



FEDERAL RESERVE BANK *of* NEW YORK

Volatile International Capital Flows and Central Bank Actions

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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

Volatile International Capital Flows and Central Bank Effects: Lecture Roadmap

- ✓ Evolution of international capital flows over recent decades
- ✓ Perspective on the changing global factor
 - Drivers, evolving strength
 - Differences across advanced economies vs emerging markets
- ✓ Pandemic insights around pre-pandemic open questions
 - Different types of participants/ health/ sensitivities
 - New amplification factors
 - Implications of more synchronized business cycles
- ✓ On central bank facilities and the international roles of the USD
 - Access to USD CB swap lines and new FIMA repo facility
 - Evidence and initial lessons

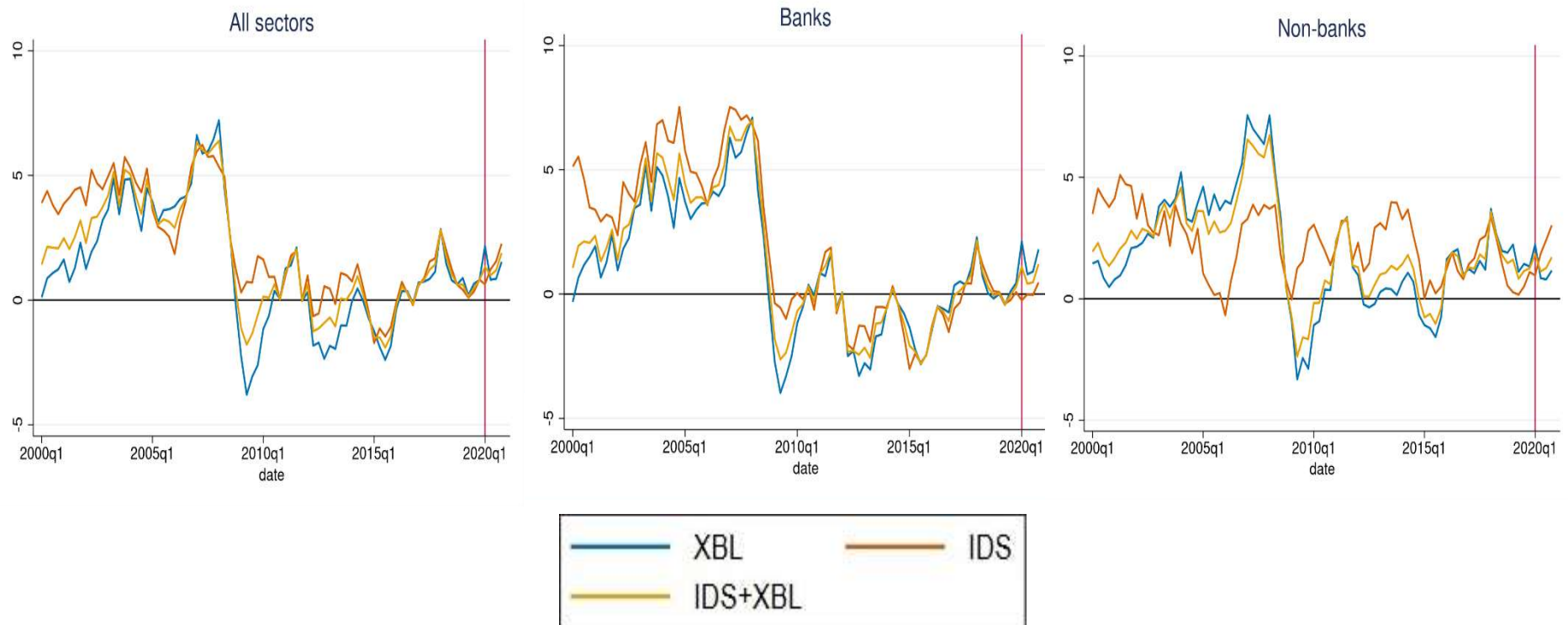
Main messages

- International capital flows are volatile and complex: composition evolves, drivers and global factor strength change, in part due to CB policies.
 - ✓ *Global factor is stronger in asset prices than in quantities of flows.*
- Data on international capital flows (plus bank-specific data; GK Exchange Market Pressure indices) allows identification of particular channels of international spillovers, and decomposition of borrower/creditor behaviors.
 - ✓ *Amplification factors: weak and under-capitalized global banks, synchronized advanced economy business cycles, big changes in investor risk sentiment.*
 - ✓ *Market-based financing has different dynamics than bank-based. Open questions on amplification via nonbank financial institutions; data gaps.*
- During COVID, having better capitalized banks helped; nonbank financial institutions increased roles in capital flows and global \$ funding dynamics; March 2020 rush for liquidity challenged market functioning.
- Central banks innovated. *CB swap lines and FIMA repo innovations helped relieve dollar funding strains and maintain credit provision in US and abroad.*

Big picture: patterns in international capital flows

Separate bank- and market-based parts of global liquidity flows.
Separate flows to different types of borrowers.

Cross border lending (blue) more volatile than market-based flows, especially for bank borrowers. COVID-19: no GFC-type collapse.



$$\text{Quarterly Growth Rate}_t = \left(\text{Outstanding Stock}_t / \text{Outstanding Stock}_{t-1} \right) - 1$$

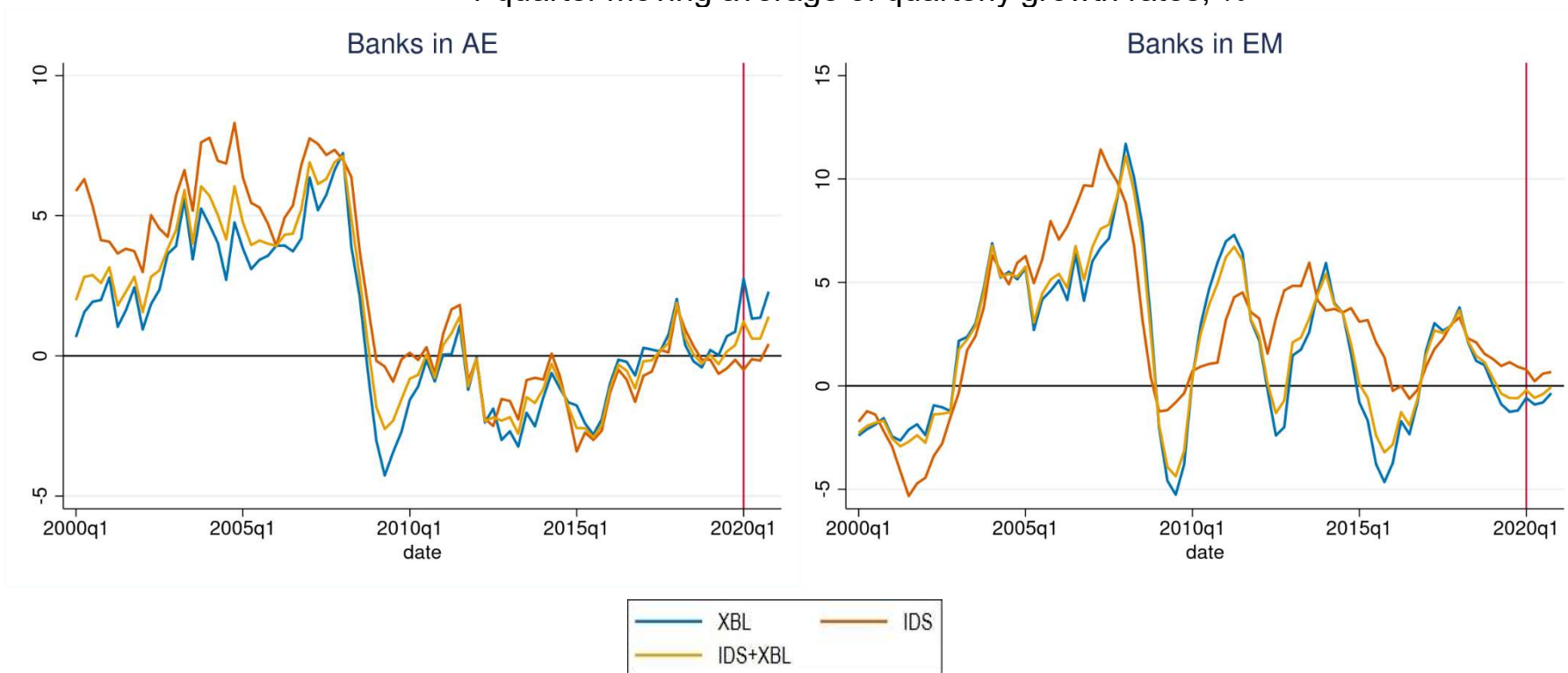
XBL = Cross-border loans, IDS = International Debt Securities

Data Source: BIS Locational Banking Statistics, International Debt Securities

Further separate by location of borrowers.

Amplitudes of swings are larger for EM **bank** borrowers.
Pre- COVID patterns continued or flattened during pandemic.

External Debt Flows, **Bank Borrowers** in AE vs EM 4-quarter moving average of quarterly growth rates, %



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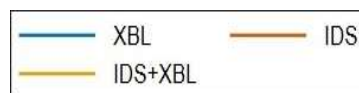
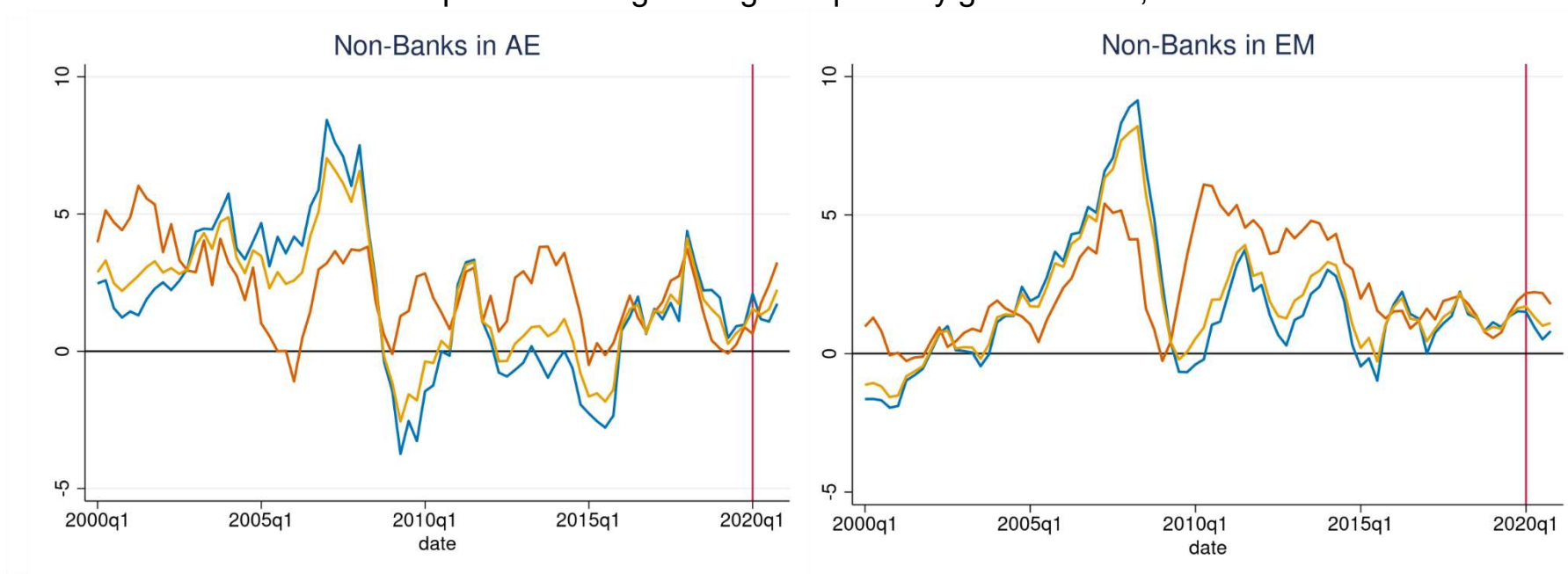
XBL = Cross-border loans, IDS = International Debt Securities

Data Source: BIS Locational Banking Statistics, International Debt Securities

During COVID-19, nonbank borrowers (corporates) saw bank-based credit sustained in EMs and especially AEs.
 Market-based finance continued to gain market share.

External Debt Flows, **Non-Bank Borrowers** in AE v EM

4-quarter moving average of quarterly growth rates, %



$$\text{Quarterly Growth Rate}_t = \left(\frac{\text{Outstanding Stock}_t}{\text{Outstanding Stock}_{t-1}} \right) - 1$$

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Perspectives on the changing “global factor”

| The evolving global factor

Global factor received considerable attention pre-pandemic, especially after influential works of Rey. The literature implicitly embedded criticism of the international use of dollars and the constraints on policy available to some central banks toward achieving mandates.

Debate on extent of limitations on toolkits. trilemma or dilemma?

Obstfeld, Ostry, Qureshi *ReStat* 2019: flexible exchange rates help.

Debate on strength of the global factor (versus idiosyncratic variation).

- Strength greatest in asset prices and some credit metrics. Pass through of global factor weaker in credit metrics (Cerutti, Claessens, Rose *IMF ER* 2019)
- Shifting drivers, and shifting strength, demonstrated using
 - ✓ International capital flows evidence. Avdjiev, Gambacorta, Goldberg and Schiaffi (*JIE* 2020, 2021) show evolving global factor and drivers.
 - ✓ Exchange market pressure indices. Goldberg and Krogstrup 2021.

Write-up in Goldberg *Annual Review of Economics* 2021 manuscript

Drivers and vulnerabilities -1

Avdjiev, Gambacorta, Goldberg and Schiaffi (*JIE* 2020, 2021)

New work extends time period of analysis, separately considers AEs and EMs, per initial exhibits of this talk.

1. Amplitude of global liquidity provision through banks in response to risk
 - magnified with low capitalization banks/ banking systems.
 - risk shocks interacting with bank health is particularly important for EM borrowers, compared with AE borrowers.
 - ✓ Pandemic period “bright spot”: banks had better risk absorbing capacity, better risk management. Provided a stabilizing role in global liquidity flows during COVID.
 - ✓ Business models matter. e.g. US global banks helped by diversified portfolios, surprising gains from trading operations.

Drivers and vulnerabilities -2

2. Global liquidity response to AE (US) monetary policy is magnified when
 - Key global currencies have common monetary policy responses
 - New work shows the importance of the relative changes for AEs v EMs
 - ✓ Under COVID, common shock was met by looser monetary policy across *all regions*, so effects of synchronous AE policies moderated.
 - ✓ EM higher levels of interest rates a continued attractor for global liquidity.
3. Risk sensitivity of market-based finance increased post-GFC.
 - ✓ New work shows this effect is stronger for flows to EMs.
 - ✓ Plus, AEs need to be distinguished as so-called safe havens (net inflows during stress) versus all others.
 - ✓ Transition of riskier borrowers to other lenders, or behavioral changes?

Global dollar funding markets – evolution, the
Covid-19 shock, CB swap lines and FIMA repo

US dollar is the key international and official reserve currency

Goldberg and Lerman, 2019. The US Dollar's Global Roles: Where do things stand? FRBNY *Liberty Street Economics*. Also ECB *International Role of Euro*.

- ✓ 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.

Globally, 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.

Central banks as stewards of the international monetary system.

Global dollar funding market developments: pre-COVID

✓ Post-GFC

- Structural shifts in key participants in global dollar funding. Largely attributed to regulatory reforms on banks. Dollar funding flows shift somewhat from Europe toward institutions in Japan and EMEs. Increase in nonbank participation (BIS CGFS 2021).
- Reduced currency mismatches, reduced the global footprints of weaker banks, shifted business models (BIS CGFS 2020).
- Foreign central banks increased foreign exchange (FX) reserves to better manage dollar funding needs in the event of sizable capital outflows.
- Chinese and some banks of East Asia are significant suppliers of dollar-denominated credit, especially to other EMs.

✓ During Covid

Cetorelli, Goldberg and 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 22 2020.

Cetorelli, Goldberg and Ravazzolo, 2020b. 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 12 2020.

Global dollar funding market developments: Covid-19 March 2020

- ✓ Reduced \$ intermediation activity as lenders held dollars as a precaution, amid economic and financial disruption uncertainty. Dash for cash.
- ✓ Increased dollar demand
 - For hedging, given significant market volatility.
 - For funding, as some banks faced new funding needs stemming from drawdowns of corporate credit lines and reduced access to other funding sources.
 - US branches of foreign banks source more net liquidity from parents (or retain more dollars in US instead of sending to parent banks).
- ✓ Some central banks intervene in the FX market to support dollar needs of domestic entities and/or stabilize domestic currencies. Some sold US Treasuries, deposited in cash accounts (including at Fed).
- Premia to obtain dollar funding increased to levels last seen in 2008.
- Strains most pronounced in dollar-yen and Asia and less in euro-dollar, reflecting structural changes post-GFC.

FOMC's March 2020 actions to address \$ funding strains

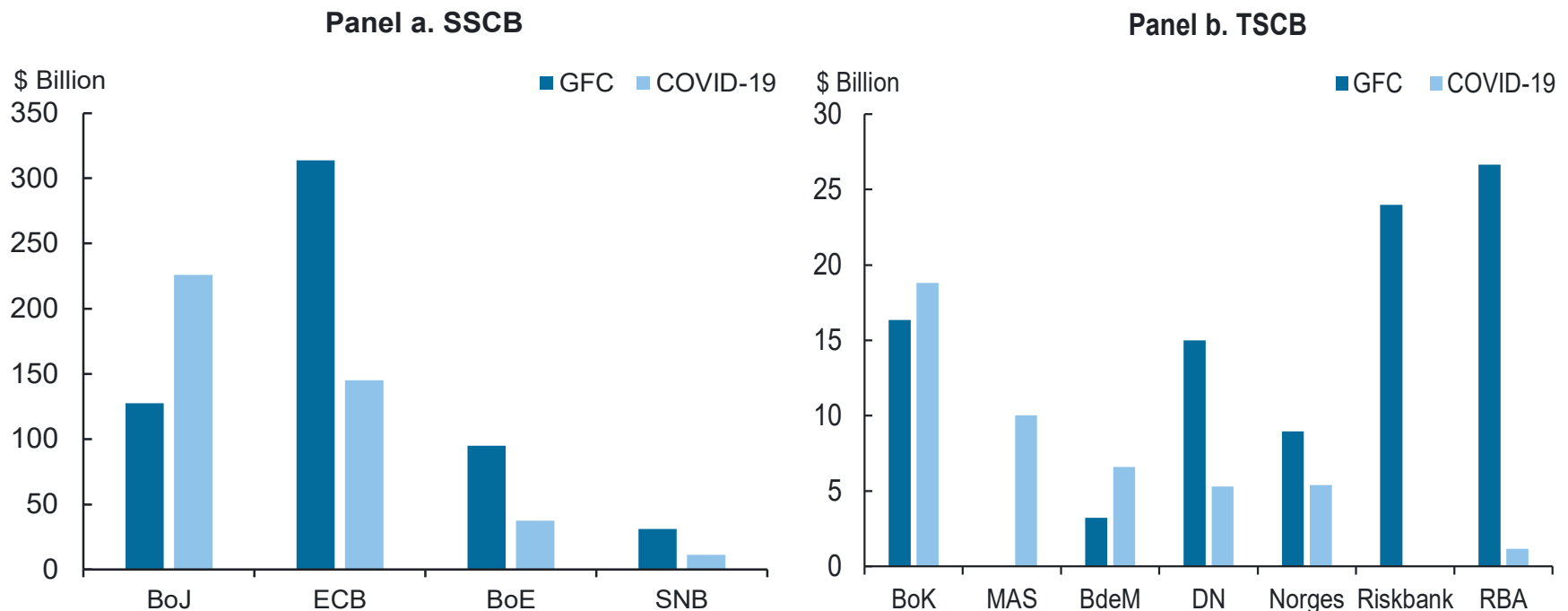
- ✓ Eased the terms of swap lines with standing central bank counterparties (ECB, BoJ, BoE, SNB, BoC), including the reduction of the swap pricing spread to OIS plus 25 bps from 50 bps, added 84-day operations and increased the frequency of 7-day operations from weekly to daily.
- ✓ Extended temporary lines with other 9 central banks (same as GFC).
- ✓ Introduced new Foreign and International Monetary Authority (FIMA) repo facility, allowing a broader range of foreign official entities to secure dollar liquidity through repo transactions with the Fed against U.S. Treasuries holdings.
 - Setting up accounts took time.
 - The facility was converted into standing on July 28, 2021.

Choi, Goldberg, Lerman, Ravazzolo. 2021. "The Fed's Central Bank Swap Lines and FIMA Repo Facility during the COVID-19 Outbreak". FRBNY Staff Report.

CB Dollar Swap line usage was notable

Reached a peak of \$448 billion in late May, lower than \$580 GFC peak.
 Different central bank distribution, reflecting post-GFC developments.
 FIMA accounts took months to operationalize, so no notable volumes.

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



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

Source: Choi, Goldberg, Lerman, Ravazzolo 2021.

Swap Lines (and FIMA repo) help mitigate dollar funding stresses.

- **Stabilize provision of credit, reduce amplification through banks.**
 - Allow foreign commercial banks to:
 - access U.S. dollar liquidity, obviating the need to bid up rates excessively in the market.
 - avoid fire sales of U.S. assets that may be used for dollar liquidity.
 - maintain the provision of credit via their U.S. branches and at home.
 - supply dollars to nonbank counterparties.
- **Reduce excess costs of acquiring dollar funding (FX currency basis)**
- **Reduce the need for some central banks to use FX reserves, liquidate Treasuries**, to stabilize domestic currencies or intervene in the FX market to support dollar needs of domestic entities.
- After sizable take-up at dollar operations of swap central banks and the stabilization of other funding and financial markets, all basis spreads began to gradually narrow in late March and normalized by summer.
- Cross-border capital flows normalized, or reverted to, pre-crisis volumes.

Unfinished business and themes for continued discussion

- Access to dollar liquidity backstop is relatively narrow, as central bank dollar auctions are focused on distributions through banking institutions
- Yet, market structure continues to change and other sectors need dollars
 - Non-bank financial institutions
 - Non-financial corporate institutions
- Narrow access under some conditions may amplify market impacts and reduce effectiveness of current backstops
 - [Number and distribution of CB swap lines same as in GFC, post-GFC changes in pattern of dollar trading / hedging / imbalances].
- Continue operational resilience, monitoring and vetting of risks and approaches, and ever evolving structure of dollar and international capital flow pressures.
- Continue to invest in cooperation and communications across the global central banking community



Thank you.

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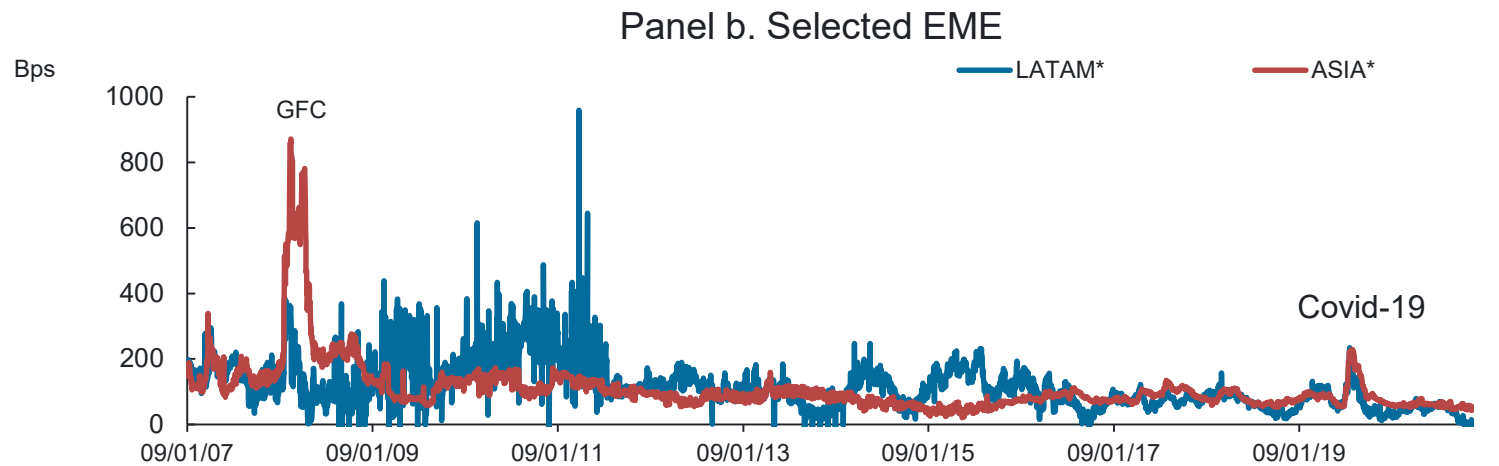
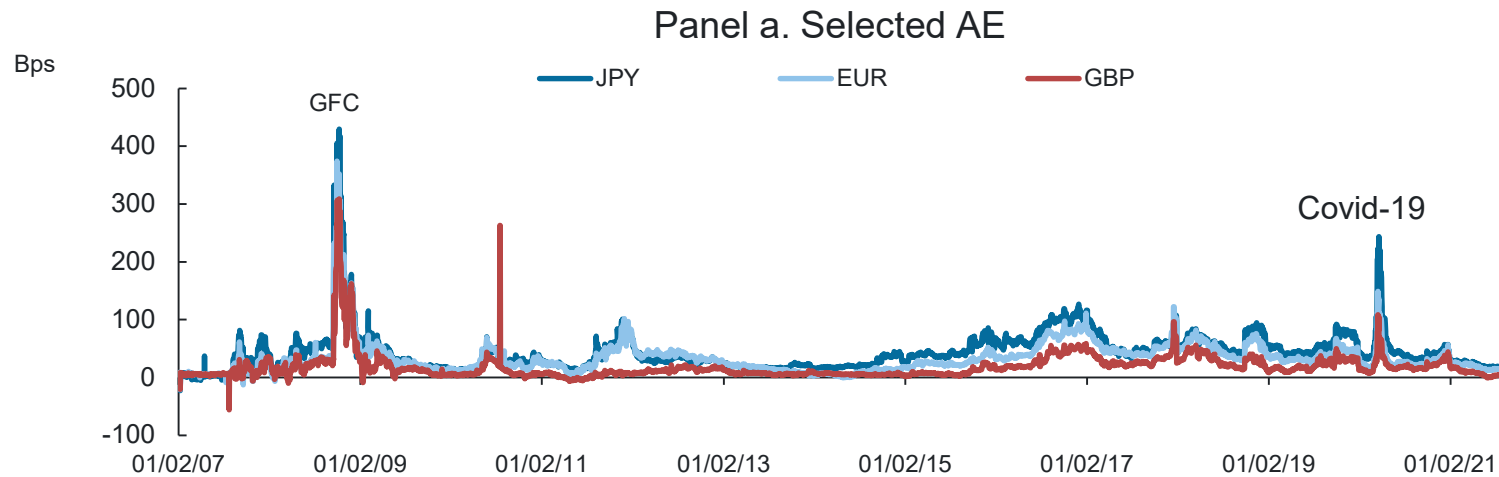
Key Features of USD liquidity facilities

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)

Source: Choi, Goldberg, Lerman, Ravazzolo 2021.

Offshore Dollar borrowing costs implied by FX swaps

Three Month FX Swap Basis Spreads for Selected Currencies against the U.S. Dollar

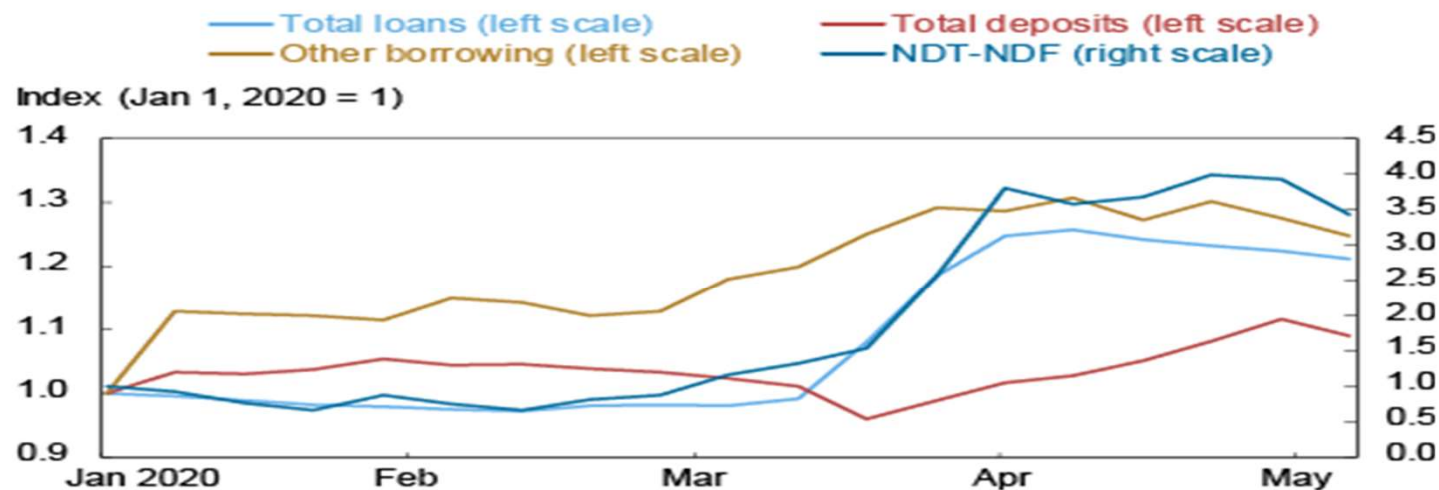


* Simple average of FX swap basis spreads of BRL, CLP, COP and MXP (blue line) and of HKD, KRW, SGD and TWD (red line).

Source: Bloomberg, L.P., authors' calculation.

With global liquidity management, US branches of FBOs reduced flows to parents/ received inflows

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



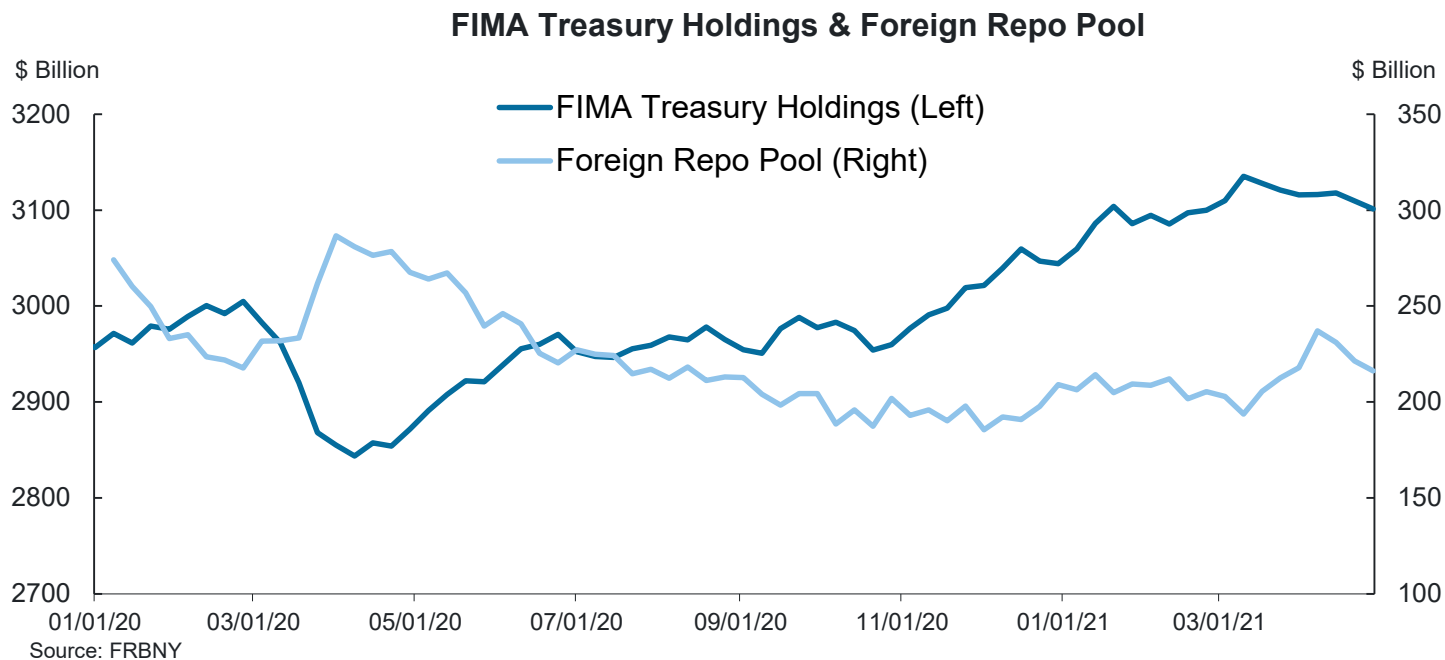
Sources: Federal Reserve, form FR 2644; Federal Financial Institutions Examination Council, form FFIEC 002.

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.

Swap dollars replaced lost dollar funding of parents, averted credit contractions in US and abroad (Cetorelli, Goldberg, Ravazzolo June 2020 LSE)

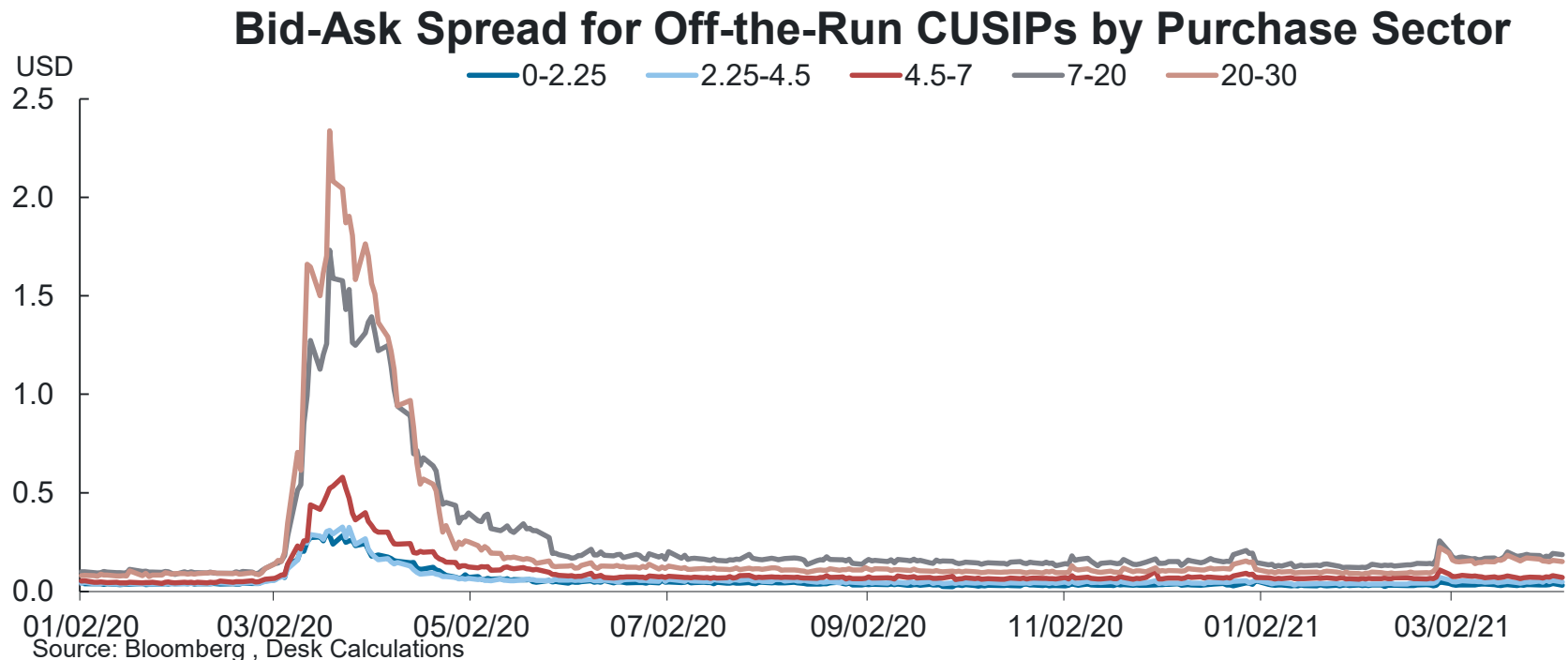
International capital outflows and foreign official accounts

- Countries experience capital outflows, including international investors decreasing holdings of local currency and dollar-denominated EME assets.
- Some central banks sold most liquid dollar-denominated assets (e.g. decreased Treasury holdings at the Fed, dark blue line) to support dollar funding needs of local institutions, the value of local currencies via FX interventions and build precautionary buffers (e.g. increased usage of foreign repo pool, light blue line).



Disorderly U.S. Treasury Market Functioning

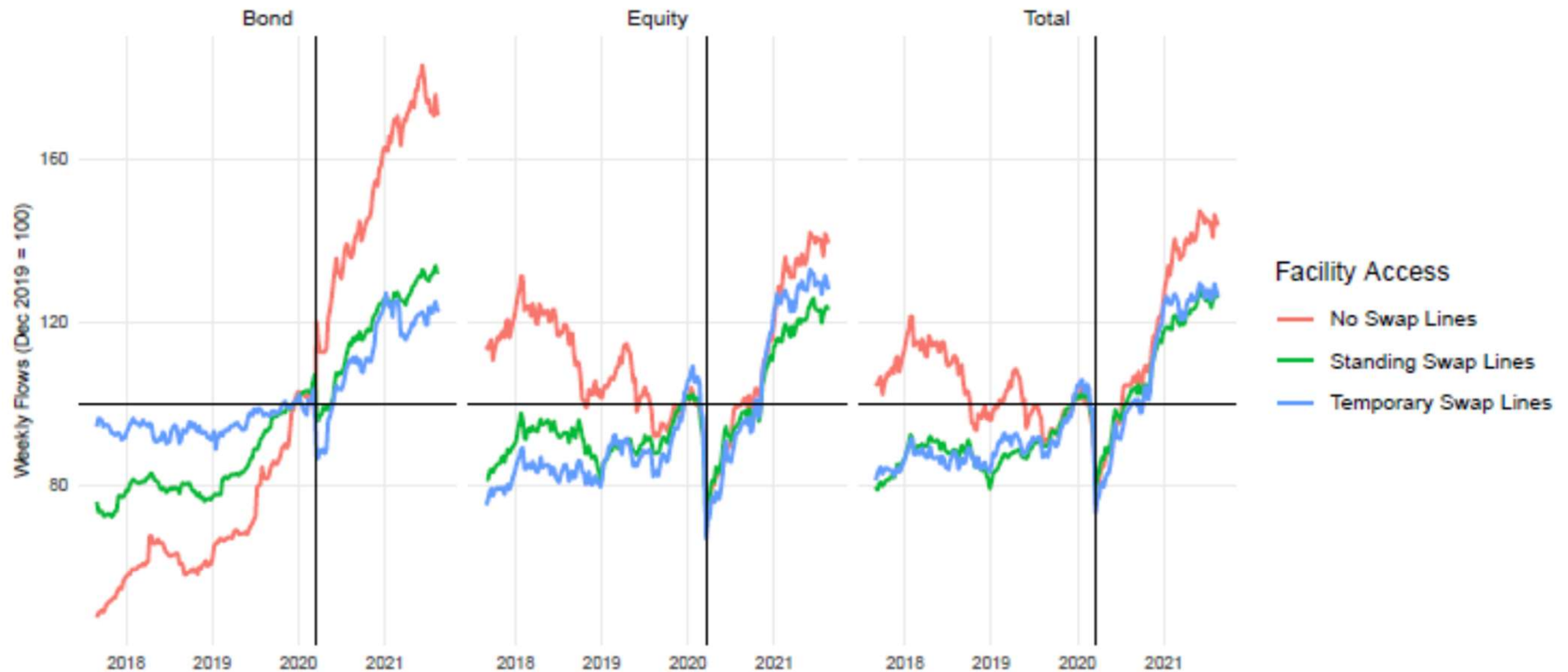
The large-scale sales by foreign institutions (~ \$275 billion in March 2020, of which half by officials) added to deteriorated U.S. Treasury market functioning.



This type of Treasury market strain, compounded by the foreign official institution dollar liquidity needs, relates back to a longer international debate on access to Fed swap lines, capital flow sudden stops, and accumulation by countries of insurance via official foreign reserve balances.

Normalized Cross-Border Bond and Equity

Normalized Weekly Fund Flows to Countries by Access to Federal Reserve Liquidity Facilities
08/2017 – 08/2021



Source: Mutual Fund Flows Data

Note: Jurisdictions with standing swap lines include Canada, the Eurozone, Japan, Switzerland, and the United Kingdom. Those with temporary swap lines include Australia, Brazil, Denmark, Korea, Mexico, Norway, New Zealand, Sweden, and Singapore. Select central banks with access to the FIMA repo facility and with no swap lines are included.

Average of weekly flows in December 2019 within facility access groups is set at 100.

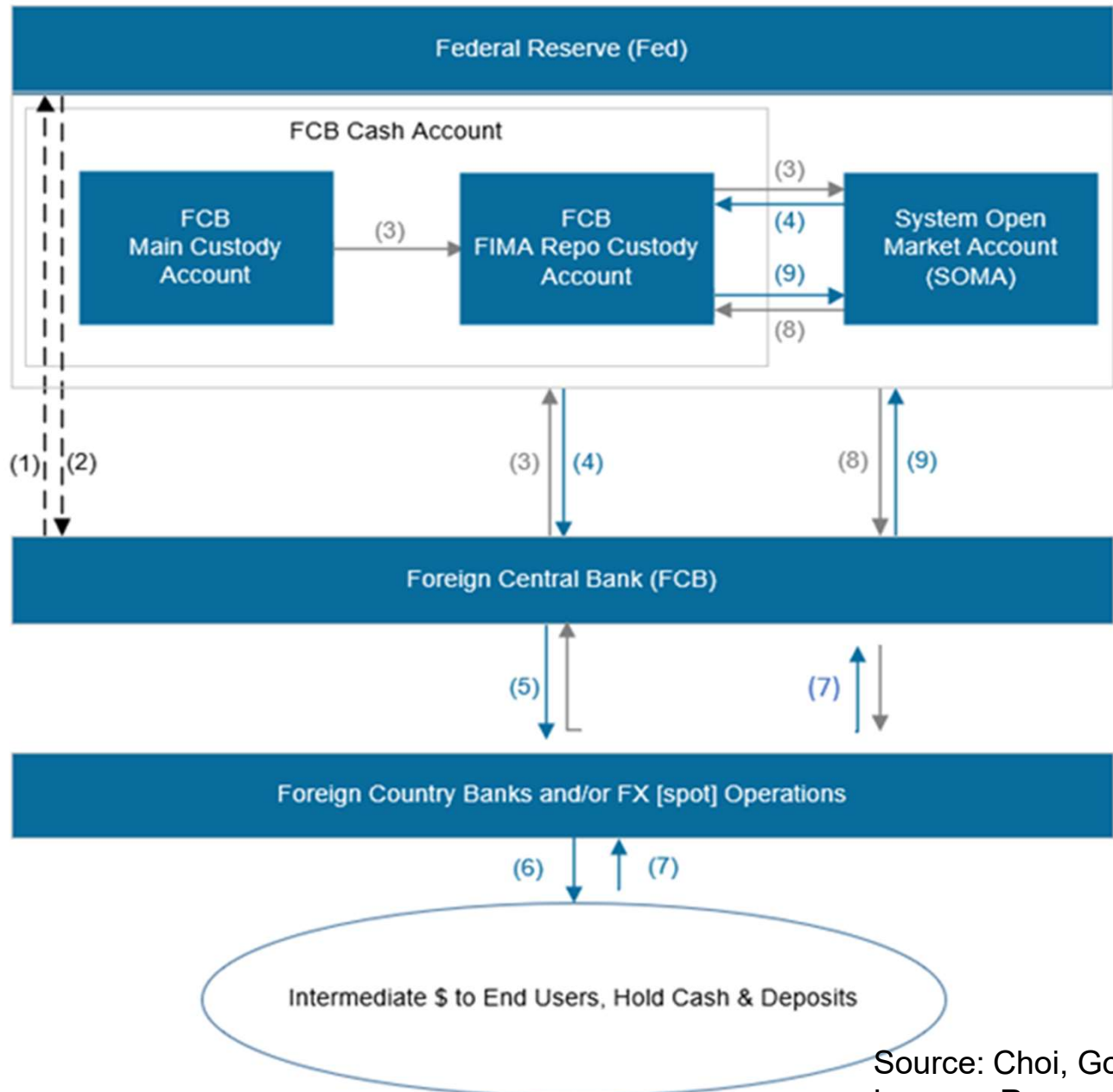
Vertical line on 18 March 2020 indicates the beginning of a series of actions by the Federal Reserve to increase liquidity in key USD markets.

Exchange rate movements reflect the global factor, but are not sufficient indicators of pressures on currencies

- New theory-based **Exchange Market Pressure** measure [GK 2018]
 - EMP is expressed in currency depreciation units
 - ✓ Weighted sum of observed exchange rate moves, plus the currency changes that are not released as foreign exchange intervention and monetary policy changes responded to pressure
 - ✓ All currency values defined against a reference currency (\$, euro)
- Global factor (as time fixed effect) is important but not always large
- Pre-crisis: AE EMPs don't move with EM EMPs
- Post-crisis: AEs less appropriate as a class. Those described as "Safe-haven currencies" appreciate with risk; other AEs economies more similar to EMs, but facing weaker exchange market pressure.

GK 2018. Goldberg and Krogstrup. "International Capital Flow Pressures" NBER 24286 (revised 7/2021)

Operational aspects of FIMA repo facilities



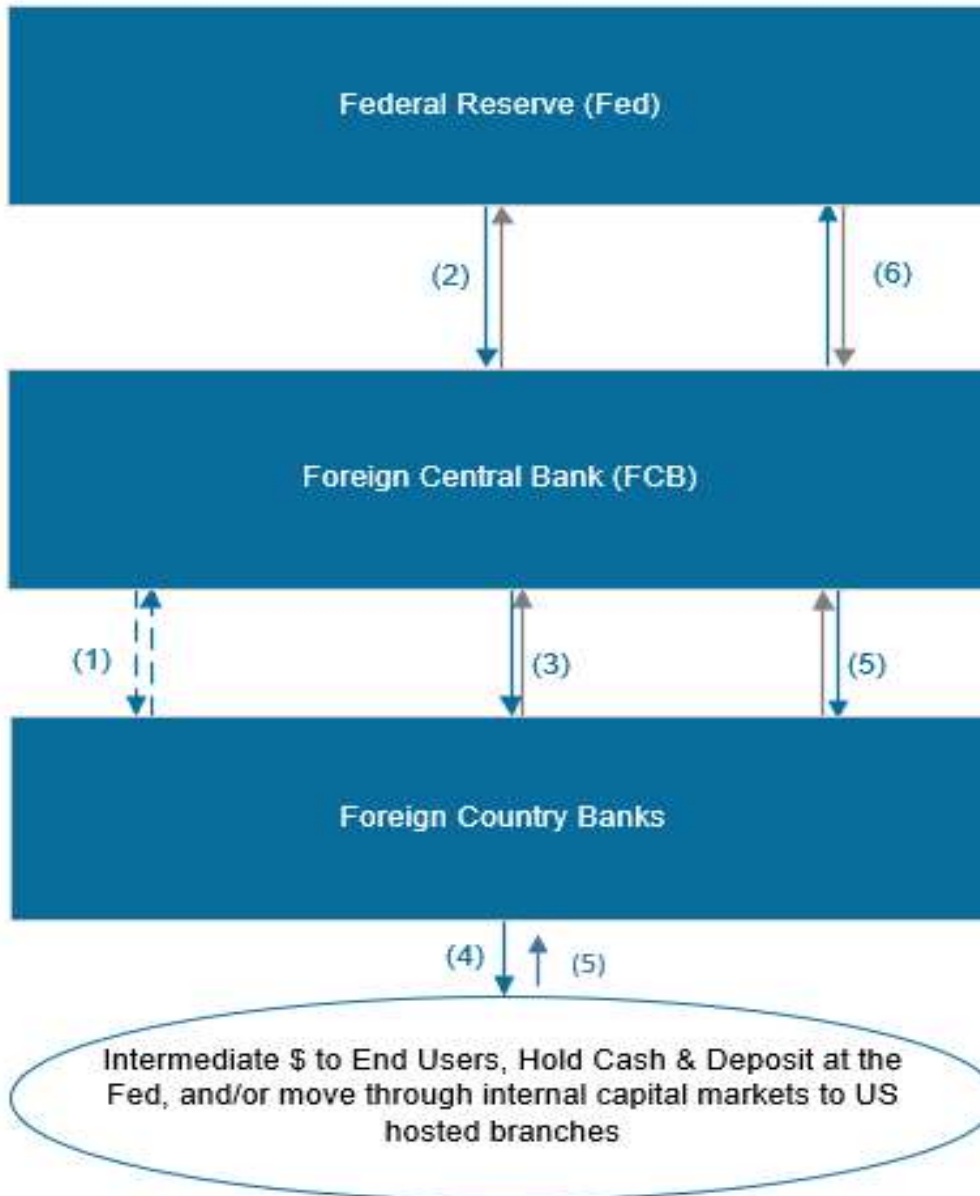
- (1) FCB requests a trade
- (2) Fed confirms trade
- (3) FCB temporarily sells U.S. Treasuries to the Fed, with the FCB moving U.S. Treasuries from its main custody account to SOMA account
- (4) Fed sends cash repo value to FCB
- (5) FCB provides obtained funds to local institutions and/or funds FX 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

Source: Choi, Goldberg, Lerman, Ravazzolo 2021.

Operational aspects of central bank dollar swap lines



(1) FCB offers scheduled operation to their supervised banks and other approved users, which bid.

(2) FCB draws on dollar swap line, Fed provides dollars against an equivalent amount of foreign currency.

(3) FCB distributes dollar liquidity take-up at its operation to foreign country banks (counterparties).

(4) Foreign country banks use dollar liquidity to meet its needs, the needs of its U.S. branches, hold buffers with the Fed and/or intermediate to end users.

(5) Foreign country banks receive back and return dollar liquidity at maturity, plus a fee; and receive back local collateral.

(6) FCB returns dollar liquidity to the Fed plus a fee and receives back local currency.

Note: line reflects flows of dollars and dotted line a step without flows.

Source: Federal Reserve Bank of New York.

Source: Choi, Goldberg, Lerman, Ravazzolo 2021.

Evidence of the effects swap lines via different approaches

- Market commentary:
 - ✓ Broad positive assessment of role of swap lines as stabilizing factor, reducing liquidity hoarding under uncertainty.
- Foreign currency basis spread analysis:
 - ✓ Construct and use daily data for a broad group of currencies
 - ✓ Initial period around facility introduction (Cetorelli, Goldberg, Ravazzolo LSE May 2020).
 - Conclude that actual settlement of dollars through auctions, more than initial facility announcements, reduced strains. Higher frequency 7-day auction announcements also reduced bases for standing swap currencies.

Evidence of the effects swap lines via different approaches

- Foreign currency basis spread analysis:
 - ✓ Daily data for a broad group of currencies, Jan-June 2020 (Goldberg and Ravazzolo 2021).
 - ✓ Difference in means tests.
 - Swap line currency bases deteriorated less overall in March 2020. Both swap and FIMA repo currencies had reduced strains in latter period, after repo introduction.
 - ✓ Differences in risk sensitivity.
 - All currencies had increased risk sensitivity with Covid shock, more so for currencies without swap lines. After FIMA account activation, more differentiation in risk sensitivity across FIMA holders. Broad pattern of decline in risk sensitivity and reversion to initial values.
- Capital flow, TIC, Exchange Market Pressure, Equity Flows. Widespread outflows, recovery. Relatively little differentiation by groups.

Some lessons learned around US dollar funding and facilities

- Interconnectedness of offshore and domestic markets important, with implications for US credit and transmission of Fed monetary policy stance
- Ability to be operationally prepared and think creatively – continue to monitor evolving roles of USD, interconnectedness, risks: eg FIMA repo
- Importance of agility and flexibility
 - ✓ Add counterparties quickly (*more quickly*)
 - ✓ Adjust tenors and frequency of operations
- Large FX reserves may not be enough in coordinated shock, impacts can be amplified through other markets (UST) and segments (non-banks).
- Maintain strong relationships with foreign central banks, coordinate actions
Signaling and communication are critical to success.