EMEAP
Executives' Meeting of East Asia-Pacific Central Banks

Study on US dollar Liquidity and Funding Dynamics in the EMEAP Region

EMEAP Working Group on Financial Markets

August 2020

Members

Members of the Executives' Meeting of East Asia-Pacific Central Banks (EMEAP)[1] Working Group on Financial Markets (WGFM)[2] are listed below.

Reserve Bank of Australia (RBA) – Co-vice chair

People's Bank of China (PBC)

Hong Kong Monetary Authority (HKMA) – Chair

Bank Indonesia (BI)

Bank of Japan (BoJ)

Bank of Korea (BoK)

Bank Negara Malaysia (BNM)

Reserve Bank of New Zealand (RBNZ)

Bangko Sentral ng Pilipinas (BSP) – Co-vice chair

Monetary Authority of Singapore (MAS)

Bank of Thailand (BoT)

[1] EMEAP, established in 1991, is a cooperative organization of central banks and monetary authorities in the East Asia and Pacific region. Its primary objective is to strengthen the cooperative relationship among its members. It comprises the central banks of eleven economies: Australia, China, Hong Kong, Indonesia, Japan, South Korea, Malaysia, New Zealand, the Philippines, Singapore, and Thailand.

[2] The WGFM studies financial market developments in EMEAP member jurisdictions as well as on ad-hoc topics that may arise from time to time, promotes local currency denominated bond markets through the Asian Bond Fund initiative, and serves as a platform to exchange views on market conditions among member central banks.

Table of Contents

Introduction

The US dollar has long been the dominant currency in the global monetary and financial system. Across EMEAP, the US dollar remains the primary reserve currency and the most commonly used currency for trade invoicing. It also plays a key role in cross-border financing, with around 70% of EMEAP issuers' outstanding international debt securities and more than half of EMEAP banks' cross-border claims and liabilities denominated in US dollars at end-2019[3]. It was with the intent to better understand the role of the US dollar in cross-border financing activities and its impact on financial stability that the EMEAP WGFM proposed a study on US dollar liquidity and funding dynamics in the EMEAP region in mid-2019.

The study's objective is to arrive at a clear picture of the provision, intermediation, and use of US dollar liquidity across EMEAP members, with analysis supported by data submissions and survey responses from WGFM members[4]. Although a majority of the data and jurisdiction-specific feedback for the study was collected before the outbreak of COVID-19, the WGFM has sought to incorporate pertinent market observations by members during the period of US dollar liquidity stress in global markets in March-April.

The study highlights many useful observations about the shifting dynamics of US dollar liquidity and funding in EMEAP. In particular, the macroeconomic adjustments undertaken after the Asian Financial Crisis (AFC) and the set of banking sector reforms undertaken after the Global Financial Crisis (GFC) had strengthened the resilience of many EMEAP economies coming into the recent episode of global US dollar liquidity stress during the COVID-19 pandemic. Nevertheless, pockets of vulnerabilities in certain jurisdictions and sectors indicate the importance for EMEAP members to continue their close collaboration to further improve their resilience against future shocks and maintain regional financial stability.

This report summarises the findings of the study. The report is structured as follows: (A) a review of US dollar funding activities in EMEAP and the associated risks and vulnerabilities; (B) a summary of the monitoring frameworks employed by WGFM members and policy options in times of stress; (C) a set of jurisdiction-specific experiences contributed by WGFM members on their domestic markets. To facilitate our discussion, and since the EMEAP region consist of a diverse group of economies, the rest of this report categorizes EMEAP jurisdictions into three groups:

- **Advance economies (AEs):** Australia, Japan and New Zealand
- **Financial intermediary centres (FICs):** Hong Kong SAR and Singapore
- **Emerging market economies (EMEs):** other remaining EMEAP members

[3] Figures calculated from BIS Debt Securities Statistics and BIS Locational Banking Statistics.
[4] In addition to banks' locational statistics, a subset of six WGFM members also submitted US dollar bank loan data from resident banks to local NBFIs and NFCs.

Summary of key findings

The US dollar continues to dominate international finance as the primary funding and investment currency. Deep and liquid US dollar funding markets attract domestic as well as non-US borrowers and lenders, as these provide access to a large set of counterparties, and play a key role in financing economic growth and diversifying risks. Through their increasing participation in global US dollar funding markets, EMEAP jurisdictions can benefit from the depth and liquidity that may be absent in their domestic capital markets, and potentially access lower borrowing costs and a more diversified pool of funding sources.

Banks still play a dominant role in the intermediation of USD liquidity in EMEAP. Nevertheless, their resilience to withstand US dollar liquidity shocks has improved substantially following post-crisis regulatory reforms. In particular, WGFM members noted a reduction in banks' maturity and currency mismatch, larger liquidity buffers, and an increased share of stable intragroup funding from international banks. However, EMEAP banks are not immune to US dollar liquidity stress. According to available data, banks in most EMEAP jurisdictions source a sizable portion of their US dollar funding cross-border, and can be susceptible to spikes in global risk aversion and counterparty concerns. Liquidity stress in key wholesale financing market segments (e.g. repo market and FX swap market) can also affect banks through direct and indirect exposures.

Non-banks' on-balance sheet US dollar liabilities have risen by nearly 50% across EMEAP in the last five years, although these remain relatively limited in many EMEAP jurisdictions as a share of GDP (an average of 10% across EMEAP EMEs,). However, there are still some sources of risk related to US dollar funding for EMEAP non-bank financial institutions (NBFIs) and non-financial corporations (NFCs). Some Asian insurance companies and pension funds appear to have increased their purchase of long-maturity US dollar securities, funded in some cases via short-term FX swaps that may be a source of rollover, counterparty and market risk.[5] Portfolio outflows from offshore US dollar bond markets could also raise refinancing difficulties for some EMEAP NFCs that have increased their share of US dollar-denominated debt financing. Unlike regulated banks, WGFM members reported less visibility in the US dollar funding, balance sheet, and hedging activities of NBFIs and NFCs, with some members noting a reliance on price action in short-term US dollar funding markets as a proxy for funding pressures faced by non-banks.

During the March-April episode of market stress, as liquidity strains percolated through offshore US dollar funding markets, the EMEAP region experienced not only large capital outflows, but also sharp moves in FX swap rates and cross-currency basis swap rates. However, prudent liquidity management by banks and timely liquidity support from authorities proved effective in mitigating adverse liquidity spillovers. In particular, some WGFM members reported good use of various Fed facilities, which in their assessment, were timely liquidity backstops that lowered US dollar funding rates.

Despite the subsequent stabilization in US dollar funding markets, high-level discussions among WGFM members suggest continued concerns about a number of

[5] See 'US dollar funding: an international perspective', CGFS Papers (Jun 2020)

developments that could heighten regional risk premia and trigger renewed capital outflows and US dollar funding stress, particularly in jurisdictions where foreign participation in equity and bond markets is high. Near-term risks include a resurgence of COVID-19 infection rates, rising corporate insolvency and potential credit rating downgrades, and escalating global trade frictions. Some WGFM members also felt rising fiscal burdens and a more crowded pipeline of US dollar bond issuance could push up financing costs for EMEAP issuers.

The liquidity stress in March-April also highlighted some of the potential pockets of risks in the non-bank sectors. Efforts to improve data coverage and reduce data gaps on US dollar exposures and hedging practices of NBFIs and NFCs, that are commensurate with the relative risks these sectors pose to individual jurisdictions, would facilitate more pre-emptive monitoring. For example, the RBA and the Australian Bureau of Statistics conduct a comprehensive 'Survey of Foreign Currency Exposure' every four years, covering Australian entities' foreign currency exposures and the level of hedging applied[6]. Similar surveys could complement improved access to financial data for non-listed companies, which are often a sizable share of the corporate universe in many EMEAP jurisdictions, but yet do not provide regular accounts of their balance sheet activities.

[6] Include the public sector, banks, non-bank financial institutions and non-financial corporates.

A. The status of US dollar liquidity in EMEAP financial markets

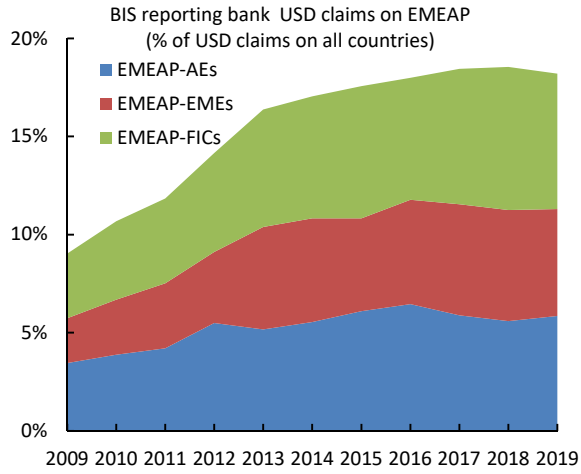
1. Recent trends and characteristics

This section looks at US dollar funding landscape across EMEAP, and examines recent trends and characteristics of the three main participants in EMEAP US dollar funding markets – banks, NBFIs and NFCs – based on analysis of both public data and WGFM members' survey responses and data submissions[7].

1.1 US dollar funding landscape of EMEAP members

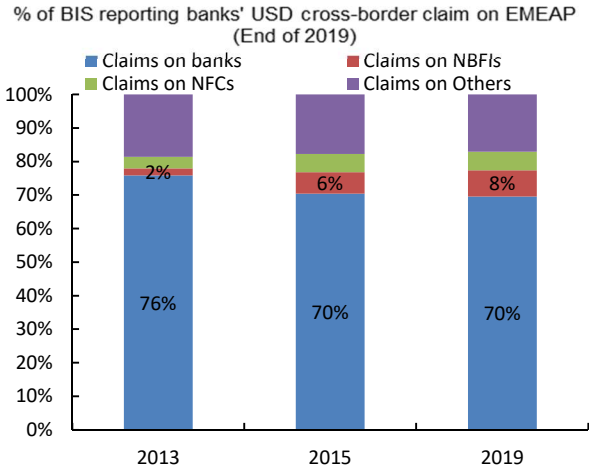
The US dollar remains the dominant currency of denomination of BIS reporting banks' outstanding claims and liabilities, in accordance with its position as the primary global funding currency. Globally, cross-border banking activities have been on a downward trend since the GFC, in part reflecting the rise in market-based financing. Bucking this broader trend is BIS reporting banks' cross-border positions vis-à-vis the EMEAP region, which have grown notably since 2009. This likely reflects the growth of EMEAP economies, and rising integration between global and EMEAP banking activities. EMEAP residents' cross-border liabilities remains predominantly denominated in US dollar.

Chart 1: EMEAP now takes up a higher share of BIS reporting banks' cross-border USD claims



Source: BIS Locational Banking Statistics; Data to Dec 2019

Chart 2: EMEAP banks remain main counterpart of BIS reporting banks' cross-border USD claims



Source: BIS Locational Banking Statistics; Data to Dec 2019; 'Claims on Others' includes households and general government.

At end-2019, BIS reporting banks' cross-border US dollar claims on residents of EMEAP totalled US$2.7 trillion or 18% of BIS reporting banks' total cross-border US dollar claims[8] (**Chart 1**). Of this, US$1.9 trillion (70%) are claims on EMEAP banks, and US$0.5 trillion (17%) are claims on EMEAP households and governments (**Chart 2**). This illustrates that the main way that US dollar funding is channelled to EMEAP borrowers is via banks based in EMEAP economies. EMEAP non-banks have increased their demand

[7] Data inputs are on collected on a 'best efforts' basis as some EMEAP central banks do not collect financial institutions' US dollar specific data, and US dollar figures are best efforts estimates.
[8] BIS reporting banks' cross-border claims include EMEAP reporting banks' claims on residents in other EMEAP jurisdictions, e.g. Japanese banks' USD cross-border claims on residents in Australia.

for US dollar funding, but their share of BIS reporting banks' cross-border US dollar claims remain small (under 8% and 6% for NBFIs and NFCs respectively). Although the outstanding amount of long-term US dollar-denominated debt securities issued by EMEAP non-banks have risen roughly fourfold in the past decade to more than US$1.2 trillion in 2019, long-term US dollar debt securities remain limited as a share of non-banks' total US dollar funding needs and relative to GDP in most jurisdictions (accounting for less than 5% of GDP for NBFI and less than 7% of GDP for NFC sectors respectively).

In EMEAP AEs, some banks play a major role in channelling US dollars obtained from domestic US dollar deposits, the interbank market and debt issuances, including to other EMEAP members. Some NBFIs in EMEAP AEs, such as superannuation funds and insurers in search of higher returns and risk diversification, have also increased their holding of US dollar-denominated securities, in some cases utilizing US dollar funding obtained from FX swaps and cross-currency swaps.

EMEAP FICs act as regional 'intermediaries' of US dollar liquidity. Banks in FICs have sizable but largely offsetting US dollar claims and liabilities. Notably, the primary purpose of banks' domestic US dollar loans is for trade financing, while the banks' cross-border US dollar loans appear in large part directed to multinational NFCs for overseas operations. NBFIs in FICs also have an increasing footprint in US dollar activities. For instance, BIS reporting banks' cross-border US dollar claims and liabilities vis-à-vis NBFIs in EMEAP FICs have roughly doubled in the last five years.

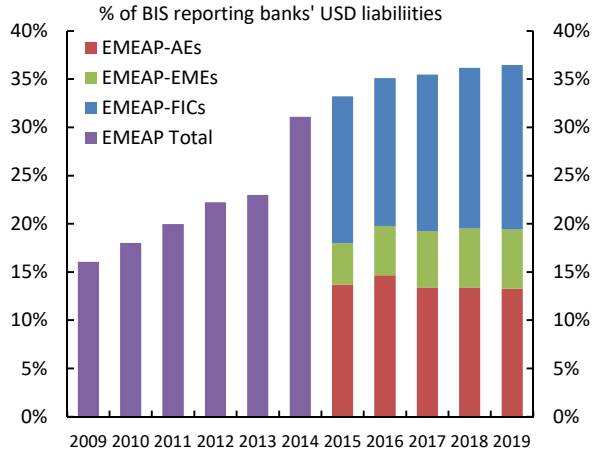
EMEAP EMEs display substantial variation across economies. Banks typically have largely offsetting US dollar claims and liabilities. However, banks' access to domestic US dollar deposits is more limited, and instead receive US dollar liquidity primarily from international banks through the interbank market or intragroup from their parent banks for low-cost funding. Such US dollar liquidity is then intermediated through US dollar bank loans to domestic NFCs, or invested in US dollar-denominated securities. This is also typical of banks in other EMEs. In comparison, NBFIs in EMEAP EMEs generally do not appear to be major participants in US dollar activity, albeit in some jurisdictions, insurers and investment funds do participate in the cross-currency US dollar swap market to fund offshore US dollar assets.

NFCs in all EMEAP economies use US dollar funding to varying degrees to support their overseas operations and in some cases to take advantage of lower funding costs. NFCs in EMEAP AEs and FICs often fund their overseas operations through a combination of US dollar sources (revenues, bank loans, and debt securities), while some WGFM members noted a reliance of local branches of multinational corporations on intercompany loans from their foreign parent/affiliates as a stable source of US dollar funding. Among NFCs accessing US dollars from international bond markets, participation by firms in the oil and gas, and real estate sectors have been particularly high in recent years.

1.2 Banks: main intermediator of US dollar liquidity in the EMEAP region

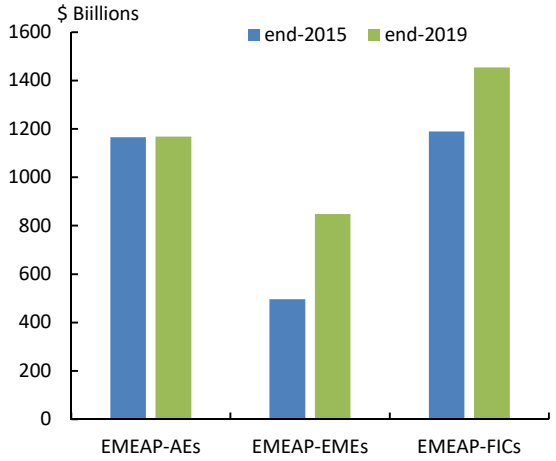
Banks located in the EMEAP region have aggregate cross-border and local US dollar liabilities of US$5.4 trillion at end-2019, which represents 37% of all BIS reporting banks' US dollar liabilities (**Chart 3**). The increase in demand for US dollar funding by EMEAP banks post-crisis is broad-based, albeit with particular growth in some EME EMEAP members (**Chart 4**). Of EMEAP banks' US$5.4 trillion in US dollar liabilities, US$1.9 trillion comes from non-resident banks.

Chart 3: EMEAP banks' USD liabilities now accounts for 37% of BIS reporting banks' USD liabilities



Source: Member submissions based on the format of BIS Locational Banking Statistics; Data unavailable for ID, MY and NZ and available for HK from 2014 and for CN and PH from 2015 onwards; Includes both cross-border and local US dollar funding (except CN which only reports cross-border US dollar funding).

Chart 4: Banks' cross-border USD liabilities in some EMEAP jurisdictions have experienced notable growth



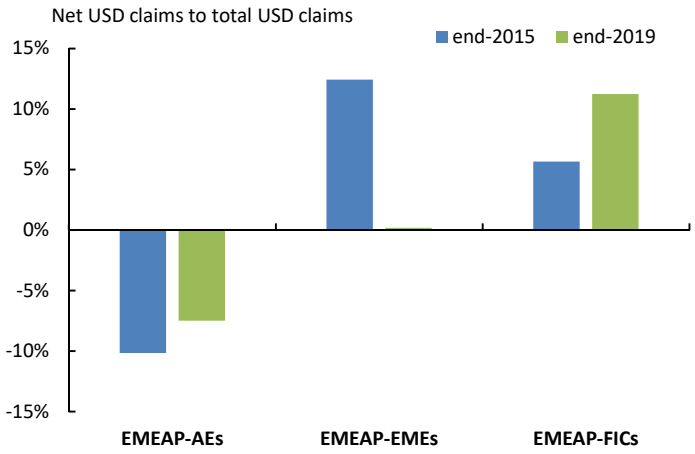
Sources: Member submissions based on the format of BIS Locational Banking Statistics and HKMA calculations; Data not available for NZ; Data for ID and MY estimated as a share of FX funding, based on average ratio of USD funding/total FX funding across EMEAP EMEs.

Granular data provided by a subset of EMEAP members[9] indicate most EMEAP EME banks' on-balance sheet US dollar liabilities remain heavily tilted towards loans and deposits. In contrast, and perhaps reflecting greater access to international capital markets, banks in some AEs appear to have a higher share of debt securities.

An increase in EMEAP banks' US dollar liabilities is not necessarily a concern for financial stability if it is currency (and maturity) matched by corresponding US dollar claims (i.e. assets) or is hedged. Indeed, banking sectors in most EMEAP jurisdictions appear to be either running net claims in US dollars or are relatively currency matched (**Chart 5**). In some cases, local authorities' efforts in promoting stable locally-sourced US dollar deposits supported the growth in net claims in US dollars since 2009. Australian banks typically swap back the majority of their US dollar liabilities into AUD in swap markets, with Australian superannuation funds as natural counterparties, and have negligible currency and maturity mismatch once swap positions are accounted for.

[9] Findings applied only for WGFM members reporting both domestic banks' US dollar loans and deposit and debt securities, including AU, KR, CN, PH and TH.

Chart 5: USD on-balance sheet mismatch[a] is relatively limited in most EMEAP banking systems

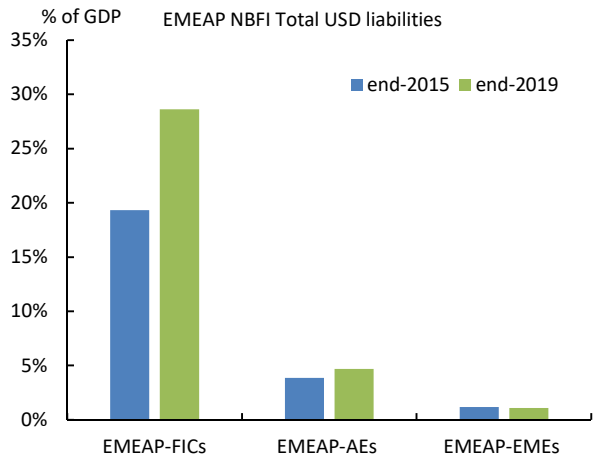


Sources: Member submissions and HKMA calculations; (a) 'Balance sheet mismatch' or 'Net USD claims', is USD claims less USD liabilities, and include both cross-border and local claims, and do not capture any off-balance borrowing nor hedging, through for example, foreign currency swaps. Data not available for NZ; Data for CN is cross-border only; Data for ID and MY estimated as a share of FX funding, based on average ratio of USD liability to total FX liability across EMEAP EMEs.

1.3 NBFIs: larger footprint in US dollar activities

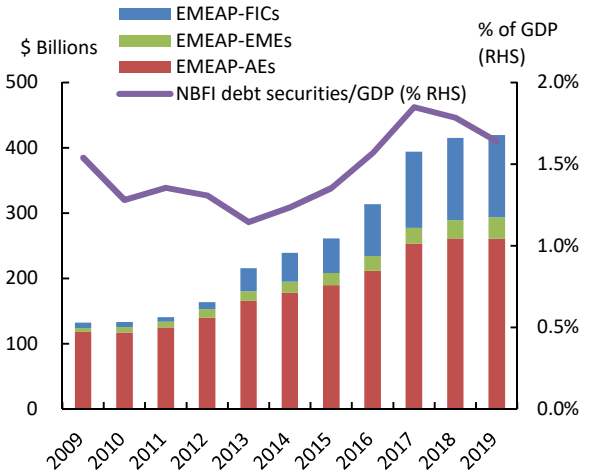
Post-crisis, some EMEAP-based pension funds, life insurance companies, and open-ended funds have increased their share of investments in US dollar-denominated securities, reflecting search for yield amid low domestic interest rates and diversification of portfolios. To facilitate purchases of foreign currency-denominated assets, including US dollar-denominated assets, EMEAP NBFIs accessed US dollar funding through a number of channels, including outright currency transactions, FX- and cross-currency swaps, US dollar bank loans, and through issuances of US dollar-denominated debt securities.

Chart 6: NBFIs' on-balance sheet US dollar liabilities remain limited in EMEAP EMEs



Sources: Member submissions, BIS LBS data, Dealogic and World Bank; Total USD liabilities include bank loans and long-term debt securities; Bank loans include loans from non-resident banks in all jurisdictions, and from both non-resident and resident banks in ID, KR, PH, HK, SG and AU. Long-term debt securities data unavailable for NZ

Chart 7: NBFIs' outstanding USD debt securities have nearly quadrupled



Sources: Dealogic and World Bank; Include all reporting members except NZ.

EMEAP NBFIs' on-balance sheet US dollar liabilities (from bank loans and long-term debt securities) appear small in EMEAP EMEs, and are more meaningful in EMEAP AEs and FICs (**Chart 6**). The outstanding amount of long-term US dollar-denominated debt of EMEAP NBFIs have nearly quadrupled over the past decade (**Chart 7**), and reflect in some instances local NBFIs' deeper integration with global capital markets, although this remains low as a share of GDP. A subset of granular data also suggests long-term US dollar debt securities as a share of NBFIs' on-balance sheet US dollar liabilities remains limited, with US dollar loans borrowed from banks (domestic and overseas) still the primary source of US dollar funding for NBFIs located in EMEAP EMEs and FICs.

Although some EMEAP NBFIs are likely to have funded their increased share of investments in US dollar assets via short-term US dollar-denominated debt instruments and via FX swaps and cross-currency swaps, data gaps on these instruments and central banks' general lack of direct purview over NBFIs can render a comprehensive assessment of NBFIs' balance sheet risks challenging.

1.4 NFCs: increasing reliance on market-based finance

Available data suggests the US dollar liabilities of NFCs now average at least 6% of GDP in EMEAP EMEs and at least 8% of GDP in EMEAP AEs as at end-2019 (**Chart 8**), though these are likely to be underestimations, given a lack of comprehensive data on bank loans from resident banks and issuance of short-term debt instruments.[10] The US dollar liabilities of NFCs located in FICs is highest at around 60% of GDP, corroborating the commentary of some WGFM members of the role of FICs in facilitating corporate intra-group financing.

EMEAP NFCs' issuance of long-term US dollar-denominated securities have risen post-crisis, with NFCs located in EMEAP EMEs in particular benefitting from increased access to international capital markets. EME NFCs now take up a much larger share of the outstanding amount of regional long-term US dollar-denominated debt securities (from under 40% in 2009 to 70% in 2019) (**Chart 9**). EMEAP NFCs' issuance of short-term US dollar denominated debt instruments, such as commercial paper and certificate of deposits, which are not captured here, are also likely to have risen, and may be of meaningful size in some jurisdictions with better capital market access.

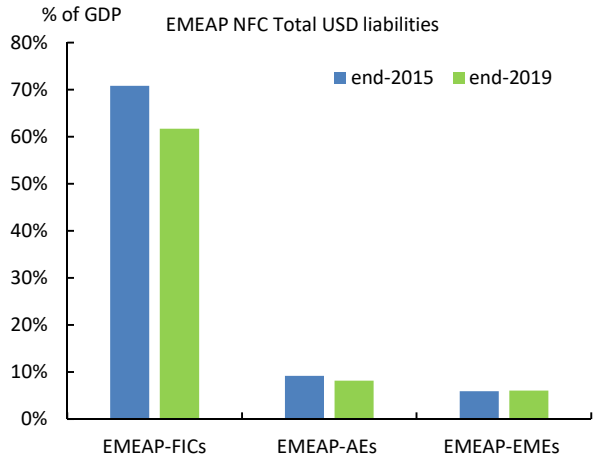
Relative to NFCs in the rest of EMEAP, NFCs in some EMEs saw more persistent growth in the issuance of US dollar debt securities relative to GDP even amid US monetary policy normalization. WGFM member observations suggest domestic NFCs take part in both bank borrowing and US dollar denominated debt issuance in search of low-cost funding to finance foreign operations. Among NFCs borrowing US dollars from international bond markets, corporates in the oil and gas, and real estate sector have been particularly active in US dollar denominated bond issuance in recent years.

For now, a subset of granular data (which includes additional data on loans from resident banks) suggests bank loans remain stable and a key source of EMEAP NFC's total US dollar funding. But limitations around access to data on EMEAP NFCs' US dollar assets, their use of short-term debt instruments, and on their natural and financial hedging again

[10] Bank loans extended to NFCs by resident banks only available for ID, KR, PH, HK, SG and AU.

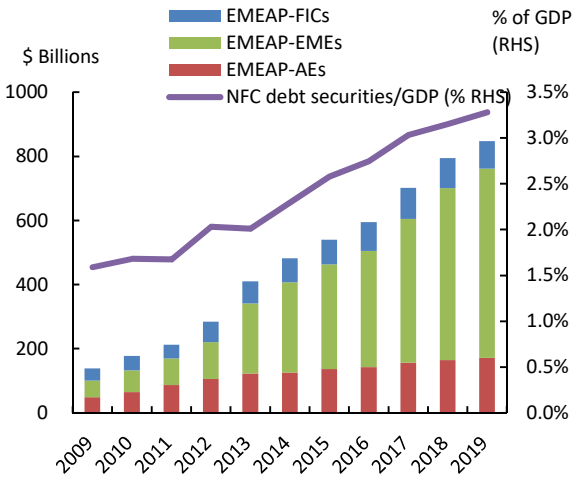
makes it difficult to assess US dollar balance sheet mismatch and related risks.

Chart 8: Available data suggests NFCs' USD liabilities as a share of GDP remain limited in EMEAP AEs and EMEs



Sources: Member submissions, BIS LBS data, Dealogic and World Bank; Total USD liabilities include bank loans and long-term debt securities; Bank loans include loans from both non-resident and resident banks in ID, KR, PH, HK, SG and AU, and only loans from non-resident banks in all other jurisdictions.

Chart 9: NFCs' outstanding USD debt securities is now four times the level in 2009



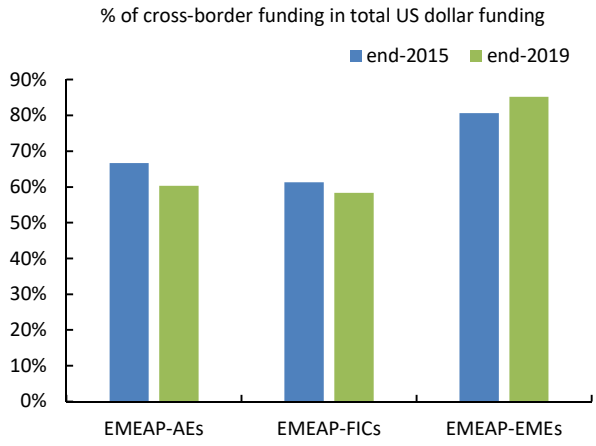
Sources: Dealogic and World Bank; Include all reporting members.

2. Risk assessments for market participants

This section assesses potential vulnerabilities and risks for the three main participants in the EMEAP US dollar funding markets – banks, NBFIs and NFCs.

2.1 Banks: better positioned against shocks, but counterparty risks remain

Chart 10: Cross-border funding remains important for EMEAP banks



Source: Member submissions; Total USD funding is sum of cross-border and local USD funding; NZ and CN excluded due to data availability issues; Data for ID and MY estimated as a share of FX funding based on EME average.

Comparable to non-US banks globally, the US dollar funding needs of many EMEAP banks cannot be met entirely by more stable locally sourced US dollar deposits. Cross-border financing from banks and non-banks remains meaningful, and account for around 60% of banks' total US dollar liabilities at the end of 2019 (**Chart 10**). Cross-border financing does not imply banks are equally vulnerable to US dollar liquidity stress. WGFM members noted that many resident banks' cross-border US dollar financing is primarily in the form of interbank loans sourced intragroup from international or regional headquarters.

As intragroup lending is in general a cheaper and more stable source of funding, banks that depend on cross-border intragroup funding are likely less prone to shocks to funding costs and availability. Banks' balance sheet mismatches are also relatively limited (see Section 1). A tightening of post-crisis regulatory standards, prudential scrutiny[11], and internal guidelines have led banks to increasingly hedge their US dollar exposures with long-term financial instruments such as long-tenor cross-currency basis swaps rather than relying on short-term instruments, which requires more rollover and are thus more sensitive to near-term volatility.[12] Authorities also place particular focus on monitoring banks with higher reliance on short-term funding from FX swaps and interbank markets. In sum, these post-GFC developments suggest that direct vulnerabilities associated with US dollar funding have generally declined for EMEAP banks, and banks now tend to have limited funding, liquidity and exchange rate risks.

Nevertheless, EMEAP banks' sizable exposure to domestic NFCs and to a lesser extent to NBFIs means adverse US dollar liquidity stress from non-banks may still impact adversely on banks' balance sheets[13]. For instance, regional NFCs reportedly tapped their existing US dollar credit lines with banks to obtain US dollar funding during the recent period of liquidity shortage and market turmoil in March-April, in order to build precautionary cash buffers and to meet refinancing needs for bond principal payments[14]. Although the credit drawdowns were manageable, with some jurisdictions reporting that the ensuing US dollar funds accessed by NFCs had been placed with banks as precautionary US dollar deposits, it highlighted a channel of transmission of liquidity stress from non-banks to banks.

2.2 NBFIs: currency and maturity mismatches are key risks to watch

EMEAP NBFIs' US dollar activities appear to be increasing, albeit the size of NBFI sectors remain relatively limited, certainly in EMEAP EMEs. As noted in Section 1, hard data on EMEAP NBFIs' balance sheet activities are limited; but anecdotal evidence suggest that some EMEAP-based pension funds, life insurance companies, and open-ended funds have increased their holding of US dollar investments in search of favorable returns over low domestic interest rates. For those NBFIs that rely on short-tenor hedging tools[15] against illiquid long-term US dollar investments, there may be currency and maturity mismatches that leave them susceptible to sharp declines in market liquidity. For instance, some NBFIs in the region have increasingly invested in long-term less-liquid US dollar assets, including US corporate bonds and agency mortgage-backed securities, and hedged such

[11] Prudential authorities place particular focus on monitoring banks with higher reliance on funding from FX swaps and interbank markets.
[12] For discussions on maturity-mismatch in banks and related increase in liquidity risk, see Goodhart, C. (2008) and *Banque de France Financial Stability Review*, *11*, 39-44.
[13] Some member central banks initiated or upgraded purchase programs for corporate debt to ensure smooth functioning of markets and curb potential contagion effects amidst COVID-19 stress.
[14] One member observed increased precautionary holdings of USD by corporate during COVID-19 period.
[15] For a discussion of EMEAP-based insurance companies, see 'US dollar funding: an international perspective', CGFS Papers (Jun 2020)

purchases with shorter-maturity FX swaps[16]. Moreover, NBFIs often have less recourse to a range of US dollar funding sources (including central bank liquidity facilities).

Challenges in rolling over short-term instruments were observable during the recent bout of market stress, as shown in the widening FX swap basis of some Asian currencies against the US dollar at short-maturities in early March[17]. Since then, while some WGFM members noted that funding rates in repo and swap markets have receded after initial spikes, transaction volumes in domestic FX swap markets have declined significantly and have not yet returned to pre-pandemic levels. Such a decline in market liquidity could hamper NBFIs' abilities to renew their hedging instruments and obtain additional sources of US dollar funding. Certain types of NBFIs such as hedge funds may also be more susceptible to credit rating downgrades that could increase margin calls and result in collateral ineligibility. Finally, pricing dislocations under broad-based risk aversion could result in large redemptions from open-ended funds.

Globally, disclosures around NBFIs have improved given their participation in debt securities issuance and more regulatory attentiveness. However, information on NBFIs' US dollar activities remains less than comprehensive and varies in availability and quality across EMEAP jurisdictions. Members generally have a good understanding of NBFIs' hedging ratios and maturity of their investments; but in line with discussions elsewhere,[18] regulators' direct access to information on the types of hedging tools used, and the size of potential currency mismatches is more limited. This can in turn render an assessment of balance sheet risks more challenging. For instance, NBFIs that require US dollars under market stress to meet collateral requirements and redemptions could face forced sale of less liquid investments[19], with potential spillovers to banks and NFCs through funding and investment exposures. Looking ahead, growing NBFI sectors in some EMEAP jurisdictions warrant monitoring.

2.3 NFCs: refinancing and currency risks in some sectors warrant attention

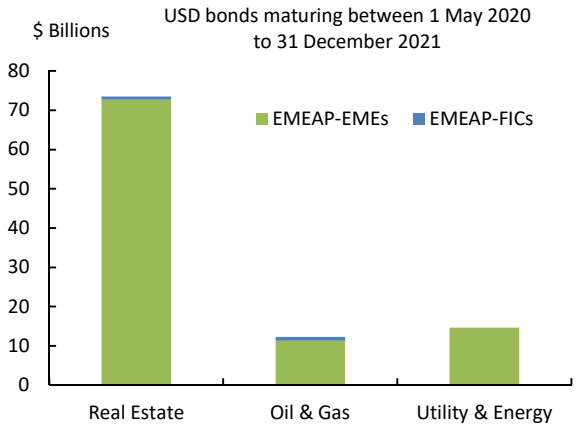
NFCs in EMEAP have increased their participation in offshore US dollar debt securities markets, and their exposure to US dollar related risks could have growing financial stability implications given their typically close link to domestic banks. As such, EMEAP NFCs' US dollar funding activities may warrant greater attention from EMEAP regulators on a forward-looking basis, should NFCs become material participants in US dollar funding markets. In general, EMEAP NFCs' currency risks can be limited through adequate natural- or financial hedging, while refinancing risks are partly offset by increased issuance of long-term US dollar bonds and additional access to bank loans. Nevertheless, these risks may be concerning in specific jurisdictions and sectors, with

[16] EMEAP-based NBFIs have invested increasingly in CLOs and US corporate bonds. See 'Financial Stability Report 2018', Bank of Korea (2019).
[17] See 'US dollar funding markets during the Covid-19 crisis', BIS Bulletin (May 2020).
[18] See 'US dollar funding: an international perspective, CGFS Papers (Jun 2020)
[19] Relative-value hedge funds were unable to meet capital requirements in Mar 2020, resulting in a disruptive unwinding. Risk parity funds also experienced forced sale of fixed income investments to reduce leverage ratios. In markets with higher foreign participation, fire sales could be exacerbated by foreign investment exit (fickle capital inflows). For related discussions, see Caballero, R. J., & Simsek, A. (2020) and *Journal of Political Economy*, *128*(6), 2288-2328.

NFC issuers of non-AE jurisdictions also more vulnerable to periods of risk aversion.

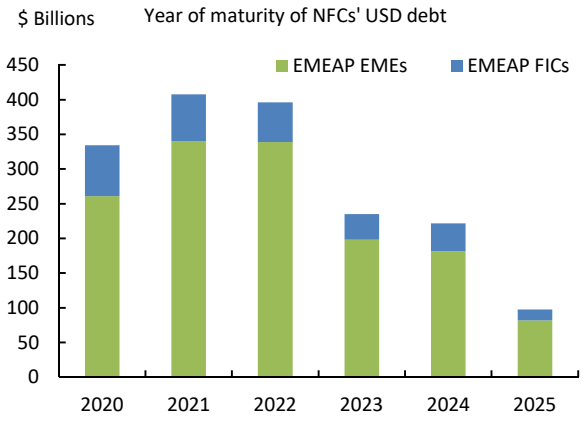
Debt securities data show increased issuance of US dollar-denominated offshore bonds by real estate developers in some jurisdictions, but only a few property developers hedge their foreign exchange exposures, while revenues tend to be denominated in local currency. Heavily indebted real estate developers also often use proceeds from pre-sale of one project for financing, and thus can be sensitive to market disruptions in any part of the funding chain. NFCs in the real estate (and to a lesser extent energy and utilities) sectors also have sizable upcoming refinancing needs (**Chart 11**). Elevated firm leverage can further amplify US dollar funding risks[20], while credit rating downgrades can exacerbate investor pullbacks in the supply of US dollar liquidity. Such non-linear investor response to 'credit cliff dynamics' that have been observed in US corporate debt markets could also pose a risk for EMEAP NFC borrowers[21].

Chart 11: NFCs in some sectors have non-trivial amount of maturing USD bonds



Sources: Dealogic and HKMA staff calculations; Data to May 2020.

Chart 12: High levels of USD debt maturing in next two years pose rollover risk to NFCs



Sources: Dealogic and HKMA staff calculations; Data to May 2020, and include bond and syndicated loans.

During the market stress in March-April, EMEAP NFCs faced difficulty rolling over US dollar debt and making debt payments, as global investors withdrew from international US dollar commercial paper and bond markets. This led to drawdowns of NFCs' existing credit lines with domestic banks, which transmitted some funding stress from corporates to banks. NFCs in EMEAP EMEs and FICs have nearly 30% of their outstanding US dollar debt maturing by the end of 2021 (**Chart 12**), and are susceptible to another bout of liquidity stress,[22] as well as to a tightening of banks' lending standards. In general, data gaps remain an obstacle to a comprehensive understanding of EMEAP NFCs' US dollar funding risks: data coverage on short-term issuances of US dollar bonds and syndicated loans is quite limited; while information on NFCs' hedging practices and non-syndicated US dollar liabilities is unavailable in most EMEAP jurisdictions. While members should take caution not to overburden smaller entities with onerous reporting requirements, timely and better coverage of material NFC participants in US dollar funding markets would help authorities to identify potential pockets of risks at an early stage.

[20] See 'US dollar Bond Issuance by Mainland Property Developers', HKMA Research Memorandum (2017).
[21] Ellul, A., Jotikasthira, C., & Lundblad, C. T. (2011). 'Regulatory pressure and fire sales in the corporate bond market'. *Journal of Financial Economics, 101(3)*, 596-620.
[22] See 'Covid-19 pandemic: Potential sources of another bout of liquidity stress', FSB SCAV (May 2020)

B. Monitoring framework and policy tools deployed

This Section summarizes the monitoring framework of member central banks on US dollar funding conditions, current data availability in surveillance and policy tools deployed during times of stress. The section also covers policy areas that members may address in the future that are beneficial to financial stability in the region.

3. Monitoring framework for US dollar funding

3.1 General monitoring: primarily directed at banks, with market indicators providing more timely data

Since banks dominate the intermediation of US dollar liquidity in EMEAP, supervisory and surveillance efforts continue to place greater emphasis on the monitoring of banks' resilience to potential US dollar liquidity stress. Feedback from WGFM members indicates regular monitoring of banks' US dollar claims and sources of liabilities (e.g. through tracking of key pricing and volume indicators), together with regular and systematic updates on banks' strategies and status in managing US dollar liquidity. Conditions in global US dollar funding markets are also monitored (e.g. through tracking of rates and spreads), given potential spillovers to domestic financial conditions. In fact, several WGFM members utilize 'Early Warning Systems' that cover a wide array of indicators across multiple financial markets for a comprehensive overview of financial conditions (see **Table 1** for details). Regular micro-prudential monitoring is in some jurisdictions further complemented by a macro-prudential framework, more in-depth analysis and banking sector stress tests to ensure adequate bank buffers and liquidity.

Table 1: Useful indicators for monitoring US dollar funding

Category	Common indicators	Frequency	Relative importance
Credit aggregate	*Cross-border / international bank US dollar claims and local banking statistics*	*Quarterly*	*3 (medium)*
Monetary liquidity	*Policy and money market interest rates*	*Intraday / daily*	*4 (high) to 5 (very high)*
	FX reserves	*Weekly to Bi-Monthly*	*3 (medium) to 5 (very high)*
Funding and market liquidity	*LIBOR-OIS spread / TED spread*[23]	*Intraday / Daily*	*4 (high) to 5 (very high)*
	FX swap basis	*Intraday / Daily*	*3 (medium) to 5 (very high)*
Risk-taking	*VIX index and other risk appetite measures*	*Daily*	*3 (medium)*

Source: Members' survey submissions

[23] Some member state that while OIS-based indicators are usually used for gauging market expectations on the US Fed's policy rates, the relatively low liquidity in the longer-end may undermine its reliability.

3.2 More granular data on hedging activities of NBFI and NFC debt issuers needed to better assess systemic implications

WGFM members monitor foreign currency hedging activities of EMEAP borrowers and the activity and pricing of FX swap markets to varying degrees. In general, the monitoring framework for assessing US dollar liquidity risks of local NBFIs and NFCs is relatively preliminary in most jurisdictions, in part a reflection of these sectors still more limited systemic importance. In jurisdictions where there is some monitoring of hedging activities of local NFCs, this is mainly via reporting systems and qualitative surveys, while collection of granular data on FX transactions and associated counterparties is via banks. For instance, one member jurisdiction conducted an expansion of their FX-transaction reporting system beyond banks to registered NBFIs, enabling the monitoring of broader funding conditions in a timely manner[24]. In general, assessing potential currency and maturity mismatches for non-bank US dollar borrowers and in terms of their systemic implications would require more granular data on the type of hedging tools used by NBFIs and NFCs.

3.3 Data availability: wider coverage and more real-time data are needed

Although monitoring data on banks is relatively comprehensive, a number of WGFM members noted time lags in reporting of key statistics, lack of granular currency breakdowns, and often low frequency of data, that could limit regulators' abilities to conduct timely assessment and in-depth analysis. One example is the reporting lag on banks' cross-border US dollar positions (e.g. the BIS Locational Banking Statistics), which are only available quarterly with typically a lag of one quarter in reporting. In addition, WGFM members find that data gaps on the size, maturity and type of US dollar assets and liabilities of NBFIs, NFCs, and households prevent a comprehensive assessment of non-bank entities' US dollar exposures and related vulnerabilities.

4. Policy tools deployed and further steps

4.1 Regional central banks stand ready to provide US dollar liquidity through various tools in time of stress

Members noted that they stand ready to provide US dollar liquidity through a wide range of instruments and operations, should stress arise in US dollar funding markets that can negatively affect access of domestic banks and non-banks to US dollar liquidity. These include operations in FX swaps market[25], US dollar repo facilities for banks, and issuance of US dollar-denominated bills to support market functioning. One member mentioned

[24] RBA conducts a comprehensive regular survey on foreign currency exposures and hedging practices for banks, NBFIs, NFCs and the government to identify concentration risk and duration mismatches.
[25] For instance, MAS provided up to 1 billion US dollar of foreign exchange swaps at its daily money market operations in late-March 2020, a 25% increase from the usual volumes.

the standing US dollar liquidity facilities that support domestic US dollar funding access[26], while others have set up temporary US dollar repo and loan facilities to provide the domestic banking sector with necessary US dollar liquidity in response to rising funding stress during the COVID-19 episode[27]. In addition to market operations, a number of WGFM members have also adjusted regulatory measures for domestic banks in order to ease US dollar funding stress, through for example, temporarily adjusted requirements for FX reserves and exchange rate liquidity coverage ratios to release US dollar liquidity in the domestic banking sector[28]. These regulatory adjustments serve as effective short-term measures to free up US dollar liquidity in times of market stress.

4.2 The accumulation of domestic buffers

Macroeconomic adjustments and structural reforms undertaken after the Asian Financial Crisis (AFC) and further strengthened after the Global Financial Crisis (GFC) helped build up the resilience of many EMEAP economies coming into the recent episode of US dollar liquidity stress during the COVID-19 pandemic. In particular, after the AFC, EMEAP members strengthened supervisory and regulatory frameworks; introduced greater governance and disclosure standards for corporations; and central banks gained greater independence[29]. Furthermore, after the GFC, banks undertook additional reforms to reduce balance sheet risks. As self-insurance is the first line of defense, most EMEAP members have also accumulated a considerable amount of FX reserves in the years since the AFC, and EMEAP central banks in general are able to deploy FX reserves and intermediate US dollar liquidity in the domestic financial market in times of stress.

4.3 Regional safety nets and US Fed facilities critical in maintaining market stability and confidence

EMEAP jurisdictions have also worked collaboratively to establish bilateral and regional safety nets for prevention of systematic US dollar funding stress and as liquidity backstops. For instance, several members (as US dollar borrowers) have established bilateral FX swap arrangements with US dollar funding suppliers in the region[30]. The ASEAN Swap Arrangements (ASA) and Chiang Mai Initiative Multilateralization (CMIM) act as additional regional safety nets. Regional and international multilateral organizations such as the Asia Development Bank (ADB) and the International Monetary

[26] BOJ has maintained their U.S. Dollar funds-supplying operation against pooled collateral since 2010 for US dollar liquidity provision to domestic banks.
[27] HKMA has set up a weekly US dollar 7-day repo facility for a total of 10 billion US dollar. BOK and MAS have deployed US dollar loan facilities (up to 60 billion US dollar) on the back of the swap arrangements with the US Federal Reserve for auctions by domestic banks. RBNZ has set up a reverse-repo lending facility, accepting NZD-denominated collaterals for lending out US dollar liquidity.
[28] BI announced lowering of exchange rate reserve requirements for commercial banks in Mar 2020, while BOK announced lowering of exchange rate liquidity coverage ratios for local banks.
[29] See 'Recovery from the Asian Crisis and the Role of the IMF', IMF Staff papers (2000)
[30] Japan Ministry of Finance has renewed bilateral USD swap arrangements with Philippines in 2017, and with Thailand, Indonesia and Singapore in 2018.

Fund (IMF) can also provide potential sources of short-term US dollar liquidity[31].

During the GFC, some EMEAP members benefitted from the establishment of temporary swap arrangements with the US Fed[32]. In the recent period of COVID-19 market stress, additional temporary swap lines and a central bank US dollar repo facility (FIMA) was established between the US Fed and several EMEAP member central banks, which aimed to ease funding strains under economic headwinds and heightened market uncertainty.[33] As a result, US dollar funding suppliers in the region were able to increase short-term and medium-term US dollar liquidity provision through more frequent swap operations with the US Fed in different tenors such as 7-days, 28-days (in one member jurisdiction) and 84-days. Additional rounds of quantitative easing conducted by Fed and other domestic liquidity facilities for commercial paper and corporate loan market have also helped ease US dollar funding stress across the globe.

While market sentiments and elevated uncertainty may still influence the regional US dollar funding situation, US dollar repo facilities and bilateral swap lines with the US Fed have served as a strong signal of joint efforts to curtail further spikes in US dollar funding stress. Upon the establishment of bilateral swap lines between the US Fed and other members in March, the EMEAP region has witnessed a gradual calming down of portfolio outflows, indicating a positive announcement effect in curbing excess market volatility. Meanwhile, US dollar funding rates such as domestic FX swap rates and cross-currency basis swap spreads at one-week tenor recovered from deep negative territories back to pre-pandemic levels for most EMEAP members. Such recovery also implies a positive market reaction to coordination efforts of members and the US Fed.

4.4 Recommendations on further steps: broadening information sources and more collaboration

While EMEAP members are equipped with a wide array of tools to address US dollar funding stresses, there are a number of policy and regulatory options that can improve members' resilience to future shocks and financial stability of the region. At the same time, it is important to note that there is no "single" option that can be applied to the region given the country specific structure of financial markets and unique drivers of US dollar funding markets in each jurisdiction.

The first step to mitigating risks in US dollar funding markets would be to improve data collection and comparability across jurisdictions. This includes building on existing banking sector monitoring frameworks with the inclusion of more frequent and nimble

[31] ADB has announced a 20 billion US dollar COVID-19 response package in mid-April 2020 to its members for both the government and private sector. IMF also established the Short-term Liquidity Line (SLL), which is a revolving and renewable backstop for member countries with very strong policies and fundamentals in need of short-term moderate balance of payments support, and provide revolving access of up to 145 percent of quota.

[32] MAS established a US$30 billion temporary reciprocal currency swap arrangement with the Federal Reserve Bank in the GFC (the facility lapsed in February 2010 after stress in the market eased).

[33] The US Fed has established temporary dollar liquidity-swap lines with member central banks such as RBA, RBNZ, MAS and BOK in Mar 2020, and a 60 billion US dollar repo line with BI in Apr 2020. It has standing USD swap lines with the BOJ for USD liquidity support.

data to facilitate the identification of shocks that can reduce banks' ability to support market-making activities and credit intermediation, and enable more prompt policy responses. For instance, real-time databases that capture FX transaction data can help identify abnormalities in the FX swap market. Timely capture of dealer inventory of liquid (and illiquid) US dollar assets would also help authorities gauge banks' willingness to act as market makers and provide US dollar liquidity, especially in times of stress.

In addition, more detailed coverage on the US dollar activities of NBFIs and NFCs could be considered, especially in member jurisdictions where these are becoming material participants in US dollar activities. Notwithstanding longer-term efforts to improve disclosure standards and requirements, in the near-term, periodic and comparable surveys on non-banks' US dollar funding activities, including currency breakdowns, hedging practices and industry concentrations would be useful[34]. Such surveys can follow the practice of those already conducted by the RBA (together with the Australian Bureau of Statistics) [35] , and can help to gauge potential FX-related vulnerabilities in particular sectors of the economy, identify potential mismatches, and are useful for communicating any risks to a broader audience. However, the design and costs of data collection initiatives should also be commensurate with the systemic relevance of local non-bank sectors. Several WGFM members already include an assessment of FX liquidity as part of their macro-prudential regulatory framework and in stress-testing models, a framework that other members may wish to consider.

In the long term, members would also benefit from enhanced regional cooperation and information sharing. Effective regional safety nets would require timely cross-border liquidity support from member central banks, as well as communications on potential contagion risks. Members should also encourage banks, NBFIs and NFCs to rely on sustainable and diverse sources for US dollar funding by providing guidance and regulations under the macro-prudential framework. Policies such as these could alleviate risks related to market participants with elevated US dollar liabilities. Moreover, development of domestic capital markets and hedging instruments would also be useful to reduce reliance on US dollar funding and provide stability in funding when stress events occur in foreign markets. For example, to deepen local capital markets, some members could encourage the efficient, timely and predictable enforcement of contracts, and set up efficient and predictable regimes for dealing with corporate distress and insolvency[36]. Better access and availability of hedging instruments would also help to reduce the exposure of US dollar borrowers to US dollar appreciation.

Finally, a number of WGFMs members highlighted the importance of monitoring developments around long-term instruments such as long-tenor US dollar cross-currency basis swaps (CCBS), in addition to pricing and transaction volume data of short-term markets such as FX swap, repo and spot markets. Reflecting this view, some members indicated the usefulness of having access to higher-frequency and granular data for the CCBS and OTC derivatives market in terms of transactional volume and market participant types, while a potential higher-frequency source could be trade repository

[34] Reserve Bank of Australia has worked with the Australian Bureau of Statistics to provide a detailed survey of Australian entities (including NBFIs and NFCs) on their FX exposures and hedging policies every four years.
[35] See 'Foreign currency exposure and hedging in Australia', RBA Bulletin (Dec 2017)
[36] See 'Establishing viable capital markets', CGFS Papers (Jan 2019)

data on OTC derivatives and CCBS transactions deployed by members such as the HKMA and MAS.

C. Experience sharing from individual jurisdiction

Australia

Landscape of US dollar funding

Among Australian entities, the major Australian banks are the main borrowers of US dollars, primarily via issuance of bonds in the US market. Australian banks issue bonds in US dollars in order to diversify their funding base and because US markets can absorb large issues at relatively attractive prices compared with issuing these volumes domestically. The majority of the US dollar borrowing is then swapped back into Australian dollars to fund AUD assets, making the banks net lenders of US dollars in the AUD/US dollar FX swap market. The remaining small portion of the US dollar borrowing is used to fund US dollar assets. In terms of scale, offshore funding accounts for a little under 20 per cent of the total funding of the banks' domestic books, with a large portion of this offshore funding being US dollar-denominated.

Australian NBFIs – superannuation funds, insurance companies and other asset managers – invest in offshore US dollar assets primarily for diversification purposes. They usually hedge a portion (around one-third as of March 2017) of these investments and therefore will be borrowers of US dollars in the AUD/USD FX swap market. These entities are natural counterparties to the Australian banks in the FX swap market. Foreign currency liabilities of other financial corporations otherwise are small.

As for NFCs, US dollar funding supports business activities of corporates with US dollar revenue streams such as exporters or those with overseas operations. Most of the Australian corporates' US dollar funding comes from bond issuance, while a smaller share comes from bank lending. For Australian resident corporates, foreign currency borrowing from banks accounts for a small share of total credit in Australia.

Foreign currency liabilities of the Australian general government sector, including federal, state and local governments are close to zero. Foreign currency assets are much larger than foreign currency liabilities, largely reflecting offshore assets held by the Australian Government Future Fund. Most of these assets are not hedged.

Monitoring Framework

On a day-to-day basis, monitoring of US dollar liquidity and funding markets is focussed on movements in pricing in the AUD/US dollar FX swap and cross-currency swap markets, the US dollar repo market and US dollar bond market (e.g. bank and corporate bonds). These measures are monitored to gauge how well markets are functioning and to determine whether there are US dollar funding cost pressures. While the main issuers of foreign currency debt are Australian banks and corporates, other issuance of US dollar denominated bonds is also monitored.

Developments in US dollar funding markets are assessed and reported to senior management on a daily and monthly basis. The purpose is to determine whether these

developments are significant to the Australian economy or to the cost of funding for Australian entities.

In addition, the RBA has reviewed Australian entities' hedging practices in detailed surveys approximately every 4 years since 2001. These surveys are very useful in gauging potential vulnerabilities in the form of foreign currency exposures in particular sectors of the economy, notably banks, other financial corporations, non-financial corporations and the government sector, and potential mismatches between the duration of foreign currency assets and liabilities and the duration of derivatives used to hedge them. Our focus is on the hedging activity of banks' foreign currency debt, as banks are the largest issuers in offshore markets and are typically using the funds for lending in Australia. This survey has provided comfort that hedging activity is appropriate and that banks and other financial institutions do not have foreign currency exposures that could result in material losses.

Policy tools in times of stress

The RBA does not actively manage the supply or cost of US dollar liquidity. However, AUD/US dollar FX swaps are used, alongside other instruments, at times in the management of domestic liquidity as part of the implementation of monetary policy. These swaps are not aimed at managing the supply of US dollar in the Australian market. Although the RBA would have capacity to have some influence on US dollar funding conditions in the AUD/US dollar swap market if it were required, it is not expected that such action would be needed, particularly given Australian banks' position as US dollar lenders in this market.

In both October 2008 and March 2020, as FX swap markets around the world experienced stressed conditions amid tight US dollar funding, the Federal Reserve extended US dollar funding via swap lines to a number of other central banks including the RBA. The RBA decision to provide US dollar funding did not reflect vulnerabilities in the Australian banking system; rather, it was intended to assist in alleviating global pressures by improving the distribution of US dollar liquidity across different time zones and locales (RBA 2008, RBA 2020). Usage of the Federal Reserve swap line was around US$27 billion in 2008/09, but has been much smaller (just over US$1 billion) in 2020.

China

Landscape of US dollar funding

The Chinese banking sector has a considerable portion of external positions in US dollar, with US dollar denominated assets exceeding liabilities. As of September 2019, China's banking sector recorded external financial assets of US dollar 1135.5 billion, with US dollar assets accounting for 69 percent (US dollar 789.0 billion). External liabilities reached US dollar 1315.4 billion, of which US dollar liabilities accounts for 41 percent (US dollar 542.8 billion). Net external liabilities of China's banking sector were US dollar 179.9 billion, of which net US dollar assets were US dollar 246.2billion.

US dollar funding supply and demand are mainly driven by the import and export demand of the real economy, i.e. trade finance, and are also affected by the cross-border investment and financing activities. According to data released by the State Administration of Foreign Exchange, from January to July 2019, in current account, the net foreign exchange sales by banks for customers was 39.7 billion US dollar, among which the net foreign exchange settlement in goods trade was 95.3 billion US dollar, and the net foreign exchange sales in services trade was 116.2 billion US dollar. In capital and financial account, the net foreign exchange settlement was 10.8 billion US dollar.

Monitoring Framework

Under the BOP framework, the State Administration of Foreign Exchange compiles and monitors external positions of China's banking sector. The data of cross-border positions under Locational Banking Statistics are also submitted to the Bank for International Settlements, on a quarterly basis.

The PBC keeps monitoring businesses with high risks and takes actions against banks, entities and individuals suspected to be unlawful through off-site supervision. The PBC has also enacted the self-discipline mechanism of the market.

Policy tools in times of stress

The PBC does not regularly intervene liquidity in the foreign currency financing market, as liquidity in the Chinese foreign currency financing market is influenced by a wide range of factors, including exchange rate expectations, foreign exchange deposits and loans, cross-border financing and other factors.

In order to make cross-border financing more convenient for financial institutions and enterprises, in 2016 the PBC issued a macro-prudential management policy on cross-border financing, which allows financial institutions and enterprises to independently conduct cross-border financing in local and foreign currencies within the ceiling linked to their capital or net assets, thus greatly enhancing the cross-border financing. The PBC may conduct macro-prudential management on cross-border financing by adjusting the leverage ratio, risk conversion factor and macro-prudential management parameters of cross-border financing according to the macro-economic conditions, balance of payments and the need of macro-financial regulation.

Hong Kong SAR

Landscape of US dollar funding

As a major international financial centre, Hong Kong plays an important role in intermediating US dollar funding in the region. Local banks, as defined by locally incorporated authorized institutions (AIs), provide on average around 40% of the total US dollar loans, while local branches of foreign banks provide the other 60%.

Banks in Hong Kong extend US dollar loans to both domestic and external borrowers for a variety of uses. As of March 2020, about 25% of the total loans for use in Hong Kong are denominated in US dollar. Regarding loans for use in Hong Kong by sector, 80% of loans to "trade financing" are denominated in US dollar, which was about HK$385 billion. Besides, NBFIs (HK$498 billion), "transport and transport equipment" (HK$173 billion) and "wholesale and retail trade" (HK$144 billion) also have considerably large share of loans denominated in US dollar, representing roughly 51%, 51% and 38% of loans in these sectors respectively. Hong Kong banks also provide cross-border US dollar loans to firms across Asia, in support of their trade activities and oversea expansions.

While NBFIs are not AIs and thus are not under the purview of the HKMA, they have participated in issuing US dollar denominated debt for lower funding cost and supporting US dollar investments.

NFCs have also issued an increasing amount of US dollar-denominated debt for lower cost and for their overseas business such as cross-border M&A.

Monitoring Framework

For financial stability analysis, the HKMA's monitoring of US dollar liquidity or more broadly foreign-currency liquidity mainly relies on assessments of selected indicators. For example, the banking sector's loan-to-deposit ratios, net FX positions, US dollar funding cost, and US dollar external claims and liabilities are regularly monitored. Spreads of cross-currency basis swaps are also useful indicators.

The HKMA also monitor US dollar denominated bonds regularly for EMEAP economies on a regular basis, with a view to monitoring the development of reliance on foreign currency funding via the bond market channel in the region. This is part of the macro-surveillance work, as over-reliance on foreign currency funding can potentially increase the risk of currency mismatch, thereby increasing the vulnerability of the financial system in the region.

Furthermore, the HKMA is also in the process of developing timely monitoring of positions in the over-the-counter derivatives market using Hong Kong Trade Repository (HKTR) data, which includes granular trade-level data on FX swaps, Outright Forwards, Options and Cross-Currency Swaps. The coverage of HKTR data is wide because the HKTR captures all trades booked or conducted in Hong Kong by all Authorised Institutions and

Licensed Corporations[37] subject to a minimum threshold. Furthermore, activity by NBFIs and NFCs is inferred from NBFIs and NFCs being reported as counterparties of AIs and LCs. While the focus of the analysis of HKTR data is currently on monitoring activities in the local currency, it can be extended to monitor USD liquidity in the Hong Kong market.

Under the Linked Exchange Rate System (LERS), local issuers take little FX risk when issuing US dollar denominated debt. In terms of sector breakdown, we monitor mainly breakdowns into financial and non-financial issuers. Over the past decade, the split between financial and non-financial industries has been about 20/80.

The HKMA also produces research papers and notes with an aim to better understand issues relating to US dollar liquidity when needed[38]. For instance, since HKD is pegged to the US dollar, HKD flows can also have significant implications for US dollar liquidity in the HK banking system[39].

Policy tools in times of stress

Under the LERS, the HKMA is committed to buying HKD with US dollar when the exchange rate reaches the weak-side Convertibility Undertaking at HK$7.85 to US$1. Similarly, it is also committed to buying US dollar with HKD when the exchange rate hits the strong-side Convertibility Undertaking at HK$7.75 to US$1. HKD interbank interest rates will be influenced by their USD counterparts under our LERS, and the ordinary monetary operations by the HKMA in effect provide and absorb excess US dollar liquidities.

The HKMA is also mindful of the USD liquidity needs of market participants during the period of liquidity strain in March-April 2020. In order to alleviate the USD funding stress, in April 2020, the HKMA announced the launch of a temporary US Dollar Liquidity Facility, whereby the HKMA will use the funds obtained from the US Federal Reserve's repurchase agreement facility for foreign and international monetary authorities (FIMA Repo Facility) for lending to local banks through repurchase transactions. A total of US$10 billion is made available under this new facility through weekly competitive tenders.

[37] Licensed Corporations (LCs) refers to "A corporation (that is not an authorized financial institution) which is granted a licence by Hong Kong Securities and Futures Commission to carry on one or more regulated activities under the Securities and Futures Ordinance"
[38] See 'US dollar Bond Issuance by Mainland Property Developers', HKMA Research Memorandum (2017), and 'Asynchronous Monetary Policies and International dollar Credit', HKIMR Working Paper, (2015)
[39] See 'How do we monitor Hong Kong dollar fund flows', HKMA Quarterly Bulletin (2012)

Indonesia

Landscape of US dollar funding

The main source of US dollar funding in Indonesia is almost proportional between domestic bank loans (49%) and US dollar-denominated debt securities (51%), with the later showing an increasing trend. State owned banks and joint venture banks are the major providers of US dollar liquidity to NFCs, which are the biggest US dollar borrowers in the total bank loan market. State owned banks and joint venture banks obtain their US dollar funding through interbank lending market from foreign banks and private banks, which provide US dollar liquidity to mitigate their currency risk.

NBFIs are not a major player in the US dollar borrowing market, with their uptake of US dollar denominated bank loans accounting for 5% of total bank loans in the last five years.

NFCs, on the other hand, are the biggest borrower of US dollar bank loans from state owned banks and joint venture banks. The US dollar demand from NFCs reflects needs arising from international trade, infrastructure projects, and searching for lower funding cost of private companies, as well as to naturally hedge currency risk by matching funding with USD based income.

Monitoring Framework

In order to assess FX (including US dollar denomination) liquidity condition in Indonesia, several indicators are used by Bank Indonesia, namely: ratio of banks' FX funding to total funding; banks' exposure on FX denominated debt; banks' Net Open Positions (NOP); fulfilment of banks' FX reserve requirement, proportion of short term and long term of non-financial corporations; non-financial corporations' compliance towards BI's hedging requirement.

To monitor and improve the early warning system of FX liquidity risk in Indonesia, BI develops and implements the following several systems and framework: External Debt Direct Reporting System, National Financial Account and Balance Sheet Indonesia, Integrated Foreign Exchange Monitoring Information System (SiMoDIS). Moreover, NFC foreign exchange debt is assessed every month, including compliance towards the minimum hedging requirement (25% of the difference between FX liabilities and assets) and minimum liquidity requirement of 70% (ratio of foreign currency assets to foreign currency liabilities).

From a macroeconomic perspective, monitoring of banks' FX liquidity risk (including US dollar denomination) is part of the assessment process within the macro-prudential framework. In order to preserve adequate FX liquidity, Bank Indonesia has issued several prudential regulations to mitigate speculative behaviour and improve resilience of corporations against FX liquidity risks. Bank Indonesia also performs regular liquidity stress tests to assess banks' liquidity resilience as indicated by the after-shock net cash balance. The focus is put towards ensuring total bank liquidity to cover short and long-

term liabilities as well as ensuring adequate liquidity buffer to withstand shocks or times of stress.

In addition, foreign currency debt both in terms of level and its possible impact to the economy is well monitored by Bank Indonesia. US dollar is the major currency in foreign currency debt. One of the important risks stemming from the foreign currency debt is the exchange rate risk. Thus, it is important that debtor properly hedged their exposure against FX fluctuation. In view of addressing this, in 2014 Bank Indonesia issued Bank Indonesia Regulation Number 16/21/PBI/2014 Concerning the Implementation of Prudential Principles in Managing External Debt of The Non-Bank Corporation.

The sectoral breakdown of debt issuers is captured by the banking reporting system and debt securities statistics. The industries that depend more heavily on US dollar liquidity are: Electricity, gas and waterworks; Manufacturing; Mining and Drilling.

Policy tools in times of stress

BI has the role as monetary authority to maintain both Rupiah and FX liquidity in the domestic market. In carrying out this role, BI has a variety of instruments for managing the FX liquidity, including: FX Term Deposit; FX SBBI (Bank Indonesia Certificate for FX) as US dollar deposit instrument; FX Swap; Spot and Forward transaction to absorb or to inject FX into domestic market. The strategy for each instrument depends on our internal FX liquidity projection, market demand and supply especially from government/SOE side, capital flows, seasonal event such dividend payment, and etc. BI has regular FX OMO through auction such as FX term deposit and FX SBBI.

There was no major stress event in US dollar funding in recent years. However, BI has monetary operational instruments to inject liquidity into domestic market, tools that are always ready to deploy whenever market needs US dollar liquidity. Furthermore, BI also maintains FX reserve as a first line defence and bilateral swap agreements with other supranational institutions and central banks within the international financial safety net as a second line defence.

During the recent COVID-19 pandemic, in order to preserve adequate FX liquidity, BI has issued several prudential regulations to mitigate speculative behaviour and improve resilience of corporations against FX liquidity risks.

The policy mix implemented by Bank Indonesia includes intensifying triple intervention policy in the spot and DNDF markets and purchasing SBN in the secondary market, as well as reducing the foreign currency reserve requirements for conventional commercial banks from 8% to 4%. For swap and forward markets, BI has increased the frequency of FX Swap auctions to daily in order to ensure adequate liquidity, together with expanding the types of underlying transactions for Domestic Non-Deliverable Forwards (DNDF), thus increasing hedging alternatives against rupiah holdings in Indonesia.

Japan

Landscape of US dollar funding

From a long-term perspective, major Japanese banks have increasingly become providers of US dollar-denominated and local currency-denominated credit, particularly in Asia. Overseas loans provided by Japanese banks, in particular by major banks, showed a moderate increasing trend, reflecting bank's focus to support both oversea activities of Japanese firms and expand their own international business base. Besides, Japanese banks have increased their holding of foreign bonds in search of higher yield. The biggest source of funding for US dollar lending, approximately one-thirds, is client-related deposits, which is a stable source. For the rest, banks depend on market funding instruments, including interbank funding, repos, and cross currency swaps. To increase portion of funding from stable sources, Japanese banks have been making efforts such as increasing local client-related deposits.

Under the prolonged low interest rate environment, non-bank financial institutions (NBFIs) such as life insurance companies and pension funds have gradually increased their share of investment in foreign-currency assets, which offer relatively higher yields. Life insurance companies obtain the foreign currency funding necessary for investment in foreign currency-denominated assets through FX swaps, outright currency transactions, and foreign currency-denominated insurance premiums. On the asset side, these companies hold sufficient amounts of foreign currency-denominated securities with high market liquidity. Therefore, in terms of foreign currency liquidity, life insurance companies are fairly resilient even if stress events occur in the FX swap market.

From a macroeconomic standpoint, the non-financial corporations (NFCs) are not likely to experience constant shortage of US dollar in terms of real demand, as Japan's trade surplus signifies that the amount of US dollar that exporters receive in payments exceeds the amount of US dollar that importers pay. In addition, Japanese firms are funding their increasing foreign direct investment through stable sources such as local foreign currency-denominated revenue and loans from financial institutions.

Monitoring Framework

At the BOJ, the Financial Markets Department is responsible for monitoring US dollar liquidity in the global financial market, while the Financial System and Bank Examination Department is responsible for monitoring US dollar funding environment of individual banks and securities companies. The Financial Markets Department compiles a wide variety of indicators and conducts quantitative and mid-to-long term analysis. The Department also monitors indicators of special importance on a daily basis, and collect market participants' views on fluctuation factors. The Financial System and Bank Examination Department monitors US dollar funding and risk management framework of financial institutions.

The inputs from the Financial System and Bank Examination Department and the Financial Markets Department are incorporated into the BOJ's Financial System Report and published semi-annually.

The BOJ also conducts onsite and offsite monitoring on financial institutions, together with monitoring on the foreign currency funding structure of financial institutions.

Policy tools in times of stress

The BOJ has U.S. Dollar Funds-Supplying Operations against Pooled Collateral. This serves as an important liquidity backstop to ease strains in US dollar funding markets. In conducting the U.S. Dollar Funds-Supplying Operations, much importance is placed on information gained from monitoring of the US dollar liquidity indicators, and information on individual institutions' financing obtained from both the Financial Markets Department and Financial System and Bank Examination Department.

In July 2016, when uncertainties surrounding overseas economies increased and volatile developments continued in the global financial markets, the BOJ decided upon the following measures to ensure smooth funding in foreign currencies by Japanese firms and financial institutions. The BOJ increased the size of the Bank's lending program to support growth in U.S. dollars (the Special Rules for the U.S. Dollar Lending Arrangement to Enhance the Fund-Provisioning Measure to Support Strengthening the Foundations for Economic Growth Conducted through the Loan Support Program) from 12 billion US dollar to 24 billion US dollar. Moreover, the Bank also established a new facility for lending securities to be pledged as collateral for the U.S. dollar Funds-Supplying Operations.

Korea

Landscape of US dollar funding

In Korea's dollar funding market (including KRW/USD swap market), banks are the main lenders, while non-bank financial institutions and non-financial corporations are borrowers. For the swap market, foreign bank branches and non-residents are the main suppliers. They are affected by incentives for arbitrage trading and international financial market conditions, while foreign bank branches are also partly affected by changes in FX macro-prudential policies like the limits on FX derivatives positions. Meanwhile, the funding for US dollar is carried out mostly through bank borrowing and foreign currency-denominated securities issued by banks and non-financial corporations.

For NBFIs, they raise dollar funding for their investments in foreign currency-denominated securities mainly through the FX and currency swap markets. Their demand for US dollars is mainly affected by yields on their overseas investment relative to those on domestic investment, taking into account FX hedging costs. In particular, Insurers and other institutional investors have relatively high exposure to US dollar liquidity, as the duration of their overseas bond holdings is long while their swap maturity is relatively short.

For NFCs, they mainly use bank FX loans and trade financing to meet their FX currency demand arising from export and import transactions. While NFCs borrow in US dollar funding markets, as they earn foreign currency income from the trade surplus, the volume of total funding in foreign currency is not so large. With the trade surplus widening from 2013 – 2017 in particular, some NFC acted as lenders to banks as they deposited some of their foreign currency surplus in banks.

Monitoring Framework

The BOK regularly monitors indicators of US dollar liquidity, including the FX LCR and the long-term FX loan to long-term foreign currency borrowing ratio.
A regulatory standard is set for the FX LCR, and penalties are imposed in the case of violations. Any anomaly in the monitoring results is additionally checked through off-site monitoring. Additional checks often take place through on-site monitoring.

In accordance with its financial stability mandate, the BOK considers foreign currency liquidity to be an indicator of FX sector soundness, and uses it as reference for examination. Concerning dollar liquidity conditions act as an early warning system swiftly identifying conditions in financial institutions. The BOK carries out monitoring to allow swift policy responses in the event of a crisis.

Policy tools in times of stress

In the early stage of market unrest, the BOK enhances monitoring of exchange rates and FX funding markets while focusing the efforts on containing the spread of market anxiety. The BOK pays close attention to various quantitative and qualitative variables including major financial and FX market indicators such as stock prices, exchange rates and interest

rates; inflow and outflow of foreign portfolio investments; and FX funding and borrowing conditions in the private sector.

In times of heightened volatility and increased strains in the financial market, the BOK uses various policy tools. For instance, in order to curb herd behaviour in the foreign exchange market, the BOK strengthened communications with the market participants, while continuing to employ efficient stabilization measures. To ensure the timely provision of FX liquidity when necessary, the BOK secures liquidity from foreign exchange reserves and explores ways to raise additional liquidity through cooperation with other major central banks including the US Fed. The BOK also strives to make sure FX financing and operation by financial institutions are carried out smoothly, in cooperation with the government, by flexibly adjusting FX macroprudential measures such as the ceilings on FX derivatives positions, the FX macroprudential stability levy, and the FX Liquidity coverage ratio according to the market conditions

Malaysia

Landscape of US dollar funding

Banks are major participants in driving two-way active flows of foreign currency (FC) funds in Malaysia. While some of FC funds is sourced from the conversion of export proceeds of the banks' client exporters, banks also source their FC funds from related entities. Locally incorporated foreign banks in Malaysia typically source FC funds from their overseas parent banks while the domestic banking group primarily borrow from and lend to their regional branches to manage their daily foreign currency liquidity requirement.

Locally incorporated foreign banks in Malaysia leverage on the stronger credit rating of their global parent banks to source cheaper and longer-term foreign currency funding from abroad. Such funds are then utilised primarily in three ways: (i) Manage any immediate liquidity mismatches in the foreign currency balance sheet; (ii) Extend foreign currency lending in the domestic interbank market; and/or (iii) Pursue short-term ringgit investments in highly liquid and low credit risk assets such as placements with Bank Negara Malaysia or holdings of Malaysian Government Securities (MGS).

Domestic banking groups with regional operations typically adopt centralised liquidity management in order to optimise funding cost advantages across various overseas operations within the group, with external borrowings broadly matched with external assets. More specifically, excess liquidity from overseas branches and subsidiaries, as well as medium to long-term funding raised in international wholesale and capital markets, are pooled at the head office in Malaysia, and strategically channelled back to related offices.

NFCs, especially multinational corporations (MNCs), are another major borrowers of US dollar funding. MNCs account for almost half of corporate external debt, of which three-quarter of such debt is in the form of stable intercompany loans between parent/affiliate companies overseas and their subsidiaries/affiliates operating in Malaysia. These loans are generally on flexible or no contractual fixed repayment schedules and zero or very low interest rates that are well below the prevailing market interest rates.

Monitoring Framework

For Malaysia, the monitoring of US dollar liquidity is within the banks' liquidity management practices governed by central bank's prudential regulatory framework. Under this framework, banks are required to manage its liquidity, both ringgit and foreign currencies, by ensuring sufficient high-quality liquid assets are held to withstand an acute liquidity stress scenario at both the entity and consolidated level. The requirement also incentivises banking institutions to fund their banking activities with sufficient stable funding on an ongoing basis. The prudential framework is regularly reviewed and updated to adapt to changing market conditions and taking into account developments in international standards.

As for US dollar debt issuers, the central bank monitors overall FX hedging activities by resident non-bank corporate, including their US dollar-denominated debts, through an established reporting system, Ringgit Operations Monitoring System (ROMS). Resident corporations issuing foreign-currency denominated bonds in domestic and international capital markets are primarily from the oil and gas and services sector. Generally, their FC liabilities will be closely matched by their FC revenue streams from overseas business operations, providing a natural hedge for these corporate borrowers.

Policy tools in times of stress

One of the objectives of central bank's financial market operations is to ensure sufficient liquidity to support the orderly functioning of the domestic financial market via the effective use of international reserves and a wide range of liquidity instruments. In its operations, the central bank may undertake transactions via FX spot, FX swap, foreign currency deposit and issuance of foreign currency Bank Negara Interbank Bills (US dollar-denominated) to intermediate US dollar liquidity in the domestic financial market.

Onshore USD liquidity remains largely susceptible to external factors of which previous episodes of pressure include Global Financial Crisis (2008-09), Taper Tantrum (2013) and the unexpected outcome of the US presidential election (end-2016). USD funding cost as reflected by the US dollar implied yield spread above the London Interbank Offered Rate (Libor), remained elevated throughout these periods. Nevertheless, throughout these periods, the financial market remained orderly and intermediation activities remained effective as the Bank stood ready to intermediate liquidity where necessary.

New Zealand

Landscape of US dollar funding

US dollar funding in New Zealand takes place mainly via bank debt, with the exception of a few large corporates. Banks are therefore the main sector with access to US dollar funding markets, but they lend mainly in NZD and hedge the currency risk. Their US dollar exposure is therefore predominantly funding or refinancing risk. New Zealand banks primarily use US dollar funding to diversify their funding sources, also to access cheaper funding if available.

The RBNZ is not aware of material US dollar borrowing or lending by non-bank financial institutions.

Though the RBNZ does not collect comprehensive data on US dollar funding by corporates, market intelligence suggests five to ten of the largest NZ corporates raise funding in US corporate bond markets. Large corporates that are active in US dollar funding markets are doing so due to trade invoiced in US dollar. This funding would usually be hedged, or in some cases may have a natural hedge.

Monitoring Framework

The RBNZ monitors implied rates and spreads across multiple markets, and keeps close communication with key market participants, particularly those in cash funding markets. The RBNZ monitors short term FX implied NZD interest rates, which are affected by changes in the NZD exchange rate. The rationale behind this monitoring framework relates to how the RBNZ implements monetary policy. Due to the domestic banks' reliance on FX forwards/swaps for their own liquidity management, pressures in the FX forward/swap market can transfer through into domestic money market rates and tom/next rates. Meanwhile, the RBNZ is in the early stage of developing analytical tools to help differentiate between US dollar and NZD pressures in the forwards market, with the objective to determine to what extent pressures in US dollar forward markets flow through to NZD forward markets.

As part of our broader monitoring of bank funding conditions, the RBNZ also monitors US dollar corporate and financial credit spreads, swap rates and cross currency basis swap spreads in order to proxy the cost of new US dollar funding.

As for foreign debt issuance, the New Zealand banking system currently has around $100 billion NZD of foreign currency-denominated debt liabilities, primarily in Euro and US dollar. Banks hedge around 95% of this foreign exchange borrowing, with most of the remaining 5% naturally hedged with foreign currency assets. Foreign exchange risks is therefore largely eliminated by these hedges, though some risks remain such as counterparties failing, demand for collateral if the NZD appreciates significantly, and not being able to roll over funding in times of financial market stress.

Policy tools in times of stress

The RBNZ doesn't currently conduct market operations for the purpose of managing US dollar liquidity in the domestic financial system. Although the RBNZ regularly transacts NZD/USD FX swaps with its domestic market counterparties, these are a tool to specifically target NZD liquidity to ensure that short-term interest rates are consistent with the Official Cash Rate.

Nevertheless, the amount of USD liquidity in the domestic system can impact NZD interest rates implied by FX swap markets, and so can affect domestic financial conditions and the transmission of monetary policy. To support its monetary policy objectives, and to enhance market functioning, the RBNZ has recently been exploring options for broadening its toolkit of open market operations to include USD Liquidity Facilities, if warranted by market conditions. USD Facilities would specifically target the supply of US dollars in the domestic financial system, and would be supported by a temporary bilateral swap line that the RBNZ has in place with the Federal Reserve Bank of New York. At this stage, the USD Facilities have not been published, and the underlying temporary swap line has not been tapped. This reflects prevailing market conditions and the limited demand for USD liquidity from domestic market counterparties.

Philippines

Landscape of US dollar funding

Philippine banks account for around one-fourth of the total external debt outstanding in Philippines as of March 2020. Banks borrow in US dollars primarily to fund US dollar-denominated investments and US dollar-denominated loans. In addition, some banks have increasingly taken advantage of the lower cost of dollar borrowings, particularly since the increase in domestic interest rates in 2018. These banks borrow in US dollar to fund peso-denominated assets, engage in repurchase agreements using US dollar-denominated securities and swap the proceeds into PHP to lend or invest.

As financial intermediaries, banks naturally lend in US dollars to meet the funding needs of on- and offshore clients. They likewise invest in dollar assets in the foreign currency deposit unit (FCDU) book to obtain interest income. The preferential treatment accorded to interest income from the FCDU under the existing tax regime has made such investments particularly lucrative for banks.

The central bank has no available data regarding motivations and US dollar funding needs of NBFIs and NFCs.

Monitoring Framework

The BSP closely monitors the FX market. FX dynamics is important as the central bank assesses how funds flow from one geography to the other, or from one asset class to another, depending on the global demand for US dollar. In particular, the BSP gathers banks' views and assessment of their expected US dollar/PHP range and flows for the day, monitors the swaps market (rates, volume, tenors dealt), along with onshore and offshore NDF transactions, to have a better picture of the dynamics that affect the US dollar/PHP market. These information, among others, form part of the formulation of the bank's daily strategy in line with the goal of tempering sharp fluctuations in the FX market. The FX desk also watches the overbought/oversold positions of banks to gauge market pressures and speculative tendencies of banks. Interest rate differentials and the cost of dollar for potential carry strategies are also looked at.

The BSP also monitors US dollar liquidity (and FCY liquidity in general) in the context of its potential implications to financial stability. Such analysis forms part of the market surveillance as the central bank examines contagion, concentration, leverage, and liquidity risks. The approach usually starts by looking at the direct and indirect bilateral exposures, which traces possible contagion channels. In the case of the US, the motivation draws from the fact that the Philippines heavily rely on US in terms of trade and investment (both hard and portfolio). Given that the Philippines is a small open economy, the BSP looks at external developments and how changes in prices affects trade dynamics. This is important because exports and imports (especially non-substitutable imports), play a big role in keeping the local economy going. Also, not only that bulk of remittances actually comes from the US, large part of remittances from elsewhere in the world has to go through correspondent banks that are based in the US – which all the more increases the country's US dollar exposures.

Delving into the particulars of what data is available in terms of US dollar debt securities, the BSP has access to the cross-border flows data of the Bank for International Settlements (BIS). From the BIS International Debt Securities (IDS) database, the BSP carves out information on US dollar-denominated bond flows (excluding negotiable loans) disaggregated by issuer and remaining maturity of the debt securities. Meanwhile, the BIS data on International Banking Statistics (IBS) provide the cross-border claims of BIS reporting countries, but this has limited breakdown on US dollar-denominated claims and liabilities. The IBS has also no data on sector.

In terms of leverage, the BSP examines cross-border claims and liabilities of Philippine banks, corporates, and government to identify possible concentration of exposures. Should headwinds upset investor behaviour and/or price fluctuations arise, the BSP assesses the full impact, including how these developments can affect debt servicing capacity of said sectors.

The BSP requires banks to submit two reports specifically aimed at capturing the foreign currency positions of banks, namely, the (1) Report on Cross-Border Financial Positions of Banks (RCBP) and (2) Consolidated Foreign Exchange Position Report (CFXPR).

The RCBP is submitted to the BSP by universal and commercial banks and their subsidiary thrift banks on a quarterly basis. It is designed to measure and monitor the reporting banks' cross-border financial claims from and liabilities to non-residents and multilateral agencies, on a per-country, sector and currency basis. The report provides the BSP with perspective on the gross and net cross-border positions of supervised entities and the industry as a whole.

Meanwhile, the CFXPR is submitted to the BSP on a daily basis by universal and commercial banks and on a monthly basis by thrift banks. The report provides the BSP with perspective on the gross and net positions of supervised entities in each foreign currency, including the US dollar. The report also allows the BSP to monitor compliance with the prescribed net foreign exchange position limit. Under existing regulations, a bank's consolidated net open foreign exchange position (either overbought or oversold) shall not exceed the lower of 20 percent of its unimpaired capital or USD50 million.

Regarding hedging activities, the BSP is only able to observe those that are supervised by the BSP. FX risk mitigation comes in the form of match funding through the lending. While it has been observed that domestic banks do not tend to hedge individual US dollar-denominated borrowings, the BSP-prescribed net open position limit as well as internal limits set by some banks (e.g., limit on the notional amount of cross currency swap positions) provide the impetus for asset and liability managers to close positions in line with prudent risk management.

The BSP monitors the industry concentration of loans extended to the real economy, including those provided by the FCDU of banks, the deposits of which are mainly US dollar denominated and provided by resident individuals and private corporate sources. As of December 2019, outstanding loans granted by FCDUs of banks stood at $18 billion. The bulk of these loans went to the following resident industries: power generation companies (17.8 percent); merchandise and service exporters (14 percent); public utility

firms (8.1 percent); towing, tanker, trucking, forwarding, personal and other industries (5.9 percent); and producers/manufacturers, including oil companies (5.2 percent).

Policy tools in times of stress

In managing US dollar liquidity, as part of its foreign exchange policy, during occasions of sharp fluctuations in the FX market, the BSP participates in the market to maintain order and stability. When warranted, the BSP also stands ready to provide some liquidity and ensures that legitimate demands for foreign currency are met. In particular, the BSP also has liquidity enhancing and managing tools such as the US dollar repo facility, the enhanced guidelines on Currency Risk Protection Program (CRPP), exporters' dollar and yen rediscounting facilities (EDYRF), and FX swap arrangements.

The Currency Risk Protection Program (CRPP) is a non-deliverable forward (NDF) hedging facility offered by the BSP through universal/commercial banks for clients who are seeking to hedge their borrowings denominated in foreign currency. Under this facility, parties agree that, on maturity of the forward contract, only the net difference between the contracted forward rate and the spot rate shall be settled in pesos.

Exporters dollar and Yen Rediscount Facility (EDYRF) is a rediscounting facility that allows a financial institution to borrow money from the BSP using promissory notes and other loan papers of its borrowers as collateral. The EDYRF interest rates are based on the 90-day London Inter-Bank Offered Rate for the last working day of the immediately preceding month plus 200 basis points plus the applicable term premia for loan maturities exceeding 90 days pursuant to Circular No. 807 dated 15 August 2013.

In terms of FX swap arrangements, currently the Philippines has three existing swap arrangements: (1) ASEAN Swap Arrangement (ASA); (2) Chiang Mai Initiative Multilateralization (CMIM); and (3) Bilateral Swap Arrangement (BSA) between the BSP and Bank of Japan (BOJ). These swap arrangements aim to address potential and/or actual BOP and short-term liquidity difficulties as well as to promote sustained partnership in the region.

During the 2008 global financial crisis, the BSP has seen temporary tightness as banks bought the US dollar amid risk aversion, leading to the peso's depreciation and the drop in FX swap yields. The BSP's market participation alleviated some of the pressure on the currency. In October of 2008, the BSP also opened a US dollar repurchase agreement (Repo) facility to support the orderly functioning of the financial system as an effective channel of monetary policy. The US dollar Repo facility was expected to augment dollar liquidity in the market to help address any temporary market tightness at that time. In turn, this will help ensure the ready availability of credit for imports and other qualified funding requirements. For this facility, the Monetary Board approved the use of foreign-denominated sovereign debt securities (ROP) as collateral for loans availed.

During the coronavirus pandemic, BSP has also taken operational relief measures for FX transactions to facilitate the access to FX resources. In particular, the BSP relaxed the documentary and reporting rules for foreign exchange transactions such as, allowing electronic submissions of documents, use of digital signatures, and relaxation of deadlines.

Singapore

Landscape of US dollar funding

As a major financial and business hub, Singapore plays an important role in intermediating demand and supply of funding for its economy and the region. Domestically, the banking system supports the FX hedging and funding needs among corporates and investors across various currencies arising from the economy's reliance on trade and its positive savings-investment gap. Externally, banks in Singapore intermediate credit from advanced economies to Asia, where a significant portion of such lending is extended to borrowers in Emerging Asia and denominated mainly in USD. The banking system also undergirds trade activities in the region, by providing trade financing, which is also mostly denominated in USD.

Local banks obtain their USD funding from customer deposits, debt securities issued (e.g. medium-term notes and commercial paper) and the interbank market. More broadly, banks also access the USD swap market for the purposes of USD liquidity management and supporting their treasury activities. The bulk of the participants in the swap market are banks.

USD funds intermediated by local banks are typically used to fund loans to non-bank customers, lending in the interbank market, as well as investment in securities including liquid assets.

Monitoring Framework

Singapore is a major US dollar funding centre for the region. As part of market surveillance, MAS monitors conditions in US dollar funding markets closely, given the potential for spill-overs to domestic money market rates and the banking system. MAS monitors two mutually reinforcing types of liquidity risks, namely market liquidity risks and funding liquidity risks.

From the market liquidity risk perspective, MAS tracks an array of price indicators, ranging from global US dollar funding rates, such as cross-currency basis swap and US money market rates, and regional FX swap-implied US dollar rates to domestic US dollar funding rates, such as broker US dollar depo and USDSGD FX-swap implied rates. MAS also tracks non-price indicators included usage of central bank swap lines with the Fed, and qualitative feedback from primary dealers, and commentary/analyst reports on US funding markets.

MAS is also a participant in the USDSGD FX swap market through its money market operation, and will take into account the spill-overs to the banking system as well as domestic money market rates in deciding the amount of USDSGD FX swap to transact with the market.

As a regulator, MAS monitors the US dollar funding sources and claims of the banking system from a systemic stability perspective. For the major banks, MAS engages them bilaterally on a regular basis to discuss their approaches and strategies in managing US

dollar liquidity, e.g. raising of US dollar liquidity via medium term notes and commercial papers issuances, their foreign currency liquidity ratios and stress-testing parameters.

To assess risks within each bank, supervisory teams in MAS review banks' funding strategies and profiles as captured in indicators such as sources and uses of funds, loan to deposit ratios, currency mismatches, liquidity positions projected under stress scenarios, as well as their risk management processes including risk limits setting and stress testing.

For the financial system more broadly, MAS monitors the FX market risks exposures of the FIs and ensure that the FIs take appropriate risk mitigating measures. In the corporate space, MAS conducts qualitative survey of hedging by local corporate issuers on a periodic basis for the purpose of monitoring risks to the financial system, MAS does not regulate the corporate sector's borrowing or hedging policies.

The bulk of the USD debt issuance in Singapore are issued by FIs, accounting for about 55% of total USD-denominated bonds in the past 5 years. Aside from FIs, Singapore firms with an international or regional focus, or those involved in the trading and production of goods that are internationally priced in USD, would need USD to fund their business activities. Among the non-financial corporates, firms in the Oil & Gas industry are significant USD issuers, accounting for about 25% of total local USD-denominated bonds issuance over the same period. The Real Estate/Property sector are also active USD bond issuers, comprising some 16% of local USD-denominated bonds. This reflects their shift towards a more international orientation, as evidenced from the REITs in their diversification of their property portfolios in recent years.

The pricing indicators in the monitoring framework effectively highlighted the US funding tightness in March 2020. The monitoring of analyst reports was particularly useful as some US money market analysts had started flagged out potential impact of COVID-19 pandemic on the US funding market prior to the manifestation of the USD funding stress.

Policy tools in times of stress

MAS requires banks to have proper planning of their liquidity needs to ensure that they have adequate sources of funds to fulfil payment obligations at all times, even under adverse conditions. MAS also encourage banks to strengthen their US dollar funding profiles by diversifying sources of funding, for instance, to seek funding from investors in broader geography and via a diverse set of funding instruments and to avoid over-reliance on the swap markets for funding.

From the market perspective, MAS participates in the USDSGD FX swap market as part of our daily money market operations with 13 primary dealers. The amount of USDSGD FX swaps to be transacted will be broadcast to the primary dealers in the morning. Bids from the primary dealers are collated and the auction results (based on multiple price auction) are transmitted via Reuters FXT and voice. The transactions are settled on a T+0 basis.

In deciding the amount of USDSGD FX swap to transact with the market, MAS takes into account the potential spill-over from USD funding conditions to the banking system as

well as domestic money market rates. For instance, when the USDSGD FX swap market comes under significant volatility due to relatively stronger demand for USD funding vis-à-vis SGD funding, MAS may increase the amount of sell-buy USDSGD FX swaps to inject USD liquidity into the banking system to moderate the impact on the FX swap-implied SGD funding cost. For example, MAS had stepped up the amount of USD provision through this channel in March 2020 to mitigate the impact arising from the heightened volatility in international financial markets during the COVID-19 pandemic.

During the Global Financial Crisis, MAS established a US$30 billion temporary reciprocal currency swap arrangement with the US Federal Reserve. While MAS did not have to draw on the facility, the swap line, and more broadly the Fed's network of USD swap arrangements, had helped to curb contagion concerns and alleviated funding strains in the global USD funding market. The facility was allowed to lapse in 2010 after strains in USD funding market had eased.

In the current COVID-19 pandemic, MAS has established a US$60 billion currency swap arrangement with the Federal Reserve on 19 March 2020. This is part of the extension of the swap arrangements to nine additional central banks, including MAS, from the standing arrangements among the five major central banks with the Federal Reserve. On the back of the swap arrangement with the Federal Reserve, MAS has set up a US$60 billion USD Facility that is available to all banks in Singapore. The USD Facility has helped to stabilise US dollar funding conditions in Singapore and enabled US dollar lending to businesses in Singapore and the region.

The USD Facility has attracted healthy interest from banks. A total of US$20.0 billion has been provided to banks, with US$7.48 billion outstanding as of 25 June 2020. Since the launch of the facility, USD funding cost in general has fallen towards the minimum levels as prescribed by the Fed at the auctions. This has helped to ensure the smooth transmission of Fed's monetary policy to key USD funding centres, including Singapore, and contribute to global efforts by central banks to maintain stability and normal functioning of financial markets.

Thailand

Landscape of US dollar funding

Foreign banks are major participants in foreign currency borrowing in Thailand. Domestic Thai banks also borrow abroad to diversify their funding and search for lower cost when opportunities arise. Banks act as USD liquidity providers mainly by funding in USD and lending the proceeds in FX swap market or through foreign currency loans.

NBFIs such as foreign investment funds (FIFs), pension funds and insurance companies borrow USD and invest abroad to enhance their returns and diversify portfolios. The popularity of FIFs becomes greater given rising search-for-yield behavior under low yield environment. In particular, fixed-term FIFs make up almost half of FIFs invested abroad. Capital outflows from fixed-term FIFs are usually fully hedged through short-term FX swaps as investors only look for fixed income exposure, which Thai retail investors are more familiar with. Such flows are mostly invested in short-term instruments in emerging countries such as China and the Middle East. Pension funds and insurance companies are also regular borrowers of USD. They however are largely involved in longer-term hedges (e.g. CCS) for their longer investment horizon.

For NFCs, multinational corporations often engage in borrowing from their foreign headquarters. Domestic corporations also borrow abroad for diversification and cheaper funding. Corporates who fund in USD usually hedge their exposure in FX swap markets in the tenors which correspond with the terms of loans.

Meanwhile, the BOT is also the major provider of USD liquidity to the Thai market through its swap operations. As excess THB liquidity created by the FX intervention (purchase of USD) needs to be fully sterilized to ensure interest rate stability, FX swap operations is one of the main tools besides the issuance of BOT bonds and bilateral repurchase that are used for such purpose. The proportion allocated to FX swap is determined by its effectiveness in transmitting monetary policy, financial stability risk (market concentration and gapping risk), USD funding cost relative to the region, and alternative sterilization costs. BOTs operations can be adjusted according to the market environment.

Monitoring Framework

USD liquidity in Thai market is reflected mainly in the context of USD funding through FX swaps, which plays an important role in determining not only the hedging and funding cost for real sectors and portfolio flows, but also the THB swap-implied interest rate which is used as an underlying rate for IRS floating leg. As a result, the BOT pays attention to liquidity conditions in the USD funding market, and continuously monitors relevant market-indicators including USD funding costs relative to the neighbors, cross currency basis swaps, trading volume at each maturity, and the concentration of players, to get a better picture of risk exposures and assessment of USD liquidity conditions.

Apart from monitoring the current situation, the BOT is aware of the importance of forward looking indicators. As a result, the BOT conducts market survey with market

participants to obtain useful information such as potential flows and other qualitative data.

While banks have a relatively small size of foreign funding (less than 10 percent of total assets), they could still be exposed to risks during times of liquidity shortage. As a result, the BOT continuously monitors relevant indicators, ranging from US Dollar funding costs and sources, currency mismatch as well as changes in funding composition by banks, to get a better picture of risk exposures and early warning of US Dollar liquidity risk. Furthermore, banks which involve in foreign exchange transactions are required to have an appropriate exchange rate risk management. Apart from obtaining an internal system to monitor the exchange rate risk, banks must not exceed the limits on foreign exchange positions both for individual currency positions and aggregate position. In addition, commercial banks are required to maintain adequate capital for market risks that are related to exchange rate, for instance, interest rate risk and liquidity risk.

The FX exposure of USD debt issued by local non-bank corporates is also monitored periodically. Data reveals that some portions of FX exposure of corporate sector, especially those of large-sized companies, are naturally hedged due to them being net exporters or net foreign assets holders. As far as hedging ratio is concerned, companies with high hedge ratio (> 50% hedged), combined with those with natural hedge, account for around 50-60% of total foreign currency borrowing outstanding (USD and other foreign currencies), reflecting a fair degree of efficiency in FX risk management. Some portions of USD long-term loans are unhedged as the debt repayment is scheduled in relatively long horizons.

Policy tools in times of stress

With high level of international reserve accumulation over the recent years, FX swaps operations can also be used to ease USD liquidity problem in times of stress, for example during the recent pandemic crisis. Regional collaboration such as the ASEAN Swap Arrangements (ASA) and Chiang Mai Initiative Multilateralization (CMIM) could also serve as second line of defense by providing an additional buffer to counter possible market turbulence, as well as potential contagion risks.

References

Berger-Thomson, L, Chapman, B (2017): "Foreign currency exposure and hedging in Australia", *RBA Bulletin*, December.

Bank of Korea (2019): *Financial Stability Report 2018*, June.

Caballero, R J, Simsek, A (2020): "A model of fickle capital flows and retrenchment", *Journal of Political Economy*, vol 128(6), pp 2288-2328.

Committee on the Global Financial System and Markets Committee (2019): "Establishing viable capital markets", *CGFS Papers,* no 62, January.

Committee on the Global Financial System and Markets Committee (2020): "US dollar funding: an international perspective", *CGFS Papers*, no 69, June.

Ellul, A, Chotibhak, J, and Lundblad C T (2011): "Regulatory pressure and fire sales in the corporate bond market", *Journal of Financial Economics,* vol 101(3), pp 596-620.

Eren, E, Schrimpf, A, and Sushko, V (2020): "US dollar funding markets during the Covid-19 crisis-the international dimension", *BIS Bulletin*, no 15, May.

Goodhart, C (2008): "Liquidity risk management", *Banque de France Financial Stability Review*, no 11, February.

He, D, et al (2015): "Asynchronous monetary policies and international dollar credit", *HKIMR Working Paper*, no 19, September.

Hong Kong Monetary Authority (2012): "How do we monitor Hong Kong dollar fund flows", *HKMA Quarterly Bulletin*, December.

International Monetary Fund (2000): "Recovery from the Asian Crisis and the Role of the IMF", *IMF Staff Papers*, no 5, June.

Leung, D, et al (2017): "US dollar Bond Issuance by Mainland Property Developers", *Hong Kong Monetary Authority Research Memorandum,* no 9, July.

Reserve Bank of Australia (2008): *Statement on Monetary Policy–Nov: Box B*, November.

Reserve Bank of Australia (2020): *Statement on Monetary Policy–May: Box B*, May.