

SECTION 2

MACRO-FINANCIAL RISKS AND VULNERABILITIES ARISING FROM VOLATILE CAPITAL INFLOWS

A. Analysis of Volatile Capital Flows to Emerging Markets

(i) Distribution analysis of portfolio debt and equity flows

Tails matter for portfolio flows to EMs and EM Asia SOFIEs. Portfolio debt and equity flows are volatile and very sensitive to risk-on, risk-off swings in global markets (**Table 2.1**). Earlier financial crises have highlighted the need to understand how a skewed fat-tailed distribution of likely outcomes can track systemic risks. Co-movements between capital flows and other macro-financial variables are time-varying, increasing during periods of tightening global financial conditions. A summary of an empirical analysis carried out with portfolio flow data from EMs and EM Asia SOFIEs indicate:

- Capital flows to EMs, encompassing both debt and equity flows, exhibit statistical behaviour consistent with a fat-tailed non-normal distribution.
- Both debt and equity portfolio flow to EMs exhibit strong elements of time-varying tail dependence, having fatter tails during times of stress.
- When global financial conditions deteriorate, the near-term risk of heavy outflows increases.
- A global shock that leads to tighter US dollar funding conditions tends to result in fatter tails of the predicted distribution of capital flows.
- Furthermore, the relationship between different types of portfolio flows (debt and equity) and the exchange rate is also amplified during such turbulent times.

Table 2.1: Descriptive Statistics of Portfolio Flows

Variable	Mean (US\$ mn)	Variance	Kurtosis	Skewness
Brazil	1,119.8	16.7	7.8	-0.2
China	8,893.6	192.5	4.4	0.1
India	1,001.3	9.7	7.4	-0.7
Indonesia	405.2	1.9	8.6	-1.3
Korea	1,436.5	12.6	3.0	0.1
Malaysia	380.4	5.4	4.2	0.1
Mexico	948.8	8.6	3.6	0.4
Philippines	126.9	0.8	3.7	0.6
South Africa	291.2	1.4	4.8	-0.5
Thailand	600.4	3.2	4.3	0.6
Turkey	618.1	4.1	4.3	0.5

Notes: Mean values of portfolio flows are in US\$ millions. Values refer to net non-resident inflows of EM equities and bonds.

Source: SEACEN staff calculations using data from IIF Monthly EM Portfolio Database (accessed in October 2022).

The distribution of high-frequency non-resident portfolio inflows to EMs and EM Asia SOFIEs is non-normal, adding complexity to policies to deal with capital flows. The in-depth analysis of weekly net capital inflows provides the following insights:

- The unconditional distributions of weekly non-resident equity and debt inflows to all selected EMs and EM Asia SOFIEs have fat tails. The shape of these tails, however, is heterogeneous across countries and types of flows.
- Debt flows to Thailand show positive skewness, i.e., long right tails suggest the higher probability of capital flow surges during boom periods.
- The unconditional distribution for equity flows to Korea and Thailand as well as for debt flows to India exhibit negative skewness, i.e., long left tails imply a higher probability of very large capital outflows.
- Higher moments of the distribution, notably kurtosis or the measure of “peakedness” or “flatness” of the distribution is prevalent across EM and EM Asia SOFIEs, with significantly positive values indicating heavy tails, suggesting a high probability of outflows and surges relative to a normal distribution.

- The heterogeneity of portfolio flows distributions warrants a differentiated policy mix across countries.

Overall, risks to portfolio flows show more asymmetry on the downside and react more to changes in global risk aversion compared to normal times. The shape of the distribution for capital flows can change dramatically during times of high financial stress such as during the onset of the COVID-19 pandemic in March to April 2020, as shown in **Figure 1.5**. Moreover, the distribution of portfolio flows in EM economies during high VIX episodes indicates several key features.

- The entire distribution, and not just the central tendency, changes over time. Policy responses will have to focus on shifting the entire distribution to the right.
- Times of high uncertainty and financial stress are associated with fat left-tails, indicating an elevated probability of outflows.
- In times of stability, however, the conditional distribution is more like a normal distribution which argues for symmetric policy responses to inflows and outflows.
- The upper tails of the conditional probability distributions appear to be more stable than the lower tails.
- The left tail of the distribution exhibits much more variation. This asymmetry in the changing nature of conditional distributions of future portfolio flows conditional on a variable like the VIX suggests that downside risks are much more variable and dramatic during stress periods.

The sensitivity of portfolio capital flows to global financial conditions has increased and become more time-varying. Conditional portfolio distributions during episodes of high financial stress provide evidence that shocks such as the drying up of global liquidity are more likely to be accompanied by sudden stops in portfolio capital flows to EMs (**Figure 1.5**). High frequency data for portfolio debt and equity flows also indicate that during risk-off episodes, portfolio debt and equity outflows become more highly correlated for EM and EM Asia SOFIEs. Such high correlation between debt and equity portfolio flows weakens the portfolio diversification benefits for cross-border investors holding different investment classes. The strong positive co-movement between these two types of flows in times of major risk-off periods exacerbates the problem of outflows for EMs.

Policy responses to sudden and synchronised reversals of non-resident debt and equity flows, as in March 2020, are usually multifaceted. The combination of a negative demand shock, sharp currency depreciation and a flight from domestic assets confronts central banks with a classic dilemma. How to ease monetary policy without adding to downward pressure on the exchange rate? During the onset of the COVID-19 pandemic in 2020, many emerging market central banks combined cutting policy rates with foreign exchange intervention and/or easing macroprudential measures (Nier and Olafsson, 2020). Second, central banks provided extra liquidity by extending existing facilities or setting up new ones and by broadening eligible collateral for repo operations (Hofmann et al., 2020). Third, and this represented an innovation, many central banks took advantage of deep local currency government bond markets to implement measures of quantitative easing. By buying local currency bonds while keeping the policy rate well above zero (to limit currency depreciation), central banks helped to reverse the sharp initial falls in bond prices. By encouraging foreign investors to return, such actions may also have supported the exchange rate (CGD-IADB, 2020; Forni and Turner, 2021; and Arslan et al. 2020).

(ii) Intra-regional connectedness

Capital flow interconnections across EM regions tend to rise during booms and busts.⁹ The degree of connectedness at the lower and upper tails of the distribution exceeds that of the median value. The wider trading of EM assets and underlying currencies as well as the greater role played by passive benchmark investing have led investors to increasingly allocate investments to an EM region as a group, such as EM Asia. The growth of dedicated regional funds has reinforced this. While ‘capital flows-at-risk’ analysis mainly focuses on sudden stops and the lower tail of the capital flow distribution, the methodology in this study also assesses the right tail of the distribution during inflow bonanzas, which can also be disruptive in creating credit and asset bubbles. Policy responses to address each extreme distribution may differ. Inflow booms, for instance, may argue for stronger macroprudential policies and accumulation of FX reserves to build resilience. But large outflows may require monetary easing and selective market support to minimise the domestic effects of large external shocks. In addition, and in response to growing interconnectedness of EM regions, regional financial surveillance and safety nets through regional cooperation is vital in enhancing policy responses to common external drivers of capital flow reversals and surges.

⁹ This finding is discussed in Goswami et al. (2022).

(iii) Capital flows and the role of the foreign exchange rate in Emerging Markets

The channels of transmission of global financial shocks to EMs have a common thread: they tend to reduce GDP. A shift to risk-off mode in global markets leads simultaneously to a sharp drop in the currency against the US dollar; tighter domestic financial conditions; and weaker balance sheets of non-financial companies and local banks. Abundant dollar liquidity and lower interest rates reduce tail risks in the bank's loan book and relax its Value-at-Risk (VaR) constraint. The supply of bank credit expands, often through increased leverage and greater tolerance of currency mismatches (including indirectly via their customers). This is reversed when global markets go into risk-off mode. The currency falls against the dollar, capital inflows decline with non-residents selling local debt securities, and local banks find it harder to borrow dollars in wholesale markets. The balance sheets of companies with unhedged dollar liabilities deteriorate, with a significant contractionary impact on business investment. The currency falls against the dollar, capital inflows decline with non-residents selling local debt securities and local banks find it harder to borrow dollars in wholesale markets.

Several financial channels amplify the negative effects of a currency depreciation against the dollar.

- The first arises from currency mismatches. The substantial rise in US dollar debts of EM corporates without commensurate dollar earnings has made the balance sheets of many EM companies vulnerable to dollar appreciation. In addition, many companies have borrowed dollars to finance investments in local financial markets: in consequence, corporate financial stress can be transmitted to local banks and markets.
- The second channel is that any shift from risk-on to risk-off in global markets will hamper the ability of banks to borrow dollars abroad to on-lend to local firms and households (Kalemli-Özcan, 2019). In addition, pricing in the foreign exchange swap markets used by banks which on-lend in local currency tends to turn against them when dollar markets go into risk-off mode.

- The third channel is related to the stronger linkages between the exchange rate and local currency bond markets in periods of financial stress. Foreign investors, doubly exposed if bond prices fall just when the currency depreciates, are more likely to flee. The widening of the domestic investor base in recent years, however, and the greater credibility of macroeconomic policies offer central banks and governments more policy options.

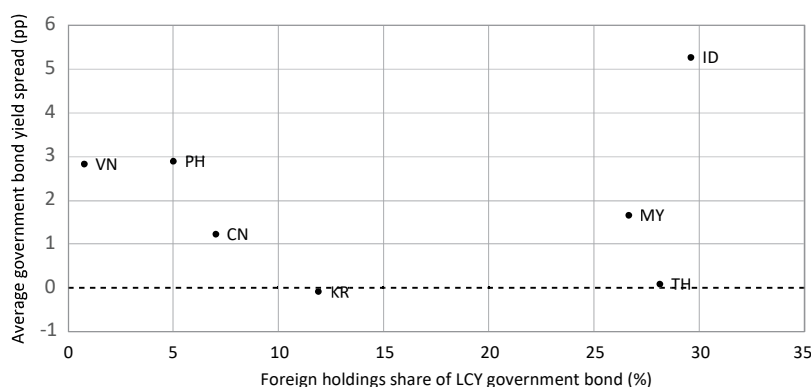
Our empirical analysis examined the joint responses of capital flows and exchange rates to a risk-off shock in global markets and show that an unexpected increase in the VIX leads to sharp and deep portfolio capital outflows (**Figure 1.5**). Although net inflows returned to zero within a month and a half, the cumulative outflows could be substantial. The impact on capital flows is short-lived, while the impact on the exchange rate is more persistent (in the case of Korea, Indonesia, and Thailand). The persistent nature of the exchange rate response is important from a policy perspective. It means that the exchange rate appears to be a shock amplifier for those sectors with significant foreign currency debts.

(iv) Local currency government bond markets and macro-financial vulnerabilities

The development of deep local currency bond markets with sizeable foreign exchange reserves has brought significant macro-financial benefits. Borrowing by issuing long-term local currency bonds has helped to ensure that the government's balance sheet improves when the currency depreciates. The net foreign currency position of most EMs has remained positive since the early-2000s. EM sovereign bond issuance in local currency has also had the added macro-financial advantage of avoiding the refinancing risks from short-term dollar borrowing from banks. This market, and its substantial domestic investor base, has added an important new instrument to the monetary policy toolkit of the central bank (World Bank, 2021). Better macroeconomic policies and the modernisation of local market infrastructure have attracted foreign investors as country risk premia have declined. Despite strong ups-and-downs related to changes in risk aversion in global financial markets, foreign holdings of EM Asia local currency bonds are likely to remain high (**Figure 1.6a**).

Local currency bond prices and the exchange rate, however, tend to decline together in periods of financial stress, amplifying pressures on unhedged foreign investors.¹⁰ Currency mismatches on the balance sheets of unhedged foreign lenders – a phenomenon dubbed “original sin redux” by Carstens and Shin (2019) – can create a destabilising feedback loop. Foreign investor flight from the local bond market adds to downward pressure on the exchange rate leading to further non-resident outflows. When returns on LCY bonds are more correlated with those of other risk assets, which happens during risk-off periods, local currency bonds become less attractive as a means of diversifying international portfolios (**Figure 2.1**). Central bank or government policies to support bond markets under stress, notably by backing increased holdings by local banks and other investors, played a significant role after March 2020 in restoring foreign confidence in local bond markets.

Figure 2.1 Foreign Holdings of Emerging Asia Local Currency Bonds and Average Bond Yield Spreads



Notes: Y-axis refers to the average spread of 10-year government local currency bond yield and the US government bond yield from 2016 to 2020. X-axis refers to the average share of foreign holdings in the LCY government bonds as a percentage of the total from 2016 to 2020. CN = China, ID = Indonesia, KR = Korea, MY = Malaysia, PH = Philippines, TH = Thailand, and VN = Vietnam.

Sources: SEACEN staff calculations using data from Refinitiv and Asian Bonds Online (July 2022).

¹⁰ This was especially evident during the “taper tantrum” in 2013 (Turner, 2014; and Hofmann et al., 2020).

Non-residents face challenges in hedging their foreign exchange exposures from EM local currency bonds, a significant contributor to tail risk as observed during the COVID-19 pandemic outflows. Investors, notably retail/real money and leveraged investors, typically only partially hedge FX risk during normal times when volatility-adjusted carry-trade returns are high. The expectation of EM FX appreciation often reinforces this calculation. But a sudden rise in volatility can quickly eliminate these prospective returns. Attempts by investors to hedge their portfolios during a market sell-off can be impeded by the shallowness of FX forward, swap and other hedging markets. In periods of financial stress, when the demand for US dollar rises, the terms of such hedges tend to turn against those investors which are short dollars. Sudden changes in pricing, or even the disappearance of foreign exchange hedging instruments for some currencies, can add further instability. One indication of such pressures is movement in the implicit spreads (the cross-currency basis) in foreign exchange swaps markets.¹¹

B. International Credit and Exchange Rate Risk

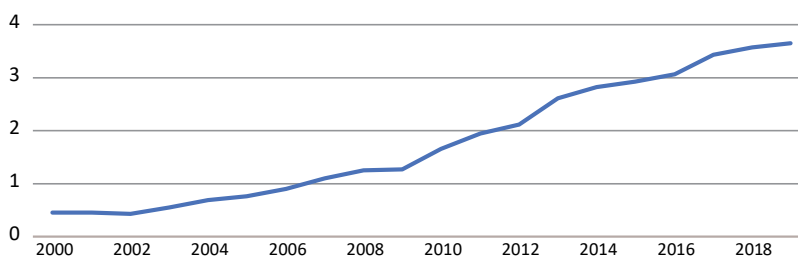
(i) International credit to the non-bank or non-financial sector

Much larger US dollar liabilities of non-financial companies of EMs in Asia have significantly increased their exposures to exchange rate risk. Exceptionally low dollar interest rates for so long have helped to increase the dollar debt of EM Asia to around US\$3.6 trillion as of end-2019, equivalent to about two-thirds of exports, compared with less than 40% of exports before the GFC of 2008-09 (**Figures 2.2a and 2.2b**). Governments, which have increasingly financed themselves by issuing local currency bonds, have been replaced by corporations, including state-owned firms, as the main EM borrowers in international markets. The bulk of the increase since the GFC took place between 2012 and 2016. Within SEACEN, the most significant increase over the past decade has been in Indonesia – from around 25% of exports at the time of the GFC to 146% of exports at the end of 2019. Since then, the issuance of dollar debt has remained high, reacting to volatile movements in global financial conditions. Nonetheless, for selected SEACEN

¹¹ An IMF calculation of the median cross-currency basis swap spreads of 22 currencies serves as a good proxy for global foreign exchange hedging pressures (Barajas et al., 2020). Before 2007, this median was close to zero indicating that the covered interest parity condition was generally fulfilled.

member economies in 2010-2021, only 8% of non-bank and non-sovereign foreign debt liabilities (bonds and loans) have short-term maturity, while most are long-term foreign debt.

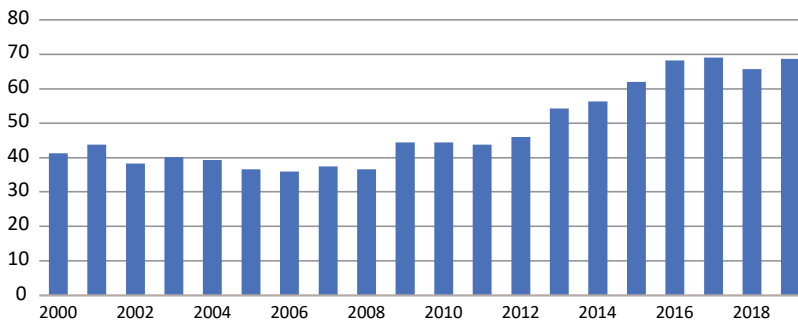
Figure 2.2a: USD Denominated Debt – Selected SEACEN Economies
(US\$ trillion)



Notes: Values are USD-denominated outstanding debt. The outstanding debt refers to claims excluding debt securities of international active banks plus outstanding debt securities liabilities.

Sources: Pradhan (2021) using data from BIS Locational Banking Statistics and BIS International Debt Statistics.

Figure 2.2b: US Denominated Debt – Selected SEACEN Economies
(Percent of Exports)



Note: Y-axis refers to USD-denominated debt as share of international exports (in %).

Sources: Pradhan (2021) using data from BIS Locational Banking Statistics, BIS International Debt Statistics and UN COMTRADE.

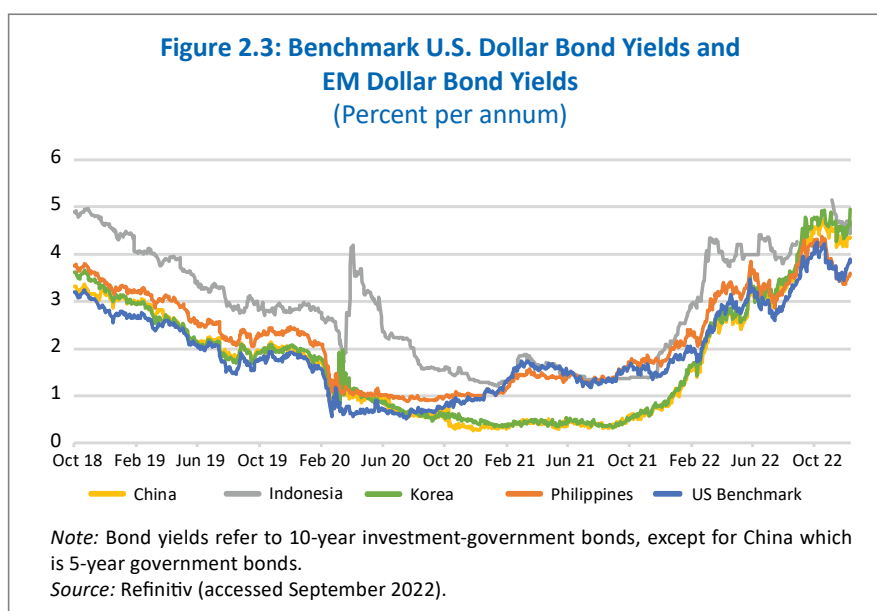
The international financing of companies has shifted toward US dollar bond issuance (overtaking dollar bank loans) and more non-financial companies have taken substantial financial positions not related to their core businesses. Most of the increase in US dollar debt has come from the issuance of medium- or long-term bonds, rather than from short-term bank loans. This shift – shared by most EMs – has made borrowers less vulnerable to the short-term funding pressures which had triggered so many sudden financing crises in the past. It has also enabled companies to take advantage of episodes of particularly favourable borrowing conditions in international markets to borrow more than needed for new spending or for refinancing maturing bonds. This seems to have happened in the second half of 2020, when a sharp and ultimately short-lived decline in global bond yields led to increased EM bond issuance. The treasury operations of non-financial companies active in international bond markets have, therefore, become more significant, both in earning profits and in generating financial risk exposures not directly related to their core businesses. Bruno and Shin (2020), for instance, have noted a tendency to invest in higher-yielding local currency assets. This has increased the risk of contagion from financial stress affecting non-financial corporations to local bond and wholesale banking markets.

The impact on local banks can become systemic when financial conditions tighten. When large firms find it harder to borrow dollars abroad, they may react in ways that put pressure on local banks. They may activate under-priced credit lines and squeeze out other borrowers. They might also reverse the carry-trade borrowing dollars and cut their wholesale local bank deposits. In addition, domestic banks continue to channel cheap and abundant dollars to local small and medium enterprises (SMEs) – often stimulating a boom in domestic credit in the process. BIS statistics show that the foreign currency liabilities of banks in the SEACEN-4 exceeded US\$100 billion by end-2019, twice the level a decade earlier. When international financial conditions tighten, as in 2008, banks may find it harder to borrow US dollars. They may also find it more expensive to swap US dollar for local currency liabilities when their business strategy is to on-lend in local currency. These forces illustrate how banks are forced to reduce lending just when the export markets of their clients are shrinking (Kalemli-Özcan, 2019).

External finance for EMs from the issuance of long-term US dollar bonds has shifted liquidity risks from borrowers to foreign investors, who also face currency exposures. This can alter market dynamics especially in moments of stress, with strong potential feedback effects on borrowers. A major trend has been the greater use of bond funds by investors and asset

managers in order to build more diversified and liquid portfolios based on individual bond issues that may be illiquid. Open-end funds (mutual funds), which offer a daily price even when the underlying assets are illiquid, have grown because they attract investors who demand liquidity. But this notion of liquidity can become an illusion (“built on a lie” was the expression of Mark Carney (2019)). Several recent episodes have demonstrated how easily such liquidity can evaporate, leaving investors with large losses and creating new uncertainty for borrowers. Repeated episodes of bond and derivative market turbulence during the period of March 2020 to February 2021 point to serious gaps in the international regulatory framework covering bond markets.

The combination of tighter rules governing international bond markets and higher benchmark long-term interest rates would mark a significant tightening in global financial conditions for EM companies seeking to borrow dollars. Addressing regulatory gaps in international capital markets is now high on the international policy agenda. But market conditions have changed. In the first half of 2022, benchmark dollar bond yields have risen substantially, with the term premium becoming positive (**Figure 2.3**). Moreover, rising policy rates to contain inflationary pressures in 2022-2023 would, likewise, raise the cost of borrowing for EM companies, particularly those borrowing in US dollar.

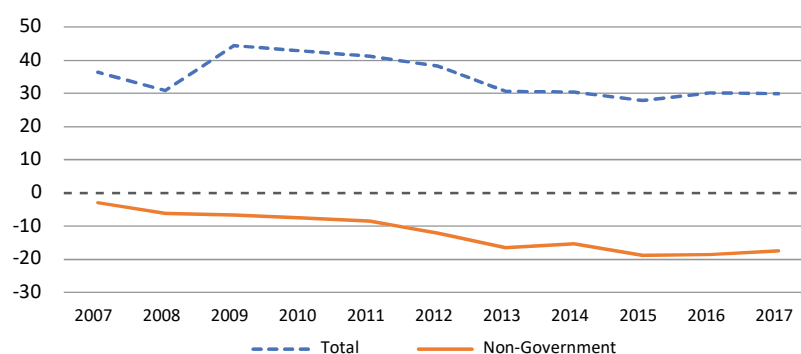


(ii) Currency mismatches

The financial stability threat from increased foreign currency borrowing by EM corporates depends on the size of their currency mismatches. It is not enough to look only at aggregate international foreign currency liabilities as they represent an incomplete measure of currency mismatches. Account also needs to be taken of (i) foreign currency assets which have also risen strongly, (ii) any offsetting reductions in other forms of foreign currency liabilities (such as domestic bank loans), (iii) foreign currency earnings (exports), and (iv) currency hedging. In the absence of corporate sector data, Chui et al. (2016) calculated currency mismatches for the *non-official sector* (including state-owned companies). The net foreign currency debt of this sector has increased, reaching 17% of exports by end-2017. Corporations, including state-owned companies, have become large borrowers on international capital markets, creating new vulnerabilities as discussed in Section 1. In contrast, the *official sector* has a large positive net foreign currency asset position, thanks to sizable foreign exchange reserves. In addition, sovereign borrowing now generally takes the form of local currency rather than US dollar bonds, albeit with a significant share held by non-residents. The blue dotted line in **Figure 2.4** shows a positive total (official plus non-official) for the four countries in aggregate. The only negative values in the sample occur for Indonesia post-2013. The significance of a positive country aggregate, rather than the negative one in the late 1990s, is that a currency depreciation improves the local currency value of a country's external balance sheet – and so reinforces the stabilising competitiveness effects of currency depreciation on the current account. This gives macroeconomic policy greater room to manoeuvre in the face of external financial shocks. Sectoral currency mismatches could still pose financial stability risks that warrant a regulatory response.

Larger currency exposures have led to a greater dependence on FX derivatives. Companies tend to hedge their long-term dollar debts imperfectly using short-term instruments, such as three-month swaps, counting on being able to renew them easily. But in periods of financial stress, when the demand for dollars surges, the terms of such hedges could turn against firms with short US dollar positions (Kalemli-Özcan, 2019). Sudden changes in pricing, or even the disappearance of foreign exchange hedging instruments for some currencies, can destabilise indebted companies. An additional concern is that currency-related corporate stress can be quickly transmitted to local banks which are often their counterparty in

**Figure 2.4: Net Foreign Currency Assets – Selected SEACEN Economies
(Percent of Exports)**



Notes: Net foreign assets of depository corporations (excluding central bank) plus non-bank foreign currency cross-border assets with BIS reporting banks less non-bank foreign currency cross-border liabilities (excluding debt securities) to BIS reporting banks less international debt securities outstanding of non-bank and non-government sectors in foreign currency; outstanding positions of year-end. Exports refers to the national account's definition. The sample includes Indonesia, Malaysia, Philippines, and Thailand.
Source: Turner (2021) using data from Bank of International Settlements.

foreign exchange derivative contracts. Liquidity strains in foreign exchange derivative markets have become more frequent. One indication of such strains is widening spreads in foreign exchange swaps markets. Before 2007, this median was close to zero, indicating that covered interest parity was generally satisfied. Since the GFC crisis, however, the dollar cross-currency bases of many currencies have become more volatile. The median widened in March 2020 at the onset of the COVID-19 pandemic. A US dollar liquidity crisis was averted only by the rapid activation of the Fed's dollar swap lines with selected other central banks. Barajas et al. (2020) estimate that this action narrowed the cross-currency basis for the currencies of swap line countries, but not for those who were not the recipient of the swap lines. In addition, international reserve buffers as well as the health of the banks (e.g., liquidity and capital buffers) can be risk mitigants during stress periods. To this end, regulatory reforms under Basel III have played an important role in building resilience of the financial system.

The risk of destabilising foreign exchange market dynamics can emerge due to unhedged dollar liabilities. Many firms without commensurate US dollar revenues had borrowed dollars without fully hedging their foreign exchange exposures (Alfaro et al., 2019; and Chui et al., 2016). The fragility

this creates is often magnified by leverage. Indeed, many firms do not fully invest the dollars they had borrowed in expanding their foreign business but rather in acquiring other financial assets. Companies with unhedged dollar debts tend to buy dollars (directly or by purchasing hedges) whenever the local currency comes under pressure in foreign exchange markets. This can set off a destabilising market dynamic: a drop in the exchange rate makes their dollar debts even harder to service inducing further dollar purchases and thus a still weaker currency. This can have macroeconomic consequences as leveraged firms with dollar debts cut business investment that can more generally negatively impact aggregate demand (Avdjiev et al., 2019).