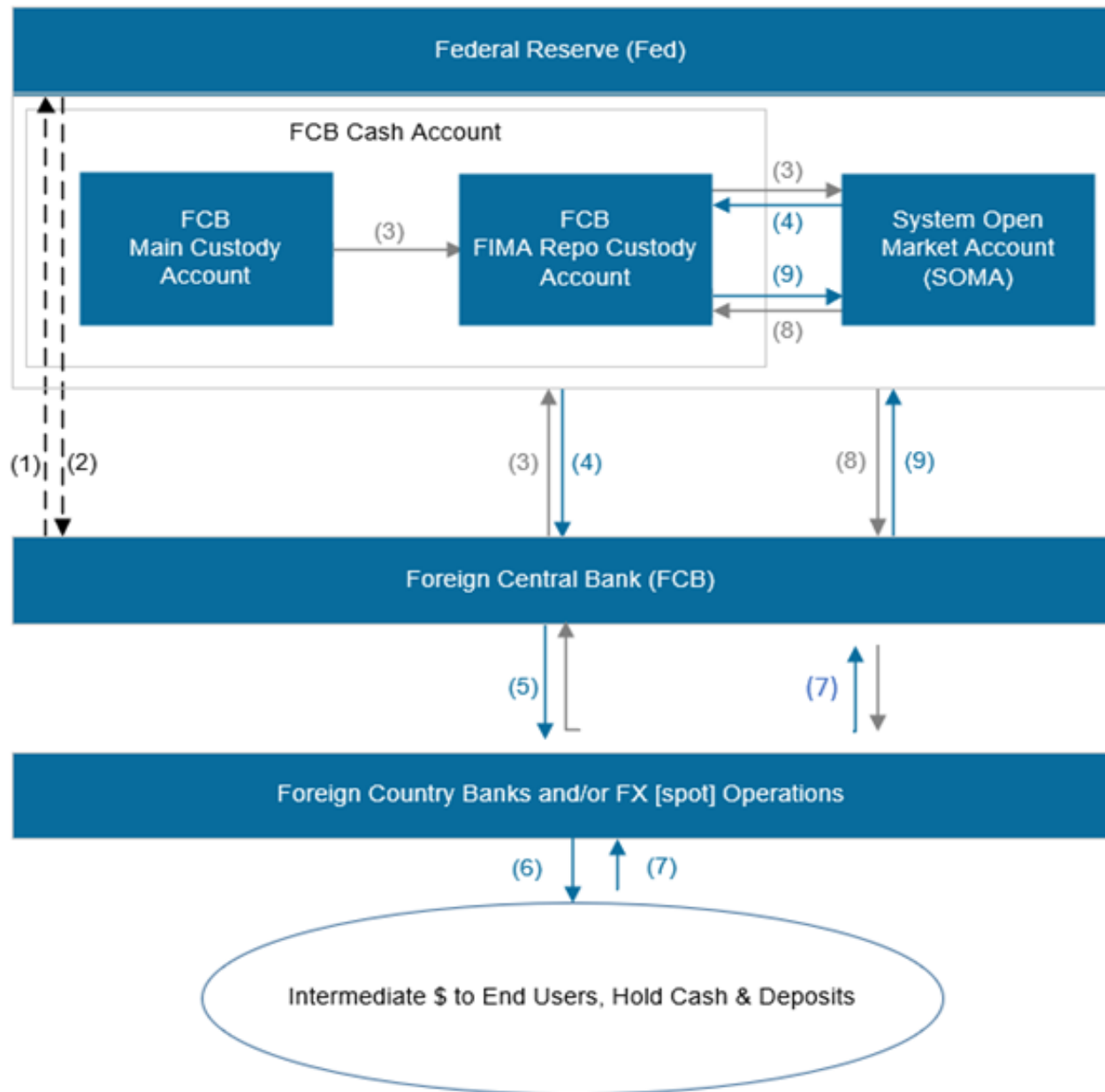
FOMC March 2020 Actions to Address \$ Funding Strains

- Several notable actions:
 - ✓ Eased the terms of swap lines with standing CB counterparties (5), including reducing the swap pricing spread to OIS plus 25 bps from 50 bps, adding 84-day operations and increasing frequency of 7-day weekly operations to daily.
 - ✓ Extended temporary lines with other 9 central banks (same as in GFC).
 - ✓ Total of \$448 bil outstanding by May 2020, v. \$580 peak in GFC
- *In March 2020, also extensive strains to US Treasury markets in dash for cash.*
 - ✓ End March: Introduced new Foreign and International Monetary Authority (FIMA) repo facility, allows a broader range of foreign official entities to obtain \$ from Fed in repo against their U.S. Treasuries holdings at Fed.
 - ✓ Initially “temporary”. Made “standing” July 28 2021
 - ✓ No transactions in March or April, took months to operationalize with CBs

Concepts behind how \$ Facilities Help Mitigate Market Stresses

- Allow commercial banks outside the US to:
 - access U.S \$ liquidity, obviating the need to bid up market rates excessively.
 - avoid fire sales of U.S. \$ assets that may be used for dollar liquidity.
 - maintain the provision of credit, either directly via their U.S. branches or indirectly, to the U.S. economy.
 - intermediate dollars to other financial and nonfinancial institutions.
- Obviates the need for some central banks to intervene in the FX market to meet dollar needs of their own domestic entities.
- Some central banks have their own network of swap line arrangements with other central banks. Serving financial center roles, these CBs more broadly distribute \$.

FIMA accounts - Operational details.



- (1) FCB requests a trade
- (2) Fed confirms trade
- (3) FCB temporarily sells U.S. Treasuries to the Fed, with the FCB moving U.S. Treasuries from its main custody account to SOMA account
- (4) Fed sends cash repo value to FCB
- (5) FCB provides obtained funds to local institutions and/or funds FX operations against local collateral or currency (6)
- (7) Foreign country banks return dollars at the maturity, received back from their counterparties, to FCB.
- (8) FCB repurchases U.S. Treasury at maturity
- (9) FCB returns dollars to the Fed

Note: Blue line reflects flows of U.S. dollars, grey line reflects exchange of U.S. Treasuries in steps (3), (4) and (8) or securities in steps (5) and (7), dotted line a step without flows.
Source: Federal Reserve Bank of New York

The Fed's International Dollar Liquidity Facilities: New Evidence on Effects

Analytics - 1

- ✓ Country- or currency-specific data, time series, mainly Dec 2019-June/July 2020
- ✓ Groupings of countries/ currencies according to access to facilities
 - All with direct access to dollar swap lines (Swap All)
 - Distinguish also between SSCB or TSCBs
 - Others: those without swap line access but later established FIMA repo accounts.
- ✓ Data by time periods
 - initial pre-pandemic baseline (approx. Dec 2019 through early March 2020),
 - heavy strains and with swap dollars settling (March 19 to early April)
 - After additional central banks without swap lines had established FIMA repo accounts (typically after mid-late April/May).

Analytics - 2

- Broad set of dependent variables
- Difference in means (difference in difference) tests
 - ✓ Conjecture:
 - countries or currencies in Fed's \$ swap network exhibit lowered strains once swap dollars settle, and as more dollars settle
- Regression analysis over weekly, monthly or quarterly time series
 - ✓ Conjectures:
 - international capital flows, pressures on currencies, exhibit reduced sensitivity to risk sentiment when swap lines available. Liquidity backstops should reduce both current pressures on funding markets and hoarding \$ liquidity.
 - Credit supply supported by liquidity facility access, supporting economic activity

Table 1: Data Series and periods used in Difference-in-Means Tests

	PERIOD 1	PERIOD 2	PERIOD 3
DATA BY CURRENCY OR COUNTRY	PRE-PANDEMIC	PANDEMIC AFTER SETTLEMENT OF INITIAL \$ CENTRAL BANK SWAP OPERATIONS	PANDEMIC AFTER FIMA REPO ACCESS IN PLACE
<i>FX Swap Basis Spreads (daily, weekly)</i>	Feb 1 2020, to March 10 2020	March 19 2020, to April 4 2020	May 21 2020, to June 30 2020
<i>FX Official Reserve Balance (monthly)</i>	Dec 2019 to February 2020	March 2020 to April 2020	May 2020 to July 2020
<i>U.S. Treasury Holdings of Foreign Countries (monthly)</i>	Dec 2019 to February 2020	March 2020	April 2020 to June 2020
<i>Cross Border Liabilities (quarterly)</i>	Q4 2019	Q1 2020	Q2 2020
<i>Bond and Equity Funds allocated in Counterparty Countries (weekly, monthly)</i>	Dec 2019 to February 2020	March 2020 to April 2020	May 2020 to July 2020

Key Analytical Findings

- Countries with central bank access to standing or temporary swap lines had **reduced costs of borrowing \$** in FX swap market. Following FIMA repo facility, additional countries had declines in local \$ funding costs despite minimal aggregate usage.
- Both facilities were associated with **reduced risk sensitivity of funding costs**.
- **Strains** in offshore \$ funding markets, and cross-border bank and international capital flows, **normalized at a slower pace and to a lesser extent in countries without access**.
- **Cross-border bank flows did not collapse** following the pandemic shock. However, **banking systems with access to Fed facilities maintained stronger cross-border lending** relative to those without access.
- Capital flows to countries where central banks have swap lines were particularly robust in comparison to other countries.
- **Equity flows were not differentiated** by facility access.



1: Foreign Currency Swap Basis Spreads: DiM DiD Tests across Groups and Periods

$$FXbasis_{c,t} = \left[\frac{360}{tenor} \left(\left(\frac{forward_{c,t}(tenor)}{spot_{c,t}} \right) \left(1 + r_{c,t}(tenor) \frac{tenor}{360} \right) \right) - 1 \right] - r_{us,t}(tenor)$$

	<i>PERIOD 1</i>	<i>PERIOD 2</i>	<i>PERIOD 3</i>	<i>PERIOD 2- PERIOD 1</i>	<i>PERIOD 3- PERIOD 2</i>	<i>PERIOD 3- PERIOD 1</i>
<i>SWAP All</i>	19.92	44.06	31.78	24.14	-12.28	11.86
<i>Other</i>	65.73	124.80	62.34	59.07***	-62.46***	-3.39
<i>Swap All - Other</i>	-45.81	-80.74	-30.56	-34.93**	50.18***	15.25
<i>Standing Swap</i>	26.38	39.94	27.25	13.56	-12.69	0.87
<i>Temporary Swap</i>	16.33	46.34	34.30	30.02	-12.05	17.97
<i>Standing - TSCB</i>	10.05	-6.4	-7.1	-16.45	-0.65	-17.1**
<i>Standing Swap - Other</i>	-39.35	-84.86	-35.09	-45.41**	49.77***	4.26
<i>Temporary Swap - Other</i>	-49.4	-78.46	-28.04	-29.06	50.41**	21.36*

*p<0.1 **p<0.05 ***p<0.001.

Data: Bloomberg, authors calculations.

Note: *Period 1* covers from February 1, 2020, through March 10, 2020; *period 2* covers from March 19, 2020, through April 4, 2020; and *period 3* covers from May 21, 2020, through June 30, 2020. *Swap All* includes currencies of jurisdictions with CB swaps (*Standing Swap* or *SSCB*: CAD, CHF, EUR, GBP, JPY; *Temporary Swap* or *TSCB*: AUD, DKK, KRW, NOK, NZD, SEK, SGD, BRL and MXP), *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality.

2: Risk Sensitivity of Daily FX swap basis Spreads across Currency Groups and Periods

Panel A: Swap All (Group Dummy) and FIMA Repo Only

	(1) <i>PERIOD 1 & PERIOD 2</i>	(2) <i>PERIOD 2 & PERIOD 3</i>	(3) <i>PERIOD 1 & PERIOD 3</i>
VIX (a)	1.57***	2.25***	1.62***
period_VIX (b)	1.23***	-2.22***	-0.43***
group_VIX (c)	-0.84***	-0.54*	-1.00***
group_period_VIX (d)	-0.32*	1.62***	0.69***
H(0): a + b = 0	2.81***	0.03	1.18***
H(0): a + c = 0	0.73***	1.71***	0.61***
H(0): a + b + c + d = 0	1.65***	1.12***	0.87***

On average, lower risk sensitivity to VIX of Swap All group. The swap access country currency bases had risk effects decline more after swap implementation. In period 3, others currency bases came down, after FIMA repo account implementation.

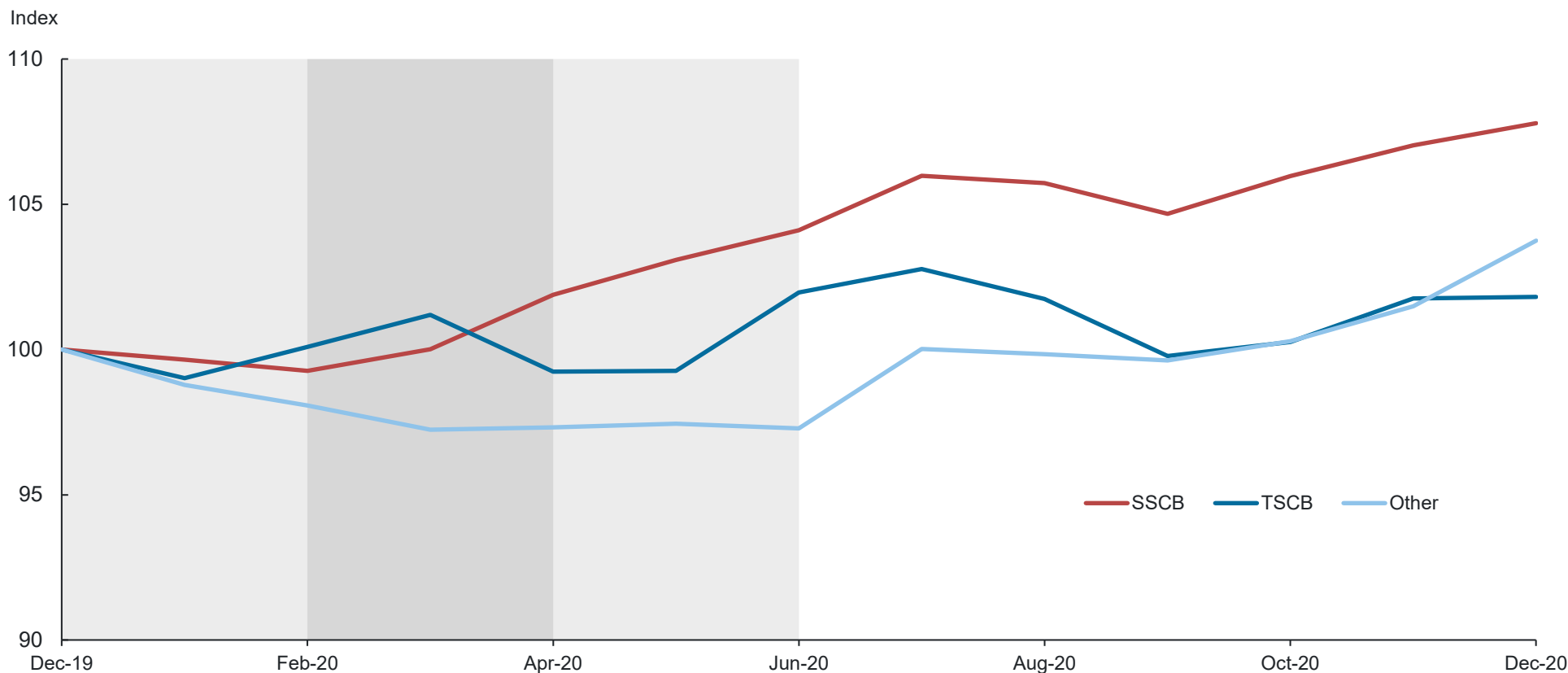
2. Risk Sensitivity of Daily FX swap basis Spreads across Currency Groups and Periods – SSCB, TSCB

Panel B: SSCB (Group Dummy) and TSCB			
	(1) <i>PERIOD 1 & PERIOD 2</i>	(2) <i>PERIOD 2 & PERIOD 3</i>	(3) <i>PERIOD 1 & PERIOD 3</i>
VIX (a)	0.58***	1.58***	0.46***
period_VIX (b)	0.96***	-0.44**	0.49***
group_VIX (c)	0.44	0.37	0.42***
group_period_VIX (d)	-0.14	-0.43	-0.64***
H(0): $a + b = 0$	1.54***	1.14***	0.95***
H(0): $a + c = 0$	1.02***	1.95***	0.88***
H(0): $a + b + c + d = 0$	1.84***	1.08*	0.74***

Differences in risk sensitivity across the SSCB and TSCB currencies were not statistically as important. Groups are heterogeneous.

Official Foreign Exchange Reserve Balances declined for countries without access to swap facilities, increased for some standing swap countries.

Figure 2: FX Reserve Balances



Data: IMF International Financial Statistics, International Reserves and Liquidity, Liquidity, Total Reserves excluding Gold, US Dollar. Monthly series are indexed to 100 using December 2019 values.

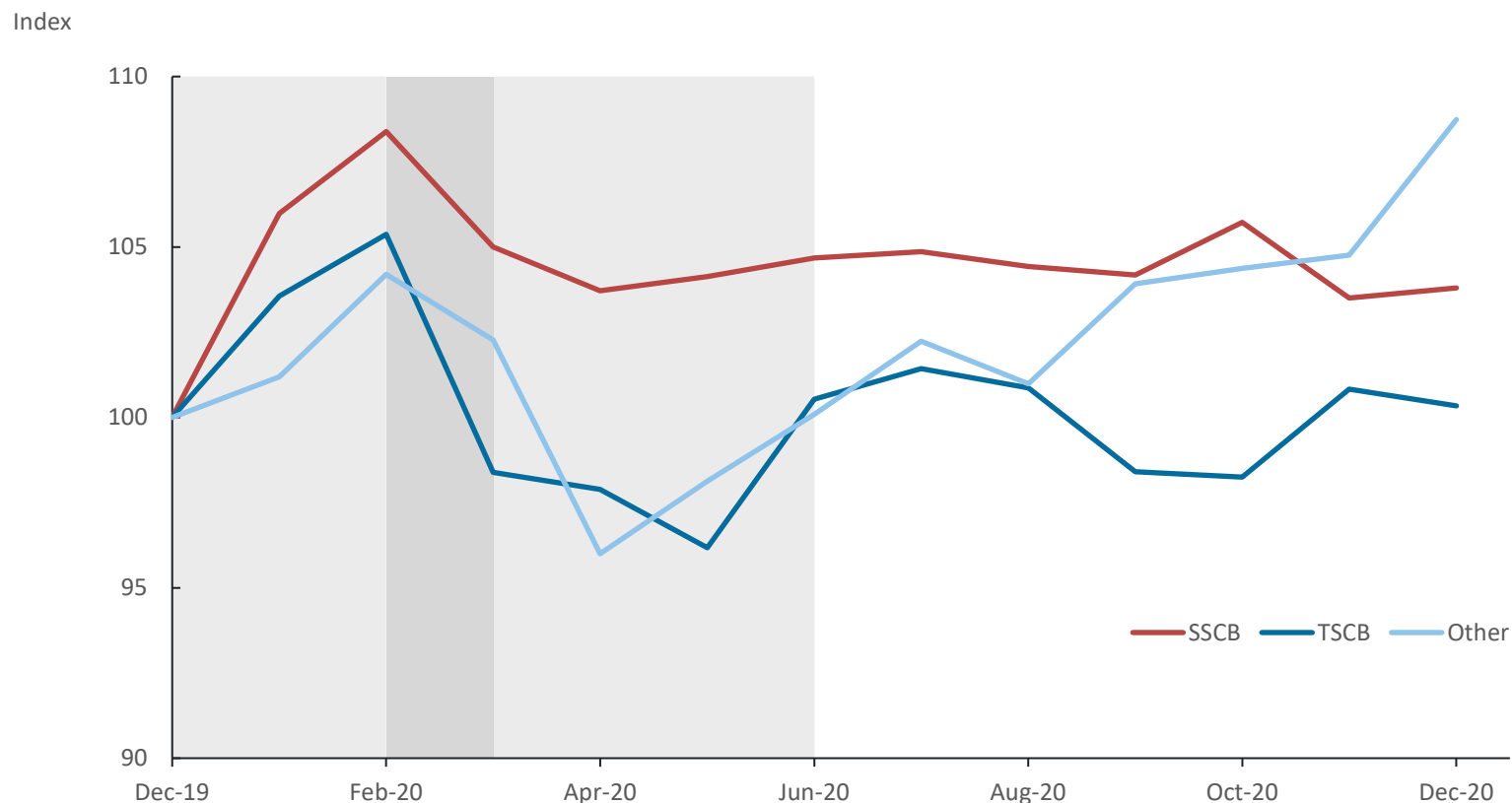
Table 4: Official Foreign Exchange Reserves: Difference in Means across Currency Groups and Periods

	<i>PERIOD 2</i>	<i>PERIOD 3</i>	<i>PERIOD2-PERIOD1</i>	<i>PERIOD3-PERIOD2</i>	<i>PERIOD3-PERIOD1</i>
<i>SWAP All</i>	100.99	101.19	0.99	0.2	1.19
<i>Other</i>	97.44	98.50	-2.56**	1.06	-1.5
<i>Swap All - Other</i>	3.55	2.69	3.55	-0.86	2.69
<i>Standing Swap</i>	100.42	103.05	0.42	2.63*	3.05*
<i>Temporary Swap</i>	101.31	100.16	1.31	-1.15	0.16
<i>Standing - TSCB</i>	-0.89	2.89	-0.88	3.77	2.89
<i>SSCB-Other</i>	2.98	4.55	2.98**	1.57	4.55**
<i>TSCB-Other</i>	3.87	1.66	3.86	-2.2	1.66

Data: IMF International Financial Statistics, International Reserves and Liquidity, Liquidity, Total Reserves excluding Gold, US Dollar. Note: Monthly series are indexed to 100 using December 2019 to February 2020 average values. *Swap All* includes currencies of jurisdictions with CB swaps (*Standing Swap* or *SSCB*: CAD, CHF, EUR, GBP, JPY; *Temporary Swap* or *TSCB*: AUD, DKK, KRW, NOK, NZD, SEK, SGD, BRL and MXP), *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality.

Dash for cash with Treasury liquidation more pronounced in countries without swap lines or with temporary facility access, but quite differentiated in groups

Figure 3: U.S. Treasury Holdings of Foreign Countries



Data: Treasury International Capital (TIC) System, U.S. Treasury Department. Monthly series are indexed to 100 using December 2019 values.

Table 5: US Treasury Holdings of Foreign Counterparties: Difference-in-Means Tests across Country Groups and Periods

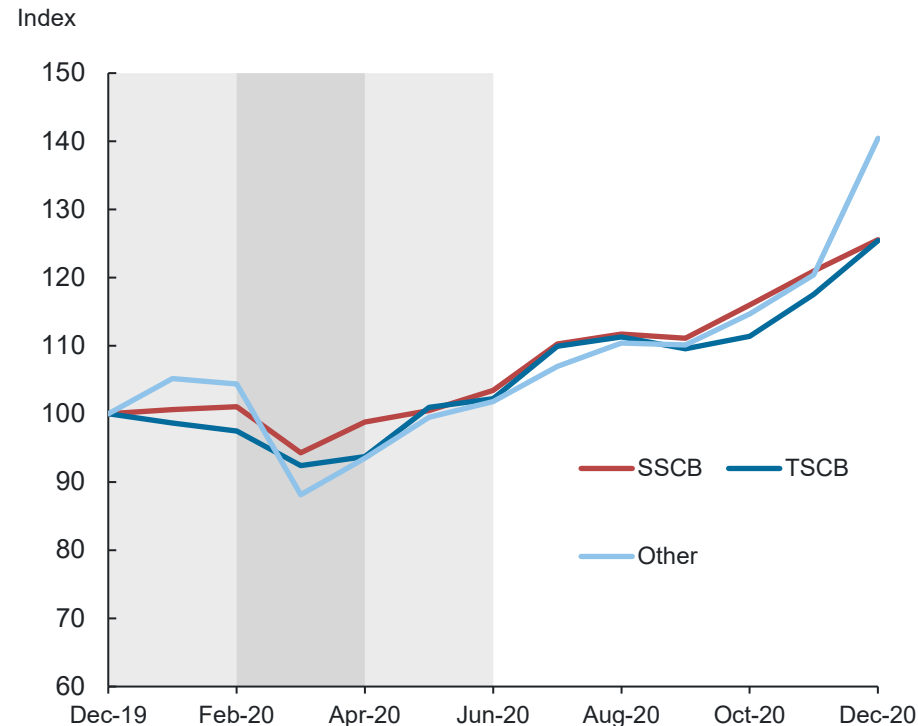
	<i>PERIOD 2</i>	<i>PERIOD 3</i>	<i>PERIOD2-PERIOD1</i>	<i>PERIOD3-PERIOD2</i>	<i>PERIOD3-PERIOD1</i>
<i>SWAP All</i>	96.93	96.25	-3.07	-0.68	-3.75*
<i>Other</i>	98.54	93.14	-1.46	-5.39	-6.86*
<i>Swap All - Other</i>	-1.61	3.11	-1.61	4.71	3.10
<i>Standing Swap</i>	100.40	98.40	0.40	-2.00	-1.60
<i>Temporary Swap</i>	95.39	95.29	-4.61*	-0.10	-4.71*
<i>Standing - TSCB</i>	5.01	3.11	5.01	-1.90	3.12
<i>SSCB-Other</i>	1.86	5.26	1.86	3.40	5.26
<i>TSCB-Other</i>	-3.15	2.15	-3.15	5.29	2.14

Data: Treasury International Capital (TIC) System, U.S. Treasury Department. Note: Monthly series are indexed to 100 using December 2019 to February 2020 average values. *Swap All* includes currencies of jurisdictions with CB swaps (*Standing Swap* or *SSCB*: CAD, CHF, EUR, GBP, JPY; *Temporary Swap* or *TSCB*: AUD, DKK, KRW, NOK, NZD, SEK, SGD, BRL and MXP), *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality.

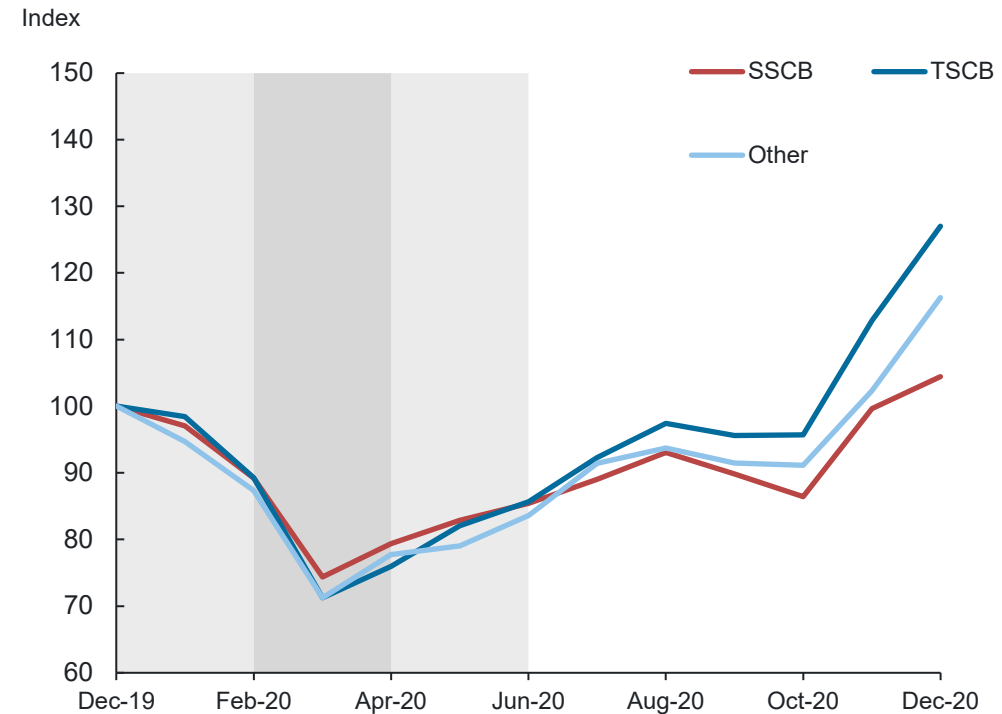
Bond Fund flows normalized quickly while Equity Funds of Foreign Counterparties took much longer to return to pre-pandemic levels. Other countries deeper declines and slower returns.

Tests for risk sensitivity differences: large for bond funds, similar to FX basis pattern, SSCB came down; sensitivities of equity funds more similar to each other.

Panel a: Bond Funds



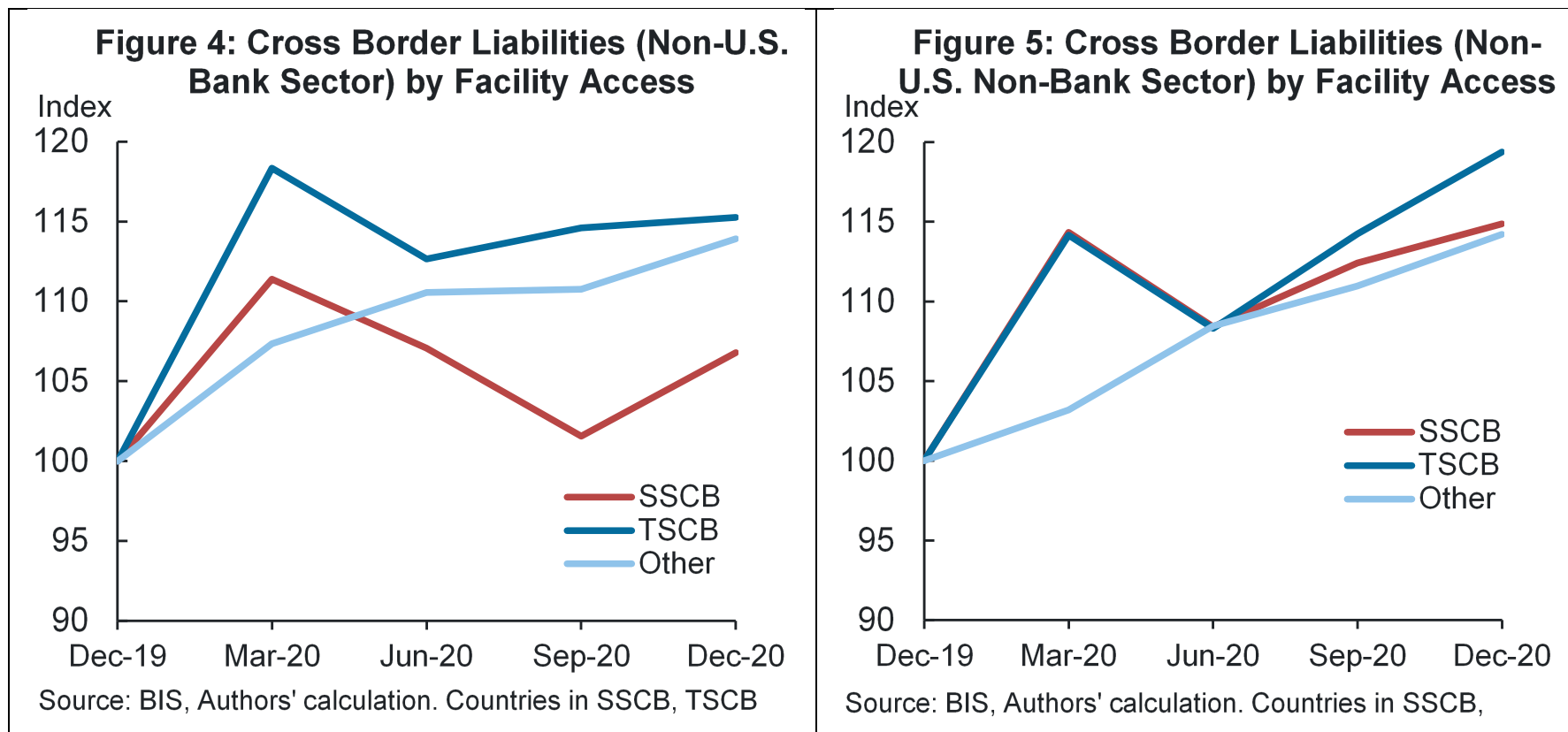
Panel b: Equity Funds



Data: Emerging Portfolio Fund Research, Informa Funds Flow data. Shadow areas are periods defined as in Table 1. Monthly series are indexed to 100 using December 2019 values.

Credit flows, through BIS statistics, examined from the source country perspective and from the destination country perspective.

Credit outflows through banks from swap line countries maintained more (not shown). Exhibits show pattern of inflows, with growth in credit to bank borrowers (including intrabank) stronger for swap line countries.

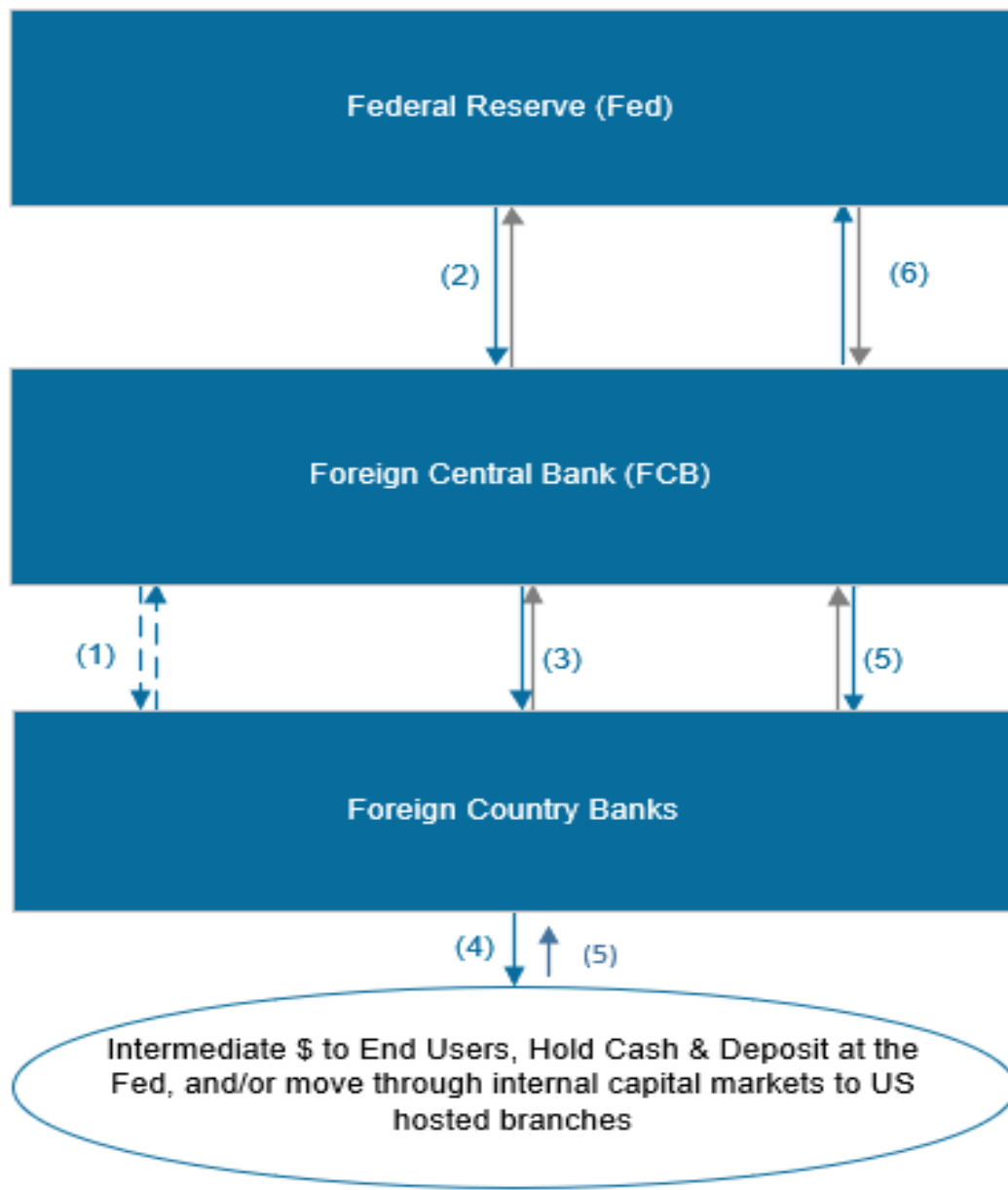


Conclusions

- Liquidity management within global banking organizations is an important part of international risk sharing, supports continued credit provision in stress periods.
- Flow across borders interact with Federal Reserve dollar liquidity facilities, ultimately supporting credit provision at home and abroad.
- The central bank swap lines and new FIMA repo have played an important stabilizing role in periods when offshore dollar funding markets are stressed.

Thank you. Linda.Goldberg@ny.frb.org

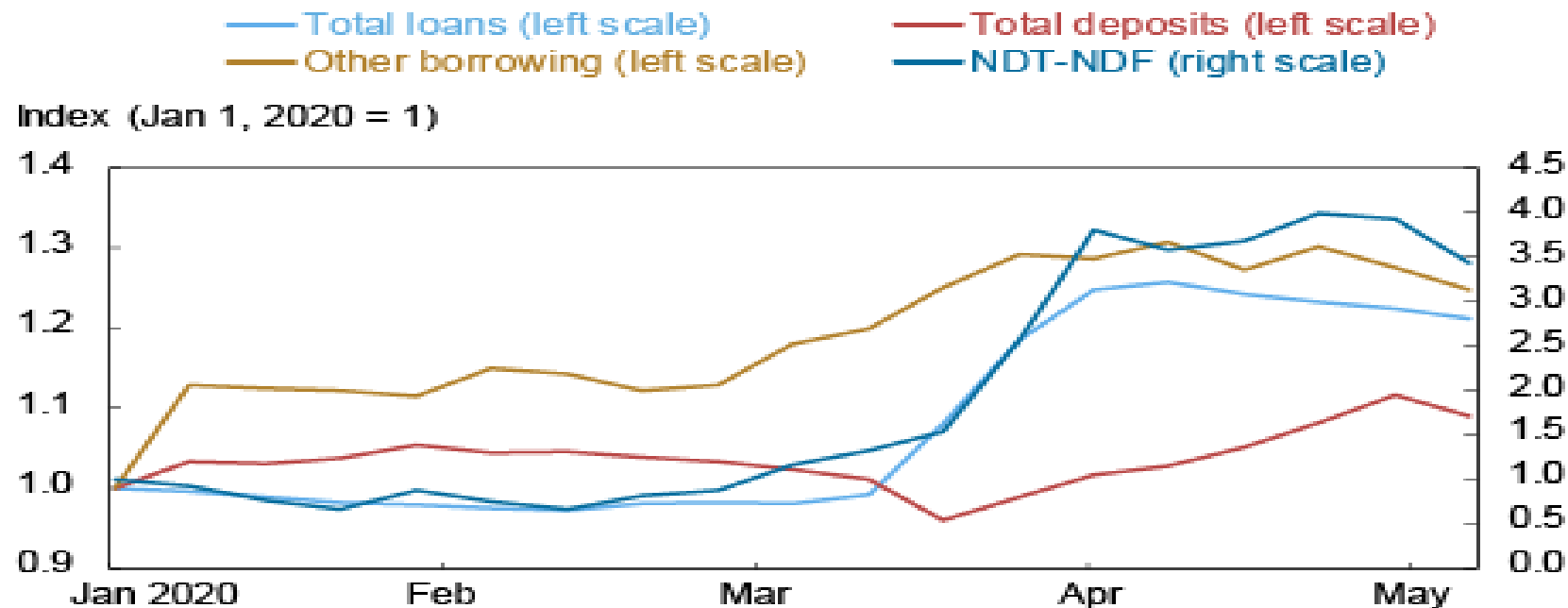
How do central bank swap lines work? Operational details



Key Features of USD liquidity facilities

Features	FIMA Repo Facility	CB Dollar Swaps
Backstop tool	Yes	Yes
Objective(s)	Backstop dollar liquidity provision and U.S. Treasury market function support	Backstop Dollar liquidity provision
Federal Reserve Counterparty	Foreign and International Monetary Authority (FIMA) account holders at the Federal Reserve/New York Fed	Select Foreign central banks
Asset exchanged for U.S. dollar	U.S. Treasuries	Foreign currency
Custodian of exchanged asset	Federal Reserve	Foreign central banks
Format	Standing	Five standing and 9 temporary
Transaction request	Ad hoc at the request of approved FIMA account holders	Pre-approved schedules of operations
Transactions Maturity	Overnight	Up to 88 days
Maximum Position Size	U.S. Treasury holdings at New York Fed, subject to internal counterparty limits communicated bilaterally to applicants	Unlimited (standing) and \$30 or \$60 billion capped (temporary)
Pricing	Temporary facility offering rate was the Fed's IOER plus a spread. Standing facility rate set at 25 basis points (the top range of the Fed's effective funds target rate).	Term USD OIS plus a spread (the rate that is generally agreed upon)

Funding Needs of U.S. Branches of FBOs Increased during the Pandemic Crisis



Sources: Federal Reserve, form FR 2644; Federal Financial Institutions Examination Council, form FFIEC 002.

Notes: NDT-NDF stands for "Net due to less net due from." NDT-NDF is measured on the righthand scale. Our sample contains sixty-five foreign banking organizations (FBOs). FBOs are defined as institutions that submit both the FR 2644 form and the FFIEC 002 form.

Cetorelli, Nicola, Linda Goldberg, Fabiola Ravazzolo, 2020. How Fed Swap Lines Supported the U.S. Corporate Credit Market amid COVID-19 Strains *Federal Reserve Bank of New York Liberty Street Economics* June.

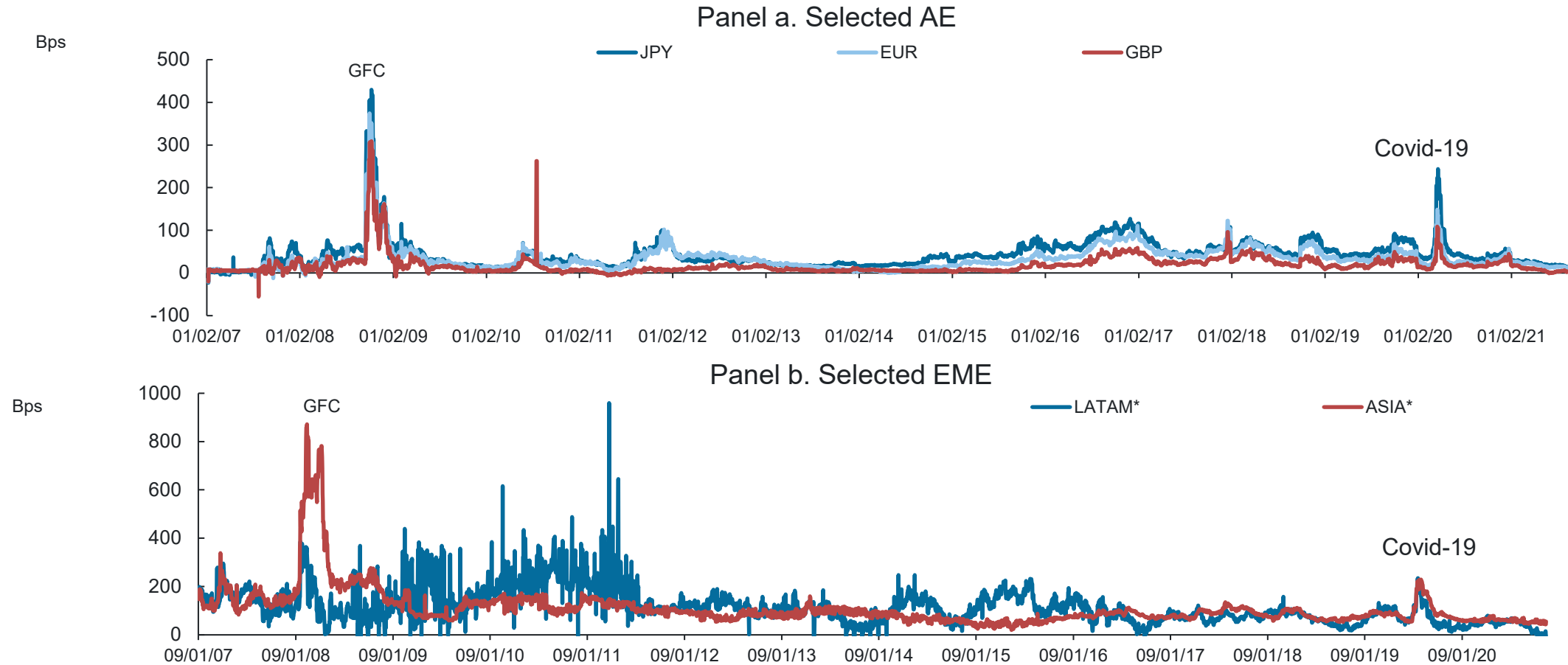
FBO US Operations: Some characteristics

		CUSO<\$1B	\$1B<CUSO<\$100B	\$100B<CUSO<\$250B	\$250B<CUSO	Total
# of CUSOs	2010	18	56	10	8	92
	2020	2	81	11	6	100
Total Assets (\$B) ¹	2010	\$10.0	\$833.4	\$1,417.4	\$3,460.2	\$5,721.0
	2020	\$1.7	\$1,157.7	\$2,051.8	\$2,127.5	\$5,338.7
Total Loans (\$B) ²	2010	\$5.7	\$237.9	\$322.2	\$533.1	\$1,098.9
	2020	\$0.7	\$378.6	\$700.3	\$631.8	\$1,711.4
Branch Assets/ CUSO Assets (%)	2010	100.0%	66.7%	49.4%	16.6%	32.2%
	2020	100.0%	81.9%	41.6%	31.2%	46.2%
# of Parent Countries (Unique)	2010	11	26	4	6	33
	2020	2	33	7	4	34

1. Aggregate US Banking System assets: \$35.0 trillion at the end of 2010; \$44.4 trillion at the end of 2020.

2. Aggregate US Banking System loans: \$10.1 trillion at the end of 2010; \$15.5 trillion at the end of 2020.

Premium to obtain dollar funding rose to highest levels since 2008. Strains most in dollar-yen (less in euro-dollar), reflecting growth in holdings of U.S. assets among Japanese entities and reduced European bank \$ activity post GFC



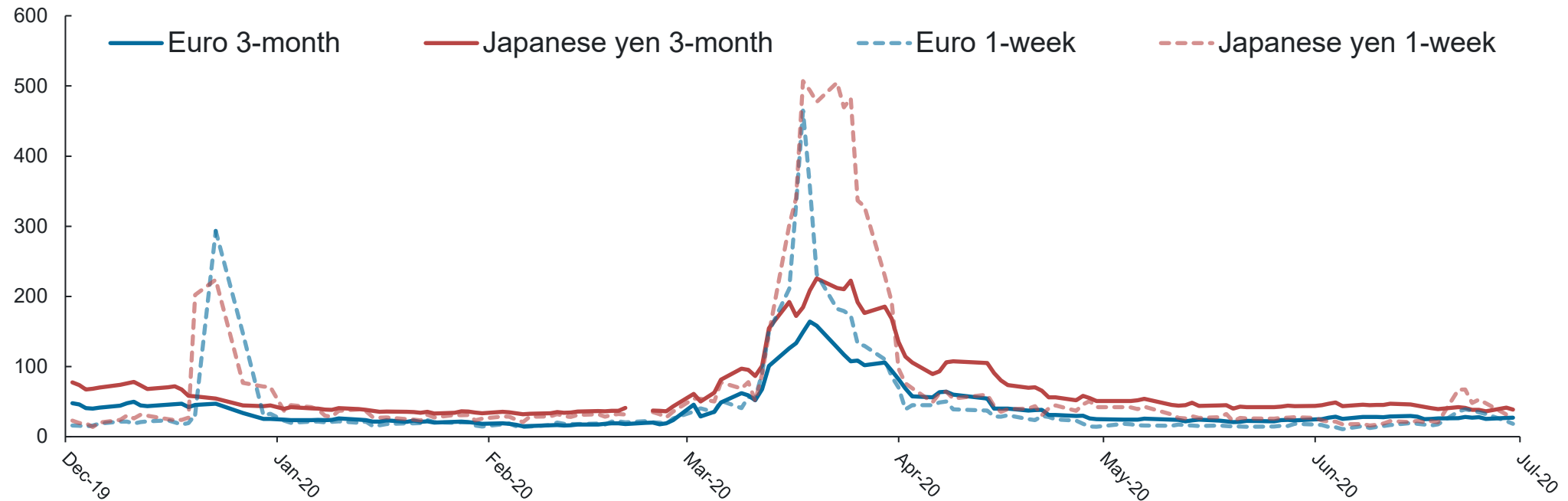
* Simple average of FX swap basis spreads of BRL, CLP, COP and MXP (blue line) and of HKD, KRW, SGD and TWD (red line).

$$FXbasis_{c,t} = \left[\frac{360}{tenor} \left(\left(\frac{forward_{c,t}(tenor)}{spot_{c,t}} \right) \left(1 + r_{c,t}(tenor) \frac{tenor}{360} \right) \right) - 1 \right] - r_{us,t}(tenor)_{30}$$

Steep increase in FX swap implied dollar borrowing costs, with longer tenor and yen strains particularly persistent.

$$FXbasis_{c,t} = \left[\frac{360}{tenor} \left(\left(\frac{forward_{c,t}(tenor)}{spot_{c,t}} \right) \left(1 + r_{c,t}(tenor) \frac{tenor}{360} \right) \right) - 1 \right] - r_{us,t}(tenor)$$

BPS



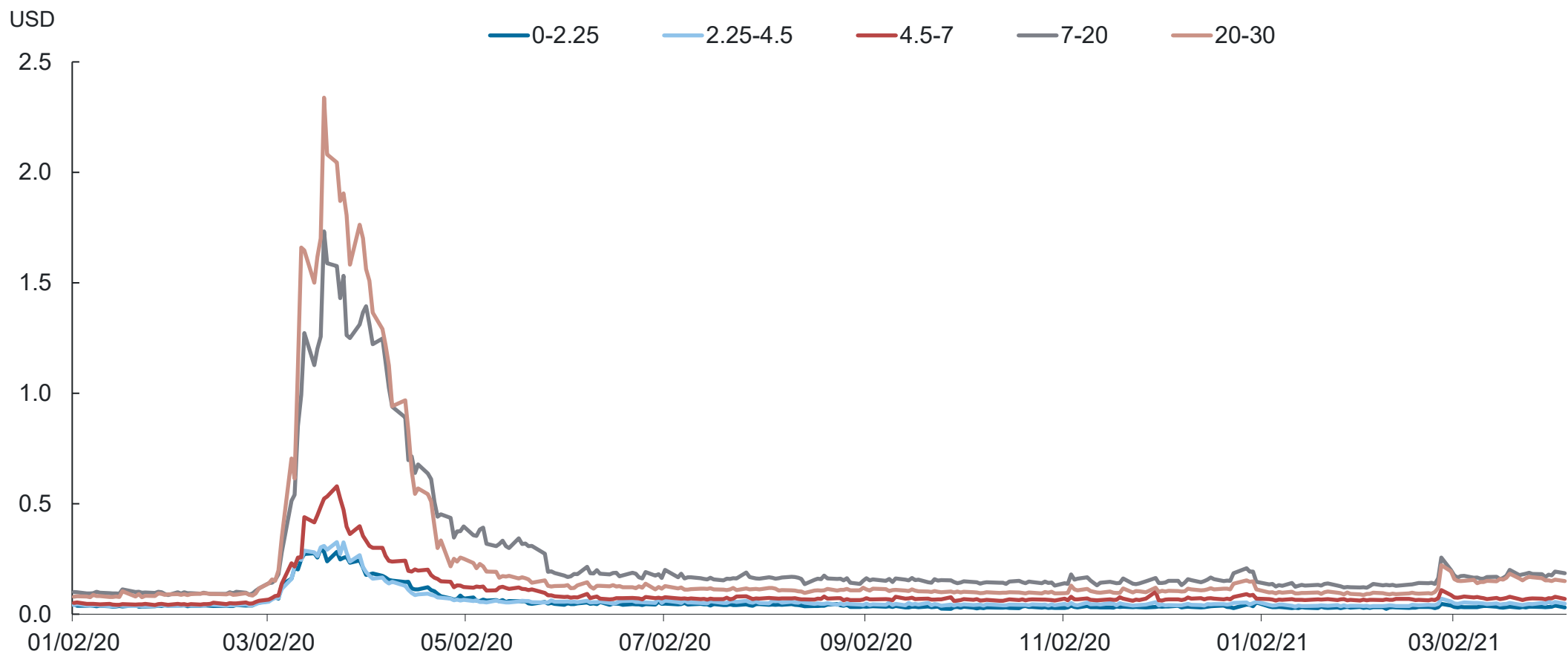
Data: Bloomberg, L.P., authors' calculations.

Note: As of 11 a.m., London time. Based on OIS. A positive number reflects a premium to borrow or hedge U.S.

Disorderly U.S. Treasury Market Functioning

The large-scale sales by foreign institutions (~ \$275 billion in March 2020, of which half by officials) added to deteriorated U.S. Treasury market functioning.

Bid-Ask Spread for Off-the-Run CUSIPs by Purchase Sector

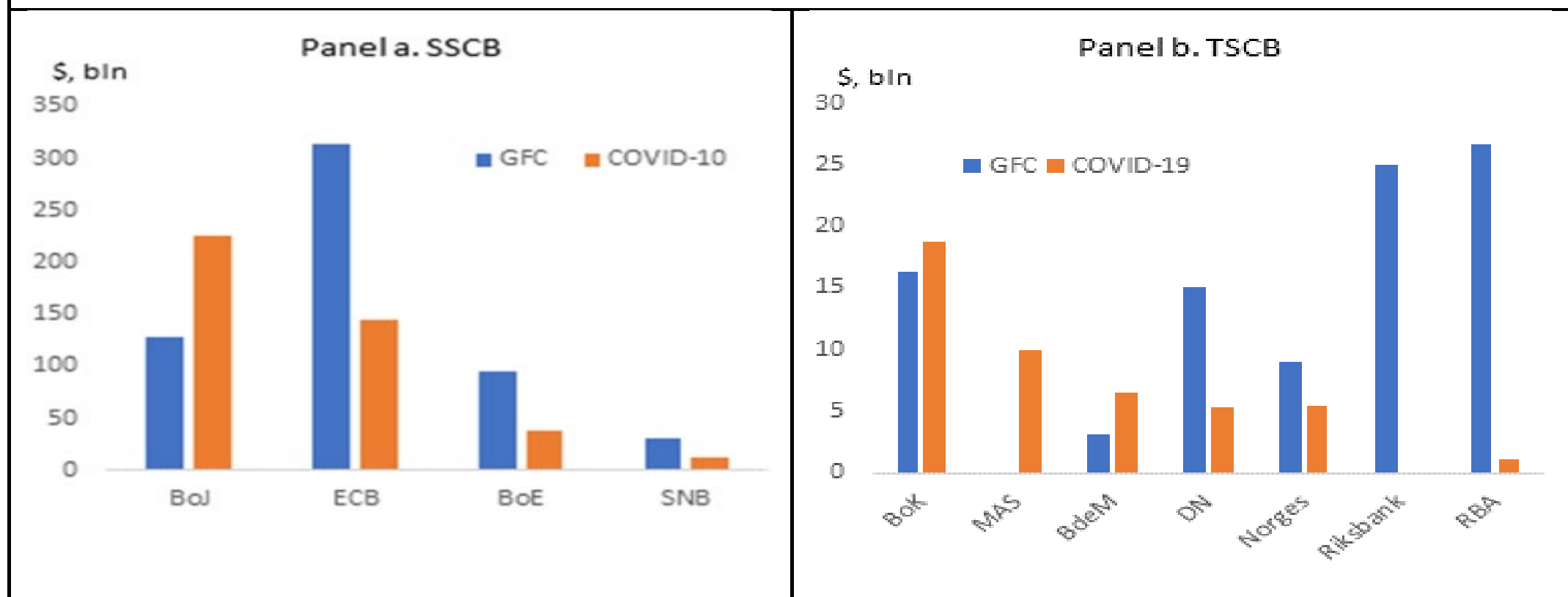


Source: Bloomberg , Desk Calculations

Swap line usage high, peaked below GFC.

Swap line usage peaked with \$448 billion outstanding in late May 2020, lower than \$580 peak during the GFC. Different distribution across central banks.

Figure 5: Peak USD Swap Outstanding during COVID-19 and Global Financial Crisis



Source: FRBNY.

Note: The BoC, BdB and RBNZ never used the facility.

Table 6(A): BIS Locational Banking Statistics, Bank Claims on Bank Borrowers, across Country Groups Periods

	<i>PERIOD 2</i>	<i>PERIOD 3</i>	<i>PERIOD2- PERIOD1</i>	<i>PERIOD3- PERIOD2</i>	<i>PERIOD3- PERIOD1</i>
<i>SWAP All</i>	105.62	100.96	5.62**	-4.66	0.96
<i>Other Countries</i>	102.40	96.67	2.4	-5.73	-3.33
<i>Swap All - Other</i>	3.22	4.29	3.22	1.07	4.29
<i>Standing Swap</i>	103.96	107.12	3.96	3.16	7.12*
<i>Temporary Swap</i>	106.36	98.22	6.36*	-8.14*	-1.78
<i>Standing - TSCB</i>	-2.4	8.9	-2.4	11.3**	8.91**
<i>Standing Swap - Other</i>	1.56	10.45	1.56	8.9*	10.45**
<i>Temporary Swap - Other</i>	3.96	1.55	3.95	-2.41	1.55

Data: BIS Locational Banking Statistics Data. Note: Quarterly series are indexed to 100 using Q4 2019 values. *Swap All* includes currencies of jurisdictions with CB swaps (*Standing Swap* or *SSCB*: CAD, CHF, EUR, GBP, JPY; *Temporary Swap* or *TSCB*: AUD, DKK, KRW, NOK, NZD, SEK, SGD, BRL and MXP), *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality.

Table 6(B): BIS Locational Banking Statistics, Bank Claims on Non-Bank Borrowers, across Country Groups Periods

	<i>PERIOD 2</i>	<i>PERIOD 3</i>	<i>PERIOD2- PERIOD1</i>	<i>PERIOD3- PERIOD2</i>	<i>PERIOD3- PERIOD1</i>
<i>SWAP All</i>	104.72	103.55	4.72*	-1.17	3.55
<i>Other Countries</i>	99.55	99.53	-0.45	-0.01	-0.47
<i>Swap All - Other Countries</i>	5.17	4.02	5.17*	-1.16	4.02
<i>Standing Swap</i>	108.26	101.78	8.26	-6.48	1.78
<i>Temporary Swap</i>	103.15	104.34	3.15	1.19	4.34
<i>Standing - TSCB</i>	5.11	-2.56	5.11	-7.67*	-2.56
<i>Standing Swap - Other</i>	8.71	2.25	8.71	-6.47*	2.24
<i>Temporary Swap - Other</i>	3.6	4.81	3.6	1.2	4.8

Data: BIS Locational Banking Statistics Data. Note: Quarterly series are indexed to 100 using Q4 2019 values. *Swap All* includes currencies of jurisdictions with CB swaps (*Standing Swap* or *SSCB*: CAD, CHF, EUR, GBP, JPY; *Temporary Swap* or *TSCB*: AUD, DKK, KRW, NOK, NZD, SEK, SGD, BRL and MXP), *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality.

Table 7(A): BIS Locational Banking Statistics, Bank Liabilities from Bank Lender, across Country Groups Periods

	<i>PERIOD 2</i>	<i>PERIOD 3</i>	<i>PERIOD2- PERIOD1</i>	<i>PERIOD3- PERIOD2</i>	<i>PERIOD3- PERIOD1</i>
<i>SWAP All</i>	117.11	111.23	17.11***	-5.87	11.23***
<i>Other</i>	106.08	108.11	6.08	2.02	8.11
<i>Swap All - Other</i>	11.03	3.12	11.02**	-7.9	3.13
<i>Standing Swap</i>	119.51	113.13	19.51**	-6.39	13.13**
<i>Temporary Swap</i>	116.04	110.39	16.04***	-5.64	10.39***
<i>Standing - Temporary Swap</i>	3.47	2.74	3.48	-0.75	2.73
<i>Standing Swap - Other</i>	13.43	5.02	13.43	-8.41	5.02
<i>Temporary Swap - Other</i>	9.96	2.28	9.95*	-7.67	2.29

*p<0.1 **p<0.05 ***p<0.001.

Data: BIS Locational Banking Statistics Data. Note: *Swap All* includes countries from jurisdictions with CB swaps (AUD, CAD, CHF, DKK, EUR, GBP, JPY, KRW, NOK, NZD, SEK, SGD, BRL and MXP). *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality. *Period 1* Q4 2019; *period 2* Q1 2020; and *period 3* Q2 2020. Quarterly observations and each country data are normalized to its average period 1 value.

Table 7(B): BIS Locational Banking Statistics, Bank Liabilities from Non-Bank Lender, across Country Groups Periods

	<i>PERIOD 2</i>	<i>PERIOD 3</i>	<i>PERIOD2- PERIOD1</i>	<i>PERIOD3- PERIOD2</i>	<i>PERIOD3- PERIOD1</i>
<i>SWAP All</i>	113.23	108.12	13.23***	-5.11	8.12***
<i>Other</i>	104.46	108.76	4.46	4.3	8.76
<i>Swap All - Other</i>	8.77	-0.64	8.76**	-9.41**	-0.64
<i>Standing Swap</i>	115.48	108.92	15.48**	-6.55	8.92
<i>Temporary Swap</i>	112.23	107.76	12.23***	-4.47	7.76**
<i>Standing - Temporary Swap</i>	3.25	1.16	3.25	-2.09	1.17
<i>Standing Swap - Other</i>	11.02	0.16	11.01**	-10.85	0.16
<i>Temporary Swap - Other</i>	7.77	-1.00	7.76	-8.76**	-1.0

*p<0.1 **p<0.05 ***p<0.001.

Data: BIS Locational Banking Statistics Data. Note: *Swap All* includes countries from jurisdictions with CB swaps (AUD, CAD, CHF, DKK, EUR, GBP, JPY, KRW, NOK, NZD, SEK, SGD, BRL and MXP). *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality. *Period 1* Q4 2019; *period 2* Q1 2020; and *period 3* Q2 2020. Quarterly observations and each country data are normalized to its average period 1 value.

 Table 8(A): EPFR Weekly Equity Fund Flows by Recipient Country Group

	<i>PERIOD 2</i>	<i>PERIOD 3</i>	<i>PERIOD2-PERIOD1</i>	<i>PERIOD3-PERIOD2</i>	<i>PERIOD3-PERIOD1</i>
<i>SWAP All</i>	78.26	85.26	-21.74***	7	-14.74***
<i>Other</i>	82.52	89.84	-17.48**	7.32	-10.16
<i>Swap All - Other</i>	-4.26	-4.58	-4.26	-0.32	-4.58
<i>Standing Swap</i>	79.41	86.21	-20.59***	6.79	-13.79*
<i>Temporary Swap</i>	77.62	84.74	-22.38***	7.12	-15.26**
<i>Standing - Temporary Swap</i>	1.79	1.47	1.79	-0.32	1.47
<i>Standing Swap - Other</i>	-3.11	-3.63	-3.11	-0.53	-3.63
<i>Temporary Swap - Other</i>	-4.9	-5.1	-4.9	-0.21	-5.11

*p<0.1 **p<0.05 ***p<0.001.

Data: Emerging Portfolio Fund Research, Informa Funds Flow data. Note: Weekly series are indexed to 100 using December 2019 to February 2020 average values. *Swap All* includes countries from jurisdictions with CB swaps (AUD, CAD, CHF, DKK, EUR, GBP, JPY, KRW, NOK, NZD, SEK, SGD, BRL and MXP). *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality.

Table 8(B): EPFR Weekly Bond Fund Flows by Recipient Country Group

	<i>PERIOD 2</i>	<i>PERIOD 3</i>	<i>PERIOD2- PERIOD1</i>	<i>PERIOD3- PERIOD2</i>	<i>PERIOD3- PERIOD1</i>
<i>SWAP All</i>	95.54	100.75	-4.46	5.21	0.75
<i>Other Countries</i>	100.34	108.97	0.34	8.63	8.97
<i>Swap All - Other</i>	-4.8	-8.22	-4.8	-3.42	-8.22
<i>Standing Swap</i>	98.52	102.50	-1.48	3.98	2.5
<i>Temporary Swap</i>	93.88	99.78	-6.12	5.9	-0.22
<i>Standing - TSCB</i>	4.64	2.72	4.63	-1.91	2.72
<i>SSCB - Other</i>	-1.82	-6.47	-1.82	-4.65	-6.47
<i>TSCB-Other</i>	-6.46	-9.19	-6.45	-2.73	-9.19

*p<0.1 **p<0.05 ***p<0.001.

Data: Emerging Portfolio Fund Research, Informa Funds Flow data. Note: Weekly series are indexed to 100 using December 2019 to February 2020 average values. *Swap All* includes countries from jurisdictions with CB swaps (AUD, CAD, CHF, DKK, EUR, GBP, JPY, KRW, NOK, NZD, SEK, SGD, BRL and MXP). *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality.

Table 9: Risk Sensitivity of EFPR Equity Fund Flows across Country Groups and Periods

Panel A: Equities. Swap All (Group Dummy) and Other			
	(1) <i>PERIOD 1 & PERIOD 2</i>	(2) <i>PERIOD 2 & PERIOD 3</i>	(3) <i>PERIOD 1 & PERIOD 3</i>
VIX (a)	-49.39	-3.79	-41.58
period_VIX (b)	-18.14	51.95	-34.25
group_VIX (c)	-413.88	-223.09	-388.26***
group_period_VIX (d)	-65.91	269.94	-67.95
H(0): a + b = 0	-67.52	48.15	-75.83
H(0): a + c = 0	-463.26***	-226.88	-429.83***
H(0): a + b + c + d = 0	-547.31***	95	-532.03***
Panel B: Equities. SSCB (Group Dummy) and TSCB			
VIX (a)	-73.93	-50.49	-68.38
period_VIX (b)	-30.72	29.82	-58.36
group_VIX (c)	-1090.12***	-493.91	-1012.08***
group_period_VIX (d)	-149.3	817.79*	-122.75
H(0): a + b = 0	-104.66*	-20.67	-126.73
H(0): a + c = 0	-1164.06***	-544.4	-1080.46***
H(0): a + b + c + d = 0	-1344.08***	303.21	-1261.57***

*p<0.1 **p<0.05 ***p<0.001. Data: Emerging Portfolio Fund Research, Informa Funds Flow data; Bloomberg. Note: The table shows a range of specifications with (1) being: $FXbasis_{c,t} = constant + a*VIX_t + b*period_VIX_t + c*group_VIX_t + d*group_period_VIX_t + e_t$. In (1), VIX is Cboe volatility index, period is a dummy equal to 1 during the later period of each data period included in the column. period_VIX (b) captures any change in sensitiveness in the second period; group is equal to 1 for FX swap basis spreads of currencies of jurisdictions with swap lines (Swap All, panel a; SSCB, panel b). Note: *Period 1* covers from February 1, 2020, through March 10, 2020; *period 2* covers from March 19, 2020, through April 4, 2020; and *period 3* covers from May 21, 2020, through June 30, 2020. *Swap All* includes currencies of jurisdictions with CB swaps (*Standing Swap or SSCB*: CAD, CHF, EUR, GBP, JPY; *Temporary Swap or TSCB*: AUD, DKK, KRW, NOK, NZD, SEK, SGD, BRL and MXP), *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality.

Table 10: Risk Sensitivity of EFPR Bond Fund Flows across Country Groups and Periods

Panel A: Bonds. Swap All (Group Dummy) and Other			
	(1) <i>PERIOD 1 & PERIOD 2</i>	(2) <i>PERIOD 2 & PERIOD 3</i>	(3) <i>PERIOD 1 & PERIOD 3</i>
VIX (a)	13.42	-7.28	10.38
period_VIX (b)	-1.04	9.96	30.14
group_VIX (c)	70.45	-0.19	78.94
group_period_VIX (d)	-112.11***	144.9	-12.77
H(0): a + b = 0	12.37	2.68	40.52
H(0): a + c = 0	83.86***	-7.48	89.32***
H(0): a + b + c + d = 0	-29.29***	147.38	106.69***
Panel B: Bonds. SSCB (Group Dummy) and TSCB			
VIX (a)	9.82	-13.56	9.95
period_VIX (b)	-22.52	24.74	3.05
group_VIX (c)	207.32***	17.03	222.23***
group_period_VIX (d)	-253.78***	364.33***	40.1
H(0): a + b = 0	-12.7	11.18	13
H(0): a + c = 0	217.14***	3.47	232.17***
H(0): a + b + c + d = 0	-59.16***	392.55*	275.33***

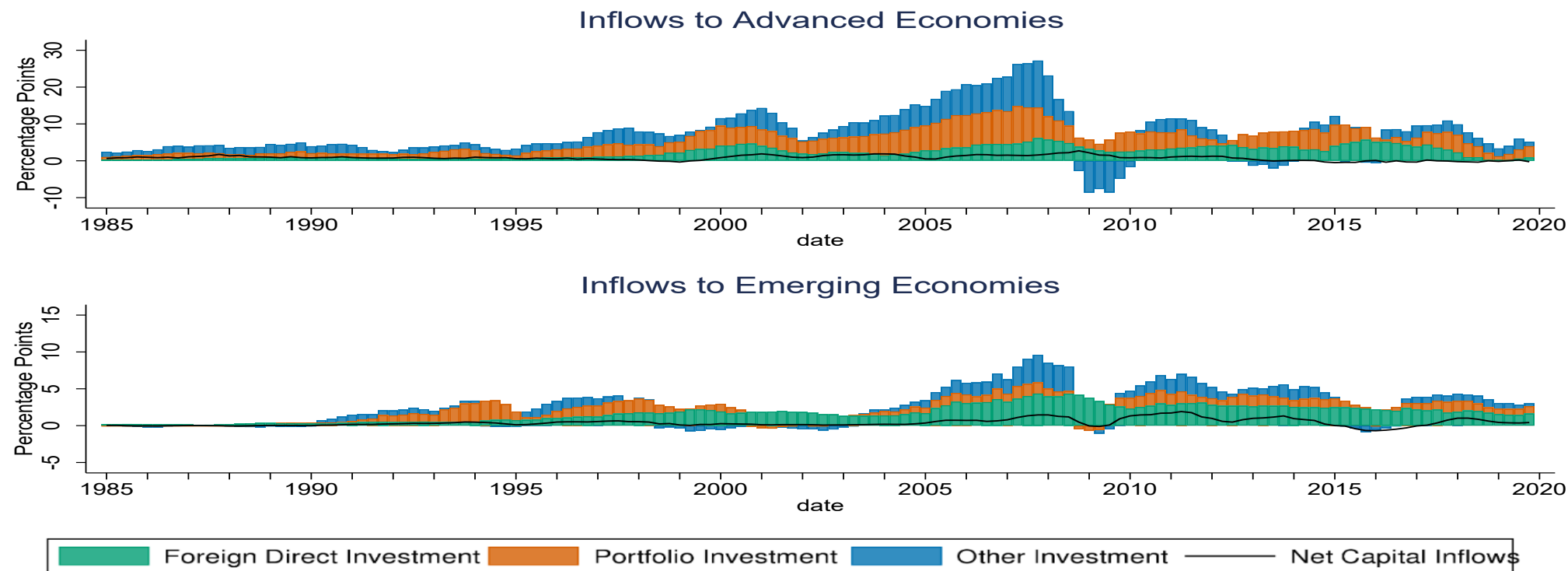
*p<0.1 **p<0.05 ***p<0.001. Data: Emerging Portfolio Fund Research, Informa Funds Flow data; Bloomberg. Note: The table shows a range of specifications with (1) being: $FXbasis_{\alpha t} = constant + a*VIX_t + b*period_VIX_t + c*group_VIX_t + d*group_period_VIX_t + e_t$. In (1), VIX is Cboe volatility index, period is a dummy equal to 1 during the later period of each data period included in the column. period_VIX (b) captures any change in sensitiveness in the second period; group is equal to 1 for FX swap basis spreads of currencies of jurisdictions with swap lines (Swap All, panel a; SSCB, panel b). Note: *Period 1* covers from February 1, 2020, through March 10, 2020; *period 2* covers from March 19, 2020, through April 4, 2020; and *period 3* covers from May 21, 2020, through June 30, 2020. *Swap All* includes currencies of jurisdictions with CB swaps (*Standing Swap or SSCB*: CAD, CHF, EUR, GBP, JPY; *Temporary Swap or TSCB*: AUD, DKK, KRW, NOK, NZD, SEK, SGD, BRL and MXP), *Other* includes those of jurisdictions with availability to access the FIMA repo facility but not CB swaps. Currency names suppressed for confidentiality.

Dollar roles, the global financial system, and central banks

- The US dollar is the key international and official reserve currency
 - Non-U.S. institutions rely on access to U.S. dollar funding to support critical international trade and financial market activities.
 - US dollar funding markets are broad and deep; borrowers incur relatively low funding rates in USD; capital reallocates internationally
 - Strains in dollar funding markets abroad can also disrupt financial conditions and flows of credit in the United States.
- Central banks play an important role in helping ensure the smooth functioning of the global financial system and funding markets, including through supporting access to funding in times of stress.

The more liquid and volatile parts of international capital flows (portfolio and other investment) evolve in importance for both AEs and EMs.

Figure 1 Composition of Annualized Net Capital Flows for Advanced and Emerging Economies (1985 Q1—2019 Q4)



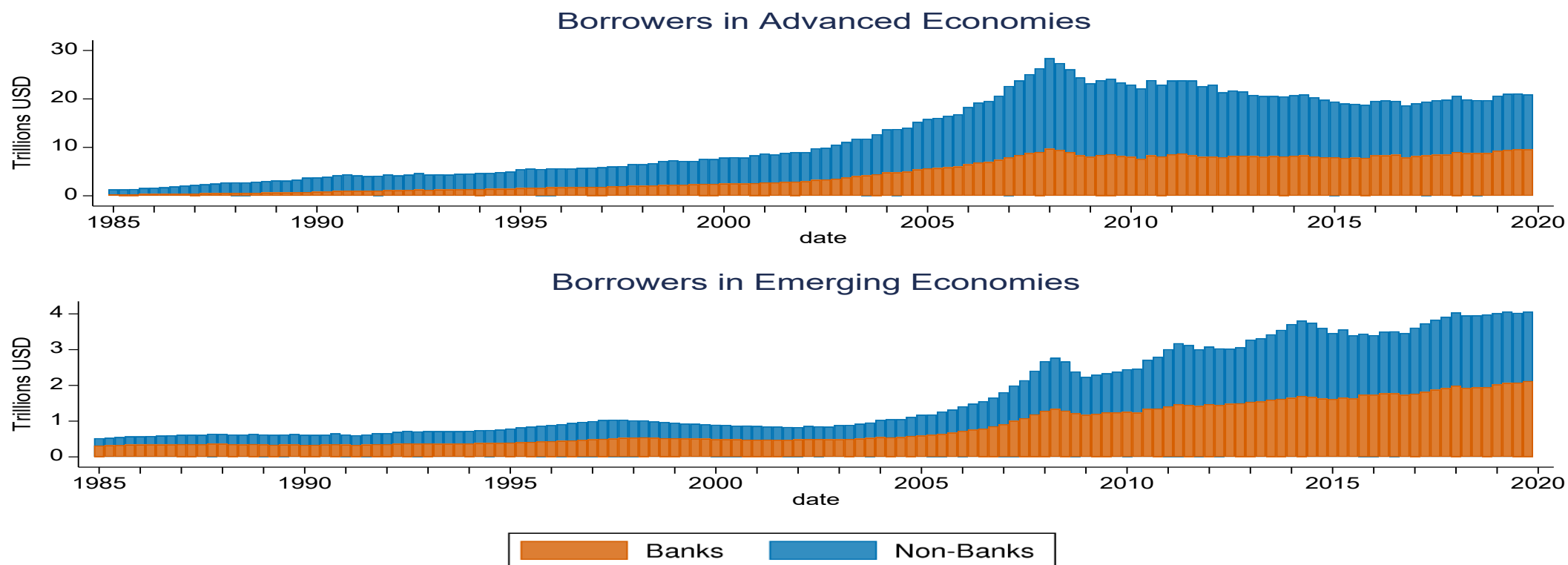
Note: Figure represents private net capital inflows, excluding currency reserves and derivatives transactions, as a percentage of aggregate advanced or emerging economy GDP. Series annualized as a four-quarter rolling sum. Includes 35 advanced and 36 emerging market economies, defined by footnote 9, for which data were available.

Source: IMF International Financial Statistics and World Economic Outlook data via Haver.

Buch, Claudia and Linda Goldberg . 2020. Global Banking Toward an Assessment of Benefits and Costs. *Annual Review of Financial Economics* vol 12

Total flows through banks rose steeply before the GFC, resumed more for EMs, with nonbank borrower shares rising. Local claims (not shown) also increased.

Figure 2 Composition of Cross-Border Bank Claims by Borrower Type, for Advanced and Emerging Economies (1985 Q1—2019 Q4)



Note: Figure depicts outstanding dollar amounts of cross-border bank claims by borrower sector, aggregated over borrower region. Advanced Economies and Emerging Market Economies are defined as 5R and 4T, respectively, as listed in the [IBS guidelines](#).

Source: BIS Locational Banking Statistics

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BIG PICTURE CONTEXT

- Global banks are important and provide net benefits
- Form of expansion into local markets, through cross-border activity or by setting up local affiliates, changes where and how bank flows respond to shocks
 - Liquidity management and internal capital markets important for global banks (Cetorelli, Goldberg JF 2012, JIE 2012)
- International funding flows through banks (claims) is less risk sensitive when:
 - Banks are healthier (better capitalized); borrowers are nonbanks; channeled through local bank affiliates instead of cross-border (Avdjiev, Gambacorta, Goldberg, Schiaffi JIE 2020).
- When considering which types of countries have more risk sensitive funding flows:
 - Advanced economy and EM division no longer as appropriate: so-called safe havens versus all others (Goldberg Krogstrup 2019, 2022).
- Reliance on global banks not just an emerging market story.
 - Ex: FBOs at over 10 % of US banking system assets and loans, even before XB flows

Presentation content draws from a number of papers

- ✓ Avdjiev, Stefan, Leonardo Gambacorta, Linda Goldberg and Stefano Schiaffi. 2020. The Shifting Drivers of International Capital Flows. *Journal of International Economics* vol. 125 (c).
- ✓ Buch, Claudia and Linda Goldberg. 2020. Global Banking: Toward an Assessment of Benefits and Costs. *Annual Review of Financial Economics* vol. 12, 2020.
- ✓ Cetorelli, Nicola and Linda Goldberg, 2011. Global Banks and Their Internal Capital Markets during the Crisis *Federal Reserve Bank of New York Liberty Street Economics*, July 11, 2011.
- ✓ Cetorelli, Nicola, Linda Goldberg, Fabiola Ravazzolo, 2020. Have the Fed Swap Lines Reduced Dollar Funding Strains during the COVID-19 Outbreak? *Federal Reserve Bank of New York Liberty Street Economics* May.
- ✓ Cetorelli, Nicola, Linda Goldberg, Fabiola Ravazzolo, 2020. How Fed Swap Lines Supported the U.S. Corporate Credit Market amid COVID-19 Strains *Federal Reserve Bank of New York Liberty Street Economics* June.
- ✓ Choi, Mark, Linda Goldberg, Robert Lerman, and Fabiola Ravazzolo, 2021. COVID Response: The Fed's Central Bank Swap Lines and FIMA Repo Facility. Forthcoming Federal Reserve Bank of New York, *Economic Policy Review*.
- ✓ Goldberg, Linda and Fabiola Ravazzolo. 2021. The Fed's International Dollar Liquidity Facilities: New Evidence on Effects. Federal Reserve Bank of New York Staff Report, December.