ASEAN+3 FINANCIAL STABILITY REPORT 2024

AMRO
ASEAN +3 MACROECONOMIC RESEARCH OFFICE

Strengthening Resilience to Challenges Ahead

The factual information covers data for the period up to 9 September 2024, except when stated otherwise.

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Table of Contents

Boxes

Annexes

Figures

Tables

Foreword from the Chief Economist

Since the release of the inaugural *ASEAN+3 Financial Stability Report* (AFSR) in late 2023, some risks to the ASEAN+3 financial systems have diminished while others have grown. While last year's report concentrated on the effects of rising debt levels on the region's financial stability, this year's AFSR expands its scope to chart a broader array of risks and challenges confronting the region in the period ahead.

Chapter 1 – Market Conjunctural: Strengthening Resilience to Challenges Ahead – explores recent market dynamics and highlights the near-term risks facing ASEAN+3 economies. The first half of 2024 saw an easing in global financial conditions as the US Federal Reserve (Fed) end its policy rate hiking cycle. Market movements have been largely driven by expectations surrounding the Fed's policy, with geopolitical risks also playing a significant role. However, in the third quarter of 2024, uncertainties regarding the US growth outlook, aggravated by the unwinding of yen carry trades, triggered significant market volatility. The Fed commenced its monetary easing in September, which could help stabilize financial conditions but uncertainties around inflation and growth outlook remain. While ASEAN+3 markets generally mirrored global trends, they also responded to local developments such as the Bank of Japan policy rate hike.

The threat of an inflation resurgence remains a significant risk, potentially forcing the Fed and other major central banks to reconsider rate hikes. Furthermore, geopolitical tensions in the Middle East and the upcoming US presidential elections have added layers of complexity to these uncertainties.

Overall, the financial stability risk across ASEAN+3 in 2024 appears lower than in 2023, offering authorities a chance to rebuild policy space while remaining vigilant to emerging risks. The current environment of robust growth and disinflation presents an opportunity for authorities in the region to reduce debt and enhance fiscal capacity to manage potential shocks. Rebuilding foreign exchange reserves during periods of capital inflows can further boost market confidence and provide buffers against extreme market volatility.

This year's report includes three comprehensive thematic studies that delve into the specific risks confronting the region.

- The Feature Analysis in Chapter 1 highlights the risks of financial contagion, showing that ASEAN+3 remains vulnerable to macro-financial shocks from major advanced economies and other external factors. The financial systems of Singapore and Hong Kong, with their extensive global connections, are particularly exposed to cross-border spillovers, acting as conduits for shocks throughout the region.

- Chapter 2 examines the real estate market downturn in the region, where weakened demand from the pandemic lockdown combined with stricter post-pandemic credit access have severely impacted the financial health of property developers, leading to declining profitability, liquidity, and debt servicing capacity. Although robust capital buffers in the banking sector seem to mitigate spillover risks from the property market to the financial system, less visible risks from smaller local banks, as well as shadow banking activities related to the property sector, require close monitoring and may even require regulatory actions.

- Chapter 3 explores the region's heavy reliance on the US dollar for cross-border financial activities, highlighting two primary risks: a potential shortage of US dollar funding, which could destabilize financial markets and intermediaries, and the transmission of global shocks through the US dollar, especially during periods of monetary tightening or geopolitical tension.

In the near term, authorities should stay alert to the risks of inflation resurgence, escalating geopolitical tensions, or a global growth slowdown, all of which could challenge the resilience of the ASEAN+3 financial system. Given the increased interconnectedness of financial systems, continuous monitoring of international spillovers is essential, along with strengthening ASEAN+3-centric surveillance and cooperation. This includes enhancing cross-border surveillance, data sharing, regional stress testing, home-host supervision, and liquidity support to manage and mitigate potential spillover risks effectively.

To stabilize the property sector, authorities should implement measures to prevent commercially sound companies from defaulting due to the tight credit environment, while also enhancing the resilience of financial institutions, particularly smaller banks and nonbank financial intermediaries (NBFIs). To improve resilience against external shocks within the dollar-reliant environment, ASEAN+3 economies should reinforce their economic and financial fundamentals, strengthen surveillance frameworks for monitoring US dollar liquidity conditions, bolster macroprudential frameworks for banks and NBFIs, and provide financing support to member economies facing US dollar liquidity stresses. Additionally, reducing structural dependence on the US dollar in the medium-to-long term by encouraging the use of local currencies and establishing cross-currencies payment systems should be a priority.

In this situation, the region must come together as one and strive for macroeconomic and financial resilience and stability. AMRO holds high hopes that our *ASEAN+3 Financial Stability Report* will play a vital role in our collective efforts, making a substantial contribution toward achieving this objective.

Hoe Ee Khor
Chief Economist

Acknowledgments

This report provides AMRO staff's assessment of both the conjunctural and structural financial stability issues facing the ASEAN+3 region. It covers the short-term developments, risks, vulnerabilities, and challenges facing member economies, as well as the policy options taken by or that are available to their authorities. It also presents staff's studies on longer-term issues that are pertinent to sustained financial stability in the region.

The analysis in this report was prepared by the Financial Surveillance team led by Kevin C. Cheng. The report was peer-commented by economists from AMRO's Country Surveillance, Fiscal Surveillance, Regional Surveillance, Macro-Financial Research, and Policy Review Group. The report was reviewed and cleared by Chief Economist, Hoe Ee Khor. It has also benefited from the guidance of AMRO Director Kouqing Li and other members of the Senior Management team. In addition, San Ling Lam provided valuable feedback on the report as a consultant.

Contributors to the report are Benyaporn Chantana, Chiang Yong (Edmond) Choo, Chenxu Fu, Yang Jiao, Kit Yee Lim, Wen Yan Ivan Lim, Leilei Lu, Ruperto Pagaura Majuca, Yoki Okawa, Prashant Pande (Chapters 1 and 3 lead), Eunmi Park (Chapter 2 lead), and Liyang (Alex) Tang, with inputs from Jungsung Kim, Trung Thanh Vu. Junjie Shi provided research support.

Chiang Yong (Edmond) Choo coordinated the production of the publication, with editorial assistance from James Unwin; Qin Jie, Andrea Abellon, Hui Shan Seah, Lynn Tan and Karen Wilkinson coordinated communications and outreach.

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Finally, the views expressed in this report are those of AMRO staff and do not necessarily represent those of AMRO member authorities.

Abbreviations

A+3, ASEAN+3	ASEAN plus China (including Hong Kong), Japan, and Korea
ABCP	Asset-backed commercial paper
ABIF	ASEAN Banking Integration Framework
ADB	Asian Development Bank
AE	Advanced Economy
AED	United Arabia Emirates dirham
AFSR	ASEAN+3 Financial Stability Report
AI	Artificial intelligence
AREO	ASEAN+3 Regional Economic Outlook
ASEAN	Association of Southeast Asian Nations
ASEAN-4	Indonesia, Malaysia, the Philippines, and Thailand
ASEAN-5	Indonesia, Malaysia, the Philippines, Thailand, and Singapore
ASEAN-6	ASEAN-5 plus Vietnam
AUD	Australian dollar
BCLMV	Brunei Darussalam, Cambodia, Lao PDR, Myanmar, and Vietnam
BI	Bank Indonesia
BIBOR	Bangkok interbank offered rate
BIS	Bank for International Settlements
BN	Brunei Darussalam*
BNM	Bank Negara Malaysia
BOE	Bank of England
BOJ	Bank of Japan
BOK	Bank of Korea
BOP	Balance of Payments
Bp(s)	Basis point(s)
BR	Brazil
CAD	Canadian dollar
CAR	Capital adequacy ratio
CB	Central bank
CBDC	Central bank digital currency
CBOE	Chicago Board Options Exchange
CD	Certificate of deposits
CDIS	Coordinated Direct Investment Survey
CDS	Credit default swap
CCB	Cross currency basis
CCP	Central counterparty
CCS	Cross currency swap
CGS	Credit guarantee scheme
CHF	Swiss franc
CHIPS	Creating Helpful Incentives to Produce Semiconductors
CIBOR	Copenhagen interbank offered rate
CLMV	Cambodia, Lao PDR, Myanmar, and Vietnam
CMIM	Chiang Mai Initiative Multilateralisation
CN	China
CNY	Chinese renminbi
COVID-19	2019 coronavirus disease
CP	Commercial paper
CPI	Consumer price index
CPIS	Coordinated Portfolio Investment Survey
CRE	Corporate real estate
CVIX	Deutsche Bank Currency Volatility Index
DE	Germany
DNDF	Domestic non-deliverable forward
DS	Thomson-Reuters Datastream
DSIB	Domestic Systemically Important Banks
DSR	Debt service ratio
DXY	US dollar index
EA	Euro area
EBIT	Earnings before interest and taxes
EBITDA	Earnings before interest, taxes, depreciation, and amortization
ECB	European Central Bank
EM	Emerging market
EME	Emerging market economy
EU	European Union
EUR	Euro
EURIBOR	Euro interbank offered rate
FCI	Financial Conditions Index

* For brevity, "Brunei Darussalam" is referred to as "Brunei" in the text.

FCY	Foreign currencies
FDI	Foreign direct investment
Fed	US Federal Reserve
FI	Financial Institution
FIMA	Foreign and International Monetary Authority
FOMC	Federal Open Market Committee
FR	France
FSB	Financial Stability Board
FSI	Financial Stress Index
FUC	Freely usable currency
FX	Foreign exchange
GBP	Pound sterling
GCC	Gulf Cooperation Countries
GDP	Gross domestic product
GFC	Global Financial Crisis
GMM	Generalized method of moments
Govt.	Government
GSCI	Goldman Sachs Commodity Index
GSIB	Global Systematically Important Bank
HIBOR	Hong Kong interbank offered rate
HK	Hong Kong, China*
HKD	Hong Kong dollar
HKMA	Hong Kong Monetary Authority
ICE	Intercontinental Exchange, Inc.
ICIO	Inter-country input-output
ICR	Interest coverage ratio
ID	Indonesia
IFC	International financial center
IFS	IMF International Financial Statistics
IIF	Institute of International Finance
IMF	International Monetary Fund
IMF WEO	IMF World Economic Outlook database
IN	India
INR	Indian rupee
IO	International organization
IOSCO	International Organization of Securities Commissions
IPO	Initial public offering
IT	Information technology
JGB	Japanese government bonds
JP	Japan
JPY	Japanese yen
KBW	Keefe, Bruyette, and Woods
KH	Cambodia
KIKO	Knock-in knock-out
KLIBOR	Kuala Lumpur interbank offered rate
KORIBOR	Korea interbank offered rate
KR	Korea
KRW	Korean won
LAT	Latin America
LA, Lao PDR	Lao People's Democratic Republic
LBS	Locational Banking Statistics
LIBOR	London interbank offer rate
LCR	Liquidity coverage ratio
LGD	Loss given default
LGFV	Local government financing vehicles
M&A	Mergers and acquisitions
MAS	Monetary Authority of Singapore
MBS	Mortgage-backed security
MOVE	Merrill Lynch Option Volatility Estimate Index
MM	Myanmar
MMF	Money market funds
MSCI	Morgan Stanley Capital International
MSME	Micro, small and medium enterprise
MXN	Mexican peso
MY	Malaysia
MYR	Malaysian ringgit
NAR	North America
NBFI	Nonbank financial institution/ intermediary
NEER	Nominal effective exchange rate
NFC	Nonfinancial corporate
NIM	Net interest margin
NPL	Nonperforming loan
NPS	National Pension Service
NOK	Norwegian krone

* For brevity, "Hong Kong, China" is referred to as "Hong Kong" in the text.

NUS-CRI	National University of Singapore Credit Research Inititative
NYCB	New York Community Bancorp
NZD	New Zealand dollar
OECD	Organisation for Economic Co-operation and Development
OIS	Overnight index swap
OLS	Ordinary least squares regression
ON	Overnight
OTH	Others
PBC	People's Bank of China
PD	Probability of default
P/E	Price-to-earnings ratio
PF	Project finance
PH	The Philippines
PLN	Polish zloty
Plus-3	China (including Hong Kong), Japan, Korea
PMI	Purchasing Manager Index
PVAR	Panel vector autoregression
REER	Real effective exchange rate
REI	Real Estate Price Index
RFF	Rapid Financing Facility
ROA	Return on assets
ROW	Rest of the world
RRP	Reverse repo program
RWA	Risk-weighted asset
S&P	Standard and Poor's
SARON	Swiss average rate overnight
SBV	State Bank of Vietnam
SD	Standard deviation
SEK	Swedish krona
SG	Singapore
SGD	Singapore dollar
SHIBOR	Shanghai interbank offered rate
SIBOR	Singapore interbank offered rate
SOE	State-owned enterprise
SOFR	Secured overnight financing rate
SRBI	Bank Indonesia Rupiah Securities
STIBOR	Stockholm interbank offered rate
SUVBI	Bank Indonesia Foreign Exchange Sukuk
SVBI	Bank Indonesia Foreign Exchange Securities
SWIFT	Society for Worldwide Interbank Financial Telecommunications
TH	Thailand
TRY	Turkish lira
TWD	New Taiwan dollar
T-bill	Treasury bill
UK	United Kingdom
US	United States
USD	US dollar
VAR	Vector autoregression
VARX	Vector autoregression with exogenous variables
VECM	Vector error correction model
VIX	CBOE Volatility Index
VN	Vietnam
VND	Vietnamese dong
WB	World Bank
WEU	Western Europe
WMP	Wealth management product
YCC	Yield curve control
YTD	Year-to-date
ZAR	South African rand
Δ	Change in

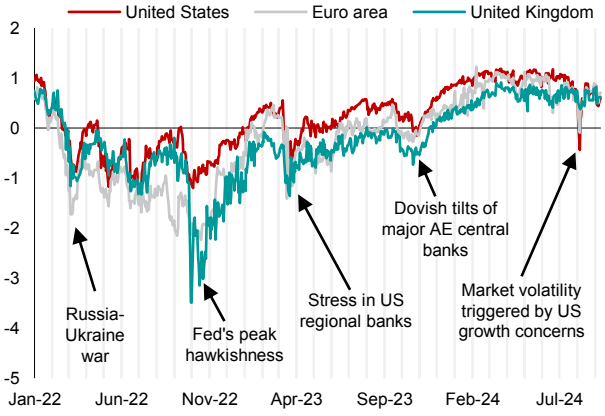
Executive Summary

Strengthening resilience to challenges ahead

Relative to the situation during the launch of the inaugural *ASEAN+3 Financial Stability Report* (AFSR) 2023, global financial conditions initially eased as the end of the central banks' tightening cycle appeared in sight (Figure E.1). However, conditions tightened again as risks surrounding the United States (US) growth outlook emerged, with market participants navigating the bifurcated risks of US growth and inflation. Initially, the primary concern was persistently high inflation—or, in an extreme scenario, a resurgence—which could have delayed US monetary easing. By August, however, the focus had shifted to the risks of an economic hard landing and the Fed's response to such a scenario. These concerns were exacerbated by growing apprehension over the potential overvaluation of the "Magnificent Seven" tech stocks, which had fuelled much of the equity market gains earlier in the year. This uncertainty culminated in an equity sell-off and volatility spikes, further aggravated by the unwinding of yen carry trades. On 18 September, 2024, the Federal Reserve (Fed) reduced interest rates by 50 basis points (Figure E.2), responding to declining inflationary risks and growing concerns about labor market weakness.[1]

Figure E.1. Selected Advanced Economies: Financial Conditions Indices
(Index)

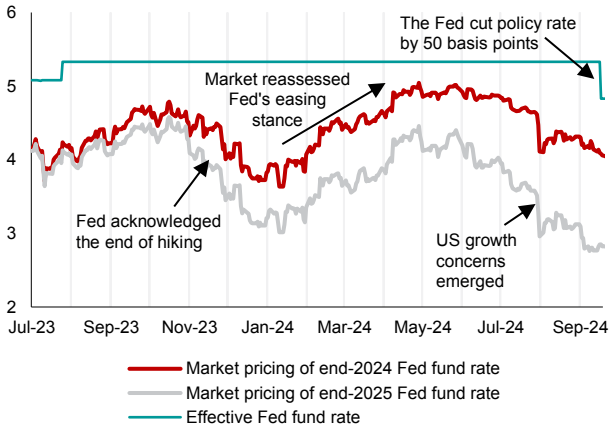
Financial conditions remained generally easy during H1 2024 in major economies, but volatilities increased since August.



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: Higher values of the index indicate easier financial conditions. AE = advanced economies. Data as of 20 September 2024.

Figure E.2. US: Fed Rate Expectations for End-2024 and End-2025
(Percent)

The market expects the Fed to ease monetary policy by around 100 basis points in 2024.



Source: Bloomberg Finance L.P.
Note: Data as of 20 September 2024.

ASEAN+3 markets generally followed global trends but were also sensitive to domestic factors. In the first half of 2024, spillovers from strong US equity markets to regional equities were limited to a few sectors while the rise in US Treasury yields led to wider interest rate differentials and weaker ASEAN+3 currencies. However, as the Fed's monetary easing loomed and eventually commenced, yields eased and led to a weaker US dollar during the third quarter of 2024. Portfolio flows in the region were relatively muted in early 2024, as ASEAN+3 asset valuations were less attractive than elsewhere, but picked up recently as US Treasury yields eased. Due to easing inflationary pressures and robust growth, many ASEAN+3 central banks may maintain their current monetary stance for some time, but idiosyncratic factors may cause some divergence in the timing and pace of rate cuts. Moreover, concerned about the exchange rate weakness, several ASEAN+3 authorities have intervened in the forex market or raised interest rates to support their currencies. Some authorities have implemented measures to encourage repatriation, and portfolio inflows, and to manage demand for US dollars in domestic markets to mitigate pressures on exchange rates.

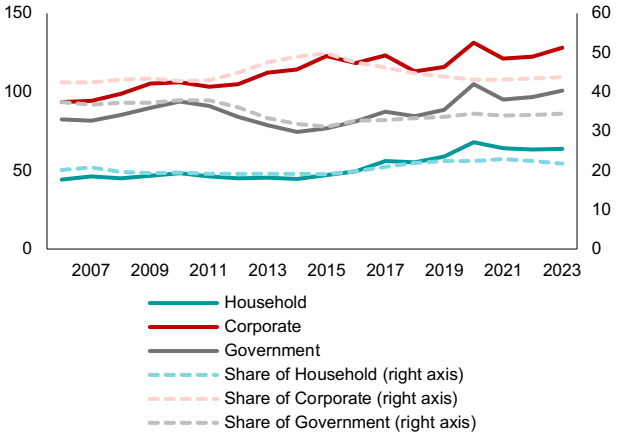
The total debt-to-GDP ratio—encompassing corporate, household, and government debt—increased by 10 percentage points to 290 percent in 2023 (Figure E.3). This rise was mainly driven by corporate and government debt, with household debt increasing only modestly. Corporate debt vulnerability is high among micro, small, and medium sized enterprises, especially in property and construction, manufacturing, and raw materials sectors. The interest payment-to-GDP ratio for government debt rose significantly in 2023 for most ASEAN+3 economies due to higher debt levels and elevated interest rates (Figure E.4). Although interest rates in some economies have started to decline, the overall debt burden would likely remain high due to increased debt levels and the slow pace of interest rate reductions.

This summary was prepared by Kevin C. Cheng, Ruperto Pagaura Majuca, Prashant Pande, and Eunmi Park, with inputs from Kit Yee Lim.

[1] The Executive Summary reflects developments up to 20 September 2024. However, Chapters 1–3 are based on information available as of 9 September 2024.

Figure E.3. Selected ASEAN+3: Corporate, Government and Household Debt
(Percent of GDP; percent)

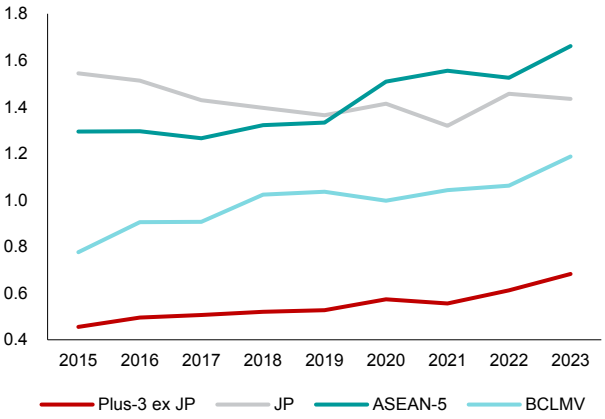
ASEAN+3's total debt-to-GDP ratio rose by 10 percentage points from 2022, driven by corporate and government debt.



Source: Bank for International Settlements (BIS); AMRO staff calculations.
Note: Data covers all economies reporting nonfinancial debt data to the BIS. Selected ASEAN+3 includes China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, and Thailand. Government debt data for these economies in nominal value, except for Korea, which reports market value.

Figure E.4. Selected ASEAN+3: Government Interest Payments
(Percent of GDP)

Elevated debt levels and rising interest rates have driven up government interest payments.



Source: National authorities via CEIC and Haver Analytics; AMRO (2024b); AMRO staff calculations.
Note: The interest payments are based on fiscal years and are computed using simple averages amongst economies in the specific group. Plus-3 ex Japan = China, Hong Kong, and Korea; JP = Japan; ASEAN-5 = Indonesia, Malaysia, Philippines, Singapore, and Thailand; BCLMV = Brunei, Cambodia, Lao PDR, Myanmar, and Vietnam.

Shifting near-term risks: some fade, some intensify

Although the Fed has commenced monetary easing, the timing and magnitude of further rate cuts will depend on developments on inflation and employment. Markets have adapted to the likelihood of sustained higher interest rates, but concerns over growth and employment have surfaced. Given that the pace of disinflation has been slower than expected (Figure E.5), a resurgence in inflation remains a potential threat, which could lead to renewed rate hikes. The worst-case scenario is stagflation, where high inflation constrains the Fed's ability to address an economic slowdown.

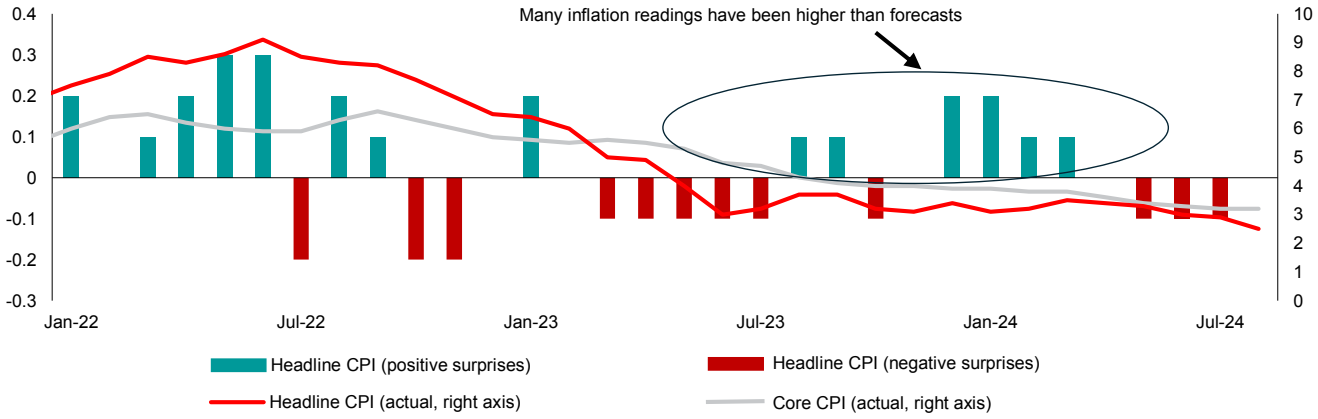
Geopolitical uncertainties have intensified. Tensions in the Middle East have disrupted global supply chains, increasing commodity prices and shipping costs, which could derail the disinflationary process. The outcome of the US presidential election will significantly influence US trade, monetary, and fiscal policies, affecting global and ASEAN+3 economies and markets. Moreover, rising geopolitical fragmentation and potential conflict escalations could lead to increased risk aversion and capital outflows from regional markets.

That said, some risks have receded over the past three quarters. The concerns surrounding the US regional banking system have diminished compared with the first half of 2023. Although stress in corporate real estate (CRE) has intensified in the US and other major developed markets, spillovers to the financial sector have been limited, with only a few banks reporting losses on their CRE exposures. Nonetheless, CRE weakness remains a risk to financial stability. Meanwhile, US dollar funding conditions have remained stable, and with the Fed easing its monetary policy, the risks of funding stress have lessened.

The risks discussed may materialize amid increased interconnectedness among ASEAN+3 financial institutions, markets, and economies, heightening the potential for financial contagion. The Feature Analysis in Chapter 1 quantifies this vulnerability, showing that ASEAN+3 financial markets remain susceptible to shocks from global factors and developed economies, particularly North America, the United Kingdom, and Europe. ASEAN+3 markets are linked to developed financial markets, with equity returns in Japan, the Philippines, Singapore, Korea, Malaysia, and Hong Kong relatively sensitive to these shocks (Figure E.6). The effect from developed markets on ASEAN+3 is bigger than from emerging markets outside the region. The Plus-3 economies (China, Japan, and Korea) and the regional financial centers (Hong Kong and Singapore) are most exposed to global factors. Hong Kong and Singapore's extensive external connections and cross-border spillovers make them potential channels of contagion for the region (Figure E.7).

Figure E.5. US: Inflation and Inflation Data Surprises
(Percentage points; percent)

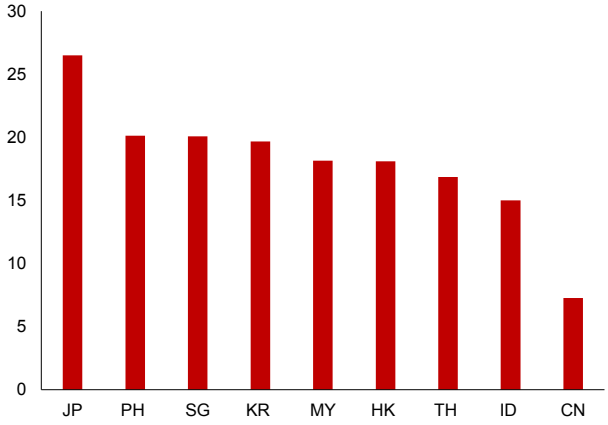
The disinflation has been slower than expected.



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: Headline CPI surprise is calculated as the difference between actual and forecast median of Bloomberg economist survey. CPI = consumer price index. Data as of August 2024.

Figure E.6. Selected ASEAN+3: Top Spillovers from Non-ASEAN+3 Advanced Economies
(Percent)

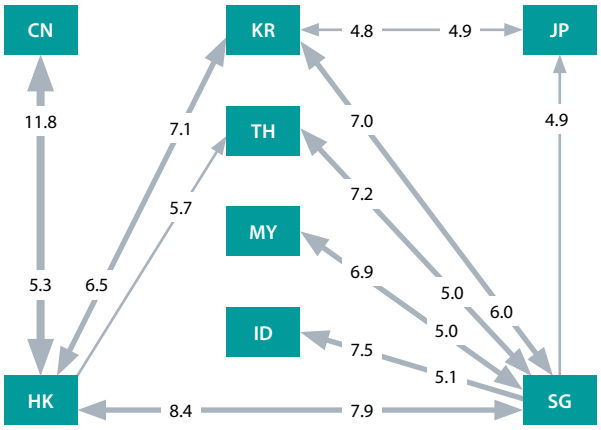
Advanced economies have significantly strong contagion effects on ASEAN+3.



Source: AMRO staff calculations.
Note: The height of the bars reflects the size of the importance of spillover transmission channel, as calculated using the approach of Diebold and Yilmaz (2012, 2014). The figures represent the percentage of total equity return variability of each ASEAN+3 economy that is explained by a shock from advanced economies outside the ASEAN+3 region. See Annex 1.2 (Feature Analysis in Chapter 1) for technical details. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand..

Figure E.7. Selected ASEAN+3: Intraregional Spillovers
(Percent)

Spillovers involving the regional financial centers are central to regional dynamics.



Source: AMRO staff calculations.
Note: The size of the directed arrows reflects the size of the importance of spillover transmission channel, as calculated using the approach of Diebold and Yilmaz (2012, 2014). The numbers displayed in the directed arrows represent the percentage of total equity return variability of each ASEAN+3 economy that is explained by a shock from another ASEAN+3 economy. See Annex 1.2 (Feature Analysis in Chapter 1) for technical details. CN = China; HK = Hong Kong; JP = Japan; KR = Korea; MY = Malaysia; SG = Singapore; TH = Thailand.

Medium-term risks loom

Property sector

Chapter 2 analyses the real estate market downturn and the risks from property developer financing in ASEAN+3. High interest rates post-pandemic have worsened developers' financial conditions, leading many, including major companies, to default or face severe liquidity constraints and rising financing costs. Eroded buyer confidence has dampened demand. From 2021 to 2023, property companies in the ASEAN+3 region exhibited significant vulnerabilities, with declining profitability, liquidity, and debt servicing capacity compared to pre-pandemic levels. Some Plus-3 economies showed more pronounced weaknesses (Figure E.8).

Currently, risks from property developers have not escalated into systemic threats, and potential spillover risks from the property sector to banks in ASEAN+3 remain limited, given the robust capital buffers of banks. However, pockets of vulnerability exist in those institutions subject to less regulatory oversight, including small or local banks, nonbank financial intermediaries (NBFIs), and other shadow banking activities.

Figure E.8. Selected Regions: Changes in Financial Conditions of Property-Related Corporates

Property companies' financial conditions, especially in Plus-3, have worsened in profitability, liquidity, debt servicing, refinancing risk, and leverage compared with pre-pandemic levels and other regions.

Source: Orbis; AMRO staff calculations.
Note: The larger the shape, the greater the vulnerability in the financial soundness of the companies. The sample consists of publicly listed property construction, developers, and real estate companies. The indices were calculated based on the z-scores using the means and standard deviation of all available values for each financial condition indicator between 2018 and 2023. For ROA (return on assets), Current Ratio, DSR (debt service ratio), and ICR (interest coverage ratio), Z-scores are inverted (multiplied by -1) to denote higher values as riskier. Short-term debt and leverage are not inverted as higher values are already interpreted as riskier. Selected ASEAN economies = Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Plus-3 economies = China, Hong Kong, Japan, and Korea. The benchmark advanced and emerging market economies are those with at least 20 listed real estate companies in the Orbis database and are grouped according to the IMF classification (https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates).

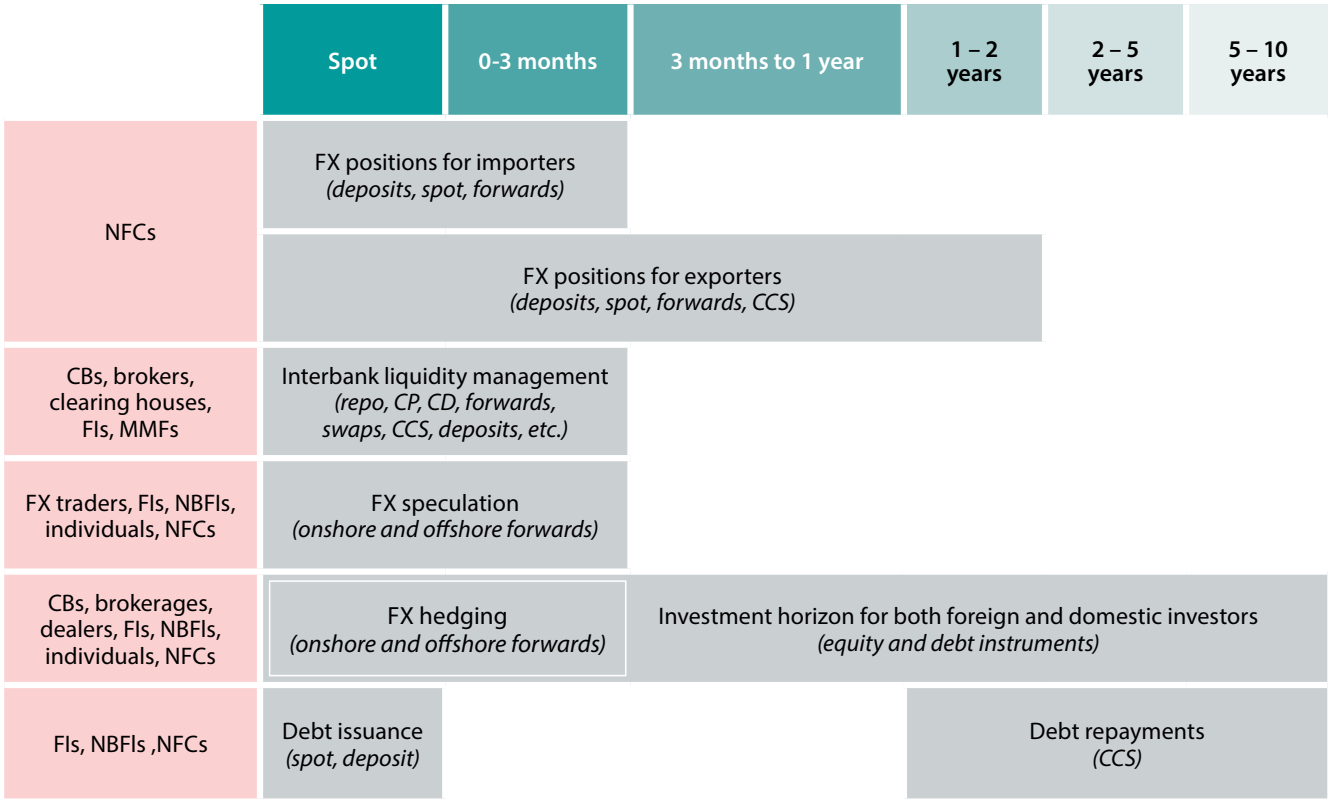
US dollar reliance

Chapter 3 examines the region's reliance on the US dollar and the major risks for the ASEAN+3 financial system. The US dollar is widely used for cross-border financial activities, and thus any change in US dollar financing impacts the ASEAN+3 financial system. The extent of this impact depends on the roles and interlinkages of various institutions, including companies, banks, and nonbank financial intermediaries. The chapter explores these aspects in detail, identifying factors that may either exacerbate or mitigate spillovers from changes in the global US dollar financing environment. The interconnectedness of these institutions also introduces risks, such as currency and maturity mismatches (Figure E.9).

The region's high reliance on US dollars in cross-border financial transactions exposes the ASEAN+3 financial system to two key risks. First, a US dollar funding shortage heightens stability risks for financial markets and intermediaries. Previous episodes of funding stress, triggered by global economic and financial shocks, created difficulties for ASEAN+3 financial intermediaries to secure liquidity. Empirical studies show cross-border lending decreases during tighter funding conditions, affecting domestic banking stability (Figure E.10), increasing financial market volatility (Figure E.11), and weakening ASEAN+3 assets. Second, the US dollar acts as a transmission channel for shocks from US monetary policy, geopolitical tensions, and other global events. Spillovers from US monetary policy have significantly affected ASEAN+3 financial markets during both prolonged periods of easy conditions and short periods of sharp tightening. The US dollar's status as a safe asset also transmits global shocks to ASEAN+3 as investors seek safe assets during times of heightened uncertainty.

Figure E.9. Interaction of Various Entities in the US Dollar Supply Chain and Resultant Maturity Mismatches

The participants in the US dollar supply chain operate in different maturities and may create duration mismatches in the financial system.

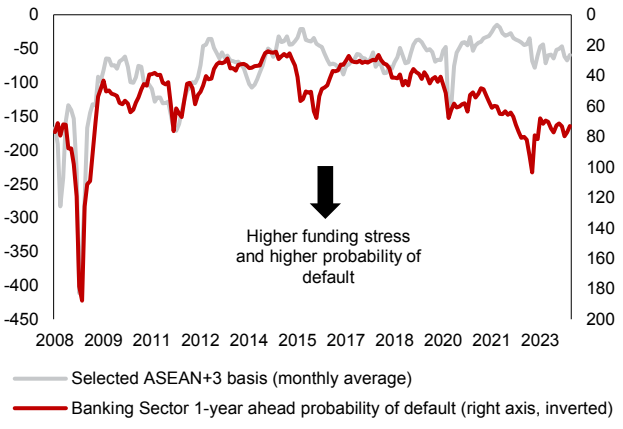


Source: AMRO staff's representation based on inputs from market participants.
Note: The diagram is a simplified and stylized representation of a complex network and is not all encompassing. CCS = cross-currency basis swap; CB = central bank; CD = certificate of deposit; CP = commercial paper; FI = financial institution; FX = foreign exchange; MMF = money market fund; NBFI = nonbank financial intermediary; NFC = nonfinancial corporate.

Figure E.10. Selected ASEAN+3: Average Cross-Currency Basis and Banking Sector 1-Year Ahead Probability of Default

(Basis points; basis points)

The probability of default for banking sector tends to rise when there is US dollar funding stress.

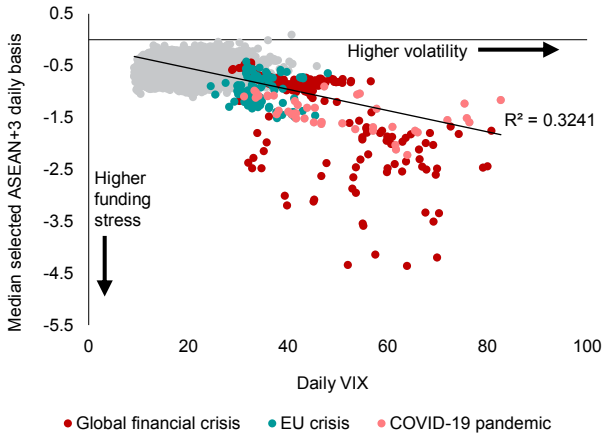


Source: AMRO staff estimates; NUS Credit Research Initiative (NUS-CRI).
Note: Cross-currency basis ("basis") is the difference between US dollar interbank borrowing rate and the rate for borrowing US dollar through foreign exchange swaps over. A more negative value of the basis shows a higher premium for borrowing in the swaps market, and hence higher US dollar funding stress. Sample is for ASEAN+3 economies which includes China, Hong Kong, Japan, Korea, Malaysia, Singapore, and Thailand.

Figure E.11. Selected ASEAN+3: Volatility Index versus Daily Median Cross-Currency Basis

(Index; percent)

Funding stress tends to be higher in periods of higher market volatility.



Source: Bloomberg Finance L.P.; NUS Credit Research Initiative (NUS-CRI); AMRO staff estimates.
Note: The volatility index used is the index of expected volatility in S&P 50 Index (VIX Index) derived from option bid and ask quotes Sample is for ASEAN+3 economies which includes China, Hong Kong, Japan, Korea, Malaysia, Singapore, and Thailand. Data as of 20 September.

Address risks and challenges by building resilience

On balance, the overall financial stability risk across ASEAN+3 in 2024 appears to be lower than in 2023. As such, the authorities can use this period to build policy space while continuing to be vigilant of emerging risks. The environment of robust growth and disinflation can provide an opportunity for ASEAN+3 governments to reduce debt and create more fiscal room to react to shocks. They may also rebuild foreign reserves during periods of capital inflows, to boost market confidence and create policy buffers against extreme market volatility.

Chapter 1 recommends that authorities remain vigilant regarding the upside risk to inflation in the region. If inflation were to rise again, major central banks may adopt a tighter monetary stance, potentially reversing the current easing of financial conditions. Central bank response within ASEAN+3 to a resurgence in inflation would have to depend on domestic circumstances in individual economies and their susceptibility to spillovers from global monetary tightening. The authorities may also need to be mindful of domestic financial stability risks such as exposure of smaller banks and NBFIs to stressed sectors and structural issues such as high debt. The authorities may need to step in to prevent financial contagion if these risks were to escalate while also avoiding moral hazard.

Escalating geopolitical tensions or a global growth slowdown could test the resilience of the ASEAN+3 financial system. Beyond the impact on inflation, severe geopolitical stress or economic slowdown could trigger investor risk aversion, leading to capital outflows and asset price declines, thereby exacerbating market turbulence. Given the increased interconnectedness of ASEAN+3 financial systems, the source and transmission channels of risks from international spillovers must be continuously monitored. ASEAN+3 financial systems have become increasingly interconnected, making robust ASEAN+3-centric surveillance and cooperation vital. By taking a holistic macroeconomic and financial view of the region, authorities can better protect their economies from systemic risks and enhance overall financial resilience. ASEAN+3 economies should strengthen cross-border surveillance and data sharing, regional stress testing, home-host supervision, and liquidity support to effectively manage and mitigate potential spillover risks (Chapter 1 Feature Analysis).

To stabilize the ongoing difficulties from the property sector, Chapter 2 recommends that the authorities implement measures to prevent companies with sound fundamentals from defaulting due to the tight credit environment, based on reasonable criteria for identifying sound companies. Enhancing the resilience of financial institutions, especially smaller banks and NBFIs, through diversification and regulatory oversight is crucial, and prompt government action in times of stress is also necessary. Well-targeted policies aimed at stimulating property demand—tailored to each economy's unique circumstances—to break the negative cycle should be considered. Ensuring transparency, rigorous credit assessments, and strict regulation will help mitigate the risks associated with overleveraging by property developers.

Chapter 3 discusses policy measures that focus on improving resilience within the dollar-reliant environment in the near term and reducing the structural dependence on the US dollar in the medium term. Strong economic and financial fundamentals have been proven to provide better resilience to withstand external shocks. The authorities should also strengthen the surveillance framework for monitoring US dollar liquidity conditions and enhance the macroprudential frameworks for banks and NBFIs. In times of localized funding stress, the regional financing arrangement can help provide support to an ASEAN+3 member facing US dollar liquidity stresses. In the longer term, authorities should continue with their efforts to reduce their reliance on US dollars by encouraging the use of local currencies and developing the required infrastructure and regulatory frameworks to facilitate the usage.

Beyond the horizon into the far future, authorities must address the financial stability issues arising from the mispricing of climate risks in financial markets. Box 1.4 (in Chapter 1) recommends that central banks explore tools such as incentivizing green projects with lower interest rates and addressing market challenges such as information asymmetry. Enhancing green taxonomies is also vital to clearly define sustainable activities, thereby promoting transparency and protecting issuer credibility.

Chapter 1

Market Conjunctural-Strengthening Resilience to Challenges Ahead

Highlights

- Relative to the situation during the publication of the inaugural *ASEAN+3 Financial Stability Report (AFSR)* in late-2023, global financial conditions eased in the first half of 2024, but fluctuated with increased volatilities in the third quarter of 2024. Expectations around the Federal Reserve (Fed) policy stance, uncertainties around the growth outlook for the United States (US) and technology stock valuations have been the key drivers for the markets, while geopolitical risks have also played an important role.

- Concerns have shifted from persistent inflation and prolonged high interest rates to a risk of a growth slowdown. Meanwhile, lingering concerns that an inflation resurgence would lead to renewed rounds of central bank tightening or constrain the Fed's capacity to stabilize the market have amplified anxiety. Geopolitical risks from the tensions in the Middle East and the US presidential elections have added to the uncertainties.

- ASEAN+3 markets had benefited from the improved financial conditions in late 2023 but the markets have diverged in 2024 as they responded to idiosyncratic developments. Portfolio flows in the region were also relatively muted during the first half of 2024 as ASEAN+3 asset valuations have been relatively modest.

- Inflation remains the primary risk for macro-financial stability in ASEAN+3, but policy responses are expected to vary due to differing domestic conditions such as growth outlook, exchange rate developments, stress faced by property sector companies, and household debt leverage. If inflation resurges, central banks' actions will depend on available non-monetary measures and the spillovers from global monetary tightening. If the emerging concerns around the US growth also materialize amid high inflation, it could complicate policy responses and tighten financial conditions. The banking system remains sound and well capitalized, although with pockets of vulnerability. The importance of nonbank financial intermediaries in the region continues to rise, but they are still small relative to banks.

- Spillovers from both within and outside the region pose risks to financial stability, necessitating close monitoring. The authorities should continue to build policy space and address structural issues such as property sector weakness and high household debt. They may need to step in to support certain segments of the financial system in periods of stress, while avoiding moral hazard. The authorities must also monitor rapid changes in green financing and financial digitalization, ensuring regulatory updates to keep pace with the evolving landscape and reduce the related risks.

This chapter is authored by Prashant Pande under the guidance of Kevin C. Cheng, with contributions from Benya Chantana, Chiang Yong (Edmond) Choo, Chenxu Fu, Yang Jiao, Kit Yee Lim, Wen Yan Ivan Lim, Leilei Lu, Ruperto Pagaura Majuca, Eunmi Park, Junjie Shi and Liyang (Alex) Tang. The chapter is based on information available as of 9 September 2024

I. Recent Developments

Global financial conditions have eased, some risks have receded, but some remain elevated

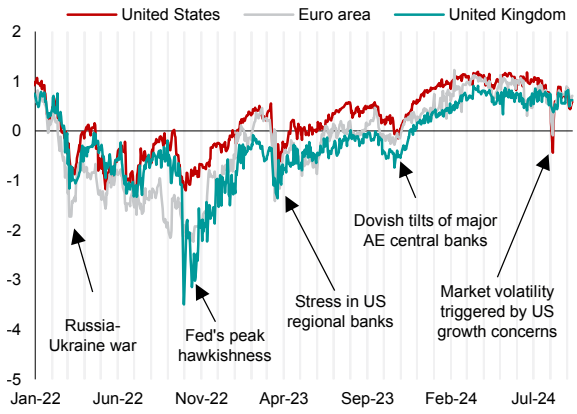
Relative to the situation around the publication of the inaugural *AFSR 2023* in December 2023, financial conditions in major global economies eased in the first half of 2024. The easing began in November–December 2023 and remained stable through the first half of 2024 (Figure 1.1). Equity and debt markets in advanced economies and emerging markets saw gains in late 2023 while the US dollar weakened. During the first half of 2024, equity markets continued to strengthen, driven by technology stocks and strong corporate earnings, although with occasional corrections in technology stocks, especially those of the so-called "Magnificent Seven".[1] Debt markets yielded positive returns despite some rise in yields. (Figure 1.2 and Figure 1.3). Barring episodes of rising geopolitical tension, the financial market volatility remained generally lower than 2023 (Figure 1.4). Portfolio flows into emerging market debt and equity (Figure 1.5) have increased and the sovereign spreads for emerging market economies (excluding Latin America) are compressed (Figure 1.6).

During the first half of 2024, the key driver for markets was the Fed's policy outlook, with geopolitical shocks also playing a significant role. In November 2023, the Fed hinted at the end of rate hikes, fueling market expectations of rapid monetary easing in 2024 (Figure 1.7). Growing confidence that inflation would continue to decline to the Fed's 2 percent target (Figure 1.8) supported the market view that the next Fed policy action would be a series of rate cuts. However, as inflation remained sticky in 2024, the markets were forced to reassess their assumptions around the timing and size of rate cuts. This reassessment, and geopolitical events in the Middle East, caused market gyrations during the first half of 2024.

However, market focus shifted to the growth outlook during the third quarter of the year. Financial conditions tightened, with the equity market stress rising significantly in early August. The changes in market perceptions have reflected concerns around overvalued technology stocks as well as some weaker-than-expected US economic data. The sell-off was initially limited to certain sectors of the stock market but soon broadened as concerns about a US economic hard landing rose. The sell-off may have been further aggravated by an unwinding of the yen carry trade.[2] The market volatilities spiked higher, while expectations of Fed monetary easing led to a weaker US dollar and lower US Treasury yields. The equity markets saw some recovery and volatilities normalized since then. However, the sell-off served as a reminder about the fragility of market strength and the vulnerability to the risks of a US growth slowdown.

Figure 1.1. Selected Advanced Economies: Financial Conditions Indices
(Index)

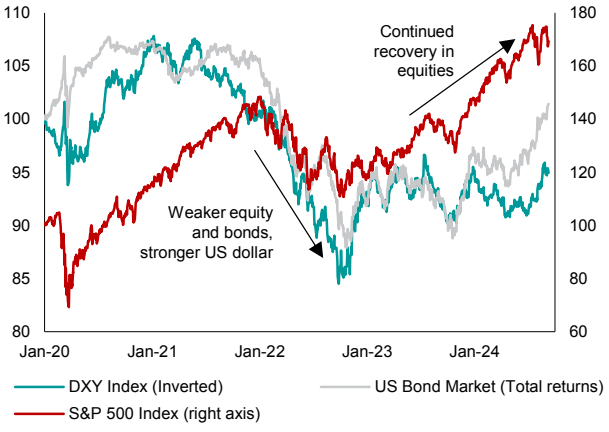
Financial conditions in major economies fluctuated in 2024, remaining easy during the first half and tightened somewhat during the third quarter.



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: Higher values of the index indicate easier financial conditions.
AE = advanced economy. Data as of 9 September 2024.

Figure 1.2. US: Equity, Bond Market, and Foreign Exchange Indices
(Index, 1 January 2020 = 100)

Equity and debt markets have yielded positive returns in the first half 2024, both in the US…



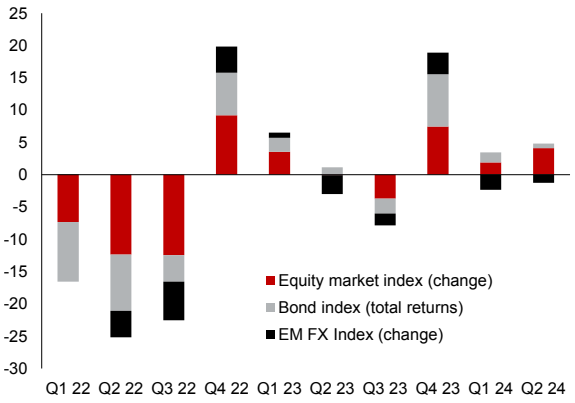
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: DXY index refers to US dollar index. Bloomberg US Aggregate Index is used for US bond market (total returns). The S&P 500 index refers to the Standard & Poor's 500 index. Data as of 9 September 2024.

[1] The "Magnificent Seven" refers to the seven largest and most influential stocks in the technology sector. These companies are Amazon, Apple, Google, Meta, Microsoft, Nvidia, and Tesla.

[2] The yen carry trade is an investment strategy where investors borrow funds in Japanese yen, which has had low interest rates for many years, and invest those funds in higher-yielding currencies, bonds, or equity investments. According to market participants, the unwind of the yen carry trade was triggered by multiple factors including Bank of Japan's monetary tightening on 31 July 2024 amid the weaker US growth outlook that caused markets to expect faster easing by the Fed. This led to a strong yen against the US dollar which, along with falling asset prices globally, inflicted losses on the carry trade positions. As investors closed their positions to prevent further losses, the markets entered a vicious cycle where asset prices fell and the yen strengthened further.

Figure 1.3. Emerging Markets: Equity, Bond Markets, and Foreign Exchange Indices
(Percent, quarter-on-quarter)

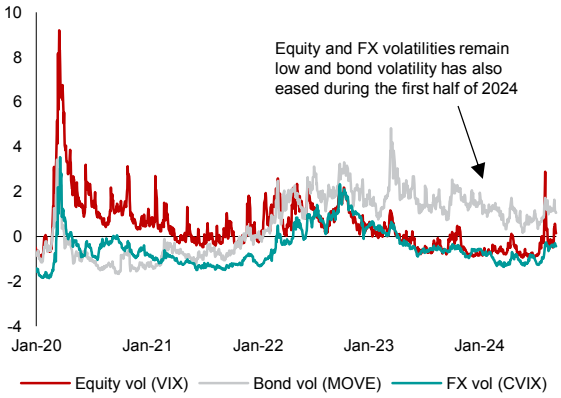
… and emerging markets.



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: EM = Emerging markets; FX = Foreign exchange. Data as of Q2 2024.

Figure 1.4. US: Volatility in Key Assets and Corresponding Long-Term Averages
(Z-score based on data since 1 January 2010)

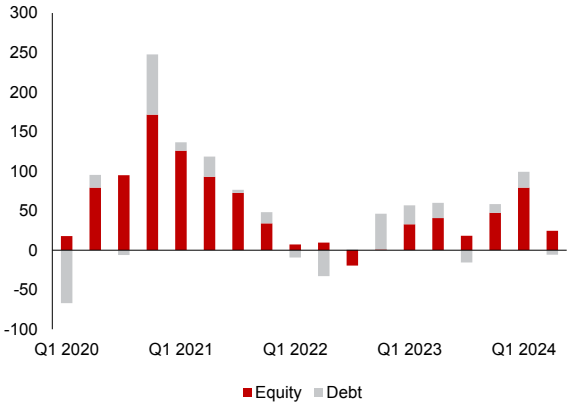
Financial market volatility has eased during the first half of 2024, but increased since August.



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: VIX refers to Chicago Board Options Exchange's Volatility Index. MOVE refers to Merrill Lynch Option Volatility Estimate Index. CVIX refers to Deutsche Bank Currency Volatility Index. FX = Foreign exchange. Vol = volatility. Data as of 9 September 2024.

Figure 1.5. Emerging Markets: Portfolio Investment Flows
(Billions of US dollar)

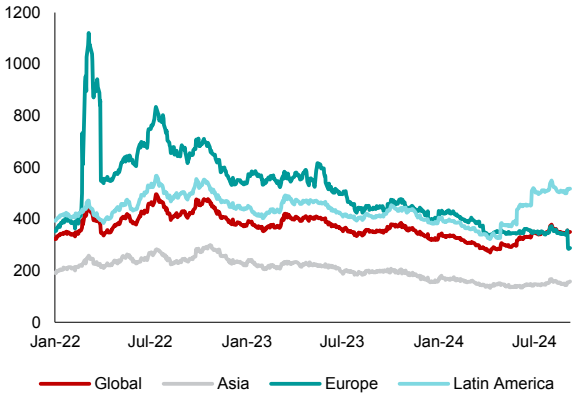
Portfolio inflows continued in emerging markets in 2024.



Source: Institute of International Finance via Haver Analytics; AMRO staff calculations.
Note: Data as of Q2 2024.

Figure 1.6. World and Selected Regions: Sovereign Spread by Region
(Basis points)

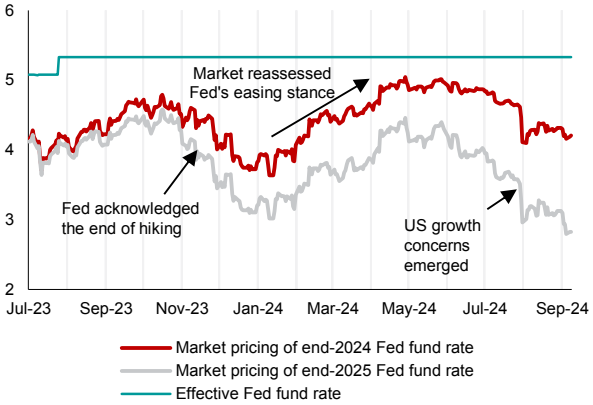
Sovereign spreads have narrowed from 2023 in most emerging markets.



Source: Haver Analytics.
Note: Data as of 9 September 2024.

Figure 1.7. US: Fed Rate Expectations for End-2024 and End-2025
(Percent)

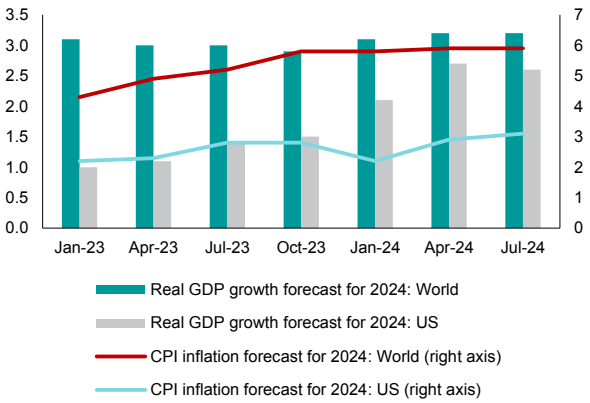
The market expects the Fed to ease monetary policy by around 100 basis points in 2024.



Source: Bloomberg Finance L.P.
Note: Data as of 9 September 2024.

Figure 1.8. World and US: Forecasts Evolution of Growth and Inflation
(Percent)

Forecasts show that the US and global growth outlook have improved while inflation outlook remain stable.



Source: IMF World Economic Outlook reports from the January 2023 edition to the July 2024 edition.

The risks highlighted in *AFSR* 2023 have evolved to varying degrees but have overall receded. These risks included the persistence (and potential resurgence) of inflation and further monetary tightening, banking sector stress, and US dollar funding stress.

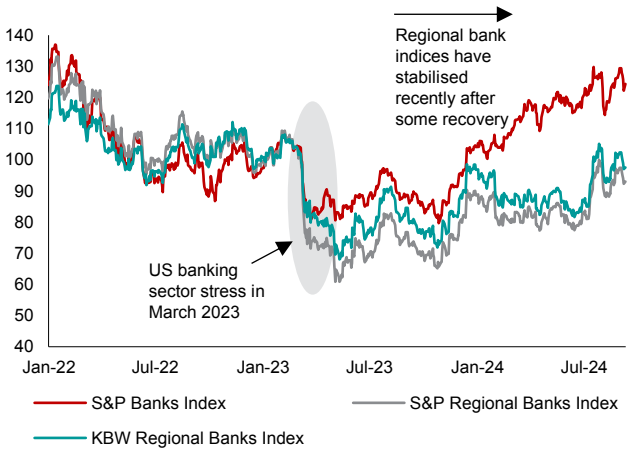
- The progress on disinflation has been slow. Consequently, both market participants and policymakers had scaled back their expectations of monetary easing through the first half of 2024. The risks of interest rate hikes can rise significantly if there is a resurgence in inflation, putting pressure on central banks to tighten further.
- US regional bank equity indices remain lower than the levels seen before the March 2023 stress, but their current pricing indicates the worst may be over, with the stocks stabilizing (Figure 1.9) despite the stress in one of the regional banks, New York Community Bancorp (NYCB) in January 2024.[3]
- US dollar funding has remained stable. The risks of a funding squeeze have decreased materially as the Fed is expected to ease monetary policy and end Quantitative Tightening in the coming quarters.

However, other risks have intensified and could cloud the outlook for global financial stability

- The concerns around the US recession or hard landing injected significant volatility in the global financial markets. Meanwhile, lingering concerns that a resurgence of inflation could lead to renewed rounds of central bank tightening or limit the Fed's ability to calm the market added to market anxiety in early August.
- Risks from geopolitical tensions have increased significantly with tensions in Middle East continuing to simmer, and evolving risks from the US presidential election. Middle East tensions may affect commodity prices and market sentiments, which could raise upside risks on inflation and downside risks on growth. Meanwhile, the upcoming US presidential election creates policy uncertainties with significant implications for ASEAN+3, potentially heightening global tensions and exacerbating economic fragmentation.
- The stress in corporate real estate (CRE)—partly reflecting a structural shift toward remote work and e-commerce following the pandemic—has intensified in the US and other major developed markets (Figure 1.10). This poses risks to banks with large exposure to CRE. During 2024, some banks reported losses on their CRE exposures, adding to concerns of financial distress.[4]

Figure 1.9. US: Banking Sector Stock Indices
(Index, 1 January 2022 = 100)

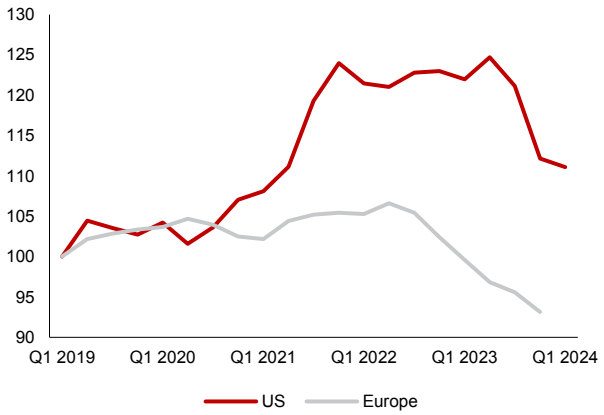
US banking sector indices have stabilized reflecting easing investor concerns.



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: KBW = Keefe, Bruyette, and Woods; S&P = Standard & Poor's. Data as of 9 September 2024.

Figure 1.10. US and Europe: Corporate Real Estate Price Indices
(Index, 2019 =100)

Corporate real estate prices continue to fall in major advanced economies.



Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Data as of Q1 2024 for the US and Q4 2023 for EU.

[3] The NYCB acquired distressed Signature Bank in March 2023, inheriting its high exposure to commercial real estate (CRE) loans. The weakness in CRE adversely impacted property owners. On 31 January 2024, NYCB reported unexpected losses due to soured loans and a 70-percent cut in dividends, leading to rating downgrades by Fitch and Moody's to junk status, and to the replacement of NYCB's chief executive in February.

[4] US regional lender First Foundation on 3 July 2024 disclosed an unexpected capital infusion by a consortium of investment companies. Like NYCB, the bank also had a large portfolio of multifamily real estate loans. Japan's Aozora Bank in February 2024 announced its first loss in 15 years due to impaired loans associated with the US commercial real estate. German bank Deustche Pfanbriefbank's loan book was tied to the US commercial real estate. The S&P credit rating agency downgraded its outlook for the bank on 14 February, 2024.

Idiosyncratic factors limited the benefits to ASEAN+3 markets from easier global financial conditions

After easing across ASEAN+3 in 2023, market stress indices in 2024 have shown some divergence. Our estimates indicate market stress (Figures 1.11 to 1.14) eased across the region and across components in 2023, but the estimates have shown wider divergence in 2024.[5] The biggest drivers behind the easing market stress in 2023 were real domestic government bond yields and foreign exchange market volatility. In 2024, the stress has increased in Japan (high stock market and foreign exchange volatility) and the Philippines (weakness in real effective exchange rate or REER), while easing significantly in Korea (stabilization of real residential prices) and Thailand (lower foreign exchange market volatility). The market stress index rose in early August, most notably in Japan, Korea, and Malaysia, due to heightened stock market and foreign exchange volatilities during the global equity sell-off on 5 August.

Figure 1.11. Plus-3: Market Stress Indicators
(Index)

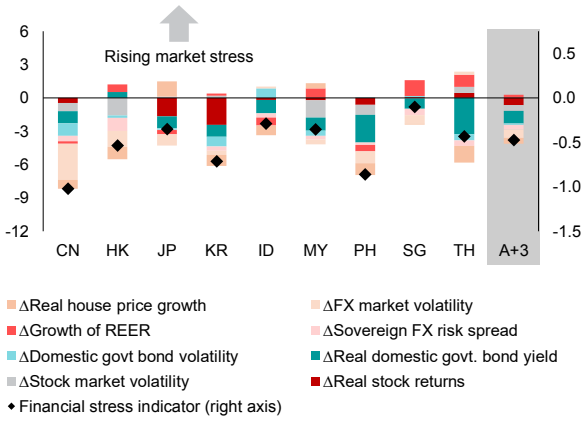
Market stress eased in 2024 before rising in August 2024, with the Plus-3 markets experiencing a sharper rise than ASEAN.

Figure 1.12. ASEAN: Market Stress Indicators
(Index)

Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: The Market Stress Index is based on the Mispricing Risk (Refined) proposed in Hennig, Iossifov, and Varghese (2023) which attempts to capture the slack in financial conditions. The Mispricing Risk (Refined) is constructed using a simple average of indicators of price growth and volatility transformed into within-economy percentiles. The measure of risk uses real equity market returns, equity market volatility, domestic sovereign bond yield volatility, sovereign foreign exchange risk spreads, foreign exchange market volatility and real house price growth. We introduce two additional parameters, real domestic government bond yield and growth of real effective exchange rate (REER), which are included in the construction of Mispricing Risk (Unrefined) as high frequency data are available. We also flip the sign of the resultant index so that higher values of the index indicate less slack in financial conditions, to create the Market Stress Index. Data as of Data as of 9 September 2024.

Figure 1.13. Selected ASEAN+3: Contributors to Change in Market Stress from End-2022 to End-2023
(Index)

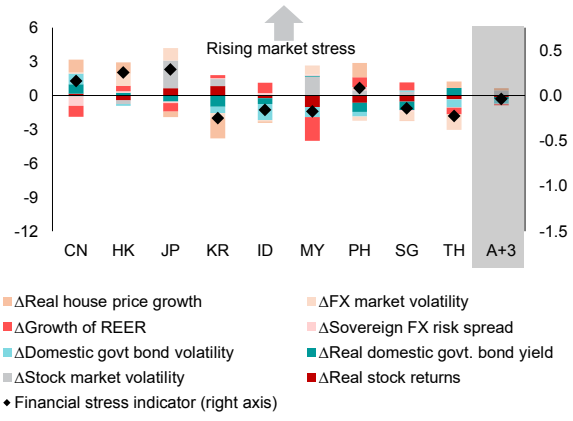
Market stress eased across ASEAN+3 in 2023…



Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: A rise in stock market volatility, real domestic government yields, domestic government bond yield volatility, sovereign foreign exchange risk spread, and foreign exchange market volatility; and a fall in real stock market returns, growth of REER and real house prices contribute to higher market stress. FX = foreign exchange; govt. = government; REER = real effective exchange rate; Δ = change in; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; A+3 = Average of Selected ASEAN+3. Data as of 9 September 2024.

Figure 1.14. Selected ASEAN+3: Contributors to Change in Market Stress from End-2023 to August 2024
(Index)

… but there has been divergence in 2024.



Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: A rise in stock market volatility, real domestic government yields, domestic government bond yield volatility, sovereign foreign exchange risk spread, and foreign exchange market volatility; and a fall in real stock market returns, growth of REER and real house prices contribute to higher market stress. FX = foreign exchange; govt. = government; REER = real effective exchange rate; Δ = change in; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; A+3 = Average of Selected ASEAN+3. Data as of 9 September 2024.

[5] Based on the methodology laid out in Hennig, Iossifov and Varghese (2023). The Market Stress Index is based on the Mispricing Risk (Refined) proposed in Hennig, Iossifov, and Varghese (2023) which attempts to capture the slack in financial conditions. The Mispricing Risk (Refined) is constructed using a simple average of indicators of price growth and volatility transformed into within-country percentiles. The measure of risk uses real equity market returns, equity market volatility, domestic sovereign bond yield volatility, sovereign foreign exchange risk spreads, foreign exchange market volatility and real house price growth. Two additional parameters—real domestic government bond yield and growth of real effective exchange rate (REER)—are introduced into the analysis. These are included in the construction of Mispricing Risk (Unrefined) as high frequency data are available. The sign of the resultant index is also flipped, so that higher values of the index indicate less slack in financial conditions, to create the Market Stress Index.

ASEAN+3 markets generally followed global trends but were also affected by idiosyncratic factors. The spillovers from the US technology stocks were limited in ASEAN+3, with only IT and communications stocks in some economies responding to the rally in first half of 2024 and the sharp sell-off in July and August (Box 1.1). On average, ASEAN+3 equity markets underperformed US equities, while the bond yields were less sensitive to changes in in the US Treasury yields. A wider interest rate differential exerted depreciation pressures on regional currencies during the first half of 2024. However, as the Fed policy easing became imminent, US Treasury yields eased and narrowed the interest rate differential, helping regional currencies strengthen against the US dollar (Figures 1.15 to 1.18).

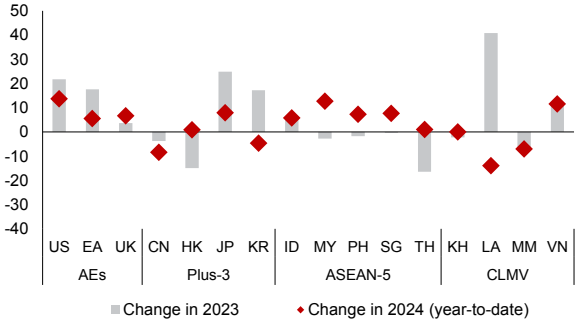
- Japan's currency and equity markets were outliers in the region for most of 2024. The yen remained sensitive to interest rate differentials. Until July 2024, the outperformance of the stock market was driven by a weak yen, which helped improve corporate earnings, and enhanced corporate governance frameworks.[6] However, the sell-off in Japanese equity markets and rapid yen appreciation in early-August partially reversed the changes seen earlier in the year.

- The other notable exception was Thailand where equities and the baht underperformed most regional peers amid weaker growth and political uncertainties for most of the first half of 2024. However, the uncertainties eased during the third quarter, and Thai equities and the baht recovered, amid weakness in the US dollar.

- Chinese government bond yields fell in 2024 as inflation remained very low and the People's Bank of China maintained its monetary policy stance to support growth. China's equity markets recovered from a slump in January and February 2024 amid government efforts to support the property markets and implement capital market reforms.[7]

Figure 1.15. Selected ASEAN+3: Changes in Equity Markets
(Percent, log changes)

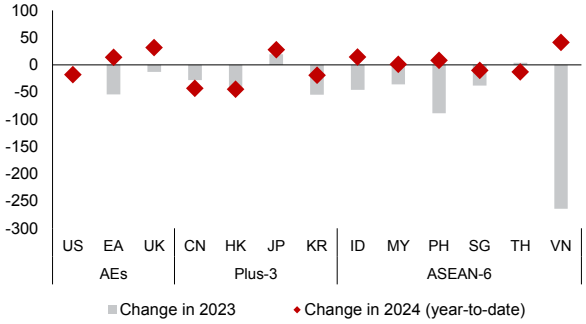
Most ASEAN+3 equity markets strengthened in 2024…



Source: National authorities via Bloomberg Finance L.P.; Bank for International Settlements; Haver Analytics; AMRO staff calculations.
Note: The DXY Index is used to determine the change in the US dollar. AEs = advanced economies; CN = China; EA = euro area; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; UK = United Kingdom; US = United States. VN = Vietnam. Data for 2024 (year-to-date) as of 9 September 2024.

Figure 1.16. Selected ASEAN+3: Changes in 10-Year Bond Yields
(Basis points)

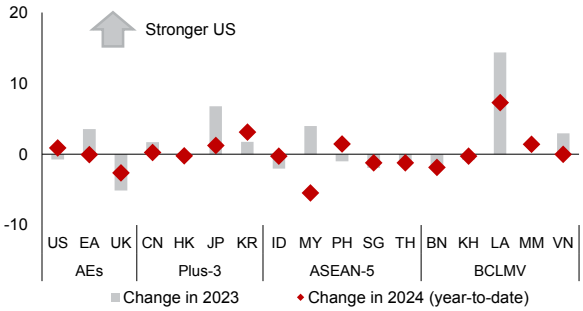
… while bond yields were mixed.



Source: National authorities via Bloomberg Finance L.P.; Bank for International Settlements; Haver Analytics; AMRO staff calculations.
Note: The DXY Index is used to determine the change in the US dollar. AEs = advanced economies; CN = China; EA = euro area; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; UK = United Kingdom; US = United States. VN = Vietnam. Data for 2024 (year-to-date) as of 9 September 2024.

Figure 1.17. Selected ASEAN+3: Exchange Rates against the US Dollar
(Percent, log changes)

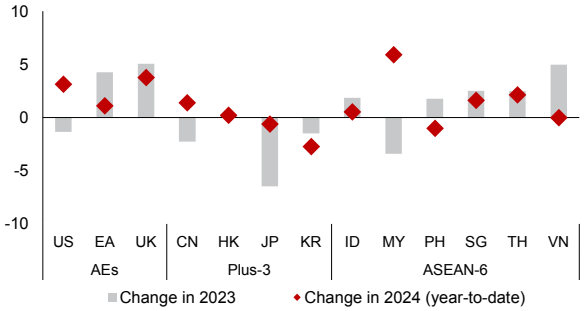
ASEAN+3 currencies generally reversed their weakness against the US dollar in the third quarter of 2024…



Source: National authorities via Bloomberg Finance L.P.; Bank for International Settlements; Haver Analytics; AMRO staff calculations.
Note: The DXY Index is used to determine the change in the US dollar. AEs = advanced economies; BN = Brunei; CN = China; EA = euro area; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; H = Philippines; SG = Singapore; TH = Thailand; UK = United Kingdom; US = United States. VN = Vietnam. Data for 2024 (year-to-date) as of 9 September 2024.

Figure 1.18. Selected ASEAN+3: Nominal Effective Exchange Rates
(Percent, log changes)

… and were mixed on on a NEER basis in 2024.



Source: National authorities via Bloomberg Finance L.P.; Bank for International Settlements; Haver Analytics; AMRO staff calculations.
Note: The DXY Index is used to determine the change in the US dollar. AEs = advanced economies; CN = China; EA = euro area; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; UK = United Kingdom; US = United States. VN = Vietnam. Data for 2024 (year-to-date) as of 9 September 2024.

[6] Enhancements to corporate governance frameworks include revisions to the Japan's Corporate Governance Code which called for stronger commitment to capital efficiency and shareholder returns from listed companies: (1) Securing the rights and equal treatment of shareholders (including minority and foreign), (2) Appropriate cooperation with stakeholders (such as employees, customers, business partners, and so on) other than shareholders, (3) Ensuring appropriate information disclosure and transparency (in both financial and nonfinancial information), (4) Responsibilities of the board, including setting broad direction of corporate strategy, establishing an appropriate risk-taking environment, and carrying out objective oversight of management, (5) Dialogue with shareholders to listen to their views and concerns, explain business policies to them, and develop an understanding of positions.

[7] The State Council issued a "Nine-Point Guideline" in April 2024 which encourages dividend payments, ensures the quality of new stock offerings and strengthens corporate governance.

Box 1.1:

Sectoral Performance of Equities

US equity markets have seen a strong recovery in 2023 and 2024. While the Fed's pivot away from a hawkish stance was an important driver, the recovery was also helped by a strong performance by technology stocks in first half of 2024, especially those standing to benefit from the increasing demand for artificial intelligence (AI) products, and strong corporate earnings. The AI-related stocks, which are primarily concentrated in the Information Technology and Communications sectors, have led the rally in US stocks in 2023 and 2024 (Figure 1.1.1). Corporate earnings have also been strong since early 2023 as many companies successfully implemented cost-cutting measures while the spillovers to the broader economy were limited. Since 2022, the gap between the number of companies reporting better earnings than analysts expected versus those reporting worse, has widened (Figure 1.1.2).

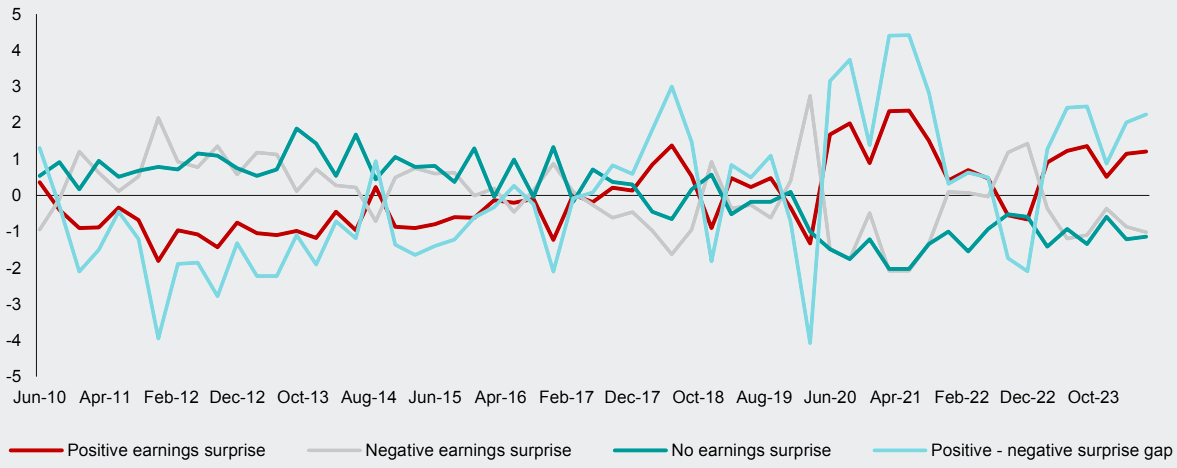
Figure 1.1.1: Selected ASEAN+3 and US: Sectoral Equity Performance
(Year-to-date, percent log changes)

	2023											2024										
	US	CN	HK	ID	JP	KR	MY	PH	SG	TH	Avg*	US	CN	HK	ID	JP	KR	MY	PH	SG	TH	Avg*
Overall	22	-14	-20	2	23	21	-3	1	-1	-15	-1	13	-2	-11	-1	9	-6	11	10	13	3	3
Energy	-5	15		-31	26	-5	-11			-8	-3	3	8		29	18	-14	-14			-5	4
Materials	10	-18		-12	34	11	-10			-21	-3	5	-3		6	-5	-42	-15			-25	-14
Industrials	17	-22	-13	-13	26	16	-2	-2	16	-21	-2	11	3	2		12	-11	25	12	-8	-2	4
Consumer discretionary	34	-17	-15	-23	28	26	-5	9	5	-21	-2	5	-6	-46	-48	0	4	0	0	-20	-9	-14
Consumer staples	-2	-27	-18	-5	7	-20	-8	-26	-16	-25	-15	16	-27	10	-4	7	6	-1	-26	-13	17	-4
Health care	1	-24	0	-26	3	20	-5			-2	-5	13	-28	0	8	15	16	11			11	5
Financials	12	-11	-24	13	23	13	-1	13	0	-8	2	17	8	-17	5	23	29	20	23	16	10	13
Information technology	43	-5	0		35	32	14		-26	6	8	17	-9	0		3	-12	-1		0	14	-1
Communication services	43	-6	-3	4	13	5	-4	-9	-16	-4	-2	14	11	7	-27	9	-23	0	13	45	28	7
Utilities	-10	-18	0	0	33	-14	3	18		-42	-3	20	7	12	0	10	14	19	1	-8	-15	4
Real estate	7	-38	-25	0	17		0	0	-2	-8	-7	9	-29	-12	0	9		0	-2	-7	-8	-6

Source: MSCI indices via Bloomberg Finance L.P.; AMRO staff calculation.
Note: MSCI indices are based on the Global Industry Classification Standard (GICS). The average is calculated by taking simple averages across the ASEAN+3 economies. Avg = Average; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States; YTD = year-to-date. 2024 data as of 9 September 2024.

The author of this box is Prashant Pande.

Figure 1.1.2. US: S&P 500 Corporate Earnings Surprises
(z-score)



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: z-score is calculated based on quarterly data from Q2 2010. S&P = Standard & Poor's. Data as of Q2 2024.

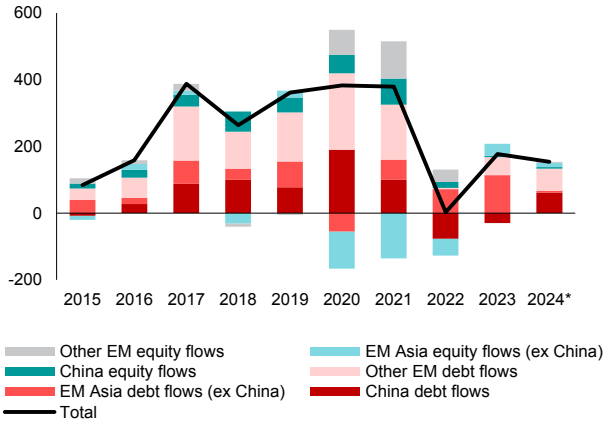
In ASEAN+3 markets, the equity markets have also responded to idiosyncratic factors and have not performed as well as their US counterparts. The equity sell-off in early August was also, on average, more severe for ASEAN+3 than the US and further increased the divergence. Financial sector stocks have been the leaders in 2024 and, banks in Japan and Korea have led the rally. Japanese banks benefitted from expectations of rising interest rates while Korean banks have been the primary beneficiaries from higher investor confidence due to the "Corporate Value-Up" program launched earlier in the year.[1] IT and communications sectors have also strengthened due to spillovers from the US markets and stocks from Malaysia and Singapore have benefitted. Consumer discretionary sector in Hong Kong and Indonesia, and materials sector in Korea and Thailand have seen significant declines while the real estate sector stocks have also lagged, with shares in Thailand, Hong Kong and China seeing the most weakness.

[1] On 26 February 2024, Korea's Financial Services Commission unveiled the Corporate Value-Up program that aims to bolster domestic stock market through attracting foreign investments and to reduce the so-called "Korea discount", referring to the gap in valuations between local firms and global peers due to various factors. Basically, the framework comprises of three pillars: (1) supporting listed firms in preparing, disclosing and rolling out of their value-up plans; (2) supporting investors in better assessing firms' corporate value through evaluating their initiatives and performances; and (3) establishing a dedicated system to support the execution of the program over the mid- to long-term (FSC 2024).

Portfolio flows in ASEAN+3 present a mixed picture as the region's asset valuations have been lackluster relative to elsewhere (Figures 1.19 to 1.22). Debt flows in most regional debt markets surged in November 2023 but lost momentum in the first half of 2024. As US Treasury yields rose and became more attractive for investors, emerging debt markets in ASEAN+3 experienced outflows. The exception was Korea, where foreigners increased bond holdings on expectations of monetary easing later in the year. Indonesia's government bonds saw outflows largely because their valuations against US Treasuries deteriorated (Box 1.2), while fiscal uncertainties led to reduced demand for Thai debt securities. Korea also stood out in equity flows as demand for artificial intelligence related stocks surged and spilled over to related Korean companies. Foreign investors reduced their holdings of Thai equities amid stock and currency weakness. That said, as the Fed's monetary easing became imminent during the third quarter, US treasury yields eased, and valuations improved for ASEAN+3 bond enabling a strong inflow in August. Fed's policy easing, if accompanied with a low volatility environment, could help ASEAN+3 markets receive inflows over the coming months.

Figure 1.19. Emerging Markets: Annual Portfolio Flows
(Billions of US dollar)

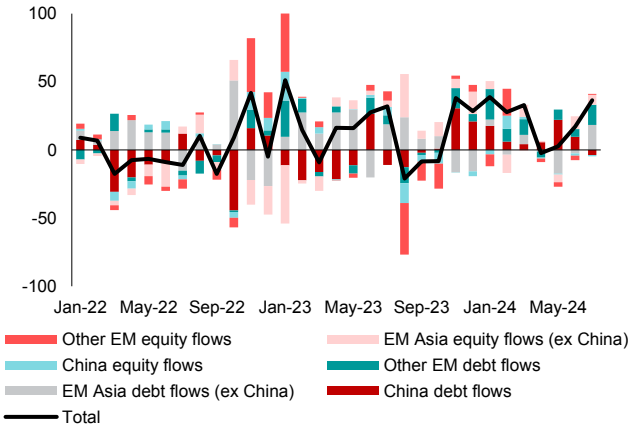
Foreign portfolio inflows into emerging markets continued in 2024…



Source: The Institute of International Finance via Haver Analytics; AMRO staff calculations.
Note: EM = emerging market. Data as of June 2024.

Figure 1.20. Emerging Markets: Monthly Portfolio Flows
(Billions of US dollar)

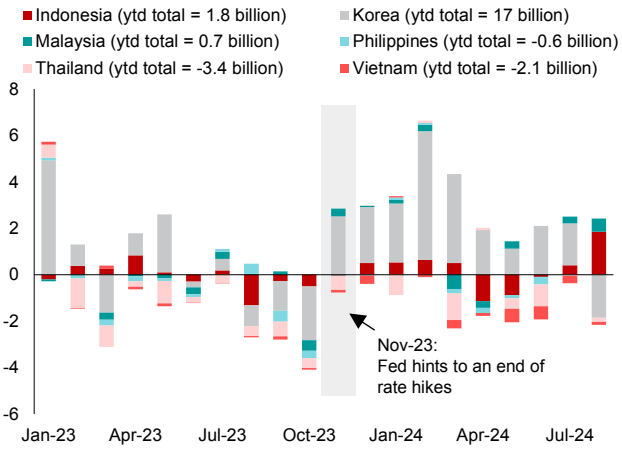
… but lost momentum in the first half of 2024.



Source: The Institute of International Finance via Haver Analytics; AMRO staff calculations.
Note: EM = emerging market. Data as of July 2024.

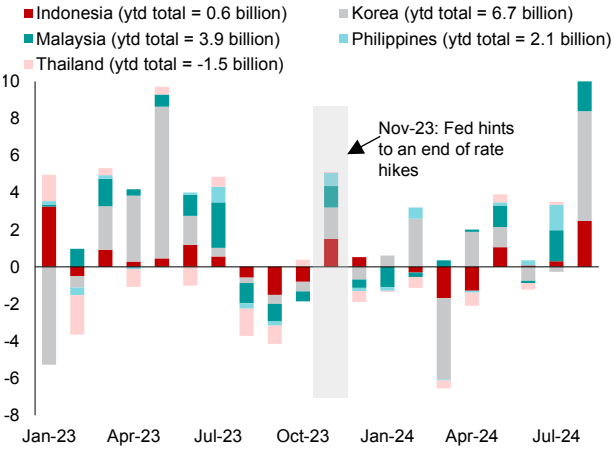
Figure 1.21. Selected ASEAN+3: Monthly Equity Flows
(Billions of US dollar)

In 2024, Korean equity and debt markets received strong inflows while foreign investors reduced their holdings of Thai assets.



Source: National authorities; Bloomberg Finance L.P; Haver Analytics; AMRO staff calculations
Note: Data as of August 2024.

Figure 1.22. Selected ASEAN+3: Monthly Debt Flows
(Billions of US dollar)



Source: National authorities; Bloomberg Finance L.P; Haver Analytics; AMRO staff calculations.
Note: The debt flows data includes foreign investments in local currency debt only. The data consists only of government bonds for Indonesia and the Philippines, and government and corporate bonds for other markets. Data as of August 2024.

Box 1.2:

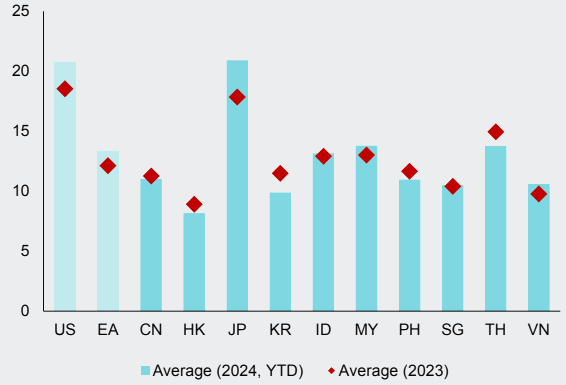
ASEAN+3 Asset Valuations

The continued strengthening of US equities further stretched their valuations, while valuations remain attractive for ASEAN+3 markets. The price-to-earnings ratio rose further, and the equity risk premium fell further for US equity markets. In ASEAN+3, only Japanese stock markets saw a comparable change in valuations. The price-to-earnings ratios fell for Hong Kong, Korea, the Philippines and Thailand stock markets while remaining broadly unchanged for China, Indonesia, Malaysia and Singapore (Figure 1.2.1). The equity risk premium rose for most ASEAN+3 economies (Figure 1.2.2). These indicators taken together show that ASEAN+3 equities are cheaper than their US counterparts and provide a better expected yield than the domestic bonds.

The yield differential of domestic bonds remains negative against the US (Figure 1.2.3), with Indonesia and Philippines being the exceptions. The spreads have moved in favor of the US since last year, leading to slower inflows in ASEAN+3 debt markets. The foreign exchange hedged valuations for bonds have worsened since 2023 but are still positive and indicate that foreign investors can still receive a positive carry-on bond investments using shorter-tenor foreign exchange hedges (Figure 1.2.4). The valuation could become more attractive as the US Fed moves closer to easing its monetary policy as the yield differential will move in favor of ASEAN+3 bond markets.

Overall, the valuations indicate that the ASEAN+3 equity and bond markets offer attractive valuations for foreign investors and could benefit from portfolio inflows during periods of low volatility and easing global interest rates.

Figure 1.2.1. US, Euro area, and Selected ASEAN+3: Forward Looking Price-to-Earnings Ratios
(Ratio)

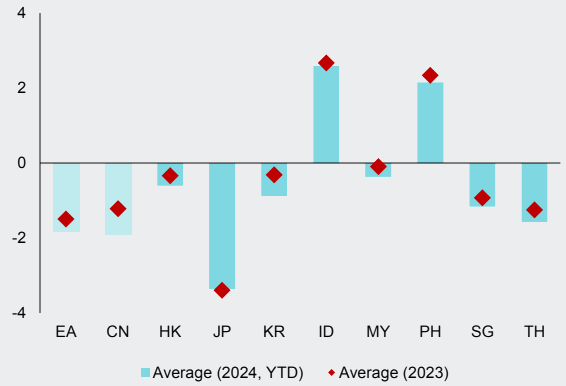


Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: The forward-looking price-to-earnings ratio used is for the benchmark equity indices of the respective markets. EA = Euro area; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States; VN = Vietnam; YTD = year-to-date. Data as of 9 September 2024.

Figure 1.2.2. US, Euro area, and Selected ASEAN+3: Equity Risk Premiums
(Percent)

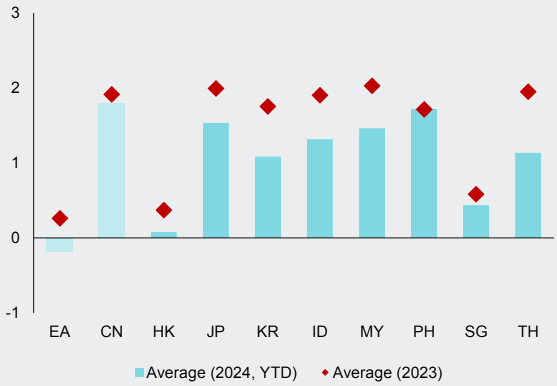
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: The Equity Risk Premium is calculated as the difference between forward-looking earnings-per-share for benchmark equity indices of the respective markets and the domestic 10-year bond yield. EA = Euro area; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States; VN = Vietnam; YTD = year-to-date. Data as of 9 September 2024.

Figure 1.2.3. Euro area and Selected ASEAN+3: 10-Year Yield against 10-year US Treasury Yield
(Basis points)



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: EA = Euro area; CN = China; GFC = global financial crisis; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; YTD = year-to-date. Data as of 9 September 2024.

Figure 1.2.4. Euro area and Selected ASEAN+3: FX Hedged 10-Year Yield against 10-year US Treasury Yield
(Basis points)



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: The domestic 10-year bonds are assumed to be foreign exchange hedged for one-year using foreign exchange forwards. EA = Euro area; CN = China; GFC = global financial crisis; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; YTD = year-to-date. Data as of 9 September 2024.

The authors of this box are Prashant Pande and Junjie Shi.

Most ASEAN+3 central banks are on hold and some are waiting for the right conditions to start cutting policy rates

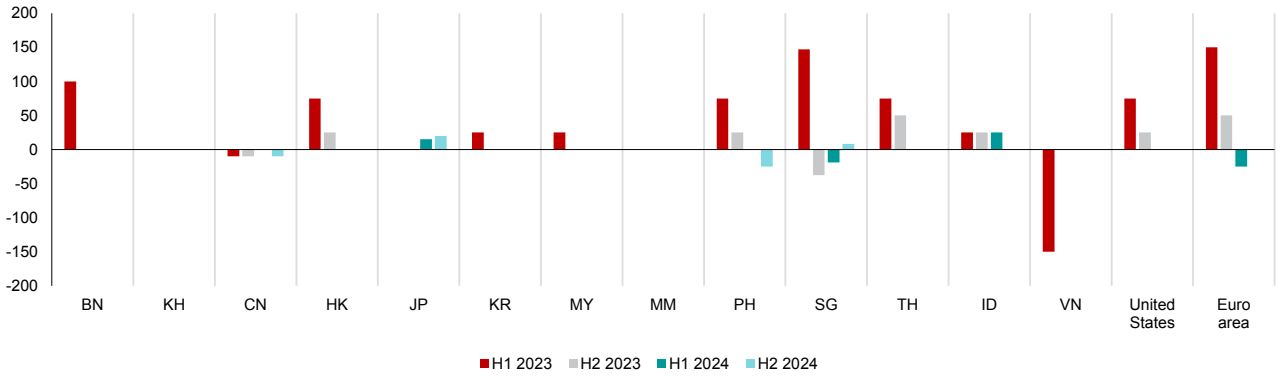
Central banks in ASEAN+3 have eased the pace of rate hikes since the second half of 2023. The pace decelerated significantly from the first half of2023 to the second half of 2023, with only Indonesia and Japan having raised interest rates during the first half of 2024 (Figure 1.23). For most economies in the region, policy rates are likely to have peaked, and most central banks are expected to cut rates (Figure 1.24), with some already having commenced easing. However, there are exceptions:

- China and Vietnam eased monetary policy in 2023 to support domestic growth. China further eased its monetary policy settings in July 2024 to provide further financial support for the economy.

- The Bank of Japan (BOJ) kept its ultra-easy monetary policy settings in 2023 as it waited for evidence of sustainable and stable achievement of the 2 percent price stability target by an intensified virtuous cycle between wages and prices.[8] The BOJ exited its negative interest rate regime in March 2024 and further raised the policy rates in July 2024. Market pricing suggests that market participants expect the BOJ to continue rate hikes in the coming quarters.

Figure 1.23. Selected ASEAN+3: Policy Rate Changes
(Basis points, semiannual changes)

The pace of rate hikes has eased in ASEAN+3 as compared with 2023 and some central banks have commenced easing.



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: H1 = first half of the year; H2 = second half of the year; BN = Brunei, KH = Cambodia; CN = China; HK = Hong Kong; JP = Japan; KR = Korea; MY = Malaysia; MM = Myanmar; PH = Philippines; SG = Singapore; TH = Thailand; ID = Indonesia; VN = Vietnam; For Brunei, we use the standing facility lending rate. For China, we use the People's Bank of China 7-day reverse repurchase yield. For Hong Kong, we use the Base Rate. Data for 2024 as of 9 September.

Easing inflationary pressures amid resilient growth suggests that regional central banks may not be in a hurry to deviate from their current monetary stance. Inflation across most ASEAN+3 economies have eased from 2023 to 2024, while growth is projected to be stronger in 2024 (Figure 1.25). Easing inflationary pressures have allowed central banks to stop hiking rates, with the inflation trajectory likely to be the biggest determinant of the timing of rate cuts. Some central banks may also prefer to keep monetary policy settings unchanged for longer, as they acknowledge the uncertainty around the inflation trajectory and want to be sure that inflation expectations are well-anchored around the inflation targets. However, beyond the inflation trajectory and expectations, other factors may influence central bank decisions around rate cuts.

- For the Bank of Korea, the decision on the timing of policy easing would depend on the effect on foreign exchange market volatility, housing prices, and household debt.

- Financial stability has also been a key consideration for the Bank of Thailand.[9] With the economy converging to its potential, long-term macro-financial stability considerations may allow the central bank to maintain its policy stance for a longer period.

- Bank Indonesia's (BI) monetary policy is also directed toward maintaining a stable exchange rate to prevent inflationary effects of a weaker currency. This prompted the central bank to hike in April 2024 to support the rupiah (Table 1.1).

- Bangko Sentral ng Pilipinas eased its policy rate in August 2024 as inflation remained on target-consistent path and the macroeconomic outlook supported a calibrated shift to less restrictive monetary policy.

[8] After adjusting the yield curve control (YCC) framework in July and October 2023, the BOJ exited the negative interest rate policy by scrapping the YCC on 19 March 2024. Furthermore, the BOJ announced the uncollateralized overnight call rate as its new policy rate and decided to encourage it to remain at around 0 to 0.1 percent, compared to the previous effective range of -0.1 to 0 percent. On 31 July, the BOJ lifted the policy rate again to "around 0.25 percent" and decided it would reduce the amount of its monthly outright government bond purchases such that it will be about JPY 3 trillion in Q1 2026.

[9] The Bank of Thailand has taken measures through bank and nonbank financial institutions to reduce risks related to high household debt. These include offering loan products that are suitable to customers' needs and repayment capabilities, aligning interest rates to borrowers' risk profiles, communicating to debtors on negative effects of persistent debt, and ensuring customers receive complete and accurate information on the products, among others.

Exchange rates are an important consideration for many regional central banks, and they have used various measures to support their currencies during the first half of 2024. While most regional central banks have maintained higher policy rates and have intervened in foreign exchange markets (including verbal interventions) to limit the volatility of their currencies, some have taken other measures to support their currencies.

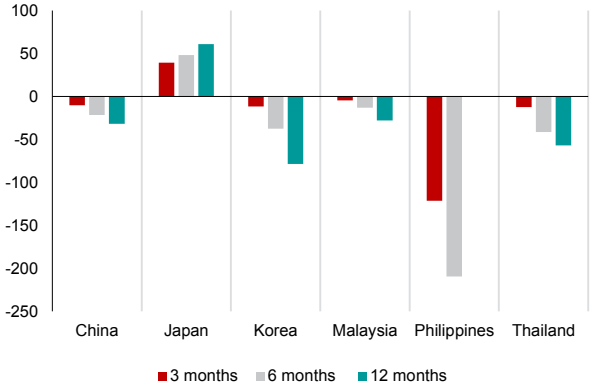
- Bank Negara Malaysia worked with the government to encourage government-linked companies, government-linked investment companies and corporates to repatriate their foreign earnings to help reduce the depreciation pressures on the ringgit.

- BI has implemented a multifaceted approach to support the rupiah and attract portfolio inflows. The BI has enhanced the interest rate structure of money markets to maintain attractive yields and introduced new investment instruments like Bank Indonesia Rupiah Securities (SRBI), Bank Indonesia Forex Securities (SVBI), and Bank Indonesia Forex Sukuk (SUVBI). These measures have also deepened the money market and strengthened monetary operations. Additionally, BI has stabilized the rupiah through interventions in the spot market, domestic non-deliverable forwards (DNDF), and secondary market for government securities.

- Korean authorities have been working with the National Pension Service (NPS), which is a large domestic investor, to manage the market impact due to NPS's US dollar demand. The measure includes maintaining a swap line with the Bank of Korea for NPS to borrow US dollars. This helps to ease the foreign exchange market imbalance between supply and demand by absorbing the demand in the spot market through swaps.

Figure 1.24. Selected ASEAN+3: Market-Implied Changes in Policy Rates
(Basis points)

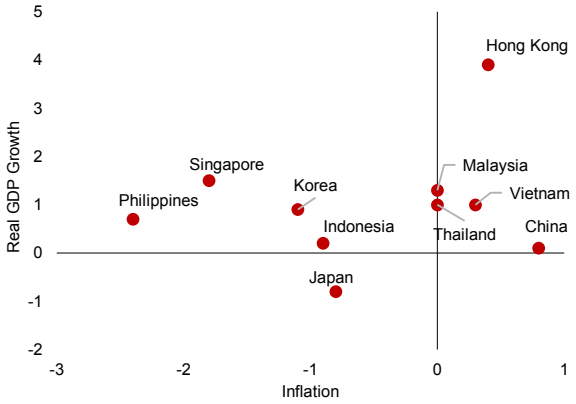
Most ASEAN+3 central banks are expected to lower interest rates in coming months.



Source: Bloomberg Finance L.P.; AMRO staff calculation
Note: Bars denote the cumulative changes in market-implied policy rates in a respective time horizon. The 12-month data point is not used for the Philippines due to its pricing irregularities. Data as of 9 September 2024.

Figure 1.25. Selected ASEAN+3: Expected Changes in Real GDP Growth and Inflation, 2023 versus 2024
(Percentage points)

Resilient growth and easing inflation have encouraged most ASEAN+3 central banks to maintain their policy stance.

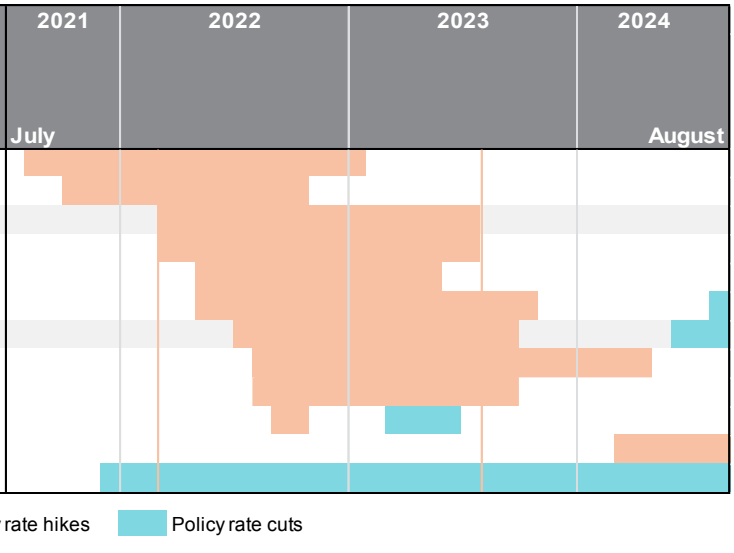


Source: AMRO ASEAN+3 Regional Economic Outlook 2024 July.
Note: The difference is calculated as 2024 forecasts minus 2023 actual data.

Table 1.1. Selected ASEAN+3, US and EU: Recent Hiking and Easing Cycles

ASEAN+3 central banks have ended their hiking cycles with China, Japan and Vietnam being the exceptions.

Economy	Change in key policy rate since July 2021 (basis points)	Months from first hike to last hike
Korea	300	17
Singapore		12
United States	**525**	**16**
Hong Kong	525	16
Malaysia	125	12
The Philippines	425	17
Europe	**425**	**14**
Indonesia	275	20
Thailand	200	13
Vietnam	50	2
Japan	35	
China*	-50	

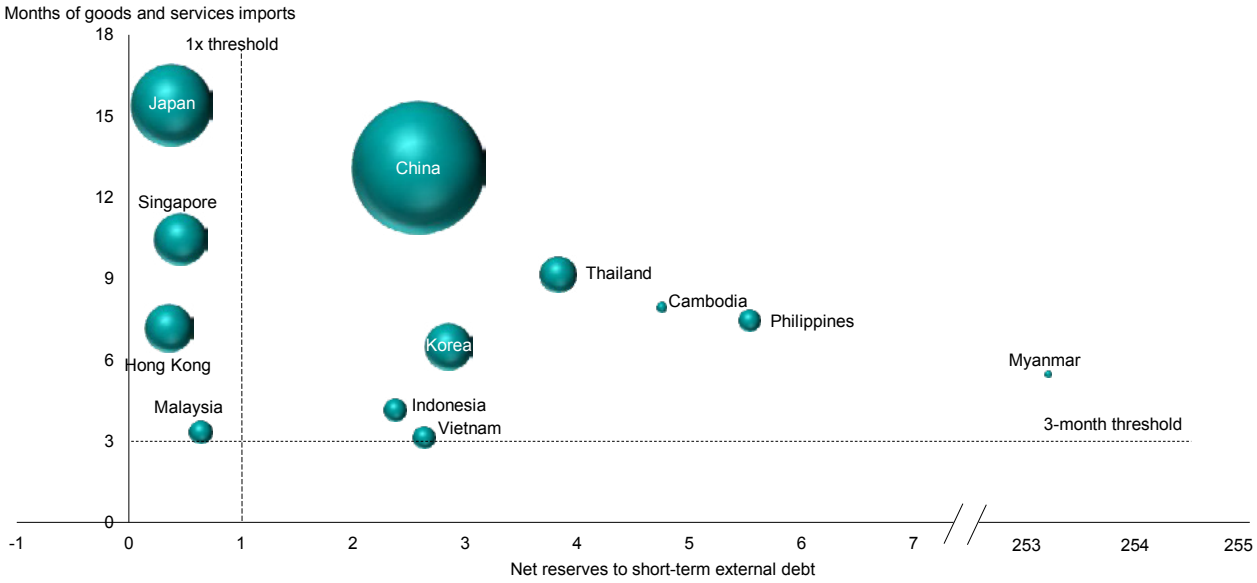


Source: Bloomberg, AMRO staff compilation.
Note: The orange bars show the period between the first and last hikes from July 2021 to August 2024. The blue bars show the duration between the first and the last cut during the same duration. The bars do not denote the pace or extent of rate changes but the change in policy rates during this period is shown in the second column. For China, we use the People's Bank of China 7-day reverse repurchase yield. For Hong Kong, we use the Base Rate. Data as of 9 September 2024.

The foreign exchange reserves for ASEAN+3 economies remain ample (Figure 1.26).[10] After increasing for most of the economies in 2023, foreign exchange reserves fell in 2024 (Figure 1.27). The fall can be attributed to a stronger US dollar (which reduces the dollar value of non-US dollar assets in the reserves) for most of the year and sporadic interventions taken by regional central banks to manage the volatility in the exchange rate. Though foreign exchange reserves have fallen, this has been driven by the foreign currency assets component of the reserves and central banks have continued to build their reserve holdings of gold. There seems to be a gradual shift in reserve allocation and almost all ASEAN+3 central banks (where data are available), now hold a greater share of their reserves in gold than at the end of 2021 (Figure 1.28). This is consistent with the trend of rising gold reserves globally and it is likely that in line with the global trend, regional central banks are also reducing their allocation of foreign reserves to US dollar assets (Douglass, Goldberg, and Hannaoui 2024).

Figure 1.26. ASEAN+3: Reserve Adequacy

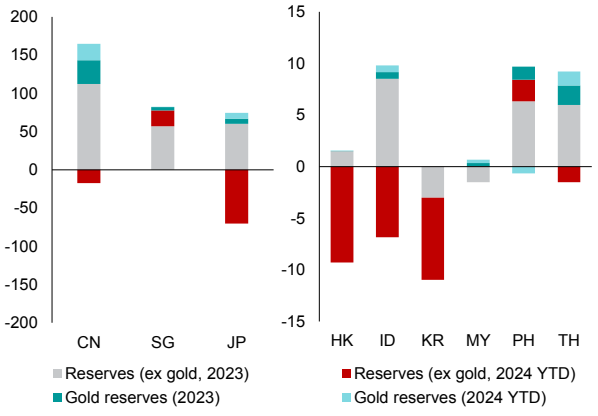
The foreign exchange reserves for ASEAN+3 economies remain ample.



Source: National authorities; International Monetary Fund; World Bank; AMRO staff calculations.
Note: Data for reserves are sourced from either national authorities or IMF IFS database and they are as of June 2024, except Cambodia, Vietnam (November 2023), Lao PDR (March 2024) and Myanmar (March 2021). Data for short-term external debt are sourced from IMF Quarterly External Debt Statistics database and they are as of Q1 2024, except Lao PDR, Myanmar (end-2021) and Vietnam (end-2023). Data for goods and services imports are sourced from either national authorities or IMF IFS database and they are as of Q1 2024, except Myanmar (Q3 2020). The size of the bubble denotes the relative amount of each economy's net international reserves in US dollars. Excludes Lao PDR due to data unavailability for recent short-term external debt.

Figure 1.27. Selected ASEAN+3: Changes in Foreign Reserves, 2023 and 2024
(Billions of US dollar)

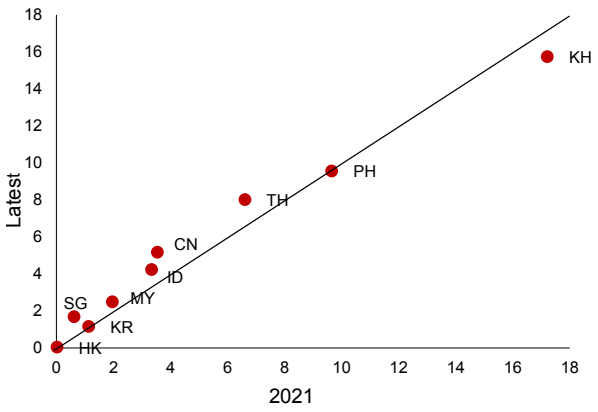
ASEAN+3 central bank reserves have broadly reduced in 2024…



Source: Haver Analytics; AMRO staff calculation
Note: CN = China; SG = Singapore; JP = Japan; HK = Hong Kong; ID = Indonesia; KR = Korea; MY = Malaysia; PH = The Philippines; TH = Thailand; YTD = year-to-date. Data as of June for 2024.

Figure 1.28. Selected ASEAN+3: Share of Gold in Foreign Reserves
(Percent for both scales)

… but holding of gold in reserves has continued to rise.



Source: Haver Analytics; AMRO staff calculation.
Note: KH = Cambodia; CN = China; HK = Hong Kong; ID = Indonesia; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand. Data as of June 2024.

[10] The reserve coverage for Lao PDR is below the three-month threshold of exports prescribed by the International Monetary Fund. Malaysia's reserve cover to external short-term debt has improved since last year and significant holdings of liquid external assets and the profile of short-term external debt liabilities further reduce the vulnerability. In Japan, Hong Kong, and Singapore, although official reserves are low on external short-term debt, public institutions and private businesses hold sizable external assets.

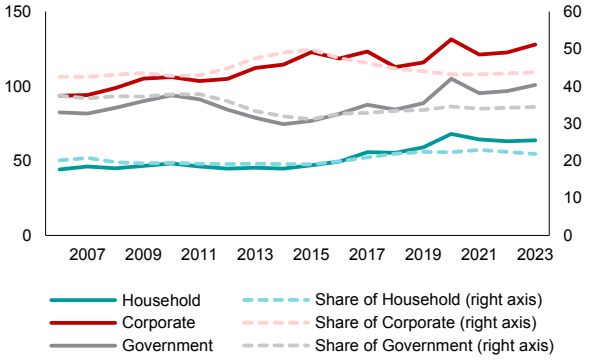
Debt-to-GDP ratios in many ASEAN+3 economies remain significantly higher than pre-pandemic

In 2023, ASEAN+3's total debt-to-GDP ratio—including corporate, household, and government debt—increased by 10 percentage points relative to 2022, exceeding 290 percent (Figure 1.29). The rise was driven largely by corporate and government debt, while household debt increased only modestly. Although interest rates in some economies have started to decline, the overall debt burden would likely remain high due to increased debt levels and the slow pace of interest rate reductions.

Vulnerability to high corporate debt continues to stem mainly from certain types of companies and certain sectors. Based on data available as of the end of 2023, listed companies maintained strong interest coverage ratios (ICRs) due to better disclosure and risk controls, although the ratio of vulnerable companies increased slightly relative to the level reported in the *AFSR* 2023. Meanwhile, many unlisted companies, particularly micro, small, and medium sized enterprises (MSMEs), with a stable share in corporate debt (Figure 1.30), are facing increased difficulties in debt servicing due to high interest rates (Figure 1.31). Corporate debt continued to be concentrated in the property and construction, manufacturing, and raw materials sectors. Debt levels in these sectors stabilized in 2023 after rising in 2022, which was driven by the post-pandemic resumption in activity. Stress in the property and construction sector remains elevated in 2024.

Figure 1.29. Selected ASEAN+3: Corporate, Government and Household Debt
(Percent of GDP, Percent)

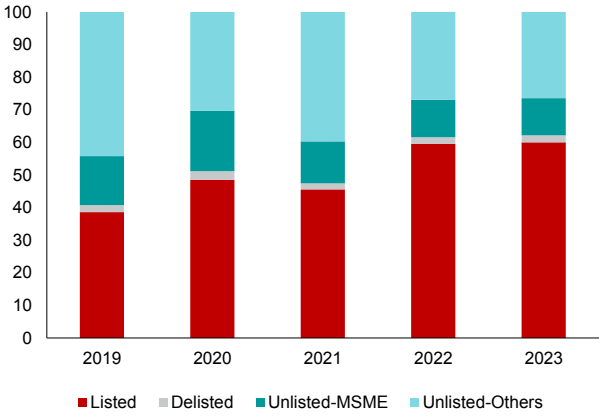
ASEAN+3's total debt-to-GDP ratio rose by 10 percentage points from 2022, driven by corporate and government debt.



Source: Bank for International Settlements (BIS); AMRO staff calculations.
Note: Data covers all economies reporting nonfinancial debt data to the BIS. Selected ASEAN+3 includes China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, and Thailand. Government debt data for these economies in nominal value, except for Korea, which reports market value.

Figure 1.30. ASEAN+3: Share of Corporate Debt by Firm Type
(Percent)

Listed firms' share of corporate debt in ASEAN+3 have increased.

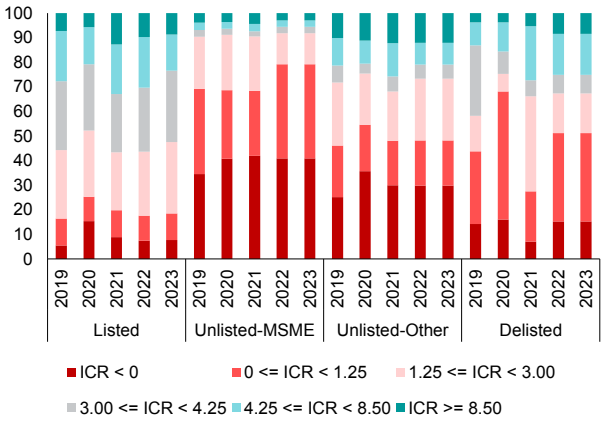


Source: Orbis; AMRO staff calculations.
Note: MSME = micro, small, and medium enterprise. Unlisted-Others refers to other sub-groups than MSMEs in the "unlisted" category.

Figure 1.31. ASEAN+3: Share of Corporate Debt by Interest Coverage Ratio (ICR) Range
(Percent of debt)

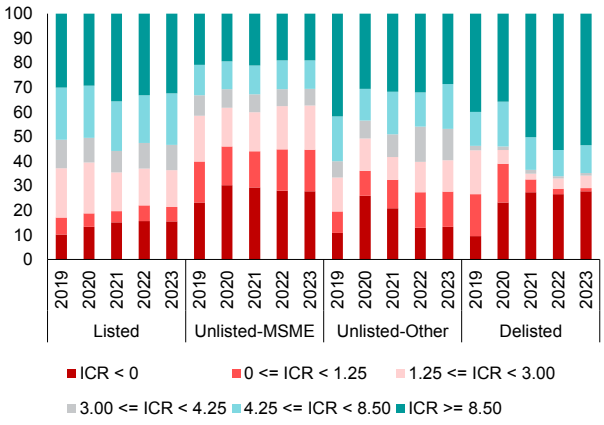
Many unlisted MSMEs are facing increased difficulties in meeting their debt obligations in recent years.

ASEAN



Source: Orbis; AMRO staff calculations.
Note: MSME = micro, small, and medium enterprise; ICR = interest coverage ratio.

Plus-3



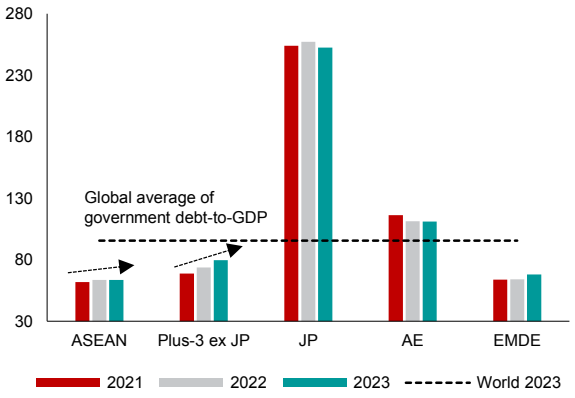
Source: Orbis; AMRO staff calculations.
Note: MSME = micro, small, and medium enterprise; ICR = interest coverage ratio.

The government debt-to-GDP ratio continued to rise in ASEAN+3 economies and the interest payment burden also increased. In the Plus-3 economies, the government debt-to-GDP ratio increased except for Japan, while the ratio in ASEAN countries remained stable, with mixed outcomes in individual countries (Figure 1.32). The interest payment-to-GDP ratio also increased significantly in 2023 for most ASEAN+3 economies as a result of higher debt levels and high interest rates (Figure 1.33). Due to the longer maturity of government debt (Figure 1.34) and the local currency denomination of the bulk of the debt, rollover risks are low in most economies in the short term, with only a few having significant debt with maturities by the end of 2025 (Figure 1.35).

The household debt burden in some ASEAN+3 economies increased, but some countries, such as Japan and Korea, experienced a reduction in their debt burden in 2023. According to AMRO's estimates, household debt burdens in 2023 have generally increased amid higher interest rates, except in China, Japan, and Korea (Figure 1.36), where they have eased slightly compared to 2022.[11] Meanwhile, house prices within the region in 2023 have converged to their "fundamental values", which are estimated by AMRO's macroeconomic model, especially in the Plus-3 economies (Figure 1.37).[12] This convergence suggests that the risk of a sharp fall in housing prices has diminished.

Figure 1.32. Selected Economies: Government Debt
(Percent of GDP)

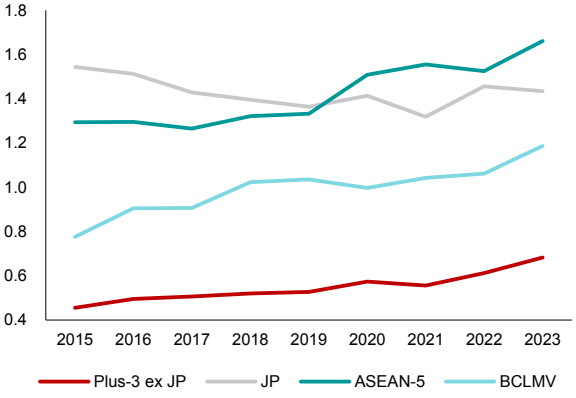
ASEAN+3's government debt-to-GDP ratio has risen in recent years.



Source: IMF World Economic Outlook April 2024; AMRO staff calculations.
Note: The dotted line is the weighted average of government debt-to-GDP of the World in 2023. A group's average is calculated as a GDP-weighted average of individual economies' ratios. ASEAN = Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam, Plus-3 ex Japan = China, Hong Kong, and Korea, AE = Advanced economies, EMDE = Emerging market and developing economies. Most data are calendar year-based, except for a few economies, including Hong Kong, Singapore, and Thailand, which report data based on their fiscal years.

Figure 1.33. Selected ASEAN+3: Government Interest Payments
(Percent of GDP)

Elevated debt levels and rising interest rates have driven up government interest payments.



Source: National authorities via CEIC and Haver Analytics; AMRO (2024b); AMRO staff calculation.
Note: The interest payments are based on fiscal years and are computed using simple averages among the economies within the specific group. Plus-3 ex Japan = China, Hong Kong, and Korea; JP = Japan; ASEAN-5 = Indonesia, Malaysia, Philippines, Singapore, and Thailand; BCLMV = Brunei, Cambodia, Laos, Myanmar, and Vietnam.

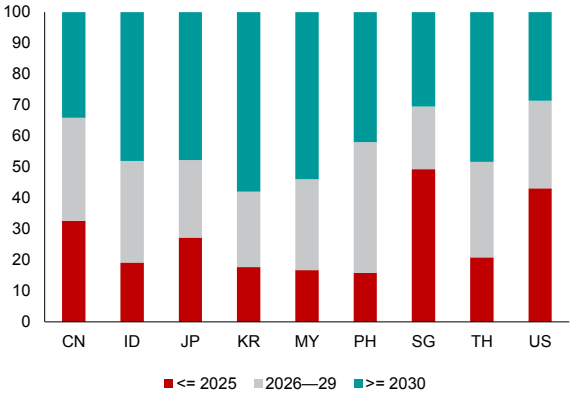
Figure 1.34. Selected Economies: Weighted Averages of Remaining Maturity of Government Securities, 2023
(Number of years)

Long average maturities of government bonds limit rollover risks.

Source: IMF Fiscal Monitor April 2024; AMRO staff calculations.
Note: The dotted line is a simple average of maturities of advanced economies and emerging market economies. CN = China; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam; AE = advanced economies; EM = emerging markets and developing middle-income economies.

Figure 1.35. Selected Economies: Maturity Profiles of Government Bonds, 2024
(Percent of total outstanding government bonds)

Only a few economies in the region have significant debt maturing by the end of 2025.



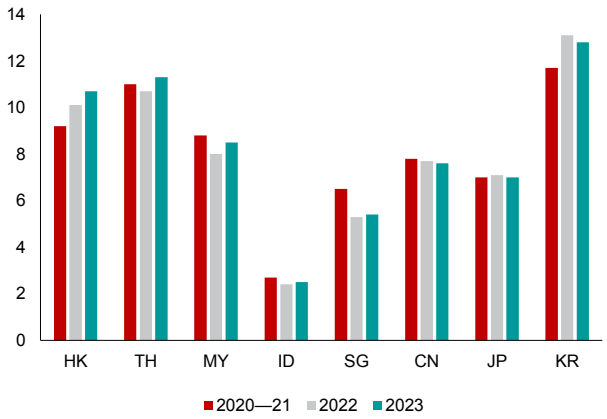
Source: Bloomberg Finance L.P; AMRO staff calculations
Note: Bond outstanding ratios maturing by 2025, between 2026 and 2029, and in or after 2030, respectively, to the total government outstanding amount. CN = China; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States. Data as of 30 June 2024.

[11] For detailed discussion, please refer to AFSR 2023. Our estimates, based on aggregate data and assumptions of 10-year loan maturity, could understate the actual debt burden. The actual burden may be greater, particularly in emerging market economies where loan terms are typically short and household income constitutes a small share of GDP.

[12] For detailed discussion, please refer to AFSR 2023. Fundamental drivers include real household income, stock market, mortgage rate and real credit to the household. To illustrate the gap between the actual rise in real house price and the increase predicted by model fundamentals, they are indexed to 100 in 2015 which is a year when the gap was generally small.

Figure 1.36. Selected ASEAN+3: Estimated Household Debt Burdens
(Percent of GDP)

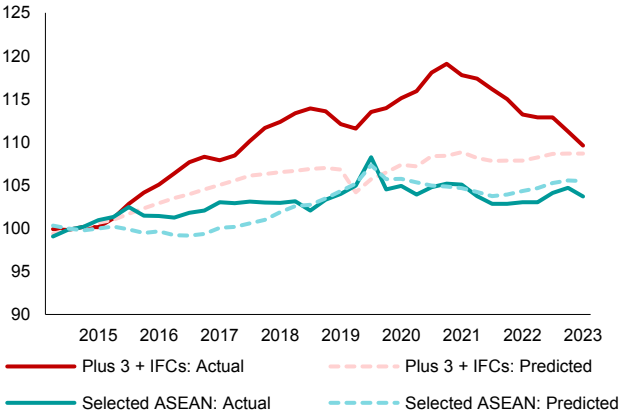
Household debt burdens generally increased in 2023 amid higher interest rates.



Source: National authorities; Bank for International Settlements; AMRO staff calculation.
Note: The debt burden is estimated by multiplying household debt by the interest rate and assuming a 10-year average debt maturity using the formula in Drehmann and others (2015). CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; SG = Singapore; TH = Thailand.

Figure 1.37. Selected ASEAN+3: Real House Price versus Predicted Value from A Model of Fundamental House Prices
(Index, 2015 = 100)

House prices in 2023 across the region converged to their fundamental values.



Source: National authorities; International Monetary Fund; Bank for International Settlements; AMRO staff estimates.
Note: Selected ASEAN economies included are Indonesia, Malaysia, Philippines, and Thailand. IFC = international financial center. Plus-3 and IFCs include China, Japan, Korea, Hong Kong, and Singapore.

ASEAN+3 financial institutions remain relatively sound, but pockets of vulnerabilities remain

In 2023, ASEAN+3 banks demonstrated resilience with strong capital buffers, effectively mitigating credit risks. ASEAN banks reported higher capital adequacy ratios (CARs) compared with banks in other regions. Plus-3 banks, though having relatively lower CARs than those of ASEAN banks, maintained levels comfortably above regulatory requirements (Figure 1.38) while boasting some of the world's lowest nonperforming loan ratios (Figure 1.39).

Despite stable credit quality and profitability, there are pockets of vulnerabilities in the banking system. First, heightened risks in the property and construction sectors could worsen banks' asset quality in some economies. As suggested in Chapter 2, the asset quality of bank loans in these sectors, as measured by property-related non-performing loan ratios, has deteriorated, especially in some plus-3 economies. Second, while deposits still account for the largest share of bank liabilities, the ratio of nondeposit liabilities to total liabilities shows an upward trend, with ASEAN+3 banks gradually shifting to market financing via bonds and repurchase operations.[13] This can expose banks to greater market risks and financial market volatility, such as an increase in the cost of raising funds from the market during a shock.[14]

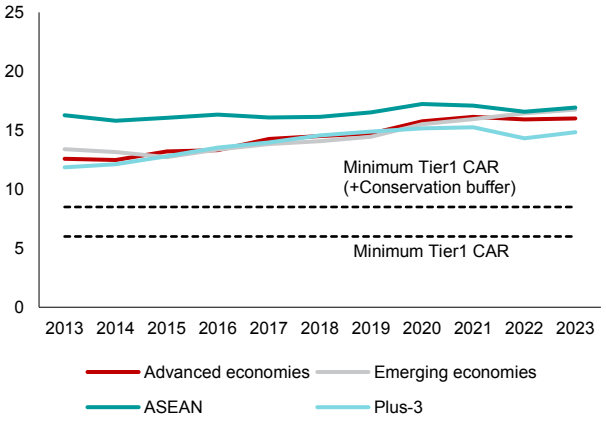
The nonbank financial intermediaries (NBFIs) sector in ASEAN+3 has continued to grow, in contrast to the declining share of NBFIs in total financing in other regions (Figure 1.40). The share of NBFIs in total financing in ASEAN+3 rose in 2023 although it remains significantly smaller than the banking sector. As emphasized in *AFSR 2023*, NBFIs offer a diversified range of financial products and market intermediation services, but they can also pose risks to financial stability. The main risks include potential liquidity pressures due to mismatches between NBFI asset and liability maturities, increased vulnerability to financial shock due to high leverage, the risk of contagion through interconnectedness with the banking sector, and the likelihood of engaging riskier activities where regulation is loose. Given the increased role of NBFIs, it is imperative to enhance surveillance and monitoring to mitigate potential risks.

[13] Ratio of non-deposit liabilities to total liabilities (percent, 2010 → 2022 → 2023): (ASEAN ex SG) 21.94 → 23.70 → 23.77, (Plus-3 ex HK) 12.59 → 19.74 → 20.57, (IFC) 25.50 → 32.16 → 31.63

[14] For example, the turmoil in the US and European banking sectors in 2023 hurt sentiment in the Plus-3 economies, leading to higher credit default swap (CDS) spreads and lower bank equity prices, which drove up the costs associated with securing market funding.

Figure 1.38. Selected Regions: Total Capital Adequacy Ratios (CARs)
(Percent)

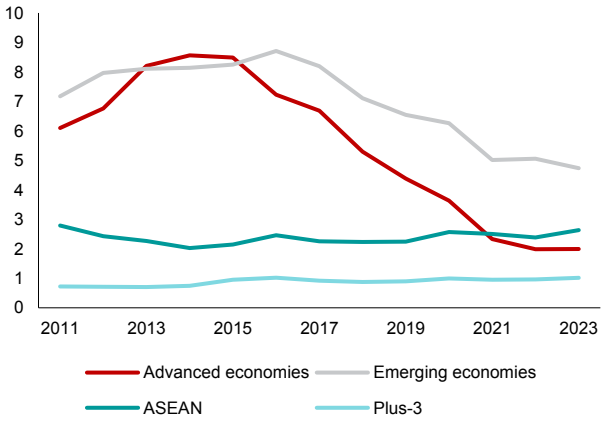
ASEAN+3 banks showed resilience with robust capital buffers, mitigating credit risks.



Source: National authorities; International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: The CARs are computed based on simple averages amongst economies in the specific region. Due to data availability, ASEAN economies not covered are Lao PDR, Myanmar, and Vietnam. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe. For countries that have not released end-2023 data, use the latest quarter data. Data for 2024 is as of Q1 2024. For countries that have not released Q1 2024 data, the most recent available quarter's data is used.

Figure 1.39. Selected Regions: Nonperforming Loan Ratios
(Percent)

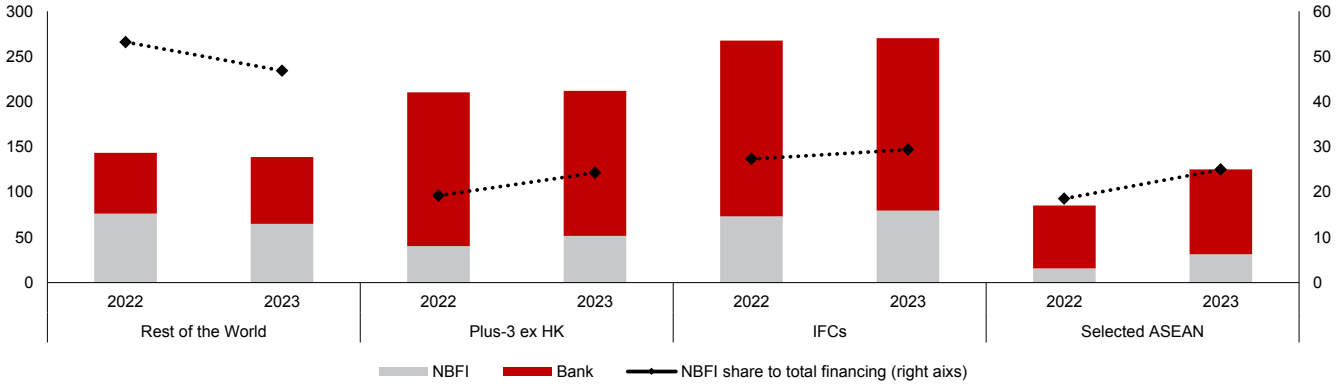
Banks in the region maintain high asset quality, with some of the world's lowest nonperforming loan ratios.



Source: National authorities; International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: The nonperforming loan ratios are computed based on simple averages amongst economies in the specific region. Due to data availability, Lao PDR, Myanmar, and Vietnam are excluded from the analysis for ASEAN. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe. For countries that have not released end-2023 data, use the latest quarter data. Data for 2024 is as of Q1 2024. For countries that have not released Q1 2024 data, the most recent available quarter's data is used.

Figure 1.40. World and ASEAN+3: Financing of Nonfinancial Private Sector by Banks and NBFIs
(Percent of GDP; percent)

NBFIs represent a smaller share of total financing than banks but continue to grow in ASEAN+3.



Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Plus-3 ex HK consists of China, Japan and Korea. International financial centers (IFCs) consist of Hong Kong and Singapore. Selected ASEAN consists of Indonesia, Malaysia, and Thailand. NBFI = nonbank financial intermediary..

II. Risks

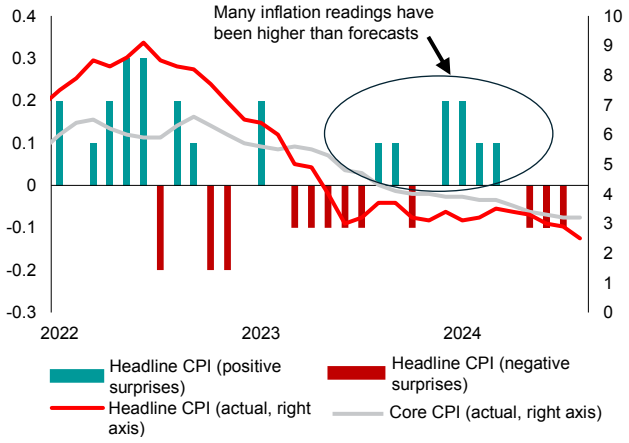
Markets juggle the twin threats of inflation resurgence and weak growth

The Fed's easing cycle seems imminent, but new risks are surfacing while old risks continue to loom. First, while inflation has continued to ease, disinflation has proceeded at a pace slower than market expectations (Figure 1.41). The final stretch of achieving disinflation has proved difficult, largely because services inflation has been persistent. Second, the risks around growth outlook have emerged, with rising concerns of a severe growth slowdown and, in an extreme scenario, a recession.

The worst-case scenario would be stagflation where high inflation (potentially triggered by commodity price hikes amid heightened geopolitical tensions) is accompanied by a recession. Persistent inflation in such a scenario might force the Fed to hike rates again, triggering a sharp repricing in global markets that currently are expecting monetary easing (Figure 1.42), and thus further weighing on the economic outlook.

Figure 1.41. US: Inflation and Inflation Data Surprises
(Percentage points; percent)

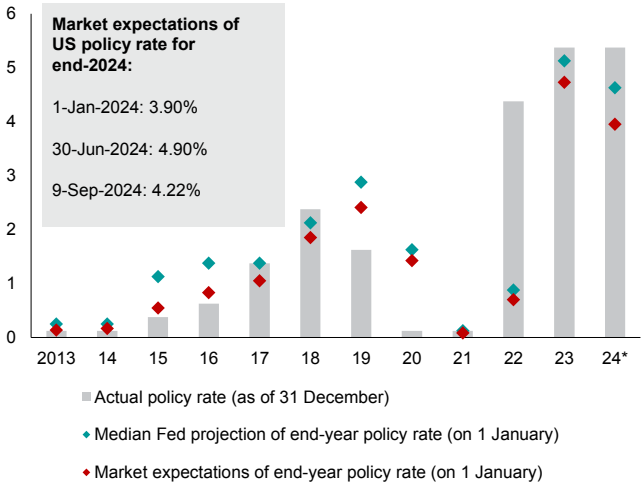
The disinflation has been slower than expected.



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: Headline CPI surprise is calculated as the difference between actual and forecast median of Bloomberg economist survey. CPI = consumer price index. Data as of August 2024.

Figure 1.42. US: Projected versus Actual Policy Rates
(Percent)

Markets continue to expect the Fed to ease monetary policy.



Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: The projected (at the start of year) is the latest available market pricing and median dots on 1 January for end-year policy rates. The intra-meeting change in market projections shows the average and median change in the market projections for the policy rates of each meeting during the year from the day after the previous meeting. Fed = Federal Reserve. Data for 2024 is as of 9 September 2024.

Rising geopolitical uncertainties could impact financial stability through multiple channels

Geopolitical uncertainties have increased since the publication of AFSR 2023. The risks can be broadly divided into three categories, each presenting a separate set of financial stability challenges for ASEAN+3:

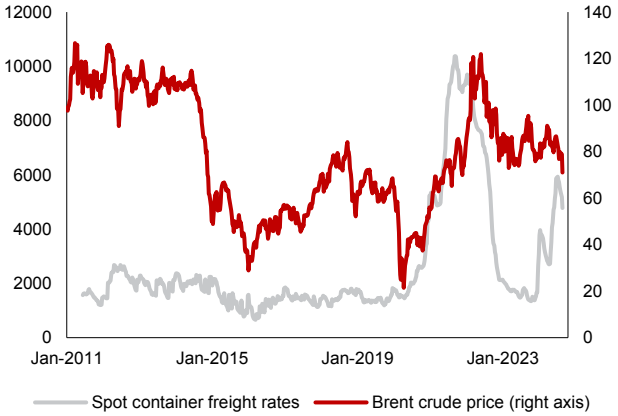
- Commodity price hikes and shipping costs: Simmering conflicts in the Middle East have to date been contained and have not escalated. Nevertheless, the conflicts have impacted global supply chains. Geopolitical uncertainty, along with OPEC+'s production cut, had kept oil prices elevated and shipping costs high. Attacks on ships in the Red Sea, rerouting of ships, the reduced availability of ships/container and port congestion, have all increased the costs of transportation (Figure 1.43). These factors may feed into prices and could stall the disinflationary process.

- Renewed trade tensions: The outcome of the US presidential elections will have a material effect on US economic policy. Presidential candidates have threatened major trading partners with higher tariffs and sanctions, and greater restrictions on technological access. A major shift in the US fiscal and monetary stance under the new administration will also have important implications for global and ASEAN+3 markets. Overall, uncertainty in the global economy and financial system will remain elevated heading into the US elections.

- Investor sentiment: Geopolitical fragmentation could cause the world to split into distinct economic blocs (Gourinchas 2022). An escalation of conflicts could lead to heightened risk aversion and capital outflows from regional markets, leading to turbulent financial markets.

Figure 1.43. Brent Crude Oil Price and Shipment Cost
(US dollar per barrel; thousands of US dollar)

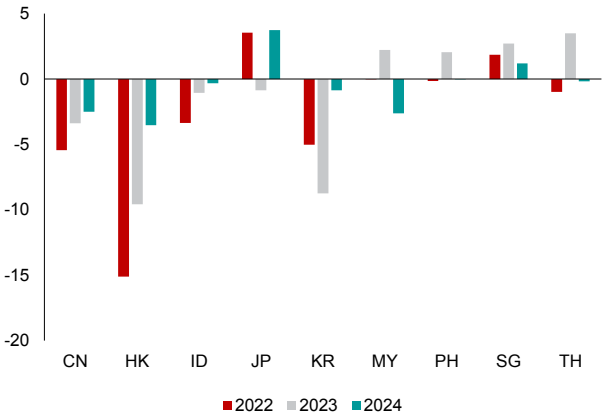
Oil prices remain elevated while container freight rates have risen recently.



Source: Bloomberg Finance L.P.
Note: Data as of 6 September 2024.

Figure 1.44. Selected ASEAN+3: Residential Property Price Indices
(Percent)

Property prices in many ASEAN+3 economies have declined in the past few years.



Source: BIS residential property price database.
Note: CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = The Philippines; SG = Singapore; TH = Thailand. Data as of Q1 2024.

More risks and vulnerabilities can affect financial stability

This section is a snapshot of other risks and vulnerabilities in the region that could have material spillovers to financial stability. These risks are discussed in greater detail in the Feature Analysis and Chapters of this report.

- Spillover risks: The interconnectedness of ASEAN+3 economies and financial systems has increased in the past decade, potentially amplifying spillovers within the region if one or more economies were hit by financial shocks. Notably, the major financial centers of ASEAN+3, with their extensive external connections, are a potential source of transmission of shocks to the region. The Feature Analysis, *ASEAN+3 Financial Interconnectedness and Potential for Spillovers*, discusses the channels of spillover risks from within and outside ASEAN+3.

- Property Sector: The property market in some ASEAN+3 economies has seen a downturn in the past few years, even as the pace of decline has eased recently (Figure 1.45). High interest rates and financially vulnerable developers can pose risks to financial stability in some economies. Chapter 2, *Vulnerabilities and Potential Spillovers Stemming from Property Developer Financing*, examines the financial conditions of property developers, and the potential spillovers from the sector to financial markets.

- US Dollar Reliance: Though the risks related to US dollar liquidity shocks have receded, the issue of reliance on US dollars still poses risks in the medium term. The reliance makes the ASEAN+3 financial system vulnerable to US dollar liquidity shortage during periods of market stress. It also acts as a transmission channel for shocks arising from shifts in US monetary policy and global financial conditions. Chapter 3, *Implications of US Dollar Reliance in ASEAN+3*, studies these risks and the role played by various participants in ASEAN+3's US dollar supply chain in transmitting and amplifying these risks.

- Green Finance: Green finance has grown rapidly in the ASEAN+3 region, largely through the issuance of green bonds. The benefits of green finance for environmental and economic sustainability, and the need for authorities to facilitate this shift, are well recognized. However, the transition needs to be carefully managed, to avoid creating new risks for financial stability. *Box 1.4* dives deeper to examine issues such as greenwashing, and the risks of stranded assets.

In an AMRO survey, member authorities were asked about their opinions about various financial stability risks. The survey was conducted in June 2024. Most of the respondents saw a medium or high likelihood of the risks related to spillovers from US monetary policy and geopolitical risks to materialize. However, most respondents were not much concerned about the risks emerging from US dollar funding, property market, corporate and household debt, and NBFI activities. See Box 1.3 for details.

Box 1.3:

Member Survey Results for Financial Stability Risks

In a survey conducted by AMRO, member authorities were asked their opinions on financial stability risks. The survey was conducted in June 2024. Key takeaways from the survey for financial stability risks are:

- **Broad risk evaluation:** More than 70 percent of respondents see a medium or high likelihood of the risks related to spillovers from US monetary policy and geopolitical risks to materialize. More than 50 percent of respondents see a low likelihood of financial risks emerging from US dollar funding, property market, corporate and household debt, and NBFI activities (Figure 1.3.1).

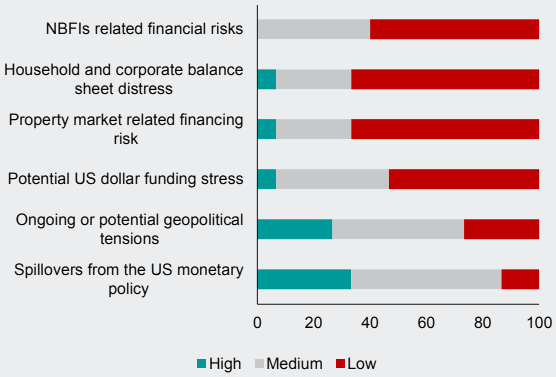
- **US dollar funding:** 20 percent of the respondents regard US dollar funding as "significantly important" for the financial stability of their economy while the other 80 percent see it as "moderately important". A majority, 60 percent, are concerned about the capital outflow pressures during the US dollar funding stress while 40 percent believe that small and medium sized banks are vulnerable to funding stress (Figure 1.3.2).

- **Property developers:** Two-thirds of the respondents evaluate property developers in their economy as being "moderately distressed", and another 13 percent see them as "significantly distressed" (Figure 1.3.3). The respondents believe that sluggish property demand, oversupply and excess inventories, and refinancing risks to be the biggest issues for property developers (Figure 1.3.4).

- **Spillovers risks:** Two-thirds of respondents show concerns about the spillovers from global factors such as commodity prices and global policy uncertainty while 47 percent are concerned with cross-sector spillovers to their economies. More authorities are concerned about intra-ASEAN+3 spillovers than spillovers from advanced economies (outside ASEAN+3) (Figure 1.3.5). The authorities are concerned about spillovers due to various scenarios, including divergence in global and ASEAN+3 monetary policies, geopolitical risks from US elections and tensions in the Middle East, the risk of a slowdown in the US, Europe, and China, commodity price volatility, geopolitical fragmentation, and the upside risks to inflation.

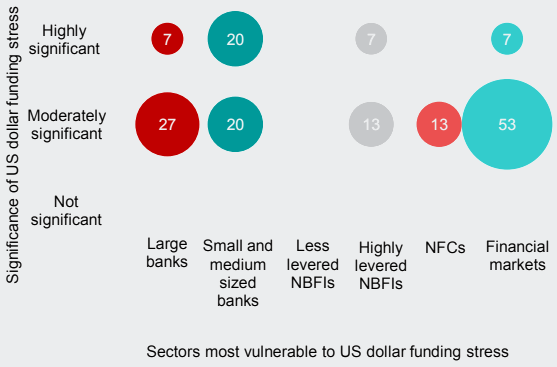
- **Green finance:** For a vast majority (87 percent) of respondents, issues related to greenwashing are "not significant" or only "somewhat significant" to financial stability (Figure 1.3.6). However, about two-thirds expect a "medium impact" from transition risks on financial institutions in their economy (Figure 1.3.7). 13 percent respondents expect a "high impact" from transition risks on concerns around (1) banking sector exposure to manufacturing sector and small and medium sized enterprises and 2) higher regulatory and compliance costs, and asset devaluation.

Figure 1.3.1. Broad Risk Evaluation
(Percent of total responses)



Source: Authority Survey; AMRO staff compilation.

Figure 1.3.2. Importance of US Dollar Funding on Financial Stability Across Different Sectors
(Percent of total responses)



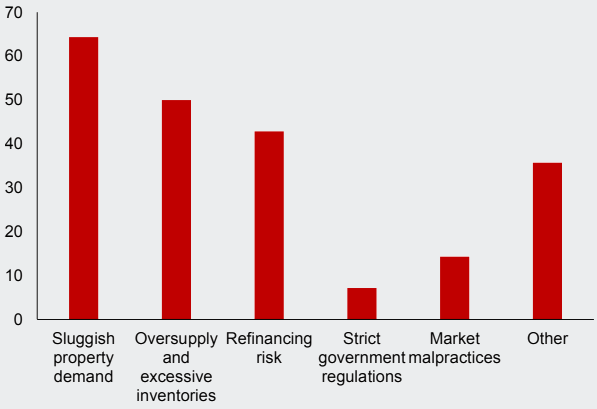
Source: Authority Survey; AMRO staff compilation.
Note: The bubble size corresponds to the percent of authorities who selected the combination(s) of level of "Significance of US dollar funding stress" and vulnerable sector. Authorities were first asked to rate the significance of US dollar funding stress. Then, they were given a multiple-choice question about sectors they would expect to be affected the most. For example, 53 percent of authorities that think that US dollar funding is "moderately significant" and expect "financial markets" to be affected most. NBFIs = nonbank financial institutions; NFCs = nonfinancial corporations;

The author of this box is Prashant Pande.

Figure 1.3.3. Impact of Real Estate Distress on Financial Stability
(Percent of total responses)

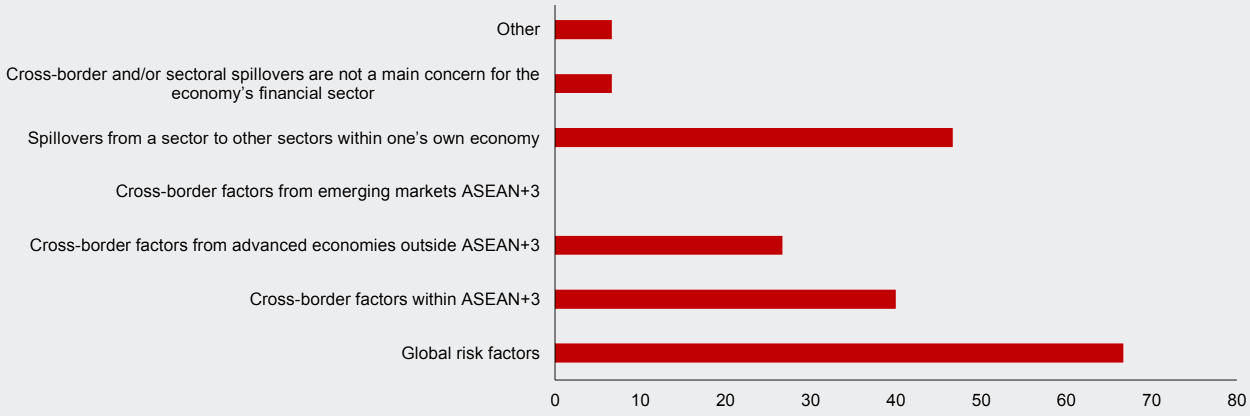
Source: Authority Survey; AMRO staff compilation.
Note: The bubble size corresponds to the percent of authorities evaluating the level of distress in the property developer sector and the impact on the economy's financial stability. For example, 62 percent of surveyed authorities that think that the property developers are moderately distressed, and that when under distress, there will be medium impact on the economy's financial stability.

Figure 1.3.4. Challenges Faced by Property Firms
(Percent of total responses)



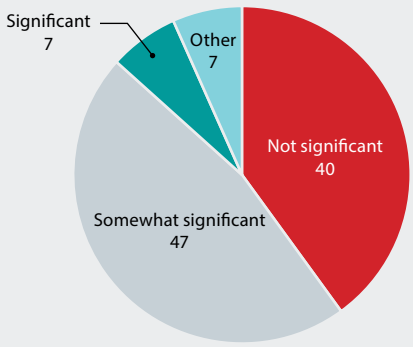
Source: Authority Survey; AMRO staff compilation.

Figure 1.3.5. Linkages and Relevant Spillovers for Financial Sector
(Percent of total responses)



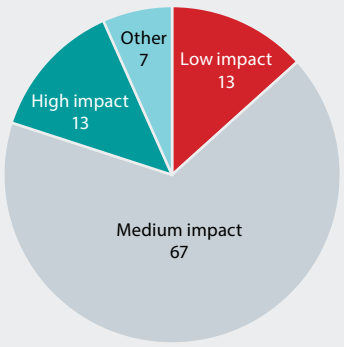
Source: Authority Survey; AMRO staff compilation.

Figure 1.3.6. Prevalence of Greenwashing Risks
(Percent of total responses)



Source: Authority Survey; AMRO staff compilation.
Note: For "other", authorities are requested to specify, in which the response is that banks had put in place relevant systems and controls to help mitigate potential greenwashing risks arising from their offering of green and sustainable products, along with good practices identified with the industry.

Figure 1.3.7. Expected Impact of Climate Transition Risk
(Percent of total responses)



Source: Authority Survey; AMRO staff compilation.
Note: For "other", responses include that results based on climate risk stress test exercises indicated that high-emission sector exposures of the industry are not high, and that the banks will remain resilient to climate related shocks given their strong capital buffers built over time.

III. Policy Discussion

Some risks highlighted in the 2023 AFSR have receded, but other risks have intensified with potential spillovers to financial stability. On balance across ASEAN+3, the financial stability risk in 2024 appears to be lower than in 2023. As such, the authorities can use this period to rebuild policy space and financial buffers while continuing to be vigilant of emerging risks.

Higher inflation driven by external factors remains a key risk for regional economies. ASEAN+3 authorities have managed inflationary pressures well, using a combination of monetary and non-monetary measures. Interest rate hikes in ASEAN+3 has been more moderate than seen in many advanced and emerging market economies outside the region, thanks to the strong credibility of the monetary authorities in anchoring inflation expectations and the skillful combination of fiscal and monetary policies to contain inflation and support growth. That said, domestic inflation may rebound due to exogenous geopolitical and weather-related factors that exert pressure on fuel and food prices. These same risk factors could cause the Federal Reserve and major central banks to turn hawkish again. Central bank response within ASEAN+3 to a resurgence in inflation would depend on domestic circumstances in individual economies and their susceptibility to spillovers from global monetary tightening. Some of the measures that authorities could consider include:

- Monetary policy to be calibrated for moderating domestic demand while at the same time supporting the currency to avoid excessive volatility and mitigate imported inflation.

- In economies where growth is weak and monetary policy has little room to respond, the burden to curb inflation may fall on fiscal policy.

- Non-monetary measures could be used to tackle supply-side inflation. Authorities have used price and income measures in the past to contain inflation while alleviating pressure on monetary policy. These measures are meant to be temporary and are typically selective and targeted to achieve maximum effect while minimizing fiscal costs.

Inflation remains the key focus of central banks but issues pertaining to financial stability also need to be monitored and managed. The financial system looks stable with large banks maintaining sufficient capital and liquidity buffers. However, the exposure of smaller banks and NBFIs needs to be carefully monitored. One of the more salient vulnerabilities arises from exposure to the property and construction sectors, which are under stress as discussed in Chapter 2 In the event of rising financial sector stress, the authorities may need to provide support to ring-fence such events and prevent financial contagion, while also avoiding moral hazard. Some examples of ASEAN+3 authorities working toward managing risks from specific sectors include:

- China announced a wide range of policy measures in May 2024 to support the real estate sector recovery, including measures to alleviate financing strains on property developers and companies closely linked to real sector (such as in construction). An important objective is to ensure the completion of housing projects for delivery to homebuyers, which is key for instilling confidence and improving sentiment. Banks are encouraged to continue providing supportive financing for the real estate sector, while managing their credit risks prudently.

- To manage the risks from high household debt, the Bank of Thailand is working with banks and NBFIs to ensure that lenders are offering suitable debt solutions to clients while rolling out measures to ensure the success of debt restructuring programs.

Rising geopolitical or growth risks may test the resilience of ASEAN+3 financial system and can pose a challenge to financial stability. Beyond the effect on inflation, a severe escalation of geopolitical stress or a global growth slowdown could cause investor risk aversion, leading to capital outflows, sell-off in the stock markets, and currency depreciation. Risk-averse investors tend to exit more volatile assets first, and in doing so could exacerbate market turbulence. Authorities may need to act swiftly to facilitate orderly market adjustments to external shocks and manage the resultant cross-border flows. That said, measures in response to market stress are no substitute for building economic resilience and fostering investor confidence in economies with solid fundamentals. On the other hand, an environment of monetary easing by the Fed amid low volatility can encourage foreign inflows in the ASEAN+3 economies. While it may not be an immediate concern, authorities may remain vigilant on potential asset price misalignments and excessive credit growth, and may implement appropriate surveillance and risk mitigation measures as needed.

US dollar liquidity risks appear low but can reemerge in adverse market conditions. The ASEAN+3 financial system has built up large US dollar assets and relies heavily on external funding from financial markets and financial institutions outside ASEAN+3. This makes the region vulnerable to US dollar funding shortages during adverse market conditions, including global economic shocks (such as COVID-19), financial shocks (such as the global financial crisis) or geopolitical tensions. Chapter 3 recommends managing the risks related to reliance on US dollars in the short-term while pursuing longer-term diversification from the US dollar. A regional self-help mechanism such as the CMIM can play a crucial role during BOP crises by providing short-term liquidity support.

The authorities should focus on rebuilding policy space while monitoring risks. As discussed in *ASEAN+3 Regional Economic Outlook 2024* (AMRO 2024a), the current period of positive growth prospects can be used to build resilience against potential risks. Government debt-to-GDP ratios have been rising in most economies of the region, and authorities may aim to reduce government debt-to-GDP while balancing the spending needs for sustainable and inclusive growth. As noted in the *ASEAN+3 Fiscal Policy Report 2024: Transitioning to Fiscal Normality* (AMRO 2024b) authorities should strive to strike the right balance between restoring fiscal buffers and carrying out an active fiscal policy. The authorities could also rebuild foreign exchange reserves during periods of capital inflows, to boost market confidence and as policy buffers against extreme market volatility.

The impact of climate change and its effects on the financial system are among the longer-term issues needing to be addressed. Containing sustainability and financial stability risks requires the development of robust frameworks for climate-related financial disclosures, conducting regular stress tests for climate risks, and promoting green finance initiatives. As discussed in Box 1.4., while the risks from green finance are assessed as low for now, it is important to remain vigilant and adaptive to emerging trends. This proactive approach to the new funding channel not only provides the necessary capital for the green transition, but also ensures that potential risks are mitigated from an early stage, fostering a more resilient financial system.

Finally, the authorities should continue to keep pace with technological developments and safeguard financial stability while harnessing the benefits of digitalization. The rise of digitalization offers opportunities to enhance financial inclusion and efficiency but also introduces risks that need careful management. Essential steps include enhancing digital infrastructure, promoting fintech innovations through a proactive risk management framework, and establishing strong cybersecurity measures.[15] Central banks and regulatory authorities need to keep pace with the latest technology and ensure that policy and regulatory frameworks are updated and calibrated to manage new risks associated with digital currencies and payment systems, and other digital financial services.

[15] This includes minimizing operational, compliance and security risks. Many authorities in ASEAN+3 have used the regulatory sandbox regime to experiment on fintech innovation within pre-defined boundaries while limiting the risks to consumers and the financial system. (https://www.mas.gov.sg/news/speeches/2019/opening-address-at-the-asia-pacific-risk-management-council-q2-meeting)

Box 1.4:

Green Finance in ASEAN+3: Expansion and the Associated Risks

Green finance products, which have gained much popularity over the past decade, are debt and equity instruments issued by public or private entities, specifically designed to direct investments toward mitigating or adapting to climate change (AMRO 2023).

Like the rest of the world, issuance of green finance products has gained prominence in ASEAN+3 region , particularly in the Plus-3 economies. As of March 2024, the region accounted for 19.1 percent of global green bond issuance, with notable issuance in foreign currencies, posing exchange rate risks to borrowers, particularly when servicing the debt (Figures 1.4.1 and 1.4.2). The use of green bond funds varies across the region, with significant investments in energy and transportation. Going forward, the ASEAN+3 region's green bond market is expected to expand significantly in the next five years, driven primarily by Plus-3 economies (Figure 1.4.3). The market share of the region is projected to increase to between 30 percent and 60 percent of the global green bond market by 2028 (Figure 1.4.4).

The environmental and economic benefits of green finance are well recognized (See for example, Sachs and others 2019, IMF 2020a, IMF 2020b, and IMF 2021a). Nevertheless, they may be accompanied by financial stability risks. Among these, are two salient risks most relevant for the ASEAN+3 region:

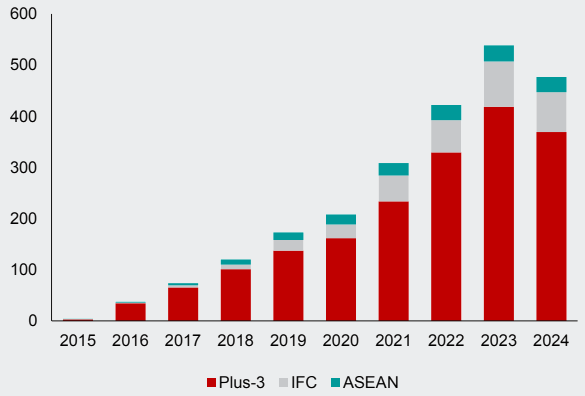
- Greenwashing: One of the primary risks associated with the rapid growth of green finance in the ASEAN+3 region is greenwashing. This occurs when firms misrepresent their business practices as being environmentally friendly or sustainable, thereby securing cheaper financing under false claims. In the region, this risk is particularly pronounced in sectors like real estate, where empirical analysis has shown that firms increase their carbon emissions after issuing green bonds. This not only undermines the environmental goals of green finance but also poses financial stability risks. As investors realize that their environmental expectations of the firms are not being met, they could withdraw their investments and other investors could also follow suit due to herd mentality. Consequently, asset prices could plummet, leading to financial distress. Although the immediate financial stability risks of greenwashing are currently minimal—due to the relatively small proportion of green bonds in the total bond market—these risks could escalate as the market grows.

- Stranded assets: Investments in carbon-intensive sectors may lose significant value due to declining demand and pro-environment regulatory changes aimed at promoting greener alternatives—and these investments could be deemed as "stranded assets". In the ASEAN+3 region, where banks have varying levels of exposure to these sectors, the devaluation of stranded assets could erode their capital adequacy ratios (CAR), potentially threatening financial stability. A simulation exercise indicates that recalibrating risk-weighted assets (RWA) to account for the increased risk of stranded assets could lead to a 5 percent to 12 percent increase in RWA for banks in the region. While ASEAN+3 banks are generally resilient with robust capital buffers, the potential for increased RWA underscores the need for enhanced risk management practices to account for risks from sectors affected by climate-related policies, in the transition towards becoming a greener economy.

While reaping the benefits of green financing, policymakers need to minimize the associated potential financial stability risks. To support sustainable investments, central banks could explore tools such as incentivizing green projects with lower interest rates and addressing market challenges like information asymmetry. Enhancing green taxonomies is also vital to clearly define sustainable activities, thereby preventing greenwashing, and maintaining investor confidence through a globally accepted and recognized green certification. Furthermore, integrating climate-related risks into banking regulation is crucial to managing the financial stability risks posed by stranded assets and ensuring a smooth transition to a low-carbon economy. These measures are essential for aligning green finance with both environmental and economic objectives.

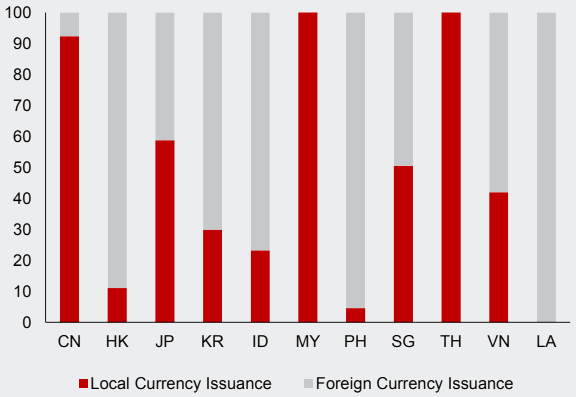
The authors of this box are Benyaporn Chantana, and Chenxu Fu.
For more details, refer to AMRO Analytical Note (2024 forthcoming).

Figure 1.4.1. Selected ASEAN+3: Green Bond Issuance Amount
(Billions of US dollar)



Source: Refinitiv; AMRO staff calculations.
Note: Data are as of 15 August 2024. Data covers all economies issuing green bonds. Plus-3 includes China, Japan and Korea. ASEAN includes Indonesia, Lao PDR, Malaysia, Philippines, Thailand and Vietnam. IFC includes Hong Kong and Singapore, Green bond share represents the percentage of share of ASEAN+3 green bonds in global green bond market.

Figure 1.4.2. Selected ASEAN+3: Share of Green Bonds by Currency Denominations
(Percent)



Source: Refinitiv; AMRO staff calculations.
Note: CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MY = Malaysia; PH = the Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 1.4.3. ASEAN+3: Past and Predicted Future Green Bond Market Size
(Billions of US dollar)

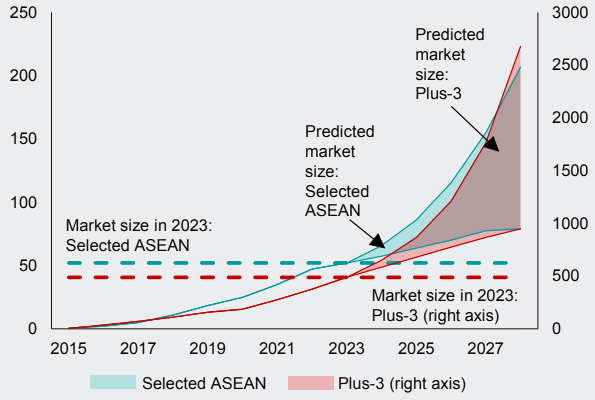
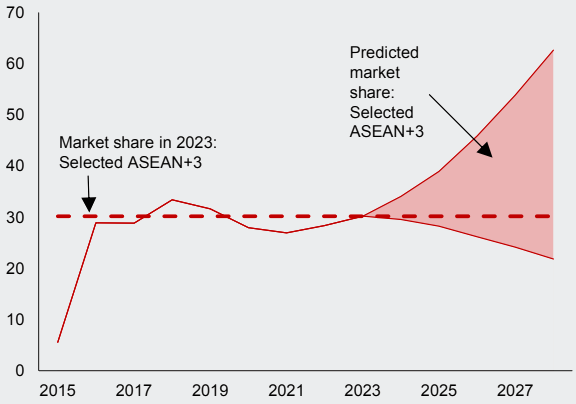


Figure 1.4.4. Selected ASEAN+3: Predicted Market Share in the Global Green Bond Market
(Percent)



Source: Refinitiv; national authorities via Haver Analytics and CEIC; IMF WEO database; European Commission Directorate-General for Joint Research Centre carbon emissions datasets; World Bank WDI database; the OECD GGI database; AMRO staff estimates.
Note: The different future growth trajectories of the green bond market size shown in the figure are derived from various forecast results obtained by inputting different combinations of the X variables into the time series econometric forecasting model. Selected ASEAN economies are Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Global market includes ASEAN+3, European Union and the United States.

Feature Analysis. ASEAN+3 Financial Interconnectedness and Potential for Spillovers

Highlights

- Intraregional interconnectedness among ASEAN+3 economies is growing, although the region remains susceptible to macro-financial shocks from major advanced economies and other exogenous shocks.
- Singapore's and Hong Kong's extensive external connections expose their financial systems to cross-border spillovers. As major global financial hubs, they transmit shocks across financial systems throughout the region. Japan's financial system is highly connected with developed economies, while China's financial system is more connected with Hong Kong.
- Individual ASEAN+3 economies are not only recipients of inward spillovers but also sources of outward spillovers to advanced and emerging market economies, within and outside ASEAN+3.
- The increasing interconnectedness among ASEAN+3 financial systems warrants stronger regional surveillance and closer cooperation. Strengthening cross-border surveillance and data sharing, conducting regional stress testing, enhancing home-host supervision, and ensuring liquidity support are critical measures.

This feature is authored by Ruperto Pagaura Majuca under the guidance of Kevin C. Cheng, with contributions from Liyang (Alex) Tang. The information in this section is based on historical data and is not a description, explicit or implicit, of actual future events.

I. Overview

Cross-border financial intermediation in the ASEAN+3 region has intensified significantly over the past few decades, leading to increased regional financial interconnectedness and contagion risks. This trend has significantly reversed the previous dominance of the United States (US), United Kingdom (UK), and European financial services firms in ASEAN+3. Instead, intra-ASEAN+3 financial transactions have surged, driven by the integration of regional financial markets and the growing interdependence among ASEAN+3 economies. Hong Kong and Singapore have emerged as major financial hubs, intermediating cross-border funds and promoting a more intraregional financing pattern. Furthermore, regional frameworks and agreements, such as the ASEAN Banking Integration Framework (ABIF), have contributed to the expansion of cross-border financing within the region. While these developments enhance efficiency, competition, and overall financial market development, they also introduce spillover risks and the potential for financial contagion (Remolona and Shim 2015).

Policymakers in ASEAN+3 need to better understand interconnectedness and potential spillovers in their financial systems so that they can mitigate financial stability risks. It is crucial to identify the potential sources of shocks, assess likely transmission channels across sectors and borders, and formulate policy responses to stress. Key questions to consider include:

- Global versus regional spillovers: Are global risk factors, such as the Chicago Board Options Exchange's Volatility Index or VIX, commodity price shocks, and shocks from advanced economies (outside ASEAN+3) still the primary sources of spillovers, or have intra-ASEAN+3 cross-border factors become more significant? To what extent do developments in other emerging market economies matter to financial stability in the ASEAN+3 region?

- Sectoral interconnectedness: How significant are spillovers from one sector to another within an economy (e.g., from real estate to the financial sector), and how important are cross-border sectoral spillovers (e.g., from the real estate sector in one economy to other economies in the region)?

- Potential shock scenarios: What stress scenarios should policymakers be most concerned about, to anticipate, mitigate, and prepare responses for when risks materialize? Is the trigger likely to originate from within or outside the region, which sectors are most at risk (banking sector, property, or corporate), and what is the nature and direction of the shock? Would ASEAN+3 economies be evenly impacted, or would some be more at risk than others?

This Feature Analysis studies cross-border contagion and interconnectedness in ASEAN+3 financial systems.[16] Section II maps the foreign exposures of ASEAN+3 banks in order to identify potential sources of risk transmission and contagion. Section III examines cross-border and sectoral networks within ASEAN+3 using market price data. Section IV evaluates the effect of global shocks on individual ASEAN+3 financial systems, such as US banking sector distress, US dollar exchange rate fluctuations, and increases in industrial metal prices. It also analyses the effects of regional shocks, such as banking distress in a financial center and disturbances in China's real estate sector on other sectors within China and across ASEAN+3 economies. Section V summarizes the findings and discusses the policy implications for ASEAN+3 financial regulators.

[16] This analysis relies on the forthcoming AMRO Working Paper by Kevin Cheng and Ruperto Pagaura Majuca: "ASEAN+3 Financial Interconnectedness".

II. Stylized Facts on ASEAN+3 Cross-Border Banking Claims and Liabilities

This section maps the cross-border exposures of ASEAN+3 banks using data from the Bank for International Settlements (BIS) Locational Banking Statistics (LBS). The LBS data measures claims and liabilities, including intra-group positions of banking offices within reporting countries, which helps analyze the geographic distribution of international banking activities and intra-group transfers in cross-border banks. This information identifies potential sources of risk transmission and contagion through bank lending and funding channels (Briccio and Xu 2019). Below are some key facts on ASEAN+3 cross-border borrowing and lending based on the LBS.

- Japanese banks are highly connected with advanced economies such as North America and the UK. They receive most of their cross-border funding from these regions and extend a significant portion of their lending there. Due to low domestic interest rates, Japanese banks seek higher yields abroad and their cross-border claims are significantly higher than their cross-border liabilities (Figure F1.1).

- In contrast, China's cross-border lending and borrowing are primarily with banks based in Hong Kong (Figure F1.2). Specifically, Hong Kong has extensive connections to China, directing a certain portion of its cross-border lending there while receiving a significant portion of its cross-border borrowing from China (Figure F1.3). Subsidiaries of international banking groups and foreign branches in Hong Kong have substantial China-related lending (IMF 2021b), making Hong Kong a key conduit for foreign banks' lending into China.

- Korean banks are well connected with banks from the US, the UK, and Europe (Figure F1.4). They also have strong ties with banks from Hong Kong and Singapore, as well as Japan, and they extend a considerable amount of lending to ASEAN economies.

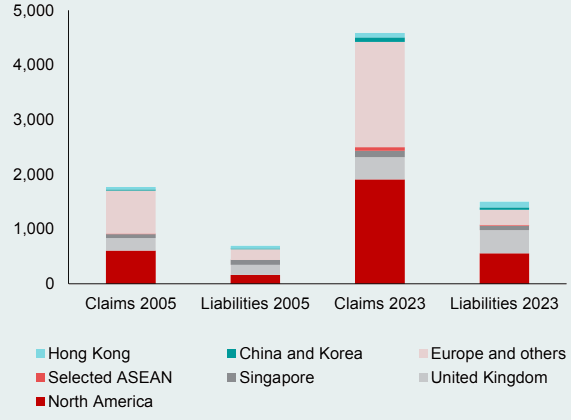
- Singapore's financial system is highly open, serving as a crucial global and regional financial hub, particularly with ASEAN+3 economies. Cross-border lending accounts for approximately 60 percent of the total exposure of Singapore banks (MAS 2023). As a regional financial center, Singapore intermediates credit from advanced economies to emerging markets in Asia (Figure F1.5), including funding from parent banks to their foreign branches, which then extend loans to corporates from their home country (IMF 2019).

- Among ASEAN economies, only the Philippines provides detailed information on banking claims and liabilities with country-specific source and direction information to the BIS locational banking statistics. This data offers insight into ASEAN cross-border banking activities. The Philippine financial system comprises mainly banks with low direct cross-border exposure, following a traditional domestic-centric commercial banking model reliant on deposits and lending primarily to large nonfinancial corporations (NFCs) (IMF 2021c). A significant portion of Philippine banks' cross-border liabilities comes from advanced economies such as the US and UK, as well as from regional financial centers. The Philippines also holds claims on banks in these advanced economies, regional financial centers, and other regional banks (Figure F1.6).

- Overall, ASEAN+3 claims and liabilities have notably increased, with significant growth observed within the region itself (Figures F1.1 to F1.6).

Figure F1.1. Japan: Cross-Border Claims and Liabilities, Q4 2005 and Q4 2023
(Billions of US dollar)

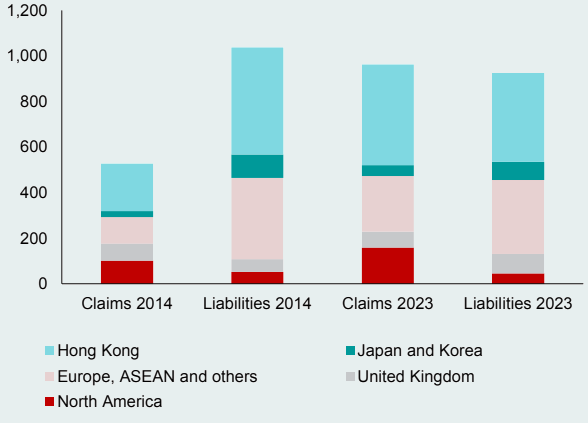
Japanese banks are highly connected with banks from advanced economies.



Source: BIS locational banking statistics; AMRO staff calculations.
Note: The reporting ASEAN+3 economy is Japan. North America is US and Canada. Selected ASEAN is Malaysia, Thailand, Indonesia, Philippines, Vietnam, Lao PDR, and Myanmar. Europe and others are all other banking jurisdictional not otherwise classified (mostly from Europe).

Figure F1.2. China: Cross-Border Claims and Liabilities, Q4 2014 and Q4 2023
(Billions of US dollar)

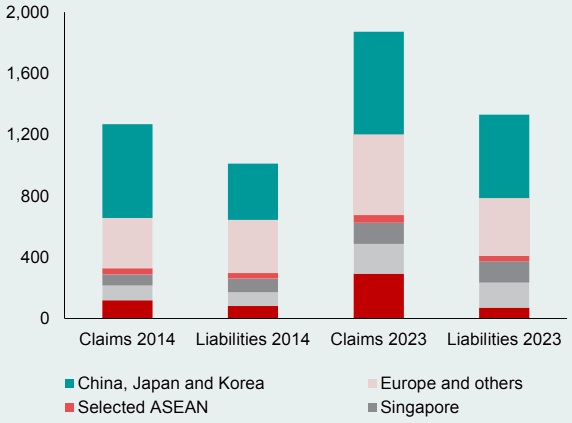
China's cross-border lending and borrowing activities are predominantly conducted with banks in Hong Kong.



Source: BIS locational banking statistics; AMRO staff calculations.
Note: Since China does not report breakdown of cross-border data by economy, the chart above is based on data from China's counterparty reports. Singapore also does not report breakdown of cross-border data by economy. North America is the US and Canada. Europe, ASEAN and others are all other banking jurisdictional not otherwise classified.

Figure F1.3. Hong Kong: Cross-Border Claims and Liabilities, Q4 2014 and Q4 2023
(Billions of US dollar)

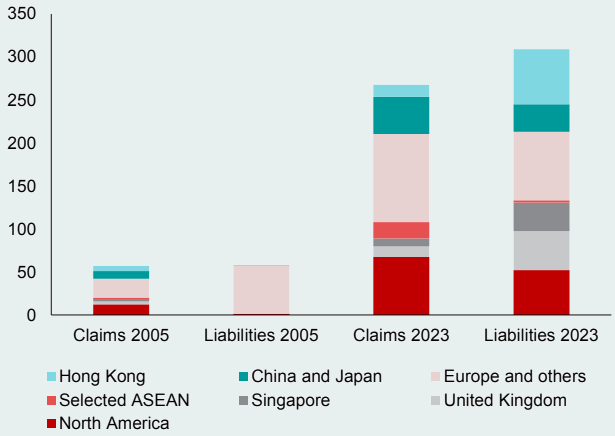
Hong Kong channels most of its cross-border lending to China and receives the majority of its cross-border borrowing from there.



Source: BIS locational banking statistics; AMRO staff calculations.
Note: The reporting economy is Hong Kong. North America is the US and Canada. Selected ASEAN is Malaysia, Thailand, Indonesia, Philippines, Vietnam, Lao PDR, and Myanmar. Europe and others are all other banking jurisdictional not otherwise classified (mostly from Europe).

Figure F1.4. Korea: Cross-Border Claims and Liabilities, Q4 2005 and Q4 2023
(Billions of US dollar)

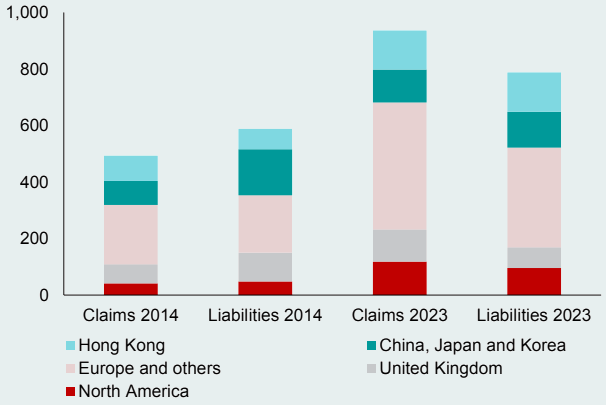
Korean banks are well connected with banks from advanced economies, regional financial centers, and Japan, while also providing substantial lending to ASEAN.



Source: BIS locational banking statistics; AMRO staff calculations.
Note: The reporting ASEAN+3 economy is Korea. North America is US and Canada. Selected ASEAN is Malaysia, Thailand, Indonesia, Philippines, Vietnam, Laos, and Myanmar. Europe and others are all other banking jurisdictional not otherwise classified (mostly from Europe).

Figure F1.5. Singapore: Cross-Border Claims and Liabilities, Q4 2014 and Q4 2023
(Billions of US dollar)

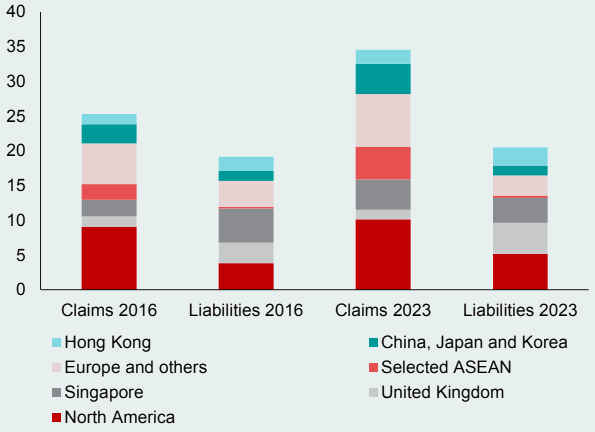
Singapore's financial system is exceptionally open, functioning as a vital global and regional financial hub.



Source: BIS locational banking statistics; AMRO staff calculations.
Note: North America is the US and Canada. Europe and others are all other banking jurisdictional not otherwise classified. Since Singapore does not report breakdown of cross-border data by economy, the chart above is based on data from Singapore's counterparties' reports. China also does not report breakdown of cross-border data by economy, so BIS statistics does not capture bilateral flows between Singapore and China. However, the MAS had reported that 47 percent of lending by local domestic systemically important banks (DSIBs) went to China as of Q2 2018 (IMF 2019).

Figure F1.6. Philippines: Cross-Border Claims and Liabilities, Q4 2016 and Q4 2023
(Billions of US dollar)

A significant portion of Philippine banks' cross-border liabilities and claims are tied to advanced economies and regional financial centers.



Source: BIS locational banking statistics; AMRO staff calculations.
Note: The reporting ASEAN+3 economy is the Philippines. North America is the US and Canada. Selected ASEAN includes Malaysia, Thailand, Indonesia, Vietnam, Lao PDR, and Myanmar. Europe and others are all other banking jurisdictional not otherwise classified (mostly from Europe).

III. Cross-Border, Cross-Sector and Interbank Contagion Analysis

This section analyzes interconnectedness and contagion risks using daily market and financial asset price data based on the Diebold and Yilmaz (2012, 2014) methodology. While the second section used bank exposure data to analyze direct cross-border credit and funding risks, the interconnectedness measure used in this section also captures indirect links, such as investor perceptions or other market-based linkages.[17] This involves utilizing information from the forecast error variance decomposition of daily equity returns (see Annex 1.2 for technical details).[18] This section uses equity returns data to analyze ASEAN+3 interconnectedness, and the Working Paper (see footnote 16) further examines interconnectedness using bond market and exchange rate data.

This section examines:

- inward spillovers to the ASEAN+3 financial systems;
- outward spillovers from ASEAN+3; and
- cross-border connectivity in ASEAN+3 banking and insurance sectors.

Furthermore, the Working Paper includes analyses of domestic cross-sector spillovers, and firm-level cross-border interbank spillovers.

Inward spillovers into an ASEAN+3 economy are measured by the percentage of equity return variability in that economy attributable to shocks from exogenous factors or the equity returns of advanced economies, emerging market economies, or other ASEAN+3 economies. If equity returns in an ASEAN+3 economy are not affected by shocks to a particular global factor, the spillover from that global factor to that ASEAN+3 economy is deemed to be zero. Likewise, outward spillovers from ASEAN+3 are measured by the proportion of the variation in global factors and equity returns in other economies explained by shocks originating from ASEAN+3 equity returns. Cross-border banking and insurance connectivity, as well as domestic cross-sector spillovers, are defined analogously.

Inward spillovers to ASEAN+3

Spillovers to ASEAN+3 are decomposed into several channels:

- exogenous factors (such as the VIX, energy prices, metal prices, agricultural price index, US dollar foreign exchange rate, and macroeconomic risk);
- advanced economies (non-ASEAN+3) spillover channels;
- emerging market economies (non-ASEAN+3) channels; and
- intra-ASEAN+3 spillovers.

Global factors have significant spillover effects on ASEAN+3 financial systems. Japan and Korea, and the regional financial centers (Hong Kong and Singapore), Malaysia and the Philippines are most exposed to global factors such as the VIX, macroeconomic risk, commodity prices, and the US dollar exchange rate. Figure F1.7 shows that among these global factors, the VIX volatility index and macroeconomic risk have the most prominent impact on ASEAN+3 equity price returns. For example, 6.3 percent of the variation in total equity returns in Japan's stock market is attributable to shocks in the VIX volatility index.

The financial markets of developed economies (North America, the UK, and Europe) have strong contagion effects on ASEAN+3, as indicated by the percentage of variation in ASEAN+3 stock market returns attributable to shocks in the stock market returns of these developed economies. All ASEAN+3 economies have significant links to financial systems in developed economies, with equity returns in Hong Kong, Japan, Korea, Malaysia, the Philippines, and Singapore being particularly sensitive to shocks from developed markets (Figure F1.8). The impact of developed economies on ASEAN+3 is significantly stronger compared to the moderate spillover effects from emerging market economies outside the region (such as Latin America and Gulf Cooperation Council economies).

ASEAN+3 intraregional spillovers are significant. Regional financial centers Hong Kong and Singapore play key roles for intermediating finance within and into the region. Consequently, spillovers involving these centers are central to regional dynamics. Hong Kong, serving as a gateway to China, has the strongest bilateral links with China (Figure F1.9). The second strongest links are between Hong Kong and Singapore. Significant bilateral links also exist between Hong Kong and Korea, Singapore and Korea, and from Singapore to regional economies such as Indonesia, Malaysia, and Thailand. Korea is the third major hub of financial connectivity in the region after Hong Kong and Singapore. Japan and the Philippines have the least exposure to financial spillovers from other ASEAN+3 economies, as they are more exposed to advanced economies (Figure F1.10).

[17] This measure of interconnectedness captures direct links (for example, through funding links discussed in the previous section as well as US dollar financing (as discussed extensively in Chapter 3 of this report), common exposure (to the same assets or risks), or behavioral factors such as herding behavior.

[18] Diebold and Yilmaz (2014) have demonstrated that variance decompositions are weighted directed networks, and that they measure both the vulnerability of economies, sectors or firms to systemic shocks, and their contributions to systemic risks.

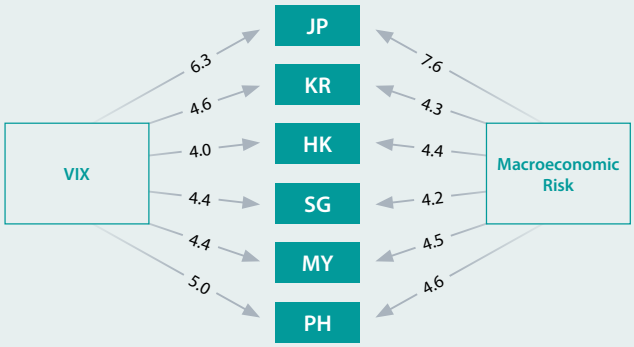
In summary, among ASEAN+3 economies, the regional financial centers (Hong Kong and Singapore) and the more developed and open financial markets of Korea, Japan, and Malaysia would receive the most inward spillovers, while China receives the least (Figure F1.10).

- Global and advanced economy factors remain significant sources of spillovers, particularly for the regional financial centers, Japan, Korea, Malaysia, and the Philippines. China receives most of its inward spillovers not directly from advanced economies but through Hong Kong, which also receives significant spillovers from China.

- Among global factor spillovers, Japan, Korea, the regional financial centers, and Malaysia and the Philippines are most affected by VIX volatility index and macroeconomics risk (Figure F1.7).

Figure F1.7. Selected ASEAN+3: Top Spillovers from Global Factors
(Percent)

Japan and Korea, and the regional financial hubs of Hong Kong and Singapore, as well as Malaysia and the Philippines, are most exposed to global factors.



Source: AMRO staff calculations.
Note: The numbers associated with the directed arrows reflect the size of the importance of spillover transmission channel, as calculated using the approach of Diebold and Yilmaz (2012, 2014). These numbers represent the percentage of the movement of equity returns of each ASEAN+3 economy that is explained by a shock from a global factor. See Annex 1.2 for technical details. JP = Japan; KR = Korea; HK = Hong Kong; SG = Singapore; MY = Malaysia; PH = the Philippines; VIX =. VIX volatility index.

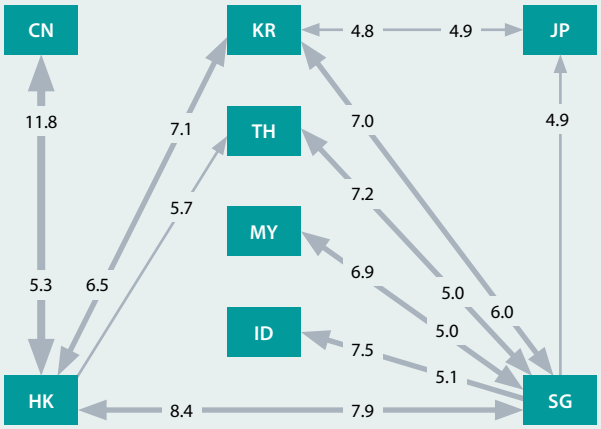
Figure F1.8. Selected ASEAN+3: Top Spillovers from Non-ASEAN+3 Advanced Economies
(Percent)

Advanced economies have significant strong contagion effects on ASEAN+3, particularly on the regional financial centers, Japan, Korea, Malaysia, and the Philippines.

Source: AMRO staff calculations.
Note: The height of the bars reflects the size of the importance of spillover transmission channel, as calculated using the approach of Diebold and Yilmaz (2012, 2014). The figures represent the percentage of total equity return variability of each ASEAN+3 economy that is explained by a shock from advanced economies outside the ASEAN+3 region. See Annex 1.2 for technical details. JP = Japan; PH = the Philippines; SG = Singapore; KR = Korea; MY = Malaysia; HK = Hong Kong; TH = Thailand; ID = Indonesia; CN = China.

Figure F1.9. Selected ASEAN+3: Intraregional Spillovers
(Percent)

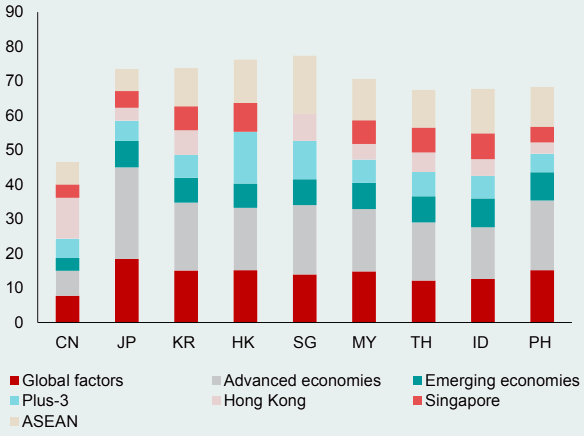
Spillovers involving the regional financial centers are central to regional dynamics.



Source: AMRO staff calculations.
Note: The size of the directed arrows reflects the size of the importance of spillover transmission channel, as calculated using the approach of Diebold and Yilmaz (2012, 2014). The numbers displayed in the directed arrows represent the percentage of total equity return variability of each ASEAN+3 economy that is explained by a shock from another ASEAN+3 economy. See Annex 1.2 for technical details. CN = China; HK = Hong Kong; JP = Japan; KR = Korea; MY = Malaysia; SG = Singapore; TH = Thailand; ID = Indonesia.

Figure F1.10. Selected ASEAN+3: Inward Spillovers by Channel
(Percent)

The regional financial centers, along with the more developed and open markets of Japan, Korea, and Malaysia, receive the most inward spillovers.



Source: AMRO staff calculations.
Note: The numbers reflect the size of the importance of spillover transmission channel, as calculated using the approach of Diebold and Yilmaz (2012, 2014). The figures represent the percentage of total equity return variability of each ASEAN+3 economy that is explained by a shock from a spillover source. See Annex 1.2 for technical details. CN = China; JP = Japan; KR = Korea; HK = Hong Kong; SG = Singapore; MY = Malaysia; TH = Thailand; ID = Indonesia; PH = the Philippines.

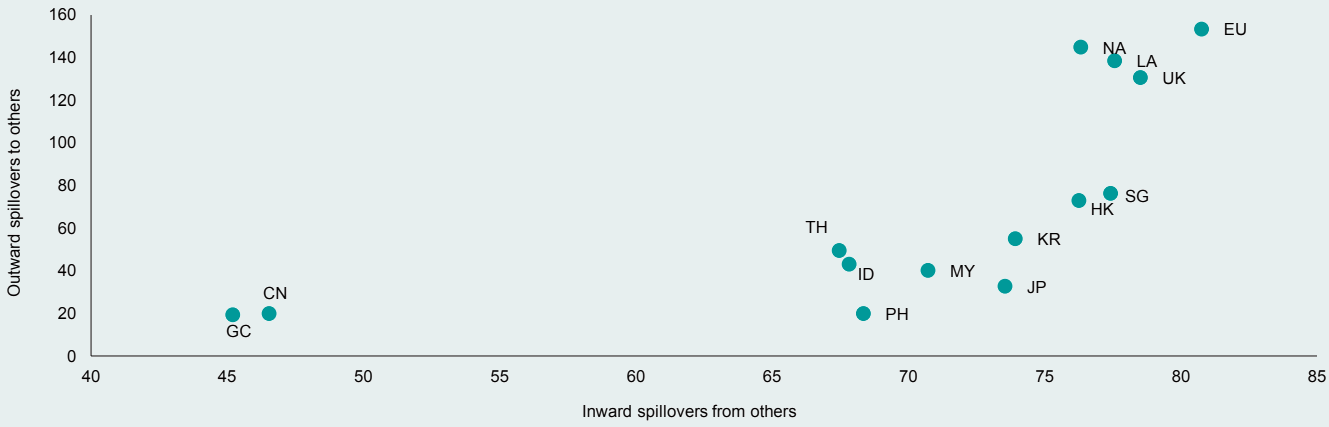
Outward spillovers from ASEAN+3

Individual ASEAN+3 economies not only receive inward spillovers from global factors, non-ASEAN+3 advanced and emerging market economies, and other ASEAN+3 economies, but also serve as significant sources of outside spillovers. Among the regional economies, Hong Kong and Singapore generate the most outward spillovers overall, affecting global factors, non-ASEAN+3 advanced and emerging market economies, and other ASEAN+3 economies. This is not surprising since the two are international financial hubs and Hong Kong's stock exchange ranked fifth-largest globally in terms of market capitalization at the end of 2020. With more than 80 percent of Hong Kong's market capitalization tied to China-related companies (IMF 2021b), a substantial portion of these outward spillovers can be attributed to them.

Figure F1.11 shows that significant outward spillovers originate from within the region, particularly from the regional financial centers (Hong Kong and Singapore), Korea, and Thailand. Hong Kong exerts a significant impact on industrial metals commodity prices while the regional financial centers exert notable influence on macroeconomic risk. Additionally, Singapore exerts some influence on the VIX volatility index. For example, shocks to Hong Kong's equity returns account for 2.4 percent of the movements in industrial metal prices (Figure F1.12). Meanwhile, the greatest influence on developed economies coming from ASEAN+3 originates from the regional financial centers, Japan and Korea, and from Thailand. For instance, shocks to Singapore's equity returns explain 4.1 percent of the variation in the UK's equity returns (Figure F1.13). Most of the ASEAN+3 effects on emerging markets also stem from the regional financial centers, and Thailand.

Figure F1.11. Selected ASEAN+3 and Regions: Financial Markets' Interconnectedness
(Percent for both scales)

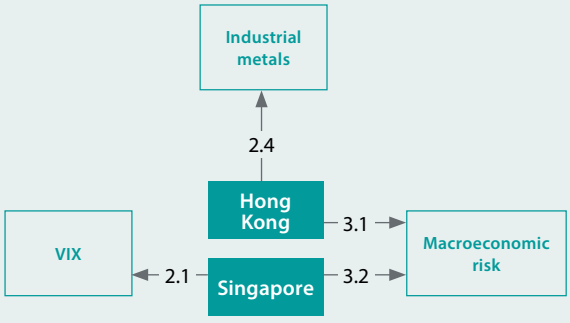
ASEAN+3 economies not only receive inward spillovers but also act as significant sources of outward spillovers, particularly from the regional financial centers.



Source: AMRO staff calculations.
Note: The numbers reflect the size of outward spillovers (total spillovers given to global factors and other economies) and inward spillovers (total spillovers received from global factors and other economies) using the approach of Diebold and Yilmaz (2012, 2014). NA = North America, LA = Latin America, EU = Europe, UK = United Kingdom, GC = Gulf Cooperation Countries, CN = China, JP = Japan, KR = Korea, HK = Hong Kong, SG = Singapore, MY = Malaysia, ID = Indonesia, PH = Philippines; TH = Thailand. See Annex 1.2 for technical details.

Figure F1.12. Selected ASEAN+3: Top Spillovers to Global Factors
(Percent)

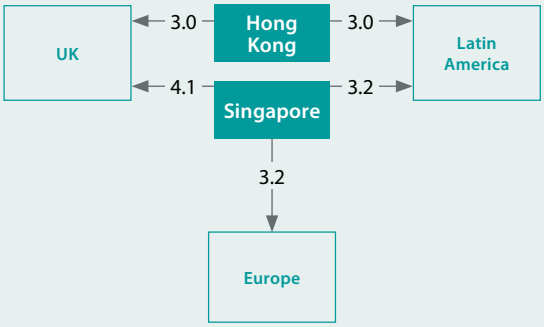
The regional financial centers exert a notable influence on global factors.



Source: AMRO staff calculations.
Note: The numbers displayed in the directed arrows represent the percentage of the movement of the global factor that is explained by a shock from an ASEAN+3 equity return, as calculated using the approach of Diebold and Yilmaz (2012, 2014). See Annex 1.2 for technical details. VIX = CBOE Volatility Index.

Figure F1.13. Selected ASEAN+3: Top Spillovers to Non-ASEAN+3 Economies
(Percent)

The top spillovers from ASEAN+3 to non-ASEAN+3 economies originate from the regional financial centers.

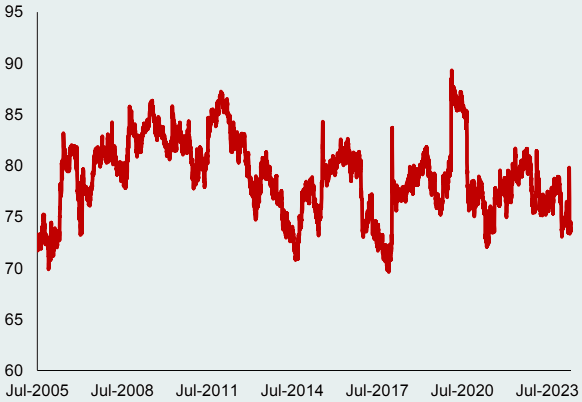


Source: AMRO staff calculations.
Note: The numbers displayed in the directed arrows represent the percentage of the movement of the equity returns of the non-ASEAN+3 region that is explained by a shock from an ASEAN+3 equity return, as calculated using the approach of Diebold and Yilmaz (2012, 2014). See Annex 1.2 for technical details. UK = United Kingdom.

By dynamically mapping spillovers over time, two general patterns emerge. Contagion and spillovers tend to escalate during periods of financial instability or stringent financial conditions. For instance, beginning from the relatively tranquil phase of 2005, the total spillover index surged during the Fed tightening in between the second quarter and the third quarter of 2006, and again during the GFC, the European debt crisis, and the COVID-19 crisis (Figure 1.14). Additionally, net spillovers from ASEAN+3—calculated as the difference between spillovers originating from ASEAN+3 and those directed towards it—have shown a tendency to increase relative to external factors, particularly evident in the trends following the GFC and the European debt crisis (Figure 1.15).

Figure F1.14. Rolling Total Spillovers
(Percent)

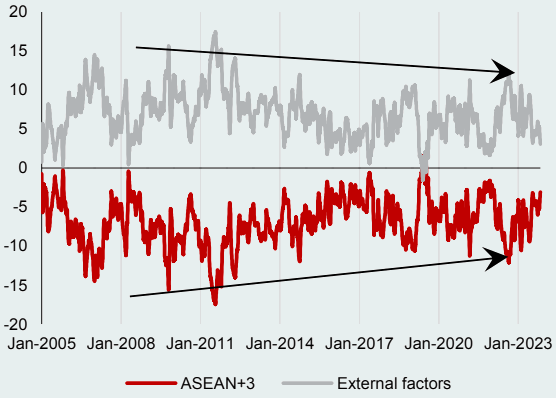
Contagion effects often intensify during periods of financial instability, as seen in the Global Financial Crisis, the European debt crisis, and the COVID-19 pandemic.



Source: AMRO staff calculations.
Note: The numbers represent the rolling total spillovers, as calculated using the approach of Diebold and Yilmaz (2012, 2014).

Figure F1.15. Rolling Net Spillovers
(Percent)

Net spillovers from ASEAN+3 have generally increased relative to external factors, particularly after the GFC and the European debt crisis.



Source: AMRO staff calculations.
Note: The numbers represent the rolling net spillovers, as calculated using the approach of Diebold and Yilmaz (2012, 2014).

Cross-border sectoral spillovers

This subsection analyzes the cross-border connectivity of the ASEAN+3 banking, insurance, real estate, and sovereign sectors. For each sector, a vector autoregression of sector-specific equity returns for each economy was performed, and connectivity was calculated using the Diebold-Yilmaz (2014) methodology. For example, to measure banking sector connectivity, a vector autoregression of banking stock equity returns from North America, the UK, Europe, and various ASEAN+3 economies was conducted. Connectivity between these economies' banking systems was calculated by summing the total spillovers shared between these sectors (see Annex 1.2 for technical details). The intensity of the total spillovers between two economies is ranked from highest to lowest, with the top third indicating high connectivity, the middle third moderate connectivity, and the bottom third low connectivity. The results are now summarized.

The banking systems of advanced economies continue to have strong impacts on ASEAN+3 banks. All ASEAN+3 banking systems, except China's and Vietnam's, are either highly or moderately connected to banks in North America, the UK, or Europe.

- Japanese and Korean banks, and the regional financial centers' banks (Hong Kong and Singapore) are particularly highly connected to banks in North America, the UK, and Europe.

- Malaysian, Thai and Indonesian banks also have strong connections with European banks.

- Hong Kong banks are well connected with Singaporean and Thai banks and moderately connected with Malaysian and Indonesian banks. Singaporean banks are highly connected with Indonesian, Malaysian, and Thai banks and moderately connected to Philippine banks. Notably, Malaysian banks are highly connected to banks in Indonesia, and Thailand, and moderately connected to Philippine banks, making them important for ASEAN banking spillovers.

- Chinese banks have moderate connectivity with banks in Hong Kong and Singapore, and low connectivity with the rest, while Vietnamese banks have low connectivity with banks in other economies (Figure F1.16).

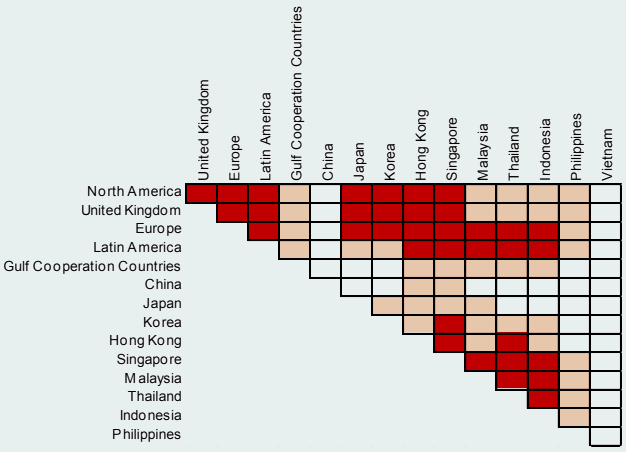
ASEAN+3 insurers are highly or moderately connected to insurers in North America, the UK, and Europe. The connections between insurers in China and Hong Kong are also robust (Figure F1.17).

Similarly, interconnections between the real estate sectors of advanced economies (North America, the UK, and Europe) and those of ASEAN+3 economies are significant, except for China and Vietnam. Interconnections between advanced economies and ASEAN+3 are particularly high for Japan and Singapore. China and Vietnam's real estate sectors generally have low connectivity with others, except that China has strong interconnections with Hong Kong and moderate interconnections with Singapore (Figure F1.18).

Finally, strong and moderate connections between the advanced economies and ASEAN+3 are also present for sovereign bonds. These connections are especially strong for Japan, Korea, and the regional financial centers, and more moderate for other ASEAN countries. Hong Kong is also highly connected with Singapore and Korea. Additionally, Singapore has substantial connections with Korea and China (Figure F1.19).

Figure F1.16. Selected ASEAN+3 and Regions: Bank-to-Bank Connectivity

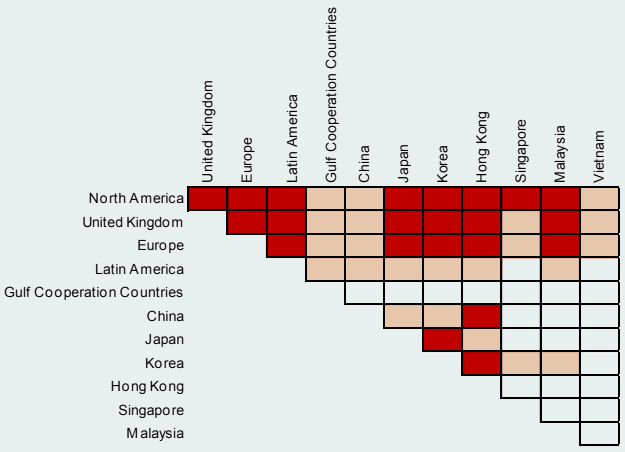
All ASEAN+3 banking systems, except China's and Vietnam's, are either highly or moderately connected to banks in North America, the UK, or Europe.



Source: AMRO staff calculations.
Note: The chart depicts the intensity of total (both to and from) implicit financial linkages among the banking sectors of various economies. The colors represent the strength of the linkages, measured in quantiles: white indicates the bottom third of all linkages, pink signifies the middle third, and red denotes the top third.

Figure F1.17. Selected ASEAN+3 and Regions: Insurer-to-Insurer Connectivity

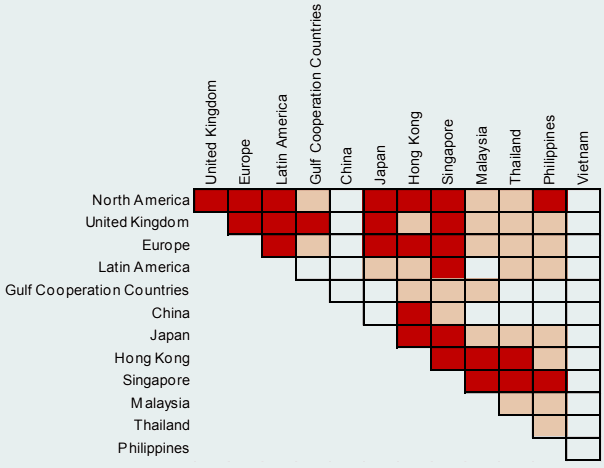
Similarly, ASEAN+3 insurers are highly or moderately connected to insurers in North America, the UK, and Europe.



Source: AMRO staff calculations.
Note: The chart depicts the intensity of total (both to and from) implicit financial linkages among the insurance sectors of various economies. The colors represent the strength of the linkages, measured in quantiles: white indicates the bottom third of all linkages, pink signifies the middle third, and red denotes the top third.

Figure F1.18. Selected ASEAN+3 and Regions: Real-Estate-to-Real Estate Connectivity

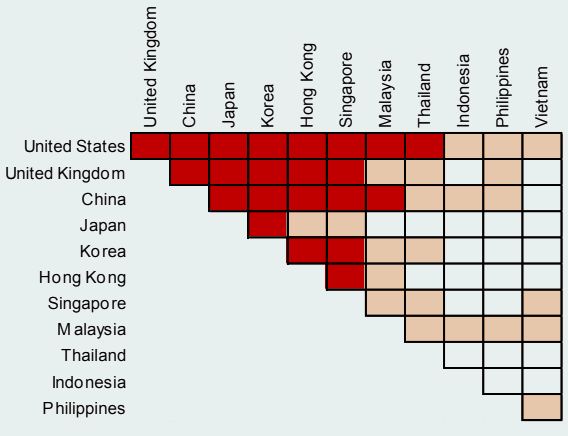
Interconnections between the real estate sectors of advanced economies and those of ASEAN+3 economies are also significant, except for China and Vietnam.



Source: AMRO staff calculations.
Note: The chart depicts the intensity of total (both to and from) implicit financial linkages among the real estate sectors of various economies. The colors represent the strength of the linkages, measured in quantiles: white indicates the bottom third of all linkages, pink signifies the middle third, and red denotes the top third.

Figure F1.19. Selected ASEAN+3 and Regions: Sovereign-to-Sovereign Connectivity

Strong and moderate connections between the advanced economies and ASEAN+3 are also evident in sovereign bonds.



Source: AMRO staff calculations.
Note: The chart depicts the intensity of total (both to and from) implicit financial linkages among government bond indices of various economies. The colors represent the strength of the linkages, measured in quantiles: white indicates the bottom third of all linkages, pink signifies the middle third, and red denotes the top third.

IV. Risk Scenarios Impact Analysis

This section examines how various risk scenarios can potentially affect ASEAN+3 financial systems. Specifically, it simulates the impact on ASEAN+3 of: (a) shocks to the banking sector in the North America, Singapore and elsewhere; (b) US dollar FX rate appreciation; (c) shocks to industrial metal commodities; and (d) the influence of China's real estate sector on other sectors of its domestic economy and on the real estate sectors of other ASEAN+3 economies. Key findings are:

- Banking sector shocks: Shocks to the banking sector in North America, UK, and developed Europe remain significant contagion risks for ASEAN+3 regional banks. Although banking systems in the regional financial centers have also become systemically important within the region, North American banks are particularly important for banks in Hong Kong, Japan, and Korea (Figure F1.20).[19] Singaporean banks have the greatest impact on banks in Hong Kong, Indonesia, Korea, and Thailand (Figure F1.21).

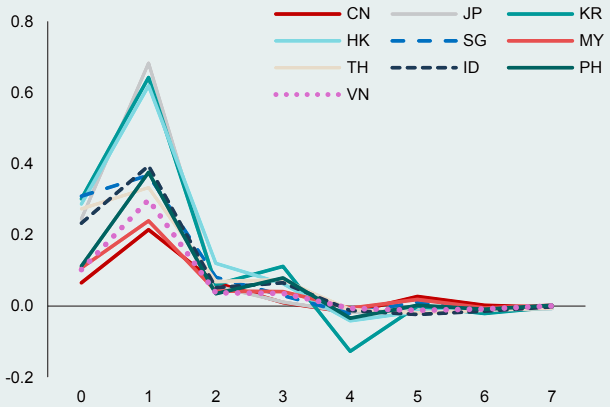
- US dollar shock: ASEAN+3 financial systems are highly susceptible to US dollar movements. Hong Kong is most affected by US dollar foreign exchange fluctuations due to the Hong Kong dollar's official peg to the US dollar. This link makes Hong Kong's open financial system vulnerable to capital outflows when the US dollar appreciates (Figure F1.22). US dollar appreciation also negatively affects other ASEAN+3 stock markets. On a positive note, stock markets in Hong Kong and other ASEAN+3 economies are expected to benefit from anticipated US rate cuts in the coming quarters.

- Commodity shocks: Among ASEAN+3 stock markets, China, Hong Kong, and Korea are most impacted by developments in industrial metals. Metals are vital to the global economy as they are essential intermediate inputs for industrial production and construction. Metal production and consumption are concentrated in a few countries, with China being a major hub for both. Consequently, China and Hong Kong are the ASEAN+3 financial systems significantly influenced by metal prices (Figure F1.23), making metal prices a particularly important global spillover to these economies. Major producers in Latin America and consumers of industrial metals in North America, UK and Europe are also significantly affected by metal prices. Looking ahead, developments in rare earth metals are worth monitoring, as they could become crucial for supply chains in the US, China, and other economies aiming to lead in high-technology sectors.

- China real estate shocks: Shocks to China's real estate sector have a significant impact on other sectors within China but the impact is short-lived. The shocks do not greatly affect other ASEAN+3 real estate sectors, except for Hong Kong. A 1 percent decrease in China's real estate stock returns would reduce stock returns in the construction, insurance, and industrial sectors by 0.6 percent; the telecommunications, information technology, and media sectors by 0.5 percent; and the banking, oil, gas, and coal sectors by 0.4 percent (Figure F1.24). Additionally, it would decrease Hong Kong's real estate sector stock returns by 0.3 percent but have a minimal effect on the real estate sectors of other ASEAN+3 economies (Figure F1.25).

Figure F1.20. Selected ASEAN+3: Impact of Shock to North American Banks
(Percent)

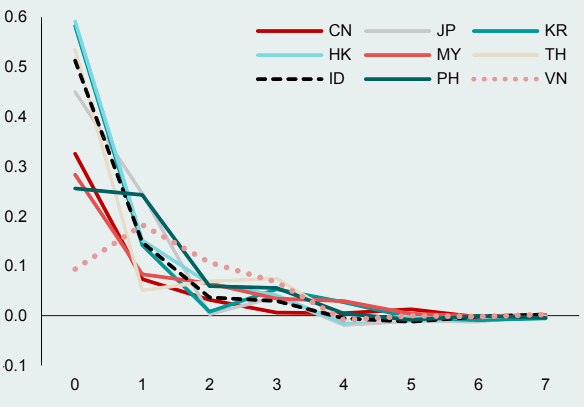
Shocks to the banking sector in North America continue to pose significant contagion risks for ASEAN+3 regional banks.



Source: AMRO staff calculations.
Note: The figure depicts generalized impulse responses of ASEAN+3 banking systems to a 1 standard deviation shock to North American banks, using daily data. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN= Vietnam.

Figure F1.21. Selected ASEAN+3: Impact of Shock to Singaporean Banks
(Percent)

Singaporean banks also have significant spillover effects on banks in the region.

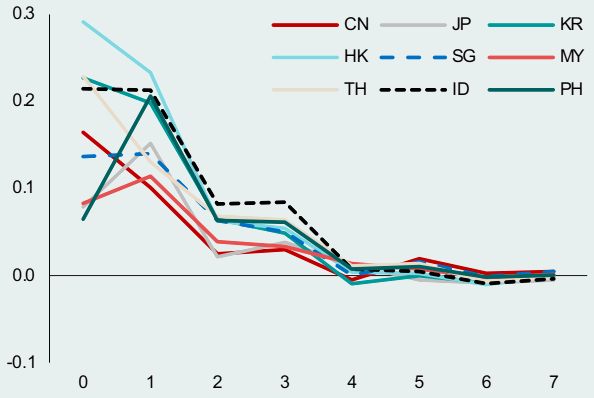


Source: AMRO staff calculations.
Note: The figure depicts generalized impulse responses of ASEAN+3 banking systems to a 1 standard deviation shock to SG banks, using daily data. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; TH = Thailand; VN= Vietnam.

[19] As a robustness check, Annex 1.1 simulates the impact of the 2023 US banking turmoil on the financial services industries of ASEAN+3 economies using another approach.

Figure F1.22. Selected ASEAN+3: Impact of US Foreign Exchange Depreciation
(Percent)

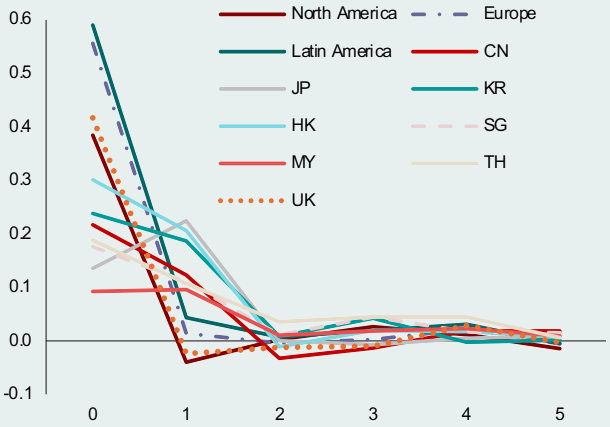
ASEAN+3 financial systems are highly susceptible to U.S. dollar movements, with Hong Kong particularly affected.



Source: AMRO staff calculations.
Note: The figure depicts generalized impulse responses to a 1 standard deviation US nominal effective exchange rate (NEER) depreciation, using daily data. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN= Vietnam.

Figure F1.23. Selected ASEAN+3 and Regions: Impact of Industrial Metals
(Percent)

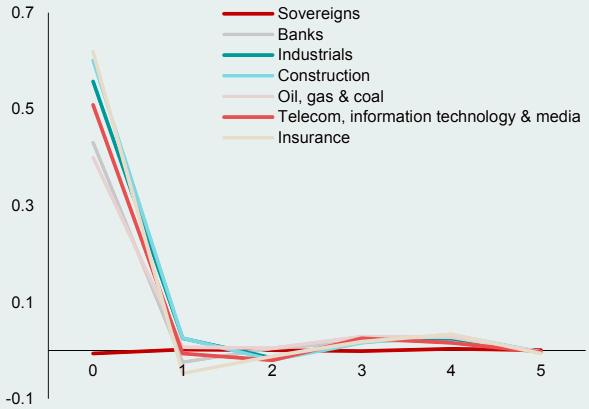
Among ASEAN+3 markets, the stock markets of Hong Kong, China, and Korea are the most affected by developments in industrial metals.



Source: AMRO staff calculations.
Note: The figure depicts generalized impulse responses to a 1 standard deviation shock to industrial metals, using daily data. CN = China; HK = Hong Kong; JP = Japan; KR = Korea; MY = Malaysia; SG = Singapore; TH = Thailand; VN= Vietnam.

Figure F1.24 China: Domestic Sectoral Impact of China Real Estate
(Percent)

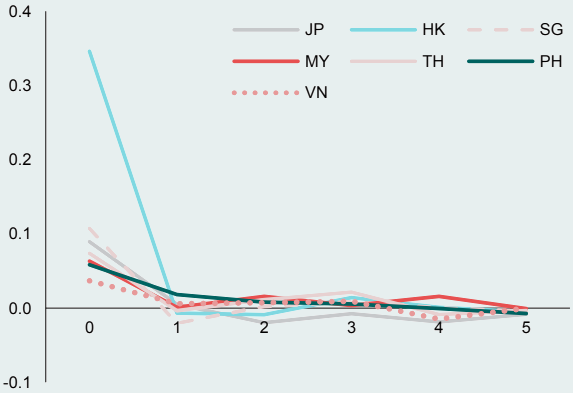
Shocks to China's real estate sector significantly impact various other sectors within China...



Source: AMRO staff calculations.
Note: The figure depicts generalized impulse responses to a 1 percent shock to CN real estate stock return, using daily data.

Figure F1.25 Selected ASEAN+3: Impact of China Real Estate
(Percent)

... but the shocks do not greatly affect other ASEAN+3 real estate markets, except for Hong Kong.



Source: AMRO staff calculations.
Note: The figure depicts generalized impulse responses to a 1 percent shock to CN real estate stock return, using daily data. HK = Hong Kong; JP = Japan; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

V. Findings And Policy Implications

ASEAN+3 financial systems remain vulnerable to shocks from global factors and external economies. Despite growing interdependence among ASEAN+3 economies and the role of Singapore and Hong Kong as key financial hubs, macro-financial shocks from major advanced economies and global factors are still significant sources of inward spillover risks. The region is susceptible to global shocks such as energy prices, metal prices, and US dollar foreign exchange rates, as well as contagion effects from systemic financial events in the US, the UK, and advanced Europe.

Singapore's and Hong Kong's extensive external connections and cross-border spillovers expose their financial systems to significant risks and make them potential sources of contagion for the region. The two financial hubs are particularly susceptible to global and regional macro-financial shocks. Given the size and connectivity of their financial networks, especially with other ASEAN+3 financial sectors, the impact of such shocks would be transmitted not only to Singapore and Hong Kong but also to financial systems across the region.

ASEAN+3 financial systems have become increasingly interconnected, making robust ASEAN+3-centric surveillance and cooperation essential. By taking a holistic macroeconomic and financial view of the region, authorities can better protect their economies from systemic risks and enhance overall financial resilience. Specifically, ASEAN+3 economies should strengthen:

- Cross-border surveillance and data sharing: Enables authorities to detect emerging risks that may originate in one economy but spread across the region. Sharing information and best practices helps identify vulnerabilities early and facilitate coordinated responses.

- Regional stress testing: Provides insight into how financial shocks in one part of the region might impact other areas. This helps prepare for potential crises by understanding transmission channels and the resilience of financial institutions.

- Home-host supervision: Cooperation between home and host jurisdictions is vital for supervising internationally active banks. Harmonized regulatory frameworks can reduce regulatory arbitrage and enhance financial stability.[20]

- Liquidity support: The interconnected nature of ASEAN+3 financial systems means that a crisis in one ASEAN+3 economy can spread quickly to others. In times of financial distress, access to liquidity can be crucial, and regional financing arrangements for liquidity support help stabilize financial markets.[21]

At the same time, the source and transmission channels of risks from international spillovers must be continuously monitored. Spillovers from advanced economies such as the US, UK, and Europe, as well as from financial institutions in these jurisdictions, pose ongoing risks to ASEAN+3 financial systems. Therefore, monitoring global financial market volatility and strengthening the supervision of global systemically important financial institutions are essential. This dual approach can mitigate the potential adverse effects of external shocks and enhance financial stability in the ASEAN+3 region.

[20] While the existing frameworks under the BIS and IOSCO provide a robust foundation for home-host supervision and cooperation, continuous improvement and adaptation are essential to meet the evolving challenges of global finance. Enhancing regulatory cooperation beyond current standards is crucial to prevent regulatory arbitrage, ensure consistent enforcement, address new challenges from fintech and digital currencies, and effectively manage systemic risks.

[21] In this context, the Chiang Mai Initiative Multilateralisation (CMIM) regional financial arrangement (RFA), together with the network of bilateral swap agreements and the IMF's international financing framework, forms a robust architecture of defense against potential financial contagion and spillovers. The regional surveillance arm, AMRO, along with flagship reports like the AFSR, plays a crucial role in cross-border monitoring. Ongoing efforts to refine CMIM facilities, in collaboration with financial architecture partners, will further strengthen defenses against spillover risks.

Annex 1.1. Robustness Check: Analyzing the Spillover of the 2023 US Banking Turmoil on ASEAN+3 Financial Services Industries[22]

The US financial system plays a pivotal role in global markets, and shocks originating from it can quickly spread across borders through various channels (Tran and Vo 2023). Analyzing these spillover dynamics helps authorities and market institutions understand potential vulnerabilities and develop appropriate policy responses (Fukuda and Tanaka 2020; ASEAN Main Portal 2023).

The literature suggests that a significant decline in the output of the US financial services industry can have far-reaching effects on other countries' financial services industries. These spillovers are transmitted through both direct financial-industry-to-financial-industry channels and indirect channels that first impact nonfinancial industries and then feedback into the financial industry. Transmission occurs through both the supply and demand. For example, most the past US financial crises affected different parts of the world through trade, financial, and other channels, highlighting the need to consider all economic and financial cross-market influences. A contraction in the US financial services industry can reduce access to capital for financial institutions in other countries, hindering their ability to finance operations, expand services, and support economic activities. Additionally, nonfinancial industries, which rely on financial services for working capital, investment financing, and risk management, can be affected. This ripple effect can spread to financial institutions in other countries that provide services to these nonfinancial firms, leading to a decline in their business activities. Nonfinancial industries, particularly those exporting to the US or part of global supply chains, may experience a drop in demand for their products and services, leading to lower revenues and reduced financial service needs, thereby impacting financial institutions in other countries (Mefford 2009; Jovanovikj and Georgievska 2015; Sun and others 20202; Tomczak 2023).

This Annex uses the international input-output table to capture all the aforementioned effects. This cross-economy and cross-industry micro-simulation method systematically incorporates various transmissions. It relies on two key formulas: (a) one reflecting production relationships from the supply side, and (b) the other representing the distribution of output for various purposes from the demand side. These formulas link industries across different economies in the OECD Inter-Country Input-Output (ICIO) tables into an integrated global economic and financial system, enabling the analysis of spillover effects from any specific industry in one economy to any industry in other economies:

(a) Output value of industry *j* in economy *i*

$$= \sum_{\text{Economy } k1} \sum_{\text{Industry } l1} \text{Value of intermediate inputs from industry } l1 \text{ in economy } k1$$

+ Value of other production inputs including capital and labor for industry *j* in economy *i*

(b) Output value of industry *j* in economy *i*

$$= \sum_{\text{Economy } k2} \sum_{\text{Industry } l2} \text{Value of output distributed as intermediate inputs for industry } l2 \text{ in economy } k2$$

$$+ \sum_{\text{Economy } k3} (\text{Value of output distributed as final products for private consumption in economy } k3$$

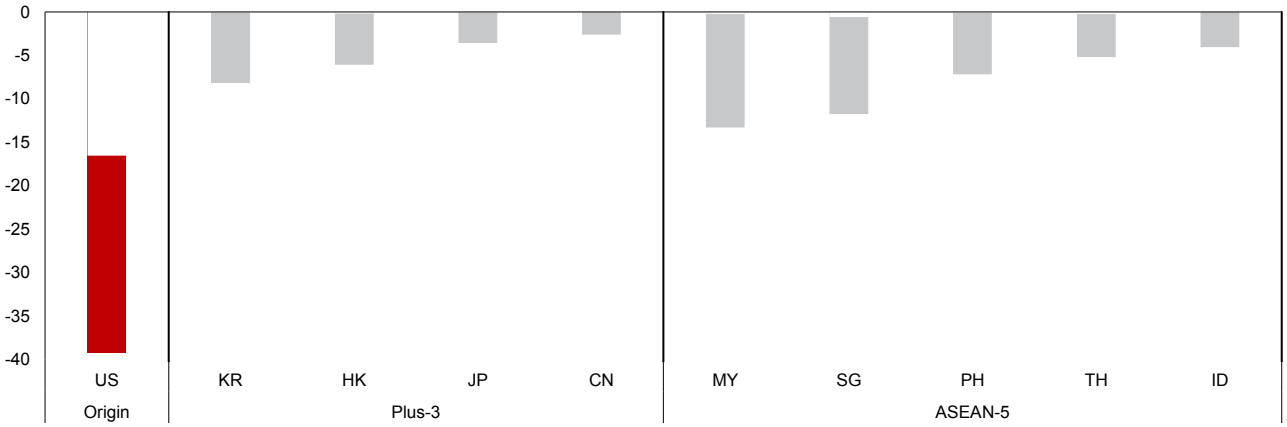
+ Value of output distributed as final products for public consumption in economy *k*3
+ Value of output distributed as final products for private and public investment in economy *k*3)

The dataset includes the latest OECD ICIO table (updated to 2020) and the daily closing indices for the financial services or banking industry from S&P, Dow Jones, and Nasdaq. The ICIO table sets all parameters in the micro-simulation model across all economies and industries, following methodologies by Aroche Reyes and Marquez Mendoza (2021), Pichler and others (2021), Pichler and Farmer (2022), and Marquez Mendoza (2023). The financial indices determine the range of the maximum percentage decline in the output value of the US financial services industry in 2023, based on lower and upper bound scenarios of the US banking turmoil that began in early 2023.

[22] The author of this annex is Liyang (Alex) Tang.

Figure A1.1.1. Selected ASEAN+3: Spillover Effects on the Output Value of Domestic Financial Services Industries from the US Financial Services Industry

(Percent)



Source: AMRO staff estimates.
Note: The analysis can be divided into the following three steps. First, establish the upper and lower bound scenarios of the severe downturn in the US financial services industry's output value since early 2023, based on industry indices such as S&P, Dow Jones, and Nasdaq. Second, refer to relevant literature to employ a cross-economy and cross-industry micro-simulation model. Third, apply the micro-simulation model to the scenarios from the first step to obtain the upper and lower bound estimates of the spillover effects of the US financial services industry on the same industries in ASEAN+3 economies, further considering the uncertainties in the speed of transmission and the persistence and accumulation of spillover effects. CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, MY = Malaysia, PH = Philippines, SG = Singapore, TH = Thailand, US = United States.

The results presented in Figure A1.1.1 reveal important insights:

- Among the Plus-3 economies, Korea and Hong Kong's financial services industries are expected to experience significant upper bound spillover effects of -8.2 percent and -6.1 percent in output value, respectively. China faces more moderate potential spillover effects of -2.6 percent. This indicates that Korea and Hong Kong are more at risk, while China is less impacted. Among ASEAN economies, Malaysia and Singapore are more vulnerable, with upper bound spillover effects of -19.5 percent and -11.8 percent in output value, respectively.
- Lower bound estimates for spillover effects from a significant downturn of the US financial services industry provide a more optimistic outlook. For example, Korea and Hong Kong might experience lower bound spillover effects as small as -0.1 percent and -0.2 percent in output value, compared to upper bound estimates of -8.2 percent and -6.1 percent. The substantial divergence between upper and lower bound estimates arises from different assumptions about the speed of cross-economy and cross-industry transmission and the persistence of spillover effects. This underscores the importance of policies to reduce transmission speed and the persistence of spillover effects.

Annex 1.2. Technical Details: Market–Data Based Spillover Analysis[23]

Methodology

The methodology for measuring spillovers is based on Diebold and Yilmaz (2012, 2014) for market data analysis. It begins with estimating a Vector Autoregression (VAR) model on equity returns. This VAR model is then used to construct a generalized forecast-error variance decomposition to identify uncorrelated structural shocks to returns, following Pesaran and Shin (1998). Spillover measures are calculated as the percent contribution of entity A to the h-step ahead forecast error variance of entity B, where the entities can be banks, sectors, or economies. This approach has an advantage over the standard Cholesky ordering or structural approaches as it does not require explicitly choosing the ordering of the variables.

Data

Equity return data, sourced from Eikon, covers the period from 1 January 2005 to 31 May 2024, at a daily frequency. Forecast error variance was calculated on a 10-day ahead basis. The market data used to measure implicit financial linkages are primarily country- and sector-level equity price indices from Thomson-Reuters Datastream (DS). Data on global factors were computed and sourced similarly to the equity returns, with the exception that VIX and macroeconomic risk indices (both short-term and long-term) were standardized as z-scores.

Below are more details about the data sources used in various VAR specifications.

Cross-border financial connections, various economies

- Global factors: VIX index from CBOE; commodity indices for energy, industrial and precious metals, and agriculture from GSCI; trade-weighted US dollar NEER index from JPMorgan; and macroeconomic risk indices (short-term and long-term) from Citi.

- Equity indices: North America DS Market; United Kingdom DS Market; Europe DS Market; Developed Latin America DS Market; Gulf Cooperation Countries (GCC) DS Market; China DS Market; Japan DS Market; Korea DS Market; Hong Kong DS Market; Singapore DS Market; Malaysia DS Market; Thailand DS Market; Indonesia DS Market; and Philippines DS Market.

Cross-border banking and insurance linkages

- Non-ASEAN+3: North America DS banks and insurance; UK DS banks and insurance; Europe DS banks and insurance; Latin America DS banks and insurance; and GCC DS banks and insurance.

- ASEAN+3: China DS banks and insurance; Japan DS banks and insurance; Korea DS banks and insurance; Hong Kong DS banks and insurance; Singapore DS banks and insurance; Malaysia DS banks and insurance; Thailand DS banks; Indonesia DS banks; Philippines DS banks; and Vietnam DS banks and insurance.

Cross-border real estate linkages

- Non-ASEAN+3: North America DS real estate; UK DS real estate; Europe DS real estate; Latin America DS real estate; and GCC real estate.

- ASEAN+3: China DS real estate; Japan DS real estate; Hong Kong DS real estate; Singapore DS real estate; Malaysia DS real estate; Thailand DS real estate; Philippines DS real estate; and Vietnam DS real estate.

Cross-border sovereign linkages

- Non-ASEAN+3: US benchmark 10-year DS government index; and UK benchmark 10-year DS government index.

- ASEAN+3: China benchmark 10-year DS government index; Japan benchmark 10-year DS government index; Korea benchmark 10-year DS government index; Hong Kong treasury 10+ year bond index; Singapore 10-year DS government index; Malaysia IBOXX ABF 10-15 index; Thailand 10-year DS government index; Indonesia 10-year DS government index; Philippines FTSE treasury 10+ year index; and Vietnam RF government 10-year.

[23] The author of this annex is Ruperto Pagaura Majuca.

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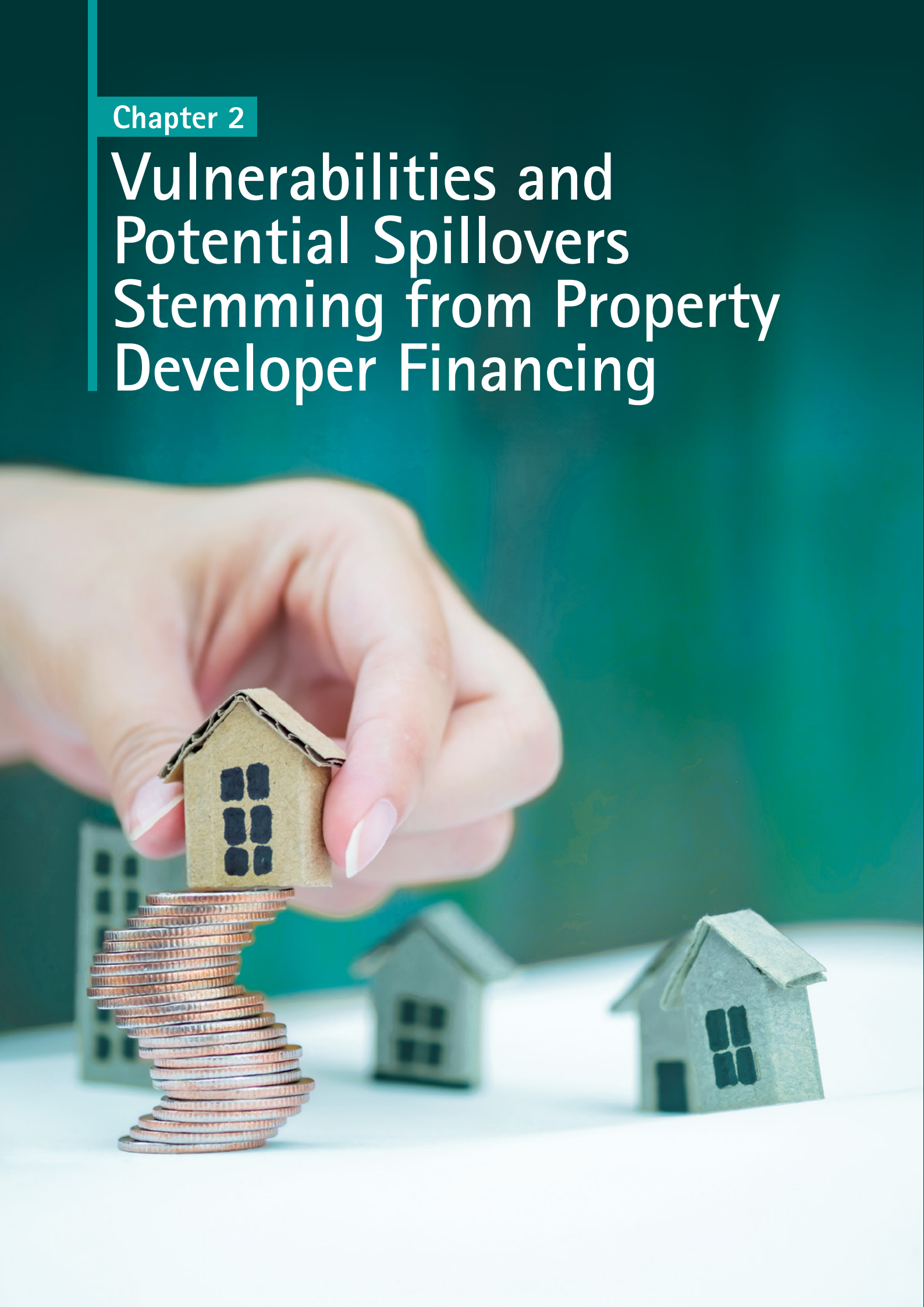
Chapter 2

Vulnerabilities and Potential Spillovers Stemming from Property Developer Financing



Highlights

- The outlook for the real estate market in the ASEAN+3 region has generally deteriorated since the COVID-19 pandemic, with reduced prices and transaction volumes seen in several economies.
- The downturn, combined with higher interest rates in certain economies, has increased vulnerabilities among property developers, as shown by their worsening financial conditions.
- Potential spillover risks from the property market to the financial market appear to be mitigated by robust capital buffers in the banking sector.
- Nonetheless, hidden and/or less visible risks from smaller and local banks, along with shadow banking activities related to the property sector, warrant careful monitoring by the authorities.
- The authorities should establish a resilient framework to support viable property projects facing temporary liquidity shortages while improving fundamentals for overall soundness.

This chapter is authored by Eunmi Park under the guidance of Kevin C. Cheng, with contributions from Benyaporn Chantana, Yang Jiao, Jungsung Kim, Kit Yee Lim, Wen Yan Ivan Lim, Leilei Lu, Junjie Shi, Liyang (Alex) Tang, and Trung Thanh Vu. The chapter is based on information available as of 9 September 2024.

I. Overview

Recent turmoil involving property developers in several ASEAN+3 economies exposed significant vulnerabilities and, highlighted their potential impact on the economy and financial markets. Notably, large developers such as Evergrande and Country Garden in China failed to meet their debt obligations. This triggered a wave of defaults among other developers that has led to a significant decline in investor confidence, with China's real estate stock index slumping (Box 2.1). The 2022 credit crunch in Korea after a property developer defaulted on paying debts further underscores the risks of property market distress spreading to financial markets, although these issues have not been widespread (Box 2.2). Developers in economies with sluggish property markets, such as Cambodia, Hong Kong, and Vietnam are struggling through severe liquidity constraints and rising financing costs, that could impact financial stability.

Historical examples also illustrate the significant risk to financial stability from real estate crises. The collapse of the subprime mortgage market in the late 2000s triggered the global financial crisis, while the bursting of Japan's property bubble in the early 1990s led to severe bank distress. The speculative activities and high leverage that preceded these past crises appear to characterize the real estate market in some ASEAN+3 economies today. Unique risks directly associated with property developers add to current challenges. Enhanced regulatory oversight and improved risk management practices are therefore crucial to preventing similar crises from reoccurring.

Risks from property developers have not yet escalated into systemic threats, but the situation is precarious. High interest rates and a property market downturn, combined with the financial vulnerabilities of developers, pose potentially significant risks to financial stability in some economies. Insolvency within the sector can heighten the vulnerability of financial institutions and negatively impact related markets, creating a negative feedback loop.[1] For instance, financial institutions concerned about developer solvency may curtail new loans, while rising bond interest rates amid higher risk premiums and loss of access to capital markets could exacerbate liquidity risks. Recent increases in interest rates, stricter credit measures, the pandemic-induced decline in property demand, and property price downturns have strained developers, leading to significant declines in property investments and sales in economies like Cambodia, China, Hong Kong, Korea, and Vietnam.

Proactive supervision and risk mitigation measures are needed. Enhanced regulatory frameworks, greater transparency in property and financial markets, and comprehensive support measures may be necessary to stabilize the market and mitigate systemic risks. Measures could include tighter regulatory oversight of financing methods, targeted support for viable projects under temporary liquidity stress caused by adverse market sentiments and preemptive, responsive support against market stress to mitigate spillover to the entire financial sector.

In this context, this chapter will:

- Examine the financial conditions of property developers by assessing profitability, liquidity, creditworthiness, and leverage to gauge potential risks arising from them.
- Evaluate the property sector's impact on financial stability by analyzing its influence on financial market volatility and the soundness of financial institutions.
- Propose policy recommendations to mitigate property sector vulnerabilities and their impact on financial stability, based on selected ASEAN+3 case studies.

[1] Bank for International Settlements (2018) suggests that property developers' default rates are highly sensitive to house price developments, potentially amplifying procyclicality in the financial system.

II. Assessing Vulnerabilities of the Property Development Sector in ASEAN+3

Market context

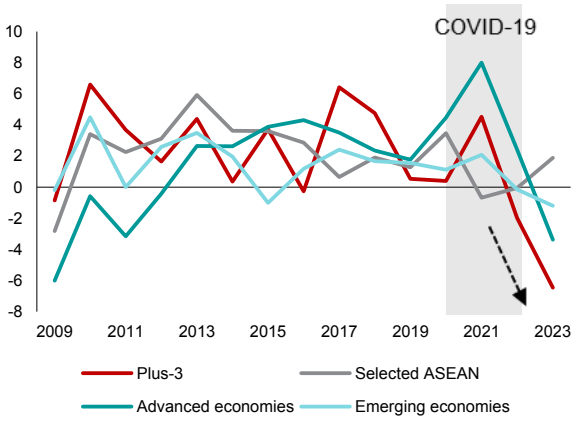
The COVID-19 pandemic hit property markets across the ASEAN+3 economies, leading to widespread downturns. Residential property prices and transaction volumes declined sharply in the Plus-3 economies (Figures 2.1 and 2.2). The commercial real estate sector (including office space) in China and Hong Kong saw rising vacancy rates (Figure 2.3). ASEAN economies have been performing better, but in several, property prices and trading volumes remain lower than pre-pandemic levels. The high unsold inventory and delayed projects compound challenges faced by property developers, although to varying extents among different economies.

The property market downturn in the ASEAN+3 region is driven by several factors. Higher interest rates from policy tightening have increased borrowing costs, reducing the affordability and demand for property. Excess supply and large unsold inventory put further downward pressure on prices. Pandemic-induced economic disruptions in China have negatively impacted Chinese buyers' demand for property investments both domestically and in other economies. Instances, where homes were not delivered or were delayed due to developer defaults, have eroded buyer confidence. Many potential buyers delay purchases in anticipation of further price cuts, which exacerbates the slowdown in sales. Though to a lesser extent than the Plus-3 economies, ASEAN economies like Cambodia, Malaysia, the Philippines, Thailand, and Vietnam face similar issues with high unsold inventories and/or delayed projects. Structural factors such as aging populations also are gradually weakening long-term property demand across the region.

The property market downturn has accentuated the risks faced by developers. Many developers maintained high leverage during the prolonged period of low interest rates and ample liquidity before the pandemic. The subsequent rise in financial costs and refinancing risks because of elevated interest rates and stricter regulations on leverage have intensified the difficulties faced by property developers in certain economies. This strain is evident in the performance of stock indices and returns, with challenges in the ASEAN+3 region being particularly noticeable compared to the rest of the world (Figure 2.4).

Figure 2.1. Selected Regions: Annual Growth in Real Residential Property Prices
(Percent, year-on-year)

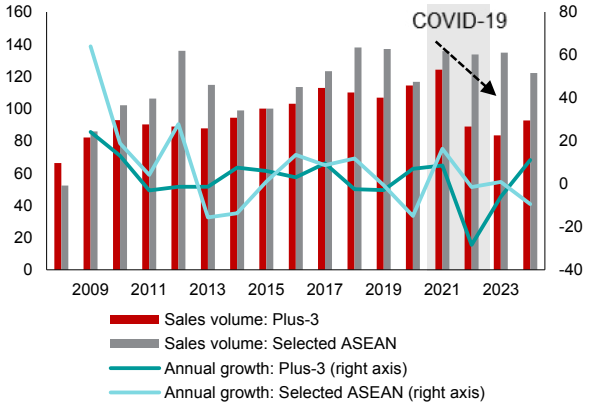
Residential property prices have declined since 2021, especially in Plus-3.



Source: Bank for International Settlements (BIS) residential property price database.
Note: The growth rate is based on the real price index. Selected ASEAN includes Indonesia, Malaysia, Philippines, Singapore, and Thailand. The values for each group were calculated as simple averages.

Figure 2.2. Selected ASEAN+3: Real Estate Sales Volume
(Index, 2015=100; percent, year-on-year)

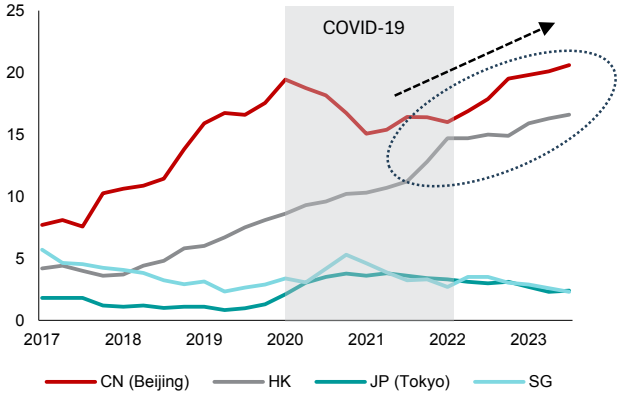
Real estate sales volumes have also decreased from their 2021 peak.



Source: Haver Analytics; AMRO staff calculations.
Note: As the real estate sales volume data are not standardized (e.g., building square meters, units, residential units, etc.), a trading volume index based on 2015 was created. The values for each group were calculated as simple averages. The selected ASEAN countries include Indonesia, Malaysia, Philippines, Singapore, and Thailand. Data for 2024 is estimated by Q1 and Q2 2024 data.

Figure 2.3. Selected Economies: Office Vacancy Rate
(Percent)

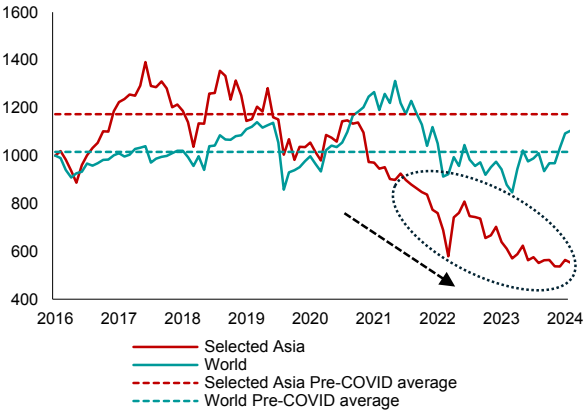
The commercial real estate markets in some economies are experiencing challenges.



Source: Colliers International via Bloomberg Finance L.P.
Note: The data is based on Grade A (highest quality) or prime office vacancy rate. CN = China, HK = Hong Kong, JP = Japan, SG = Singapore

Figure 2.4. World and Selected Asia: Real Estate Stock Index
(Index, August 2016=1000)

The real estate stock index in the region has been sharply declining.



Source: MSCI Real Estate Indices via Bloomberg Finance L.P.
Note: The data are from August 2016 to 9 September 2024. For selected Asia, a proxy of ASEAN+3, MSCI AC Asia ex JP indices are used. Selected Asia indices include securities from eight ASEAN+3 economies (e.g. China, Hong Kong, Indonesia, Korea, Malaysia, Singapore, Philippines, and Thailand), India, and Taiwan Province of China. Pre-COVID is defined as August 2016 to December 2019.

The scorecard—What is the current financial health of property sector companies?

Financial conditions in property companies in ASEAN+3 point to significant vulnerabilities. Their financial health, assessed through profitability, liquidity, debt servicing capacity, refinancing risks, and leverage, worsened from 2021 to 2023 compared with performance before the pandemic. ASEAN+3 economies have experienced more substantial declines in these indicators, especially in profitability and debt servicing capacity, than economies in other regions. While the Plus-3 economies exhibit more pronounced weaknesses, ASEAN countries witnessed a milder deterioration (Figure 2.5). Advanced economies and emerging market economies outside the ASEAN+3 region show relatively better performance, despite challenges in the commercial real estate market in some countries.

Profitability

Profitability trends among property firms in ASEAN+3, as indicated by their return on assets, show a broad decline relative to pre-pandemic levels. This is attributed to falling property prices and sales volumes (Figures 2.1 and 2.2), rising input costs, and higher funding costs. However, variations can be seen between the Plus-3 and ASEAN economies. The Plus-3 economies, particularly China, experienced a sharper and earlier drop in profitability, with near-zero or negative returns on assets since 2021, indicating persistent challenges and heightened financial distress risks. Property firms in the ASEAN region saw declining profitability during the pandemic, but their profits have increased recently, albeit modestly (Figure 2.6). Meanwhile, although earnings have remained relatively strong in the advanced economies, overall profitability continues to be weighed down by higher expenses, particularly due to increased payments in the tightening financial environment.

Liquidity

Property firms in ASEAN+3 are under increasing liquidity risk. The current ratio, which exceeds 1 if current assets can meet short-term obligations, has declined steadily in both Plus-3 and ASEAN (Figure 2.7). While the industry average exceeds the threshold of 1, many firms are dealing with liquidity challenges. Property sales, the major source of liquidity, have fallen sharply, especially in China and Hong Kong, leading to reduced cash inflows. In China, regulatory tightening aimed at deleveraging has restricted access to funding, leading to a liquidity squeeze. Moreover, delays in project completion due to regulatory and financial pressures have exacerbated the issue. For example, pre-sale proceeds in China are held in escrow accounts in banks and released based on project progress, which, although being a good consumer protection measure, makes it difficult for developers to obtain liquidity when projects are delayed.

Debt servicing capacity

Property firms in ASEAN+3 have increased solvency risks due to their declining ability to meet debt obligations. The Debt Service Ratio (DSR), which measures a firm's capacity to use operational profits to meet all debt payments for the year, falls below the critical threshold of 1 in ASEAN+3 economies, and is particularly low in the Plus-3 (Figure 2.8a).

This indicates that firms are not generating sufficient revenue to service their debts on schedule. The declining Interest Coverage Ratios (ICR) further underscores the solvency risks. The ICR, which measures the ability of earnings to cover interest expenses, has dropped sharply in both ASEAN and Plus-3 economies (Figure 2.8b). An ICR of 2.5 corresponds to an S&P rating of 'B', indicating significant default risk (Damodaran, 2024).[2]

Refinancing risks

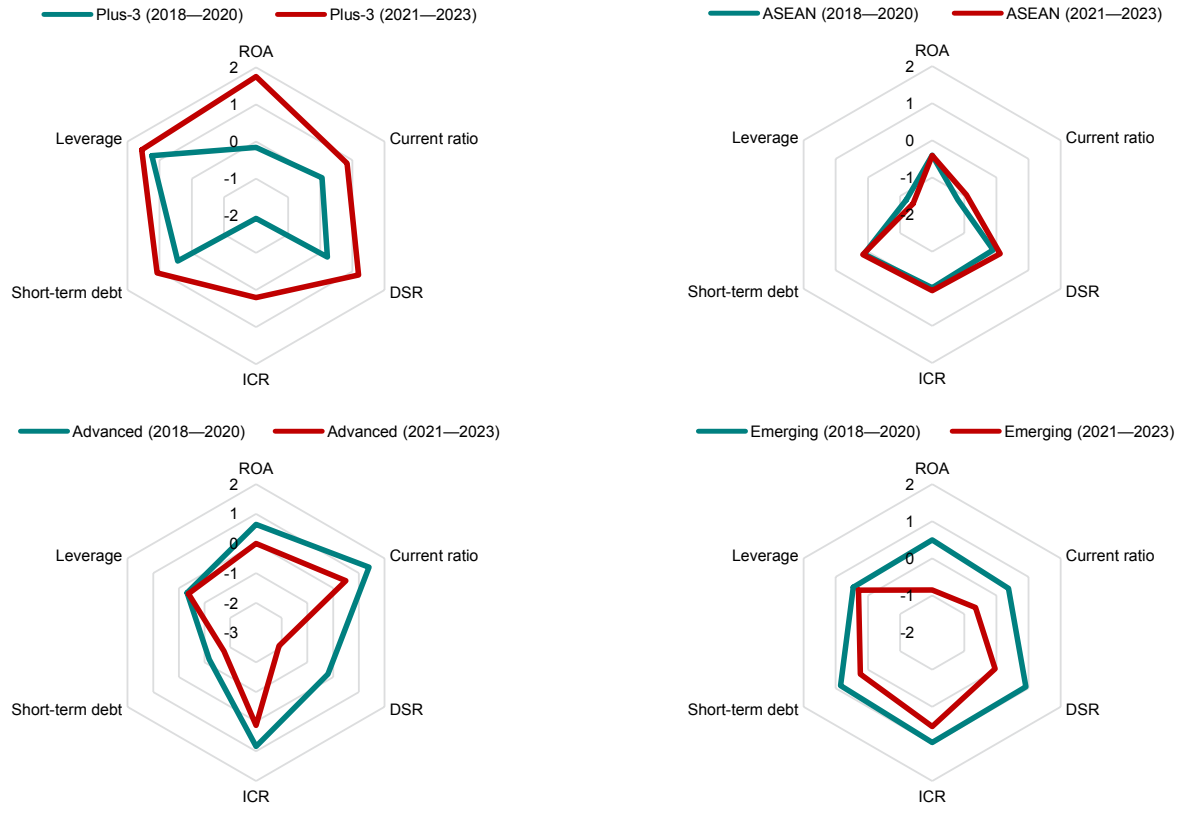
Property firms in ASEAN+3 have seen their refinancing risks rise, not only above pre-pandemic levels but also to levels higher than in other major economies. The weighted average of remaining maturities of property corporate bonds has decreased in 2023 from 2019, indicating higher refinancing risk (Figure 2.9a). Across most ASEAN+3 economies, over 20 percent of these bonds will mature by 2025 (Figure 2.9b). Access to offshore and onshore bond markets is still challenging, and funding costs are high because investors are cautious. Credit ratings for property firms are significantly worse than for other sectors, with a high share of bonds rated as "junk" (with C ratings). Indeed, credit rating agencies have downgraded many property firms, particularly in China, Hong Kong, Indonesia, and Vietnam, due to increased refinancing risks, limited funding access, and weak performance (Figure 2.10). Many firms that rely heavily on offshore funding, especially in China and Indonesia, have restructured or in the process of restructuring their offshore US dollar notes to avoid defaults (Fitch 2023; S&P 2024).

Leverage

Property firms in the Plus-3 economies maintain particularly high leverage ratios (Figure 2.11). This is mainly due to their much higher ratio of non-financial institution liabilities[3] compared to firms in other regions. High leverage can enhance shareholder returns during favorable economic conditions, but it also exposes firms to increased financial risk, particularly when property prices fall.

Figure 2.5. Selected Regions: Changes in Financial Conditions of Property-Related Companies

Property companies' financial conditions, especially in Plus-3, have worsened in profitability, liquidity, debt servicing, refinancing risk, and leverage compared with pre-pandemic levels and other regions.



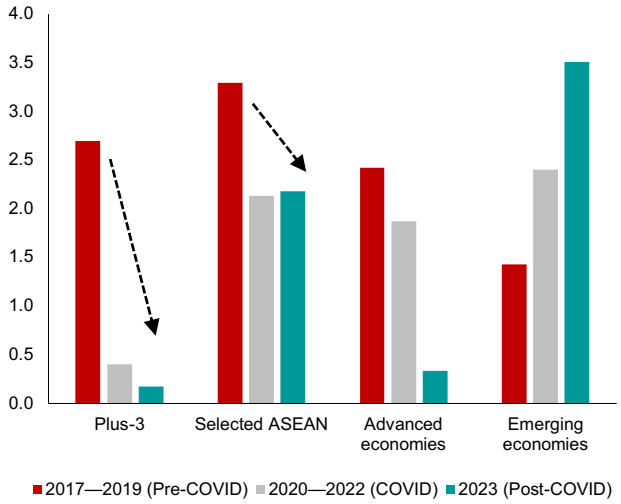
Source: Orbis; AMRO staff calculations.
Note: The larger the shape, the greater the vulnerability in the financial conditions. The sample consists of publicly listed property construction, developers, and real estate firms. The indices were calculated based on the z-scores using the means and standard deviation of all available values for each financial condition indicator between 2018 and 2023. For ROA (return on assets), Current Ratio, DSR (debt service ratio), and ICR (interest coverage ratio), Z-scores are inverted (multiplied by -1) to denote higher values as riskier. Short-term debt and leverage are not inverted as higher values are already interpreted as riskier. Selected ASEAN economies = Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Plus-3 economies = China, Hong Kong, Japan, and Korea. The benchmark advanced and emerging market economies are those with at least 20 listed real estate companies in the Orbis database and are grouped according to the IMF classification (https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates).

[2] Meanwhile, for advanced economies, the DSR increased significantly during the pandemic as short-term debt plummeted from high-pandemic levels. It increased further after the pandemic as earnings improved. However, with the increase in total debt, interest expenses rose in the high interest rates environment, and the ICR remained low despite the increased earnings.

[3] The nonfinancial liabilities include trade payables to suppliers and contractors and 'other liabilities' such as intra-group debts and payables, accounts received in advance, and so on. The presale proceeds from the widespread use of pre-sale systems, as observed in China, Hong Kong, and Korea, likely contribute to their high liabilities. Furthermore, many property firms in the Plus-3 economies are part of large conglomerates, which may lead to substantial intra-group debts. As of end-2023, the ratios of trade payables to suppliers and contractors and other liabilities to total assets are 46 percent in Plus-3 economies, 37 percent in emerging market economies, 22 percent in advanced economies, and 20 percent in ASEAN economies, respectively.

Figure 2.6. Selected Regions: Return on Assets
(Percent)

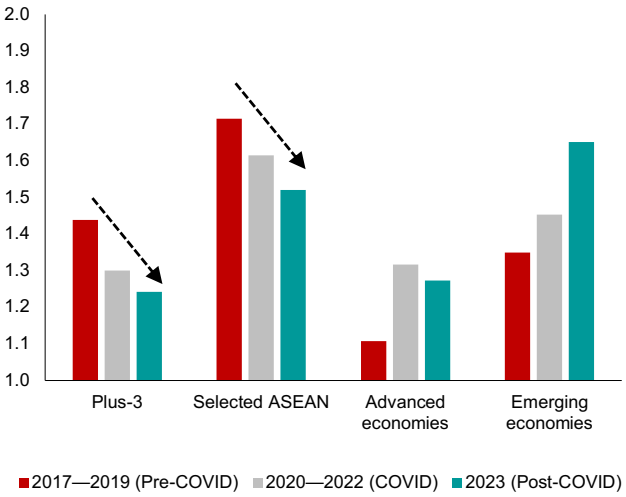
Profitability of ASEAN+3 property firms has decreased.



Source: Orbis; AMRO staff calculations.
Note: Return on assets = Net income / Total assets. The sample consists of publicly listed property construction, developers, and real estate firms. Selected ASEAN economies = Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Plus-3 economies = China, Hong Kong, Japan, and Korea. The benchmark advanced and emerging market economies are those with at least 20 listed real estate companies in the Orbis database and are grouped according to the IMF classification (https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates). The values for each group were calculated as simple averages.

Figure 2.7. Selected Regions: Current Ratio
(Ratio)

ASEAN+3 property firms are facing increasing liquidity risk.

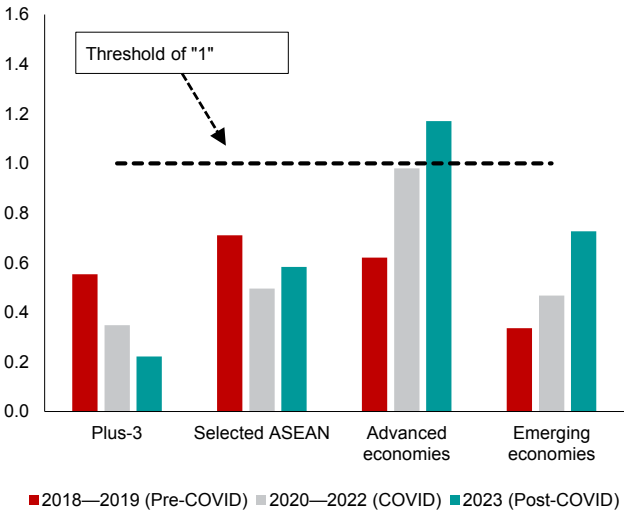


Source: Orbis; AMRO staff calculations.
Note: Current ratio = Current assets / Current liabilities. The sample consists of publicly listed property construction, developers, and real estate firms. Selected ASEAN economies = Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Plus-3 economies = China, Hong Kong, Japan, and Korea. The benchmark advanced and emerging market economies are those with at least 20 listed real estate companies in the Orbis database and are grouped according to the IMF classification (https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates). The values for each group were calculated as simple averages.

Figure 2.8. Selected Regions: Debt Servicing Capacity
(Ratio)

Weakened debt servicing capacity is shown by a lower debt service ratio…

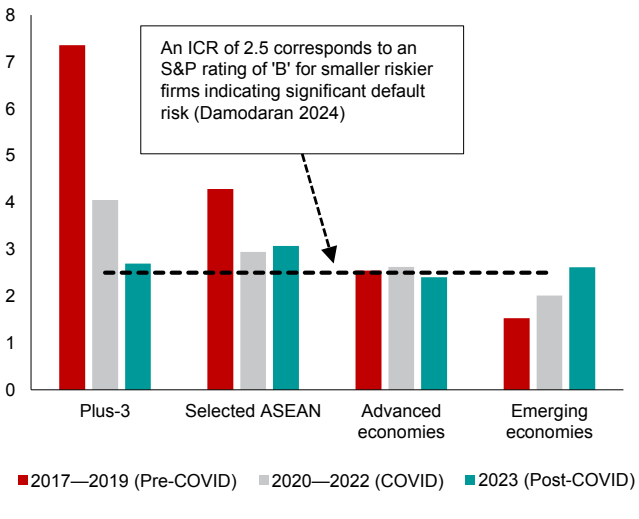
a. Debt Service Ratio



Source: Orbis; AMRO staff calculations.
Note: Debt Service Ratio = EBITDA (Earnings before interest, taxes, depreciation, and amortization) at time t / (Interest expense at time t + Principal on short-term debt at time t-1, due at time t). The sample consists of publicly listed property construction, developers, and real estate firms. Selected ASEAN economies = Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Plus-3 economies = China, Hong Kong, Japan, and Korea. The benchmark advanced and emerging market economies are those with at least 20 listed real estate companies in the Orbis database and are grouped according to the IMF classification (https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates). The values for each group were calculated as simple averages.

… and decreased interest coverage ratio.

b. Interest Coverage Ratio

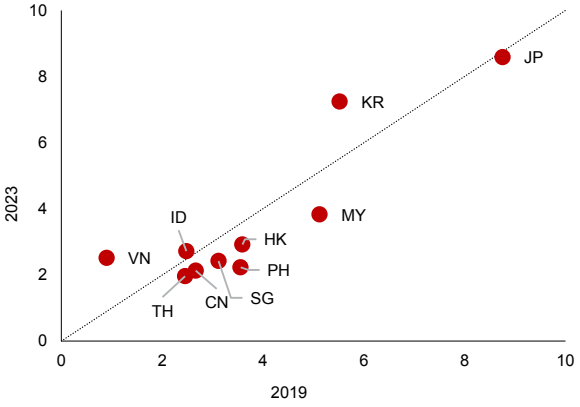


Source: Orbis; AMRO staff calculations.
Note: Interest Coverage Ratio = EBIT (Earnings before interest, taxes) at time t / Interest expense at time t. The sample consists of publicly listed property construction, developers, and real estate firms. Selected ASEAN economies = Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Plus-3 economies = China, Hong Kong, Japan, and Korea. The benchmark advanced and emerging market economies are those with at least 20 listed real estate companies in the Orbis database and are grouped according to the IMF classification (https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates). The values for each group were calculated as simple averages.

Figure 2.9. Refinancing Risks

Refinancing risks have increased, as indicated by shortened maturity…

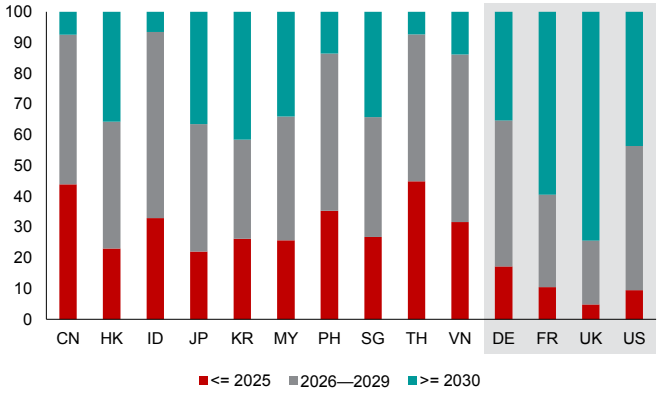
a. Selected ASEAN+3: Weighted Average Remaining Maturity of Property Corporate Bond
(Number of years)



Source: Cbonds; AMRO staff calculations.
Note: The weighted average remaining maturity is calculated by weighting each bond's remaining maturity by its size relative to the total bonds outstanding in the property sector, and then summing these weighted maturities. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = the Philippines; SG = Singapore; TH = Thailand; VN = Vietnam. The data includes bonds issued by both state-owned and privately-owned firms.

… and a concentration of maturities in the near term for property corporate bonds.

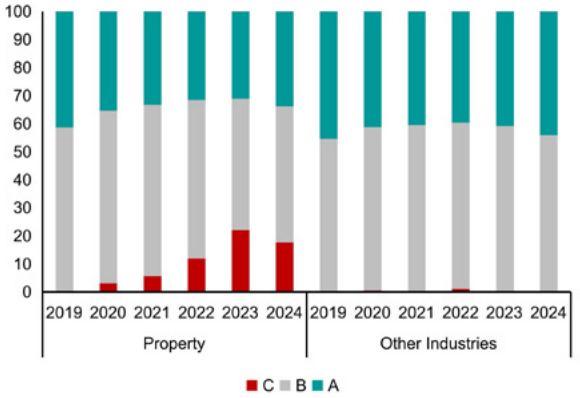
b. Selected Economies: Maturity Profile of Property Corporate Bond
(Percent)



Source: Cbonds; AMRO staff calculation
Note: Data as of 9 September 2024. Bond outstanding ratios maturing by 2025, between 2026 and 2029, and in or after 2030. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = the Philippines; SG = Singapore; TH = Thailand; VN = Vietnam; DE = Garmany; FR = France; UK = United Kingdom; US = United States. Countries with gray shade are non-ASEAN+3 countries. The data includes bonds issued by both state-owned and privately-owned firms.

Figure 2.10. ASEAN+3: Credit Ratings Across Industries
(Percent)

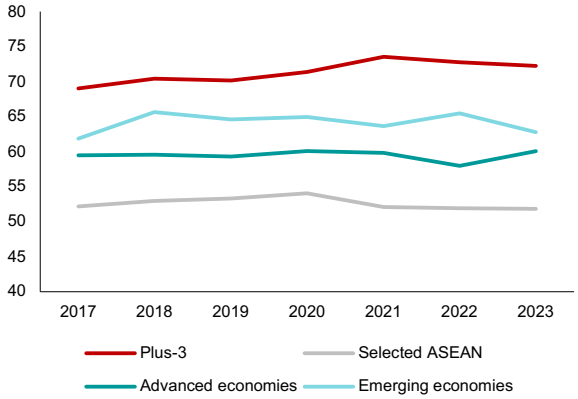
The property sector faces a higher credit risk than other sectors in the region.



Source: Moody's CreditView; Staff calculations.
Notes: C= Very high credit risk; B= Moderate to high credit risk; A= Low to very low credit risk; This chart includes ratings of firms in China, Hong Kong, Indonesia, Japan, the Philippines, Malaysia, Singapore, Korea, Thailand, and Vietnam. The sample consists of 524 listed firms (122 from the property sector, and 402 from other industries). Data for 2024 is as of 15 August.

Figure 2.11. Selected Regions: Leverage of Property Sector
(Percent)

Property firms in Plus-3 maintain higher leverage compared with other regions.



Source: Orbis; AMRO staff calculations.
Note: Leverage = Total liabilities / Total assets. The sample consists of publicly listed property construction, developers, and real estate firms. Selected ASEAN economies = Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Plus-3 economies = China, Hong Kong, Japan, and Korea. The benchmark advanced and emerging market economies are those with at least 20 listed real estate companies in the Orbis database and are grouped according to the IMF classification (https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates). The values for each group were calculated as simple averages.

How do property firms fare during times of stress?

If difficulties persist, a significant share of property firms may struggle with debt payments and high insolvency risks. AMRO conducted a simulation to assess the impact of two shocks on property firms resulting in: (1) a further increase in funding costs, and (2) a further decline in earnings.

Funding cost shocks

Property firms may encounter funding shocks for a variety of reasons. In recent years, central banks globally have raised interest rates amid persistent above-target inflation. Property firms are also confronted with higher funding costs and widening credit spreads due to worsening investor sentiment toward the property sector. A 200-basis point (bp) increase in funding cost is simulated in a stress test for property firms, since it aligns with two standard deviations of bank lending rates in ASEAN+3. Furthermore, a 500-bp increase is considered to assess what would happen under an extreme scenario.

Simulation results indicate that a 200-bp increase in funding cost would push the share of debt at risk[4] in ASEAN+3 property firms from

[4] This refers to the debt of firms with an Interest Coverage Ratio (ICR) below 1.25, equivalent to a "CCC" rating by S&P.

29.5 percent at end-2023 to 36.9 percent (Figure 2.12a). Taking into consideration their cash buffers, the proportion of debt at risk would be reduced by almost half (Figure 2.12b). For comparison, the same exercise is conducted on property firms in advanced economies and emerging market economies outside the ASEAN+3 region. As of the end of 2023, the proportion of debt held by property firms with low capacity for debt service in ASEAN+3 was slightly better than that of emerging market economies but much worse than advanced economies. However, under the stress scenario, the additional increase in debt at risk in ASEAN+3 is smaller than in advanced economies. A large pool of cash buffers would help relieve the stress in every region.

Earnings shocks

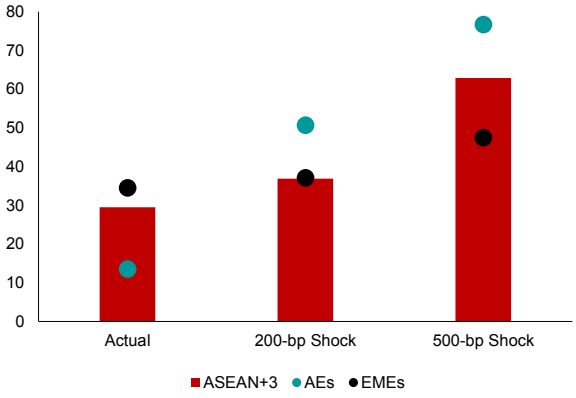
A decline in property demand reduces property firms' sales and earnings, impacting their ability to service debt. An earnings shock scenario is considered here, which assumes a 25 percent decline in earnings, representing the largest median annual decline in a single economy across the region during 2021–2022. A 50-percent decline is considered in an extreme scenario.

Results show that a 25 percent decline of earnings would increase the share of debt at risk in ASEAN+3 property firms from 29.5 percent to 32.8 percent (Figure 2.13a). Similarly, cash buffers would mitigate the impact, indicating their crucial role in absorbing losses and servicing debt (Figure 2.13b). The same stress test on property firms in advanced economies and emerging market economies demonstrates a similar trend to the funding cost shock scenario. Advanced economies, which have more property firms with ICRs slightly above the debt-at-risk threshold, are more sensitive to earnings shocks than those in ASEAN+3 and emerging market economies; their strong cash buffers could also save them from debt payment difficulties.

Figure 2.12. Selected Regions: Share of Debt Under Stress by Funding Cost Shock, 2023 (Simulation Results)
(Percent)

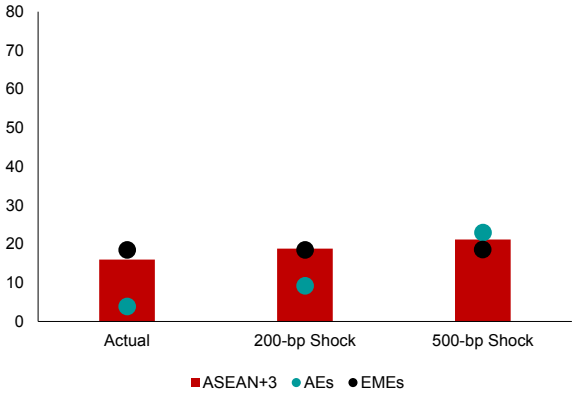
Funding cost shocks, like high-risk premiums, can sharply increase property firms' solvency risk…

a. Without Considering the Cash Buffer



… but a robust cash buffer could mitigate this risk.

b. Considering the Cash Buffer

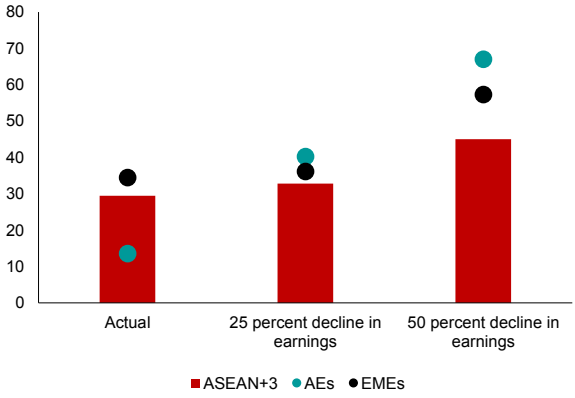


Source: Orbis; AMRO staff calculations.
Note: AEs = Advanced economies; EMEs = Emerging market economies; Interest Coverage Ratio = EBIT (earnings before interest, taxes)/interest expense. A rise in funding cost is assumed to affect interest expense but not EBIT. 'Actual' refers to the real data in 2023. 'Shock' refers to a 200-bp or 500-bp increase in funding rate. The scenarios indicating "no cash buffer" consider only EBIT in servicing interest expense while the scenarios indicating "with cash buffer" also include cash and cash equivalents in servicing interest expense. Due to data availability, Brunei Darussalam, Cambodia, Lao PDR, and Myanmar are not included in the ASEAN+3. AEs refer to selected advanced economies in western Europe and North America. EMEs refers to selected emerging market economies in eastern Europe and Latin America.

Figure 2.13. Selected Regions: Share of Debt Under Stress by Earning Shock, 2023 (Simulation Results)
(Percent)

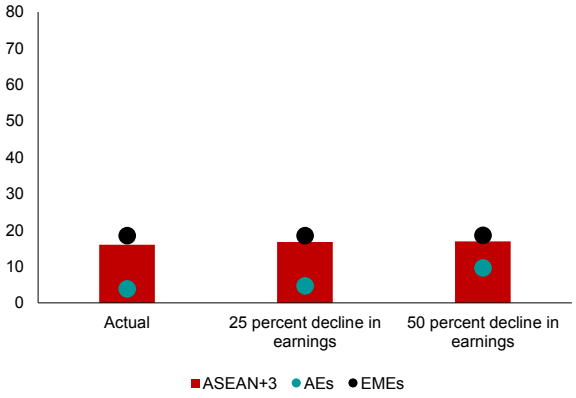
Earnings shocks from demand decline can reduce property firm's debt servicing ability…

a. Without Considering the Cash Buffer



… but a robust cash buffer could mitigate this risk.

b. Considering the Cash Buffer



Source: Orbis; AMRO staff calculations.
Note: AEs = Advanced economies; EMEs = Emerging market economies; Interest Coverage Ratio = EBIT (earnings before interest, taxes)/interest expense. A decline in earnings is assumed to affect EBIT but not interest expense. 'Actual' refers to the real data in 2023. 'Shock' refers to a 25 percent or 50 percent decline in earnings. The scenarios indicating "no cash buffer" consider only EBIT in servicing interest expense while the scenarios indicating "with cash buffer" also include cash and cash equivalents in servicing interest expense. Due to data availability, Brunei, Cambodia, Lao PDR, and Myanmar are not included in the ASEAN+3. AEs refer to selected advanced economies in western Europe and North America. EMEs refers to selected emerging market economies in eastern Europe and Latin America.

III. Assessing the Spillovers from the Property Market to Financial Stability

How significant is the impact of the property sector?

Understanding the relationship between real estate and the stability of the financial sector is crucial for managing credit and systemic risks. The literature identifies that shocks in the real estate market can undermine financial stability through different channels, including through bank solvency, collateral value, and the health of nonbank financial institutions (NBFIs). These shocks can also spill over into other sectors and asset classes (IMF 2021).

To assess how the financial market perceives risks across the property market, a market beta analysis was conducted.[5] The property market beta, which has risen globally, surpassing 1 in most regions, indicates that the property market is viewed as riskier than the broader economy. Before the pandemic, the property market beta in the ASEAN+3 region was significantly higher than in other regions. The beta dropped during the pandemic as the risk perception for the property market declined relative to the overall economy, coinciding with heightened risks in other industries. From late 2021, largely due to issues with large property developers, the beta increased again, with the average value surpassing 1 since 2023 (Figure 2.14a). Within the region, China's property market beta remains high, exceeding 1 (Figure 2.14b).

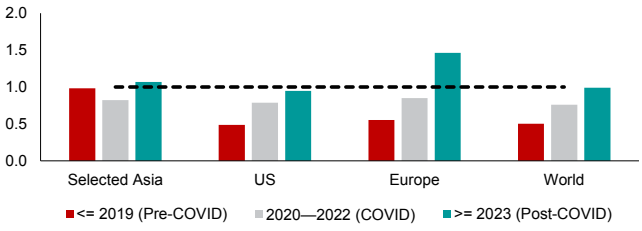
Empirical analysis reveals a close inverse relationship between the property market's robustness and financial market stress (Annex 2.1). Using monthly panel data of the changes in the Real Estate Price Index (REI), changes in the Purchasing Manager Index (PMI), and Financial Stress Index (FSI) from five ASEAN+3 economies (China, Hong Kong, Japan, Korea, and Thailand) covering from May 2008 to August 2023, a panel vector autoregression (PVAR) and Granger causality test were conducted.[6] This analysis aims to explore the dynamic relationship between the property sector, the real sector, and financial stability.

The findings suggest that negative shocks in the property market, such as declining property prices, would aggravate stress in the financial market, and vice versa. The impact of a property market disturbance on the financial market is persistent, lasting for over 10 months. Conversely, disruptions in the financial market negatively affect both the property market and the real economy for about 3 months but with more intensity. Real sector activity (proxied by PMI) positively impacts property prices, though the reverse is muted, and both PMI and REI negatively correlate with financial market stress (Figure 2.15). The Granger causality test demonstrates that past changes in the property market index predict subsequent changes in the financial stress index.[7] Conversely, past changes in the financial stress index also predict subsequent changes in the property market index.

Figure 2.14. Property Market Beta
(Coefficient)

Financial markets perceive increasing risks in the property market globally, reflected in higher market betas…

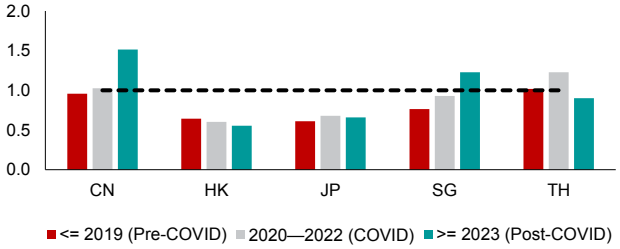
a. Selected Economy Groups



Source: MSCI indices via Bloomberg Finance L.P.; AMRO Staff calculations.
Note: For selected Asia, a proxy of ASEAN+3, MSCI AC Asia ex JP indices are used. Selected Asia indices include securities from eight ASEAN+3 economies (e.g. China, Hong Kong, Indonesia, Korea, Malaysia, Singapore, Philippines, and Thailand), India, and Taiwan Province of China. The coefficients for the beta are calculated on a rolling basis for a period of six months. Data as of 15 Aug 2024.

… and China's property market beta remains high within the region.

b. Selected ASEAN+3



Source: MSCI indices via Bloomberg Finance L.P.; AMRO Staff calculations.
Note: The coefficients for the beta are calculated on a rolling basis for a period of six months. CN = China, HK = Hong Kong, JP = Japan, SG = Singapore, TH = Thailand. Data as of 15 Aug 2024.

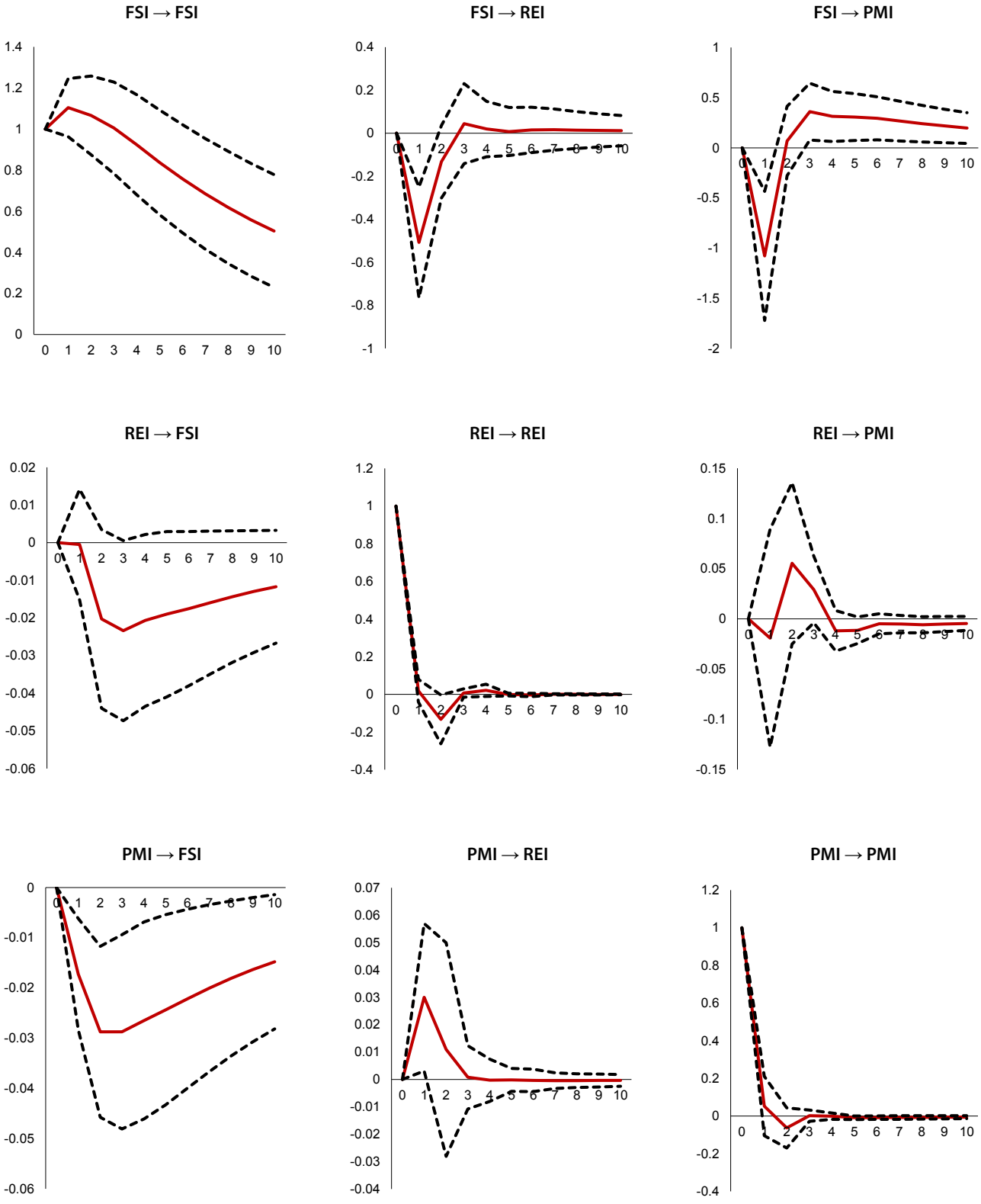
[5] The market beta is the coefficient of regression of the daily changes in a sector index to the daily changes in the benchmark index of the broader economy. It measures the perception of the risk associated with the sector compared to the broader economy. A market beta greater than 1 typically indicates that the sector is perceived as riskier than the broader economy. For more details, refer to AMRO (2023a).

[6] This analysis may have limitations, including the potential for omitted variables that could affect both the real estate market and financial stability, the simplified assumption of linear relationships, and the reliance on proxies.

[7] According to panel VAR-Granger causality Wald test, the null hypothesis (H0: Excluded variable does not Granger-cause Equation variable) is rejected with a p-value of 0.038 when the excluded variable is REI and the Equation variable is FSI. H0 is also rejected with a p-value of 0.000 when the excluded variable is FSI and the Equation variable is REI.

Figure 2.15. Selected ASEAN+3: Impulse-Response Function (Impulse → Response)

Stress in the real estate market negatively impacts the financial market, while increasing financial market stress, in turn, adversely affects the real estate market.



Source: Asian Development Bank; national authorities via CEIC; S&P Global via Have analytics; AMRO staff calculations.
Note: FSI = Financial Stress Index; REI = Real Estate Price Index; PMI = Purchasing Manager Index; The first variable is an impulse factor and the second variable is a response factor. An increase in FSI indicates heightened financial market stress, while an increase in REI indicates rising real estate prices and a higher PMI reflects a more favorable economic environment. The dotted lines are 95 percent confidence intervals. The x-axis represents months following a shock and the y-axis represents the magnitude of the response variable. The dotted lines are 95 percent confidence intervals. The magnitude of the shock corresponds to a one-unit increase in the impulse variable.

How does property sector credit risk affect the soundness of banks?

In recent years, ASEAN+3 banks have shown relatively stable trends in exposure to property industry-related lending (Figure 2.16). Financial regulators and banks are increasingly aware of the risks associated with excessive concentration in any single sector. They have concentration risk measures to prevent excessive bank lending to property developers. Also, property developers have increasingly turned to alternative financing channels, such as bond issuances, direct investment, or other local financing mechanisms, and so have reduced their reliance on traditional bank financing. NBFI funding to the property sector in Korea, for example, has increased rapidly.

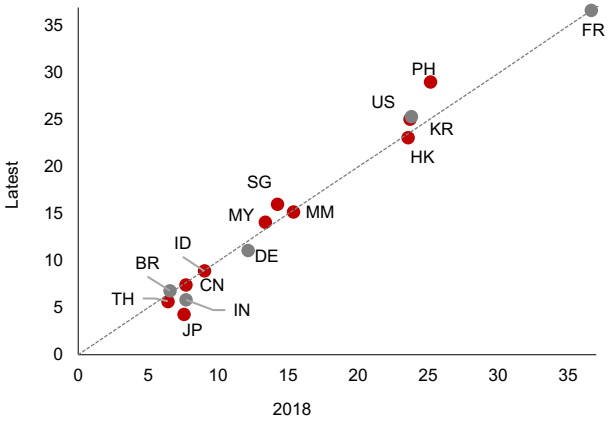
The quality of property-related loans in ASEAN+3 varies, with asset quality remaining stable in selected ASEAN economies but deteriorating in some Plus-3 economies since 2021 (Figure 2.17). An empirical analysis by AMRO, employing a regression model, identifies that in economies witnessing dramatic rises in nonperforming loan (NPL) ratios, the contributing factors include conventional elements such as increased developer debt, rising interest rates, and declining real estate prices, as well as market sentiment indicators like a deteriorating expected business climate index and business performance index (Annex 2.2).

As credit risk in the property sector rises, so does the risk of credit losses for banks exposed to this sector. The probability of default for property firms in the Plus-3 economies increased significantly in 2021 and 2022, leading to a sharp rise in the forward-looking credit loss rate,[8] which, remains above pre-pandemic levels, while moderating in 2023 (Figure 2.18a).

However, the adjusted forward-looking credit loss rate suggests that banks in the ASEAN+3 region with property exposures are relatively resilient. This adjusted rate is calculated by multiplying the original forward-looking credit loss rate—which reflects the probability of default in the sector—by the economy-specific realized bank loan loss rate—the actual percentage of loans that banks have written off as uncollectible. This measure can provide insight into the banks' credit risk to the property sector reflecting the effectiveness of banks' risk management practices in the economy. The rates in Plus-3 and ASEAN economies are lower than in Europe and other countries except for the US (Figure 2.18b). The adjusted figures indicate that ASEAN+3 region banks are practicing strong risk management, including by increasing provisions or reducing exposure to risky sectors.

Figure 2.16. Selected ASEAN+3: Share of Property-Related Loans in Total Loans
(Percent)

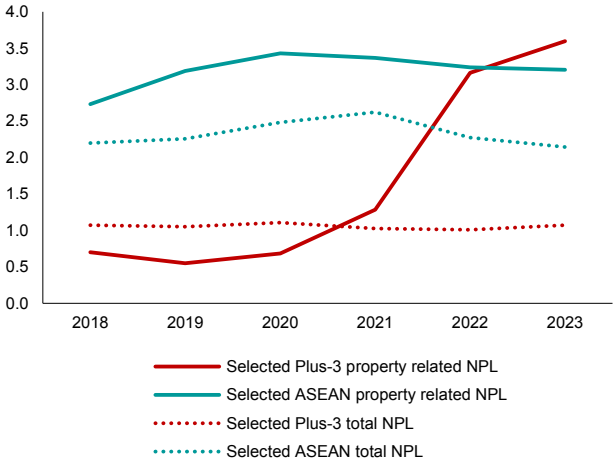
Banks in ASEAN+3 have kept their exposure to the property industry relatively stable.



Source: CEIC; Wind; Haver Analytics; AMRO staff calculations.
Note: Property-related sectors include commercial banks' loans to building and construction, property development and investment, and real estate activity sectors, which may have different coverages across different economies. For US, data for commercial real estate (including construction and land development) is shown. For "latest" data, 2023 data are used for CN, HK, ID, JP, PH, and US; and 2022 data are used for KR, MY, MM, SG, TH. BR = Brazil; CN = China; DE = Germany; FR = France HK = Hong Kong; ID = Indonesia; IN = India; JP = JP; KR = Korea; MM = Myanmar; PH = Philippines; SG = Singapore; TH = Thailand; US = United States.

Figure 2.17. Selected ASEAN+3: Property-Sector Related NPL Ratio and Total NPL Ratio
(Percent)

Property-related loan quality in Plus-3 deteriorated sharply.



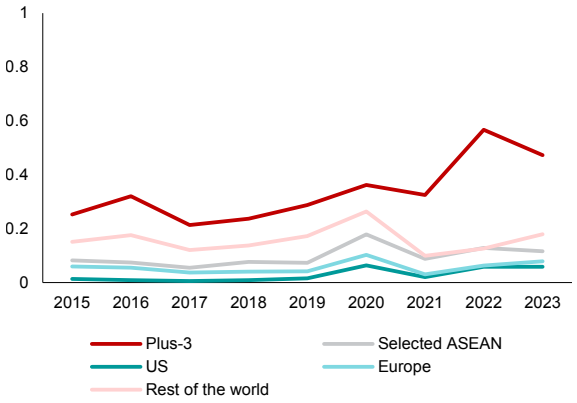
Source: CEIC; Wind; Haver Analytics; national authorities; AMRO staff calculations.
Note: Economies selected based on data availability. Simply averaged. Selected Plus-3 includes China, Hong Kong, and Korea. Selected ASEAN includes Indonesia, Singapore, and Thailand. Property-related loans are commercial bank loans to construction and real estate activities (CN, ID, KR, TH); Construction, property development and investment (HK); and building and construction (SG). Property-related NPL ratios refer to property-related NPLs out of all property-related loans. Some missing data are replaced with interpolated values or the closest available value. NPL = nonperforming loan.

[8] The forward-looking credit loss rate in the property sector reflects the likelihood that banks will experience losses on their credit exposures to the property market over the next 12 months. This rate is calculated by multiplying the probability of default (PD) of firms in the property market by the loss given default (LGD). For more details on methodologies, refer to Ong and others (2023).

Figure 2.18. Selected Regions: 1-Year Forward-Looking Market-Implied Credit Loss Rate in the Property Sector
(Percent)

Rising default risks for property firms in Plus-3 sharply increased banks' forward-looking credit loss rates…

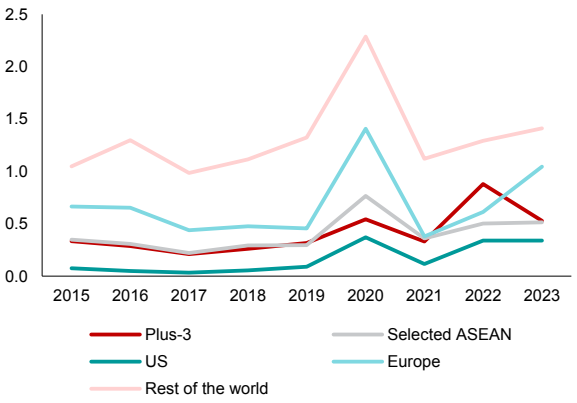
a. Original Rate



Source: AMRO (Global credit loss rates database); AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Credit loss rate by region is a simple average of the rates of the individual countries in each region. ROW = rest of the world.

… however, banks are resilient to property exposure, given their strong risk management practices.

b. Adjusted Rate Reflecting the Economy-Specific Level of Bank Loan Losses

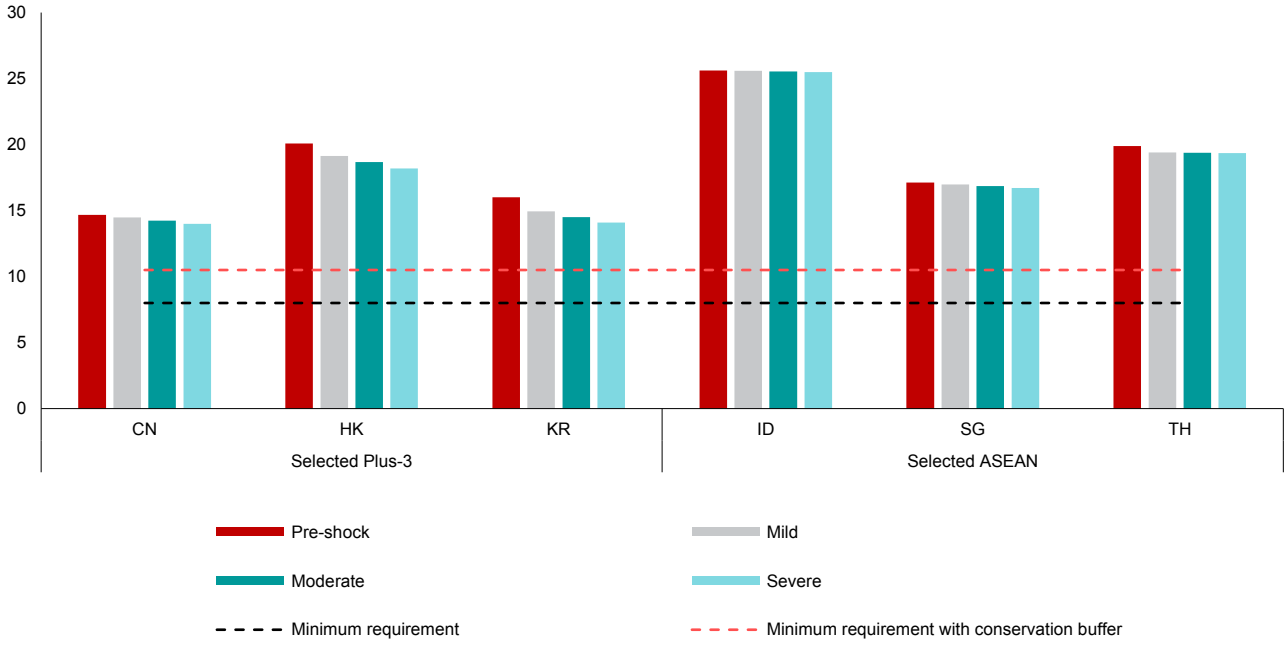


Source: AMRO (Global credit loss rates database); AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Credit loss rate by region is a simple average of the rates of the individual countries in each region. ROW = rest of the world.

An AMRO stress test assessed the impact of a downturn in property developers' financial performance on ASEAN+3 banks' capital adequacy ratios (CARs) and found that banks would maintain sufficient capital under adverse conditions (Annex 2.3). A downturn in property developers' financial performance could erode banks' capital buffers due to increased provisions and reduced profits from lower interest income. Nevertheless, under mild, moderate, and severe scenarios (equivalent to one, two, and three standard deviation shocks to NPLs), CARs in ASEAN+3 economies remained well above the Basel III minimum regulatory requirement. Even in the severe shock scenario, CAR levels stayed between 14 percent and 18 percent in the Plus-3 economies and 17 percent and 25 percent in the ASEAN economies, underscoring overall banking system resilience due to high capitalization levels and provisioning buffers, as well as their prudent approach to lending, with limited concentration in the property-related sectors (Figure 2.19).

Figure 2.19. Selected ASEAN+3: Potential Impact of Property Developers' NPL Deterioration on Banks' CAR
(Percent)

AMRO's stress test shows that ASEAN+3 banks have sufficient capital buffers to manage potential risks from property developers.



Source: CEIC; Wind; national authorities; individual bank financial statements; AMRO staff estimates
Note: Economies selected based on data availability. CN = China; HK; Hong Kong; KR = Korea, ID = Indonesia; SG = Singapore; TH = Thailand. NPL = nonperforming loan.

However, despite overall banking sector resilience, small banks, regional banks, and savings banks are likely to be more vulnerable to property market shocks. The collapse of a few small banks may not add a significant risk to the financial system, but if multiple small banks fail simultaneously, this could develop into a systemic risk, necessitating caution.

- China: Small regional banks, such as city or rural commercial banks, have high exposure to local government debt.[9] As land revenue accounted for about 20 percent of local government revenue in 2021 (Huang 2023), the property market downturn has placed significant financial strain on many local governments. Consequently, small regional banks, with their high exposure to local government debt, face substantial credit risks and decreases in profitability.

- Hong Kong: Some small to mid-sized banks have higher exposure to small and mid-sized developers, whose repayment abilities are under greater pressure. Consequently, these banks are likely to face higher risks than large banks, albeit most of these loans are secured. Moreover, some small and mid-sized banks are more exposed to property developers in mainland China,[10] which indicates higher asset risk.

- Korea: Concerns are rising about the soundness of financial institutions with project financing (PF) exposure amid high interest rates and a sluggish property market. Savings banks increased the size of real estate PF loans during the low-interest-rate environment and the booming real estate market. Although their loans decreased somewhat after the interest rate increase, the amount reached KRW 9.6 trillion at the end of 2023, compared with KRW 6.9 trillion at the end of 2020, a 39.1 percent increase. As a result of the downturn in the real estate market, asset quality has decreased, and the delinquency rate has risen from 2.3 percent in 2020 to 6.9 percent in 2023.

The soundness of a bank exposed to the property sector is influenced by bank governance and lending practices. In Vietnam, for example, the appointment of property developers in key management positions in banks has brought the issue of cross-ownership to the forefront. Developers can bypass loan limits by using subsidiaries, affiliated businesses, or employees to secure extra funding, leading to banks unknowingly exceeding lending limits (Ho and others 2022). The opacity and complexity of this intricate web can further amplify the risks arising from the property sector and have adverse spillovers on the broader financial market (Box 2.3).

What are the property market risks from nonbank financial intermediaries (NBFIs) and shadow banking activities?

The risks of financial institutions to the property sector extend beyond traditional bank loans. In several countries, NBFIs such as insurance companies, securities firms, trust companies, and entities offering wealth management products play a significant role in property development funding. These entities often operate under less stringent regulations than banks, and a lack of accurate data obscures their risks. NBFIs frequently cater to lower-quality borrowers because of easier regulations. Their expanding role in property sector financing could pose systemic risks through maturity mismatches, liquidity transformations, and increased leverage. Moreover, the informal nature of some lending practices adds another layer of complexity, potentially exacerbating financial instability during economic downturns (FSB 2023).

Specific risks are associated with NBFI lending to the property sector across ASEAN+3 economies, including in:

- China: The bankruptcy of the Zhongzhi Group in January 2024 was triggered by the default of its subsidiary trust company with significant property market exposure, highlights the risks associated with NBFIs. This event, while not escalating to systemic risk, significantly undermined investor confidence and market sentiment. The property market downturn is a challenge not only for investors in trusts which are like wealth management products but also for financial institutions such as banks, trust companies, and securities firms that provide implicit guarantees. Tighter regulations and heightened awareness of property sector risks by the Chinese government have sharply reduced the size of legacy shadow banking activities such as wealth management products and their exposure to property.[11]

[9] Official statistics on small banks' exposure to local government debt are limited, but estimates from various agencies provide a gauge of the size. According to Goldman Sachs, non-covered banks hold local government debt amounting to 48 percent of their total assets, compared to 18 percent for covered banks as of 2022. S&P global (Huang 2023) estimates that regional banks have around 25 percent of their loan portfolios exposed to local government financing vehicles based on the top regional banks' data.

[10] According to research, large banks have exposures to property developers in mainland China about 1–6 percent of their total loans but some small and medium-sized banks have over 10 percent of their total loans (Hung 2024).

[11] According to research, the size of legacy shadow banking activities such as wealth-management-like products decreased to CNY 3 trillion, nearly half its peak in 2020. The shadow banking industry's property exposure also has been reduced by 62 percent, falling to CNY 1.1 trillion as of July 2023 (Wu 2023).

- Korea: NBFIs, including securities firms, have increased their exposure to the real estate PF market. Securities firms increased their exposure to PF loans from KRW 5.2 trillion in 2020 to KRW 7.8 trillion in 2023, a 50 percent rise. The delinquency rates for PF loans provided by securities firms surged from 3.4 percent in 2020 to 13.7 percent in 2023. Securities firms not only provide PF loans but also issue debt guarantees for securities backed by PF loans. Small and mid-sized securities firms with contingent liabilities in high-risk PF-backed securities can exacerbate spillover risks in financial stability. The credit crunch in October 2022, which affected the money and corporate bond markets, underscores the need for specialized management to prevent PF insolvency from triggering broader systemic risks.
- Cambodia: Another form of shadow banking associated with property developers involves providing mortgage loans to homebuyers through installment plans. This method operates outside of the supervision of the authority and is popular due to less stringent credit evaluations. The size of this type of lending accounts for an estimated 60 percent–70 percent of the country's GDP (AMRO 2023b). However, heavy reliance on these schemes exposes developers to cash flow disruptions from homebuyers' late payments. Small developers, especially when not backed by conglomerates, are particularly vulnerable to credit crunches and default threats. Prolonged property market stagnation and deepening financial stress among developers can transmit credit risks from shadow banking to the official banking sector, impacting both the stability of financial system and the broader economy.

IV. Policy Recommendations

Implement measures to mitigate the impact of worsening market sentiment

Ongoing weakness in market confidence in the property sector can put even fundamentally healthy property firms at liquidity risk. It is crucial to implement measures that prevent companies with sound fundamentals from defaulting because of tight credit conditions caused by risk aversion in worsening market.[12] Some strategies worth considering include facilitating access to credit for firms with sound financial health, offering guarantees to viable projects, and reducing immediate debt redemption burdens, such as through bond maturity extensions.

Governments in ASEAN+3 have implemented measures to support liquidity in their property sectors:

- China: The government started a "whitelist" project, with local governments listing property projects eligible for financing support and coordinating with local financial institutions (The State Council, China 2024). In addition, the central government provided CNY 300 billion to support local governments' purchase of unsold properties which can then be converted into affordable housing (PBC 2024a).
- Korea: The authorities introduced a project finance guarantee program worth KRW 35 trillion to facilitate funding for development projects with solid financial fundamentals (FSC, Korea 2024).
- Vietnam: The government amended decrees to allow the extension of privately-issued corporate bond terms by up to two years and permit payment by assets other than cash through agreements with bondholders.

Successful policy implementation depends on accurately identifying sound companies and ensuring cooperation from regulatory authorities, government agencies, financial institutions, and the real estate industry. Support should be targeted at viable firms, while non-viable ones should undergo swift restructuring or liquidation, to avoid perpetuating "zombie firms". Establishing robust and objective evaluation standards tailored to each country's unique circumstances through cooperation among financial institutions and regulatory authorities is essential. Additionally, for non-viable firms, strengthening and streamlining resolution and liquidation procedures is crucial to ensure the effective management of these processes.

[12] If liquidity support measures rely primarily on government funding, authorities should be cautious of the potential for these funds to become contingent liabilities, which could influence market perceptions of both financial and fiscal stability. It is crucial that countries ensure they have sufficient fiscal capacity before adopting such measures.

Enhance the soundness of financial sectors with property market exposure

To address vulnerabilities in financial institutions with significant property exposure—particularly small regional banks, savings banks, and NBFIs—proactive measures and robust oversight are essential to strengthen their resilience. While it is accepted that systemically important financial institutions (typically large banks) warrant more stringent supervision due to their impact on financial stability, smaller institutions also require adequate oversight. Major banks have reduced exposure and built adequate provisions, but smaller institutions require tailored regulatory attention to prevent systemic risks because they lack diversification, transparent governance, and have not had to deal with strict regulations.

As such, ASEAN+3 countries should:

- Diversify business models: Smaller financial institutions, including regional banks and savings banks, and NBFIs should diversify beyond real estate investments to reduce risk. For example, in Korea, it is crucial for savings banks and securities firms to reduce reliance on real estate PF. Similarly, in China, reducing regional banks' dependence on the property sector and local government financing vehicles is essential. Governments can support this by promoting mergers and acquisitions to form financially healthier institutions and offering the necessary assistance to encourage diversification. Encouraging these smaller institutions to explore alternative business models and revenue streams will help mitigate these risks.

- Tightening regulatory oversight: Strengthening regulatory oversight of under-regulated shadow banking is crucial to mitigating systemic risks. China has improved supervision and regulation of shadow banking products and encouraged banks to bring off-balance sheet activities onto their balance sheets. Korea has announced measures for orderly soft-landing in real estate project finance, including actions targeting NBFIs. Authorities can further mitigate risks by encouraging financial institutions to conduct regular stress tests on property-related activities to identify and manage insolvency risks proactively.[13] For instance, institutions could measure expected loss in scenarios of sharp property price declines or interest rate increases, and set aside provisions accordingly.

- Implement prompt government action: When property sector stress begins to impact the financial sector, governments must act swiftly to prevent broader market spillover. For instance, the Korean government announced a KRW 50 trillion support package in response to the credit crunch triggered by a property developer's default in 2022, which promptly alleviated investor anxiety and prevented systemic risk.

- Address country-specific issues: Tailoring measures to unique challenges in different countries can enhance overall financial resilience. For instance, in Vietnam, tackling the issue of cross-ownership governance, where property developers can influence bank lending practices, is crucial. The government amended the law to lower ownership limits and impose stricter disclosure requirements. Furthermore, regulators need better information systems to track the ultimate ownership of commercial banks and mitigate ownership concentration. Enhancing bank governance by mandating board diversity to prevent ownership being concentrated in the hands of a few large shareholders, and empowering independent directors to challenge corrupt business practices, could also further address this issue.

[13] Given that regulatory stress tests may require substantial resources—including data and technical expertise—it may be challenging for small banks or NBFIs to conduct such exercises on a regular basis. Nevertheless, it is still warranted that proactive risk management practices be encouraged for these institutions, which can help them better prepare to identify and address potential vulnerabilities.

Carefully utilize property demand stimulation policies tailored to each country's circumstances

To break the downward cycle of shrinking demand for property and deteriorating financial conditions for developers, countries can consider introducing demand-boosting measures. For example, lowering the burden of purchasing property through measures such as stamp duty waivers, reduced downpayment ratios, and tax reductions can help stimulate demand. The Hong Kong Government abolished all demand-side management measures for residential properties, including stamp duty and adjusted loan-to-value ratios to ease mortgage lending (HKMA 2024). In China, the government lowered the minimum downpayment ratio (PBC 2024b) and eased home buying restrictions to stimulate demand. In Indonesia, the government introduced a policy to reduce Value Added Tax for eligible properties and has relaxed loan-to-value and downpayment policies for green property loans during 2024.

However, policies to stimulate property demand must be tailored to the circumstances of each country. For instance, in economies with excessive household debt ratios, caution is required as policies to boost property demand could increase debt levels. Moreover, it is crucial to consider that if the stagnant demand results from deeper issues, such as economic recession or lack of confidence in developers, then demand stimulation policies may have limited effect. By customizing demand-related policies to fit each country's unique circumstances, governments can more effectively deal with the distinct challenges of their property markets and promote economic stability.

Improving property market practice and conduct

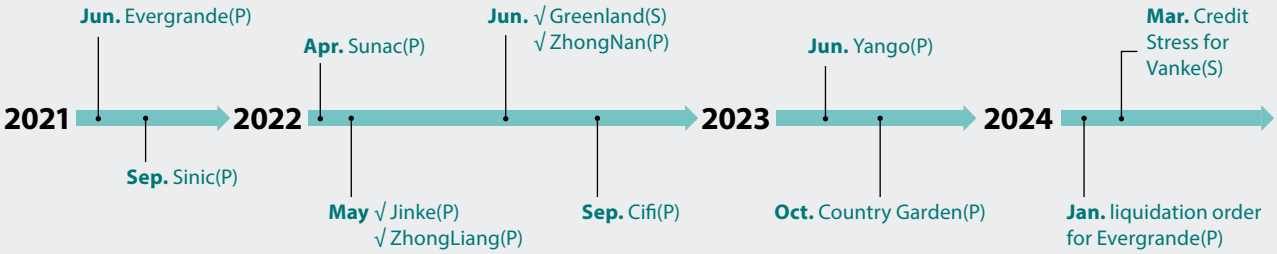
Once current property market difficulties subside, fundamental structural reforms are crucial to curb aggressive property developers from overleveraging. This requires joint efforts by authorities, creditors, and the industry itself. Strict regulation and monitoring are essential to prevent the misuse or diversion of funds from financial institutions and mortgage funds in escrow accounts raised through presales. Financial institutions must rigorously assess the creditworthiness of developers and feasibility of projects when providing or extending loans and conduct regular audits of fund utilization. Authorities should ensure comprehensive oversight to maintain the stability and soundness of property and financial markets by setting stricter limits on the debt developers can take on, improving transparency requirements, and providing for financial institutions with clear guidelines on property sector exposure.

Box 2.1:

China: Recent Development and Prospect of Chinese Developers' Tribulations

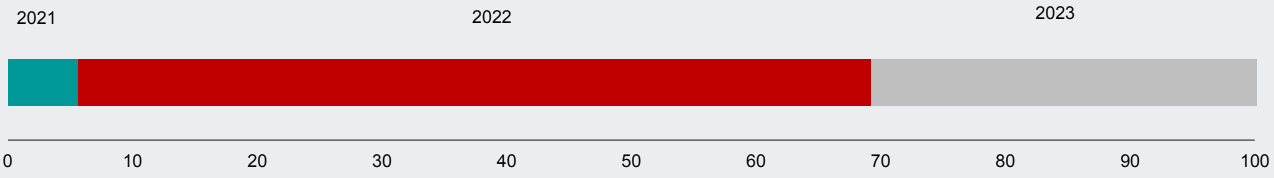
Concerns regarding highly leveraged Chinese developers remain unresolved. Alarm surrounding these developers began to surface in 2021, triggered by Evergrande defaulting on payments to holders of its dollar-denominated bonds. The number of default cases among major real estate developers, including Evergrande, started to increase from then on (Figure 2.1.1). Default cases reached their peak in 2022, after which signs of stabilization began to emerge. The interest spread of high-yield bonds denominated in dollars, which reflects the credit anxiety for low credit-rating Chinese corporations, widened significantly in 2022 but gradually decreased after.[1] The scale of defaults on offshore bonds issued by Chinese developers also declined after reaching its peak in 2022 (Figure 2.1.2). However, concerns resurfaced following a liquidation order issued by a Hong Kong court against Evergrande in January 2024. In March 2024, concerns spread about the ability of Vanke, a major state-owned Chinese developer, to repay upcoming dollar-denominated bonds. Although Vanke managed to meet its bond repayment obligations, Chinese developers remain under scrutiny.

Figure 2.1.1. Timeline of Major Chinese Developer's Default Cases



Source: AMRO staff illustrations.
Note: 1) P denotes a private firm and S denotes enterprises owned or backed by the state.

Figure 2.1.2. US Dollar Bond Defaults by Chinese Developers
(Billions of US dollars)



Source: Bloomberg Finance L.P.; AMRO staff calculations.

The difficulties of Chinese developers stem mainly from a downturn in the real estate market and tightened regulations. Property prices in China have been declining since 2022 (based on 70 cities), exacerbated by oversupply, and growing concerns among homebuyers about the delivery of pre-purchased homes. The downturn has led to a decline in sales, worsening developers' funding woes. Revenue from home presales represents a key source of financing for developers, alongside bank loans and bond issuance. Property sales in China have been falling since 2022, with a rapid increase in unsold completed inventory (Figure 2.1.3).[2] Analysis of the interest coverage ratio (ICR), a commonly used indicator to measure solvency, reveals that an increasing proportion of developers face difficulties in repaying their debts (Figure 2.1.4). Borrowing restrictions imposed on developers by Chinese authorities in 2020 contribute to the liquidity crisis (Jing 2022).[3] The stricter credit policy[4] implemented in August 2020 to curb excessive leverage of developers, led to significant financing challenges for some developers unable to meet the stringent conditions. Tight US monetary policy increased the cost of offshore funding for developers and heightened their risk of default. The escalation in defaults on offshore bonds issued by Chinese developers after the US raised interest rates in 2022 corroborates this.

The author of this box is Jungsung Kim.

[1] According to Bloomberg Finance L.P., the interest rate spread on China's speculative-grade dollar-denominated bonds surged to 2,500 basis points in 2022 but significantly decreased to around 530 basis points in June 2024.

[2] Inventory increased by an average of 18 percent in 2023 (compared to the same period of 2022) and expanded by an average of more than 20 percent in the first quarter of 2024, based on the data from National Bureau of Statistics.

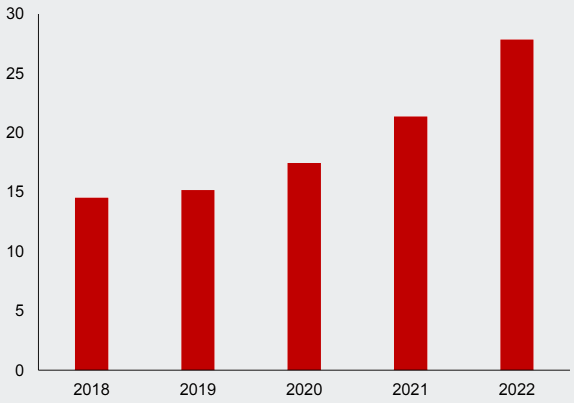
[3] Jing, Liu. 2022. "Series: China's Real Estate Problem 1. The Three Red Lines." CKGSB Knowledge, 5 July.

[4] Many media outlets and market participants refer to this policy as the "Three Red Lines."

Figure 2.1.3. Residential Properties Sold and Housing Price
(Percent, year-on-year)

Source: National Bureau of Statistics, AMRO staff calculations.

Figure 2.1.4. Share of Debt at Risk for Property Sector
(Percent)

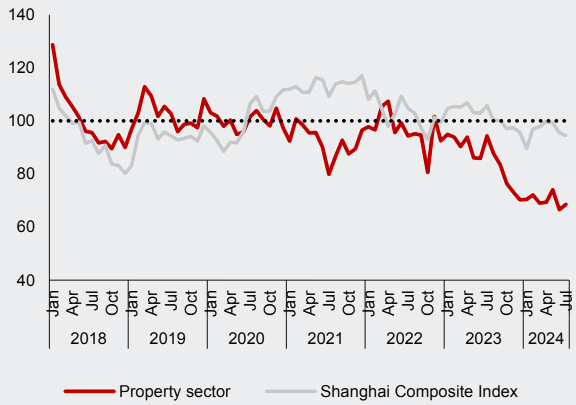


Source: Orbis of Moody's Analytics, AMRO staff calculations.
Note: Debt at risk estimated based on share of developer debts that have ICR less than 1.25.

That said, the risk from troubled property developers has not spilled over to an extent that compromises financial stability in China. Concerns had been raised about potential spillover into the banking sector, given that developers' rely on bank loans for a substantial part of their funding. However, banks have been managing nonperforming assets through sales and write-offs, maintaining a stable nonperforming loan (NPL) ratio. After peaking at 1.96 percent in September 2021, the NPL ratio continued to decline, reaching 1.59 percent by the end of 2023. The overall exposure of banks to developers, at 5.4 percent of total loans at the end of 2023, is manageable. Notably, the smaller rural banks exhibited higher NPL ratios of 3.34 percent and smaller city banks' NPL ratios were 1.75 percent at the end of 2023. In the stock market, concerns about developers have led to a roughly 30 percent decline in the real estate sector's stock prices since 2020 (Figure 2.1.5). Nevertheless, the Shanghai Composite Index exhibits a robust performance, buoyed by stock price increases in sectors other than real estate.

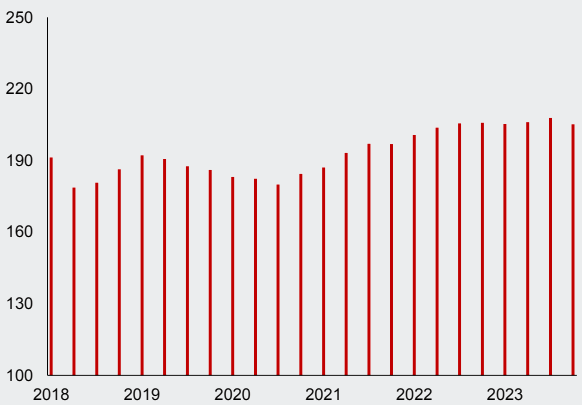
It is assessed that developer-related risk is unlikely to escalate significantly in the short term, although challenges remain. Authorities are implementing comprehensive measures encompassing both supply and demand initiatives to facilitate the recovery of the real estate market. Specifically, they are providing special loan support for the completion of pre-sold housing projects, and encouraging financial institutions to support viable construction projects. Also, authorities have introduced a scheme for state-owned enterprises to purchase unsold houses and convert them into public rental housing, to alleviate the oversupply problem in property market. These initiatives are expected to enhance the financial conditions of developers and aid in the recovery of the real estate market, thus containing the spillover of developer-related risks into other sectors or industries. Banks have built sufficient buffers to respond to possible asset deterioration with a provision coverage ratio of 205 percent at the end of 2023 (Figure 2.1.6). However, as the real estate market has yet to show significant recovery, the financial problems plaguing highly leveraged developers are unlikely to be resolved soon. Particularly, from Q3 2024 until the end of 2025, USD 49 billion worth of US dollar bonds of property developers will come due. Difficulties in refinancing these bonds might heighten insolvency risks for the more vulnerable firms. Authorities might need to continue providing support to highly leveraged developers until market stabilization is achieved. To prevent an excessive increase in financial leverage resulting from the ongoing supportive measures, these policies should be reviewed on a regular and timely basis.

Figure 2.1.5. Shanghai Stock Market Index
(Index, 2020 = 100)



Source: Shanghai Stock Exchange; AMRO staff calculations.

Figure 2.1.6. Provision Coverage Ratio for Commercial Banks
(Percent)



Source: China Banking Regulatory Commission

Box 2.2:

Korea: Vulnerabilities in Real Estate Project Financing and Implications for Financial Stability

In recent years, Korea's property market has faced significant challenges. The end of low interest rates and abundant liquidity, combined with stricter government regulations[1] aimed at reducing high household debt and preventing market overheating, has led to a decrease in property demand. Since the COVID-19 pandemic, housing prices and transaction volumes have sharply declined (Figure 2.2.1). Consequently, business conditions in the construction and real estate-related industries have worsened and their funding situations have deteriorated (Figure 2.2.2).

Amid the recent market downturn, real estate project financing (PF) has become a critical weak point for financial stability in Korea, linking the property and financial sectors. Real estate PF—characterized by high leverage, complex structures, and multiple stakeholders— becomes riskier as development projects become less profitable. This heightened vulnerability raises concerns about the soundness of financial institutions involved in real estate PF.

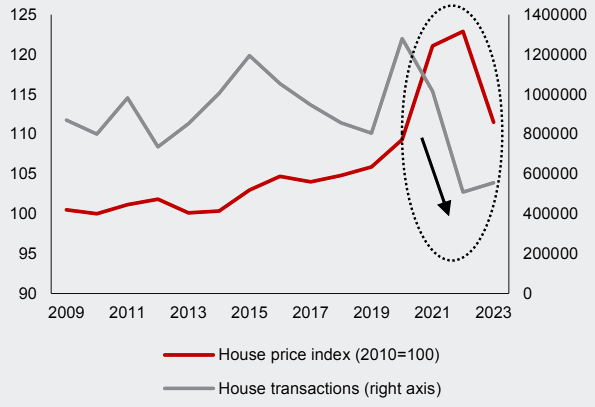
Historical instances of financial instability due to PF include the 2011 savings banks crisis and the 2022 credit market crunch following the default of the Legoland developer. In 2011, falling property markets amid real estate regulation tightening and the global financial crisis, led to the bankruptcy of over 30 savings banks heavily invested in real estate PF, which affected more than 100,000 consumers and subordinated bond investors. In 2022, the Legoland developer's default, coupled with the local government's refusal to honor a debt guarantee, eroded confidence in the corporate financing market, resulting in a credit crunch. In October of that year, corporate bond spreads reached their highest levels since the global financial crisis (Figure 2.2.3).

PF loans continue to rise, particularly through nonbank financial institutions (NBFIs), although the overall growth rate slowed recently. Amid the property market downturn, the asset quality of financial institutions involved in PF has deteriorated (Figure 2.2.4). Delinquency rates for PF loans have surged, especially among NBFIs. Operating under less stringent regulations than banks, NBFIs often cater to lower-quality borrowers, who are more susceptible to delinquencies. By the end of 2023, the delinquency rate for banks' PF loans was 0.35 percent, whereas for securities companies it was 13.73 percent and 6.94 percent for savings banks, raising significant concerns.

There are vulnerabilities not only in the PF loan itself but also in PF loan securitization. Lending institutions often transfer their loan claims to a securitization special purpose corporation (SPC) to diversify risks and secure liquidity. Securities companies, acting on behalf of the SPC, issue securitized securities such as asset-backed commercial paper (ABCP) or asset-backed short-term bonds (ABSTB) using these loan claims as collateral. To attract demand for these, securities firms commonly provide guarantees, such as purchasing securities if refinancing fails or repaying PF loans if developers default (Figure 2.2.5). Since construction projects typically take two to five years, while securitized securities are short-term bonds maturing in less than one year, there is a refinancing risk. As of the end of 2022, the contingent liabilities from these guarantees amounted to KRW 20.9 trillion, or 37.1 percent of the average equity capital of securities companies (KIF 2023).[2] This risk is particularly acute for small and medium-sized securities firms with high exposure to risky securitized securities.

Figure 2.2.1. Residential Property Price Index and Home Transactions

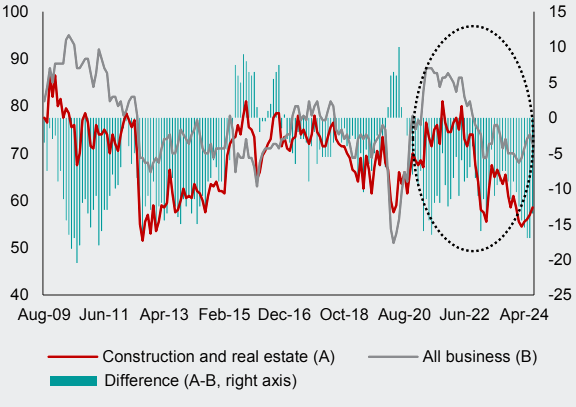
(Index, 2010=100; number of transactions)



Source: Bank for International Settlements (BIS); Ministry of Land, Infrastructure and Transport, Korea via Haver Analytics.

Figure 2.2.2. Construction and Real Estate Business Conditions in Business Survey Index

(Index)



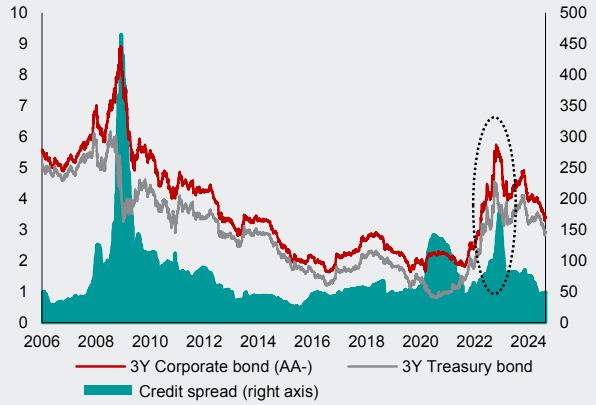
Source: Bank of Korea; AMRO staff calculations

The author of this box is Eunmi Park.

[1] The Korean government announced household debt management measures twice in 2021 (April and October), primarily focusing on tightening debt service ratio regulations.

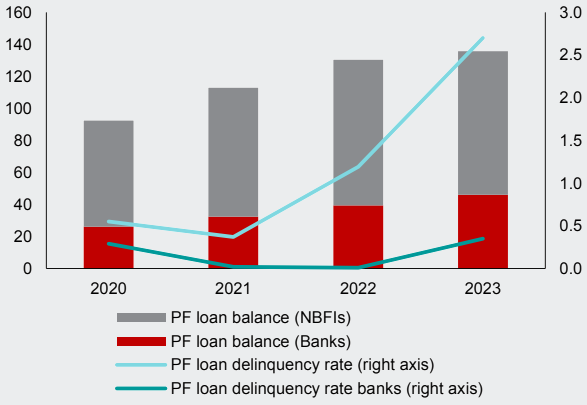
[2] Korea Institute of Finance. 2023. "Securities Firms' Contingent Liabilities Tied to Real Estate PF Loans." Financial Research Brief, 31 March.

Figure 2.2.3. Credit Spread Between 3-Year Treasury Bond Yield and 3-Year Corporate Bond Yield
(Basis point; percent)



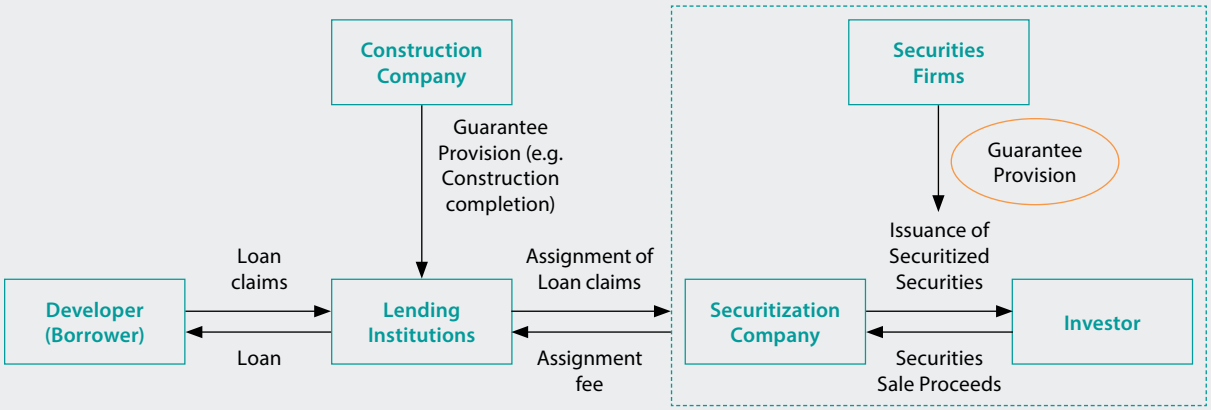
Source: Korea Financial Investment Association via CEIC; AMRO staff calculations.
Note: Credit spread is calculated by subtracting 3-year Treasury bond yield from the 3-year corporate bond (AA-) yield.

Figure 2.2.4. Project Financing Loan Balance and Delinquency Rate
(Trillions of Korean won; percent)



Source: Financial Services Commission, Korea; AMRO staff calculations.
Note: NBFIs include securities firms, Insurers, savings banks, specialized credit finance, and mutual finance. The delinquency rate is based on principal and interest delinquent for more than 1 month.

Figure 2.2.5. Stylized Example of Real Estate Project Financing Securitization



Source: Jang 2023; AMRO staff illustrations.

Since 2022, the Korean government has implemented measures to facilitate an orderly soft landing in the real estate PF market. Following the Legoland-triggered credit crunch, the government launched a market stabilization program worth more than KRW 50 trillion October 2022, which has since been increased to about KRW 94 trillion. This initiative stabilized financial markets, such as PF-ABCP and the bond market, and provided funding support to financially viable development projects while encouraging the restructuring and liquidation of projects that were not viable.

Korean government measures aimed at fostering an orderly soft landing of real estate PF include[3]:

- Improving evaluation standards to enable financial companies to strictly assess project feasibility by comprehensively considering risk factors specific to each project.
- Ensuring seamless support for projects with sufficient business feasibility through smooth funding from both public and private sectors.
- Encouraging systemic restructuring and liquidation of financially unviable projects, with funding and incentives provided.
- Continuously monitoring the provisioning status and encouraging capital expansion to manage soundness risks in financial institutions.

[3] Financial Services Commission, Korea. 2024. "FSC and FSS Announce Measures to Seek an Orderly Soft-landing in the Real Estate Project Finance Market." Press release, 13 May.

Box 2.3:

Vietnam: Challenges, Risks, and Policy Measures in the Real Estate Market

Vietnam's real estate sector is showing signs of recovery after significant challenges since late 2022. The sector experienced a decade of robust growth in 2013–2021 fueled by rapid urbanization and demographic expansion. However, it has faced significant challenges since the boom ended in late 2022 (Figure 2.3.1). Transactions decreased sharply in number and the absorption rate plummeted to about 33 percent in 2023, down from a 69 percent peak in 2019 (Figure 2.3.2). The market has also been polarized with an oversupply of high-end housing and an undersupply of social housing. However, transaction volumes and prices have increased in recent times. According to the Vietnam Association of Realtors, the number of transactions increased to 6,200 units in Q1 2024 from 2,700 units in Q1 2023. This nascent rebound hints at a modest stabilization as market conditions improve and policy measures start to take effect.

Several factors contributed to the downturn. First, legal issues related to licenses and land use have caused delays in real estate projects, leading to a decrease in supply. Alongside the misconduct of some property developers, the downturn has made homebuyers and investors lose confidence and adopt a wait-and-see attitude, leading to less demand. Second, tightening financial conditions since late 2022 have constrained developer financing. Third, an imbalance in the supply of housing, particularly oversupply in the high-end segment and undersupply in the affordable housing segment, has exacerbated the supply-demand mismatch. Fourth, external factors such as the tightening of monetary policy in the US, a slowdown in demand from major countries, and global supply disruptions have had indirect adverse impacts on Vietnam's macroeconomic performance. Amid weakening macroeconomic conditions, tighter household spending has decreased the demand for real estate.

These market conditions have increased default risks for property developers. Highly leveraged developers face significant refinancing stress, with many delaying bond payments. By October 2023, 69 companies, mostly property developers, had delayed bond repayments totaling VND 176.1 trillion, accounting for 17.8 percent of total corporate bonds outstanding (Thu Minh 2023).[1] Furthermore, most listed firms struggle with liquidity challenges and high debt-to-capital ratio (Figure 2.3.3), while their assets are tied up in illiquid unsold inventory, triggering an escalation of default risk.

Defaults in the real estate sector pose credit risks to the banking sector. The real estate sector relies heavily on bank lending, and about 20 percent of total loans in the banking system are allocated to the real estate sector. Credit to the real estate sector also showed an increasing trend during 2020–2022 (Figure 2.3.4). Although the current NPLs ratio is lower than during the 2008–2014 crisis, the ratio has increased since Q4 2022 (Figure 2.3.4). Furthermore, about 70 percent of collateral for bank loans is rooted in real estate assets, suggesting that a decrease in property values may further affect the quality of other loan portfolios (Van Son 2023).[2] According to the State Bank of Vietnam, 94 percent of outstanding real estate loans have terms spanning from 10 to 25 years (Nguyen Le 2022).[3] Loans with such extended repayment periods mean banks are exposed to these loans for a longer duration.

An intricate web of hidden cross-ownership across banks and real estate developers can magnify inherent credit risks. Major shareholders or senior executives in some real estate developers hold significant shares in commercial banks. Such entanglements raise concerns about potentially distorted lending practices that could be in breach of regulatory limits (An Phong 2022).[4] For instance, developers with influence in banks might exploit their positions to secure loans for their subsidiaries or affiliated businesses. In some cases, shell companies may be established in unrelated industries to facilitate bank loans for developers. The amended Law on Credit Institutions is expected to partly address the cross-ownership issue by tightening regulations on bank ownership.

The Vietnam government is supporting the real estate market by amending the legal framework and adopting a series of policy measures to support different market segments. Three amended laws, including the Law on Land, the Law on Real Estate Business, and the Law on Housing, are expected to address legal bottlenecks related to issues on land valuation and land acquisition. A notable policy initiative is the VND 120 trillion package aimed at developers and homebuyers of social housing, targeting 1 million social housing units by 2030. Efforts to implement this package underscore the government's commitment to addressing housing challenges. Furthermore, policy measures such as Resolution 33/NQ-CP/2023 and relevant circulars and decrees have been introduced to alleviate financial strains on developers and navigate legal complexities before the enactment of the new laws.

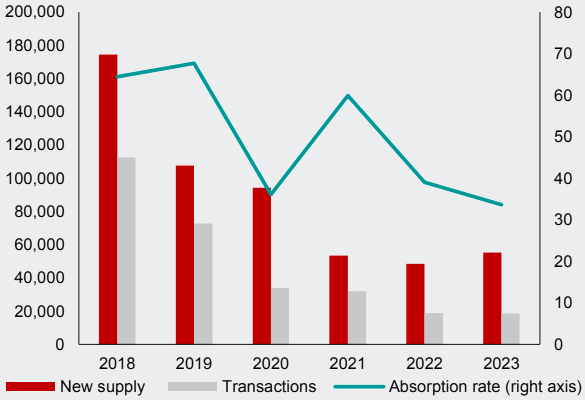
The authors of this box are Trung Thanh Vu and Eunmi Park.
This box is based on "Box C. Vietnam's Real Estate Puzzle: Facing Challenges" (2023 Annual Consultation Report for Vietnam, AMRO 2024).

1 Thu Minh. 2023. "More than 176 Trillion VND Bond Repayment Delayed in Nine Months of 2023." Vneconomy, 5 October.
2 Van Son. 2023. "Real Estate as a Collateral Assets at Banks." Baotintuc, 30 October.
3 Nguyen Le. 2022. "94 percent of Loans on Real Estate are Medium and Long-term." Baodautu, 6 June.
4 An Phong. 2022. "Some Real Estate Business Circumvent the Law, Buy Shares, and Control Lending Activities of Commercial Banks." *Vneconomy*, 9 August.

Figure 2.3.1. Equity Index of the Real Estate Sector
(Index)

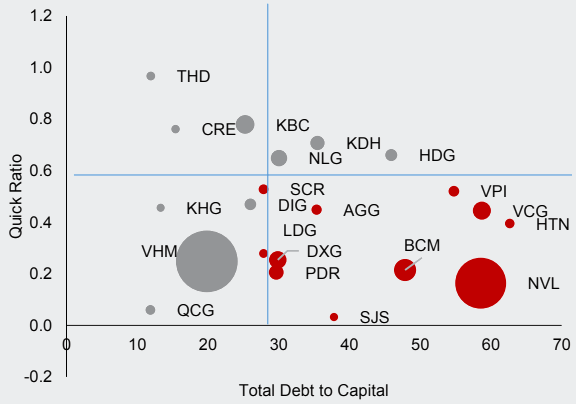
Source: Bloomberg Finance L.P.; AMRO staff calculations
Note: The index is calculated based on the equity price index of listed real estate developers. The index is rebased by 2009/02/01=100 and is a one-month moving average.

Figure 2.3.2. New Supply and Transactions of Properties
(Number of units; percent)



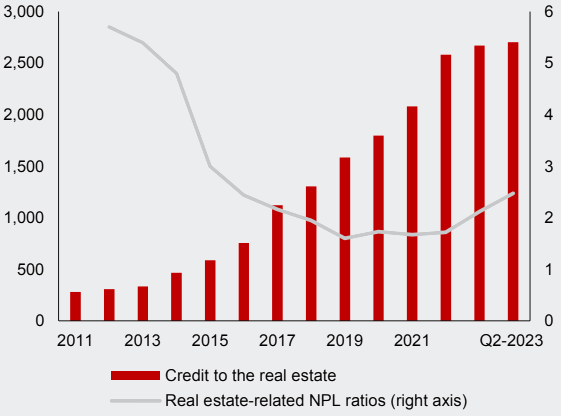
Source: Vietnam Association of Realtors.

Figure 2.3.3. Real Estate Developers' Debt
(Percent; percent)



Source: Bloomberg Finance L.P.
Note: The quick ratio is an indicator of a company's short-term liquidity and measures a company's ability to meet its short-term obligations with its most liquid assets. The higher the ratio, the better the company's liquidity position. A quick ratio lower than 1 can mean that the company is relying heavily on inventory or other assets to pay its short-term liabilities. The bubble size represents the relative asset size of a developer to the total sample assets. The vertical and horizontal lines represent sample average. Data are as of Q1 2023. Red bubbles represent developers that have a quick ratio lower than the sample average and total debt to capital close to or higher than the sample average.

Figure 2.3.4. Credit to Real Estate and Nonperforming Loans
(Trillions of Vietnamese dong; percent)



Source: State Bank of Vietnam.

Annex 2.1. The Dynamic Relationship Between the Property Sector and Financial Stability[14]

This annex study examines the dynamic relationship between the property market and financial stability using panel VAR analysis. Recent property market downturns and developer difficulties have raised financial market concerns, while financial strains, such as credit crunches, can also impact the property market.

Key questions this study seeks to answer include:

- How do property market fluctuations and financial market stability interact?
- Does a property market shock increase financial market stress?
- How does financial market stress influence the property market?

Data and methodology

Monthly panel data from May 2008 to August 2023 for five ASEAN+3 economies (China, Hong Kong, Japan, Korea, Thailand) is used. The data includes:

- Financial Stress Index (FSI) – Sourced from the Asian Development Bank, measures the degree of financial stress covering four major sectors (e.g. banking, foreign exchange, equity, and debt market). A higher FSI indicates heightened financial stress.
- Real Estate Price Index (REI) – Sourced from national authorities via CEIC, reflecting property market conditions. A higher REI reflects favorable property market conditions.
- Purchasing Manager Index (PMI) – Sourced from S&P Global via Haver Analytics, a proxy for the real economy as a control variable. A higher PMI indicates positive economic conditions.

The equation is as follows:

$$FSI_{it} = \alpha_i + \beta_{1i} FSI_{it-1} + \beta_{2i} FSI_{it-2} + \beta_{3i} REI_{it-1} + \beta_{4i} REI_{it-2} + \beta_{5i} PMI_{it-1} + \beta_{6i} PMI_{it-2} + \varepsilon_{1it}$$

$$REI_{it} = \alpha_i + \beta_{7i} FSI_{it-1} + \beta_{8i} FSI_{it-2} + \beta_{9i} REI_{it-1} + \beta_{10i} REI_{it-2} + \beta_{11i} PMI_{it-1} + \beta_{12i} PMI_{it-2} + \varepsilon_{2it}$$

$$PMI_{it} = \alpha_i + \beta_{13i} FSI_{it-1} + \beta_{14i} FSI_{it-2} + \beta_{15i} REI_{it-1} + \beta_{16i} REI_{it-2} + \beta_{17i} PMI_{it-1} + \beta_{18i} PMI_{it-2} + \varepsilon_{3it}$$

Where

- FSI_{it} = Financial stress index for country *i* at time *t*.[15]
- REI_{it} = Change of house price index for country *i* at time *t*.
- PMI_{it} = Change of purchaging manager's index for country *i* at time *t*.
- FSI_{it-1}, FSI_{it-2}, REI_{it-1}, REI_{it-2}, PMI_{it-1}, PMI_{it-2} = Lagged values of the respective variables for country *i* at time *t*-1 and *t*-2
- α_i = Dependent variable-specific panel fixed effects
- $\beta_{1i} \ldots \beta_{18i}$ = Coefficients of the lagged variables for each country *i*
- ε_{1it}, ε_{2it}, ε_{3it} = Idiosyncratic error terms

Prior to conducting the panel VAR analysis, unit-root tests assessed the suitability of the time series data for analysis. In addition, a cointegration test evaluated the appropriateness of the VAR model compared to the vector error correction model (VECM). The results of these preliminary tests ensure the robustness and reliability of the subsequent panel VAR analysis.

Main findings

The financial, property, and real markets are interconnected and influence each other. As expected, the FSI has a negative relationship with both the REI and the PMI. When REI and PMI increase due to favorable conditions, financial stress decreases, and vice versa (Figure 2.15, Table A2.1.1).

- FSI: Positively influenced by its own first-lagged value and negatively by its second-lagged value. Negatively impacted by REI's and PMI's both-term lags.
- REI: Negatively influenced by FSI's first lag and positively by its second lag, both significantly. Positively impacted by its own second-lagged value and PMI's first lag significantly.
- PMI: Negatively influenced by FSI's first lag and positively by its second lag, but not significantly affected by REI. Positively impacted by its own first-lagged value and negatively by its second-lagged value, with only the latter being significant.

[14] The author of this annex is Eunmi Park.

[15] Since the FSI already consists of first-difference elements such as changes in stock market returns compared to the previous period, the index itself is used rather than its changes.

Granger causality tests show that REI and PMI significantly Granger-cause FSI, meaning past values of REI and PMI improve predictions of FSI's future values. Conversely, FSI also significantly Granger-causes REI and PMI (Table A2.1.2)

Table A2.1.1. Panel VAR Results on FSI, REI, and PMI

Dependent variable / Independent variable	FSI	REI	PMI
FSI L1.	1.1042***	-0.50742***	-1.0758***
	(0.07046)	(0.13069)	(0.31766)
FSI L2.	-0.17191***	0.46952***	1.3044***
	(0.06197)	(0.15375)	(0.31554)
REI L1.	-0.00052	0.01899	-0.01916
	(0.00764)	(0.03266)	(0.05576)
REI L2.	-0.02001**	-0.13307*	0.05619
	(0.00795)	(0.06805)	(0.04272)
PMI L1.	-0.01729***	0.03002**	0.05285
	(0.00581)	(0.01456)	(0.07753)
PMI L2.	-0.00872	0.00002	-0.08382*
	(0.00532)	(0.02042)	(0.05074)

Source: AMRO staff estimates.
Note: Standard errors are reported in parentheses. Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent, respectively.

Table A2.1.2. Results of Granger Causality Test

Equation variable	Excluded variable	Chi-squared	P-value(Prob>Ch2)
FSI	REI	6.565	0.038**
	PMI	12.761	0.002***
	ALL	17.757	0.001***
REI	FSI	15.897	0.000***
	PMI	4.255	0.119
	ALL	23.825	0.000***
PMI	FSI	19.431	0.000***
	REI	1.787	0.409
	ALL	19.706	0.001***

Source: AMRO staff estimates.
Note: H0 (Null hypothesis) —Excluded variable does not Granger-cause Equation variable. Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent, respectively.

Annex 2.2. Exploring the Drivers of Property Developers' NPL Ratio[16]

The objective of this analysis is to identify the drivers contributing to changes in the developer nonperforming loan (NPL) ratio within the ASEAN+3 region. Using regression analysis with panel data from six selected ASEAN+3 economies, the study finds developers' debt, interest rates, and housing prices are significant drivers of NPLs. For economies that have experienced dramatic NPL increases, unconventional factors such as failed debt-driven real estate models, overcapacity, and broader economic challenges like trade tensions also play a crucial role. The study highlights the importance of considering conventional and unconventional drivers to address the fluctuations in developers' NPL ratios.

Data and methodology

Theoretical derivations, such as the association of increased developers' NPL ratio with declining repayment ability and escalating repayment burden, supported by economic theory (Vitek 2018; Debb and others 2022), help in the specification of the following regression equation. This equation encompasses both conventional and unconventional factors (ADB 2021; Moody's 2022; S&P Global Ratings 2022; IMF 2023a, 2023b; KPMG 2023; OECD 2023; World Bank 2023) that drive the developers' NPL ratio:

$$\begin{aligned}&\text{Developer NPL ratio}_{it}\\&= \beta_1 * \text{Housing sales volume}_{it} + \beta_2 * \text{Housing price}_{it} + \beta_3 * \text{Construction and real estate development costs}_{it} +\\&\beta_4 * \text{Developers' debt}_{it} + \beta_5 * \text{Interest rates}_{it} + [\beta_6 * \text{Expected business environment index}_{it} +\\&\beta_7 * \text{Expected business performance index}_{it}] \text{ (incorporate only when conventional drivers lack explanatory power)} +\\&\text{Economy fixed effects}_i + \text{Residual}_{it}\end{aligned}$$

The dataset comprises developer loan NPL time series data for China, Hong Kong, Indonesia, Korea, Singapore, and Thailand starting from 2001 to 2017 and up to 2023, sourced from Bloomberg, Refinitiv, Wind, and reports from commercial banks or authorities. Proxy data for five conventional and two unconventional drivers are obtained from national authorities or industry institutions via CEIC or Haver Analytics. The sample is segmented into three groups for comparative analysis: all selected regional economies, regional economies experiencing dramatic NPL increase (the NPL ratio has risen by more than 25 percent within one year), and regional economies not experiencing dramatic NPL increase.

Regression and findings

The regression results in Table A2.2.1 reveal two key findings. First, the five conventional drivers analyzed are robust explanatory factors for regional economies that have not experienced significant increases in NPLs, as indicated by higher R-squared values. In contrast, for economies that have experienced dramatic NPL increases, additional unconventional drivers, such as failures in debt-fueled real estate models and broader economic challenges, are likely more significant. Incorporating these unconventional drivers, such as the expected business environment and performance indices, significantly enhances the explanatory power for developers' NPL ratios in these economies. Second, developers' debt, interest rates, and housing prices are significant drivers of the NPL ratio in selected ASEAN+3 economies that have not experienced dramatic NPL increases, while housing sales volume and development costs are not significant.

However, housing sales volume shows weak significance in economies that have experienced drastic NPL changes, whereas the expected business environment index remains strongly significant.

[16] The author of this annex is Liyang (Alex) Tang.

Table A2.2.1. Regression Results on Drivers of Developers' NPL Ratio in Selected ASEAN+3 Economies

Group / Variable	All selected regional economies	Regional economies not experiencing dramatic NPL increase	Regional economies experiencing dramatic NPL increase	Regional economies experiencing dramatic NPL increase
Housing sales	-0.354	-1.279	-2.149*	-1.976
	(-0.550)	(-0.604)	(-0.751)	(-0.589)
Housing price	-0.469	-1.867*	-2.013	-14.741
	(-0.178)	(-0.747)	(-0.081)	(-0.327)
Development costs	0.326	0.006	1.520	4.062
	(0.187)	(0.008)	(0.141)	(0.376)
Developer debt	0.891*	0.609*	0.677	16.918
	(0.760)	(1.068)	(0.097)	(0.570)
Interest rate	0.264	0.394**	0.566	2.337
	(0.606)	(2.028)	(0.138)	(0.497)
Expected business environment index				-9.938****
				(-3.283)
Expected business performance index				-16.666
				(-0.632)
Economy fixed effects	Yes	Yes	Yes	Yes
Observations	59	34	25	25
R-squared	0.67	0.96	0.20	0.72

Source: AMRO staff estimates.
Note: t-statistics are reported in parentheses. Asterisks (*, **, ***, ****) denote significance levels at 50 percent, 10 percent, 5 percent, and 1 percent, respectively. The selected ASEAN+3 economies that have developer loan NPL data include China, Hong Kong (China), Indonesia, Korea, Singapore, and Thailand. Note that regional economies that have experienced dramatic NPL increases refer to those where developer loan nonperforming (NPL) ratio has increased by more than 25 percent within one year, either historically or currently. The development costs indicator ultimately adopts the ratio of the development cost price index to the housing price index. This ratio more accurately reflects whether the developers' profits have expanded or been squeezed, and whether their repayment ability has improved or deteriorated. This, in turn, can lead to a decrease or increase in developer NPL ratio.

Annex 2.3. Assessing the Impact of Credit Risk within the Property Sector on Bank Asset Quality[17]

This simulation exercise estimates the impact of a property market downturn on banks' capital adequacy in six ASEAN+3 economies: China, Hong Kong, Indonesia, Korea, Thailand, and Singapore. These economies were selected based on the availability of industry-specific asset quality data.

Banks are assumed to have a procyclical bias in provisioning behavior: in a property market downturn and heightened credit risks, banks would anticipate future losses and increase provisions. The exercise assumes banks would raise their provisioning to maintain at least their historical average level of loan loss provision coverage ratio levels.

Drawing partially from the methodologies by Wezel and others (2014), this analysis evaluates ASEAN+3 banks' available capital buffers during a stressed environment through the following steps:

- Stress scenario application: A stress scenario is applied to the property-related sectors' nonperforming loans (NPLs), including all substandard, doubtful, and loss loans. Where data for these categories and corresponding provisions are unavailable, data on NPLs and corresponding provisioning amounts are used. Three scenarios—mild, moderate, and severe—are assumed, with one, two, and three standard deviation increases in NPLs or all substandard, doubtful, and loss loans.
- Impact estimation on profits: The estimated impact from the increase in NPLs on banks' profits is calculated. This estimated impact is captured through two channels: the increase in provisioning and the reduction in interest income.
- Adjustment of profits: The change in profits is adjusted using the historical average profit retention rate to estimate the impact on retained earnings. Since retained earnings are a key component of banks' Tier 1 capital, changes in retained earnings directly affect banks' regulatory capital amounts.
- Estimation of new CAR: The adjusted capital is divided by the estimated post-stress risk-weighted assets (RWA) to estimate the new capital adequacy ratio (CAR).

$$CAR_{post\ stress} = \frac{CAR_{pre\ stress} + (\Delta\ Profit_{post\ stress} * Profit\ retention\ rate)}{RWA_{post\ stress}}$$

where

$$Profit_{post\ stress} = Net\ revenue - \Delta\ Provisioning_{post\ stress} - \Delta\ Interest\ income_{post\ stress}$$

$$\Delta\ Interest\ income = Implicit\ interest\ rate * \Delta \sum(Substandard, doubtful\ and\ loss\ loans)$$

$$Implicit\ interest\ rate = \left(\frac{Interest\ revenue}{Loan\ balance}\right)$$

[17] The author of this annex is Benyaporn Chantana.

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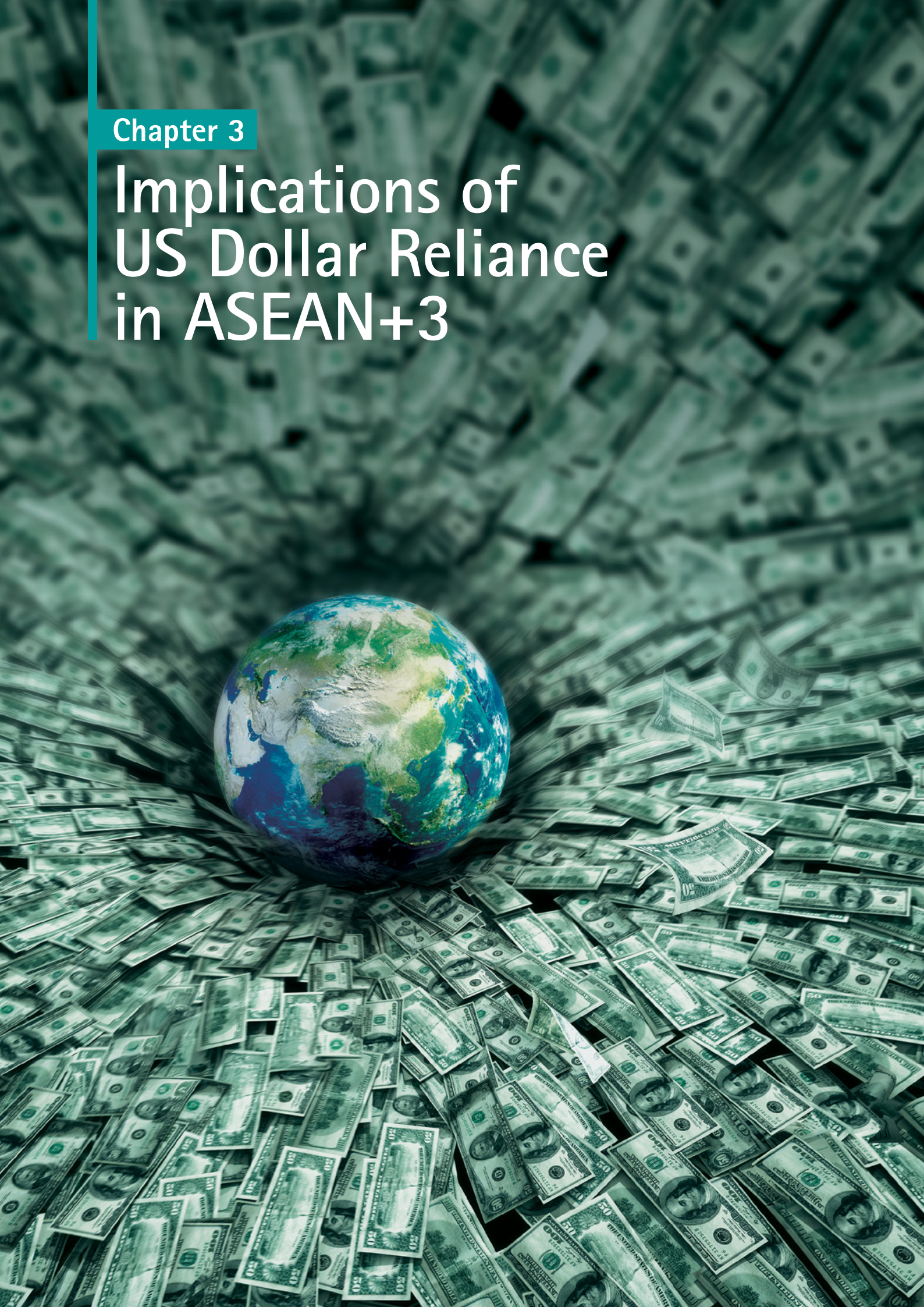
Chapter 3

Implications of US Dollar Reliance in ASEAN+3



Highlights

- The United States (US) dollar has a significant role in the ASEAN+3 macro-financial system as a vehicle currency for trade invoicing and the preferred currency for cross-border financial transactions. Though ASEAN+3's reliance on the US dollar has declined in the past decade, the pace has been slow. Heavy reliance on US dollars can only be partly attributed to direct linkages to the United States and is a result of several different factors.

- The ASEAN+3 US dollar supply chain is complex as a variety of players interact through different roles. Exporters of goods and services and bond issuers are the main sources of US dollar foreign exchange whereas imports and debt repayments are the main uses of the foreign exchange. Banks and a wide range of nonbank financial institutions (such as securities companies, asset managers, and other market intermediaries) facilitate the flow of funds and risk management. However, this supply chain also results in some currency and maturity mismatches which could pose risks during adverse market conditions.

- The region's reliance on the US dollar creates two important risks for the ASEAN+3 financial system. First, a shortage in availability of US dollars can increase stability risks for financial markets and intermediaries. Second, the US dollar acts as a transmission channel for shocks arising from US monetary policy, geopolitical tensions and other global developments.

- Surprisingly, Federal Reserve policy tightening in 2022 and 2023 did not create a US dollar liquidity squeeze in the region even as capital outflows occurred and exchange rates came under depreciation pressure. While the strong external position of ASEAN+3 economies was among the underlying reasons for the robust US dollar liquidity situation, many micro-market developments also supported US dollar availability. These include an increase in US dollar deposits from domestic investors, reduced US dollar borrowing and negative carry costs from leveraged investments.

- Authorities may adopt a two-pronged approach to deal with the risks. In the near term, they can build economic resilience against global spillovers while strengthening financial sector surveillance and risk management strategies. In the long term, the authorities can diversify from the dominant use of US dollars to a wider range of other currencies, including local currencies within the ASEAN+3 region while adopting technological solutions. Regional cooperation and strengthening the regional financial safety net are also of utmost importance for improving the financial stability.

This chapter is authored by Prashant Pande under the guidance of Kevin C. Cheng, with contributions from Chiang Yong (Edmond) Choo, Yang Jiao, Kit Yee Lim, Wen Yan Ivan Lim, Leilei Lu, Yoki Okawa, Eunmi Park, and Junjie Shi. The chapter is based on information available as of 9 September 2024.

I. Overview

Role of the US dollar in the ASEAN+3 financial system

The United States dollar has been the cornerstone of the international financial system for decades. Its significance is well documented and demonstrated by its disproportionate share in foreign reserves, foreign exchange trading, invoicing, cross-border payments, and cross-border loans (Maronoti 2022). Factors reinforcing the US dollar's pivotal role in the international financial system are equally well known. They include the size of the US economy and its share in global trade, policy credibility of US authorities, characteristics associated with the US dollar such as its perception as a safe, liquid and convertible currency, as well as the deep and liquid markets for US dollar financial assets. Historical agreements, such as the Bretton Woods agreement in 1944, and the US-Saudi agreement in 1974, have played crucial roles in its dominance. Lack of a credible alternative (CGFS 2020), strong inertia, network effect, along with the US dollar's "Imperial Circle" further entrench its global role.[1]

As in the rest of the world, the US dollar plays a significant role in the ASEAN+3 financial system as a vehicle currency for trade invoicing and payments, and the preferred currency for cross-border financial investment and borrowing. The disproportionate share of the US dollar is also evident in ASEAN+3 as the share in external financing in US dollars far exceeds the direct trade or financial linkages with the US (Figure 3.1).[2] The US dollar remains the most used foreign currency in the ASEAN+3's cross-border financial system (Figures 3.2 to 3.4) and generally is used more in the region than the global averages.[3] Specifically, the US dollar is widely used in the following two areas:

- As the vehicle currency for trade invoicing and payment: The US has long been a key market of regional exports (Figure 3.5). The deep integration of ASEAN+3 economies into the global production supply chain contributes to the extensive use of US dollar (Mercado, Jacildo, and Das 2022), which is the vehicle currency for trade with many countries (Boz and others 2020) within and outside ASEAN+3. Over 80 percent of trade invoicing across the ASEAN+3 region is in US dollars (Figure 3.6).

- As the currency of denomination for banks' holdings of cross-border assets and liabilities: Following the global financial crisis (2008–2009), low interest rates made US dollars attractive for emerging market nonbank borrowers. At the same time, the European debt crisis (2010) led European banks to scale back their US dollar lending activities. The rising demand from emerging market borrowers and constrained supply from European lenders created an opportunity for Asian banks to increase their US dollar lending. By 2016, Asia held the highest share of cross-border US dollar assets (loans made and debt securities held) by non-US banks.[4] This also created a demand from Asian banks for US dollar liquidity to finance the assets, through cross-currency swaps (CCS) and short-term debt. The share of US dollars in ASEAN+3 banks' cross-border assets and liabilities remains above 50 percent (Figure 3.7).

Over the past decade, ASEAN+3 trade and investment exposures to the US have diversified with lower FDI inflows from the US (Figure 3.1) and with China overtaking the US as the most important export destination for most ASEAN+3 countries (Figure 3.5). At the same time, the share of US dollars in cross-border activities, such as trade invoicing and cross-border investment and borrowing of the domestic banks, has reduced slightly—although some activities have seen a rise in the share of US dollars (such as FX trading of ASEAN+3 currencies (Figure 3.4)).[5] Overall, the region remains reliant on US dollars for cross-border activities, although reliance is declining at a very slow pace.

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1 The dollar's "Imperial Circle" is a confluence of structural, international and US-specific elements, creating a self-reinforcing pro-cyclical force that keeps the US dollar strong even during economic slowdowns. The dollar's dominance in trade invoicing and credit-intensive trade makes it crucial to the global manufacturing cycle. A strong dollar weakens the global manufacturing sector, but since the US economy is more service-oriented and less dependent on manufacturing, the dollar benefits relative to US trading partners that are more exposed to the manufacturing cycle. (Akinci and others 2022)

2 External financing is defined as the cross-border claims on domestic banks, nonbank financial intermediaries (NBFIs) and non-financial institutions.

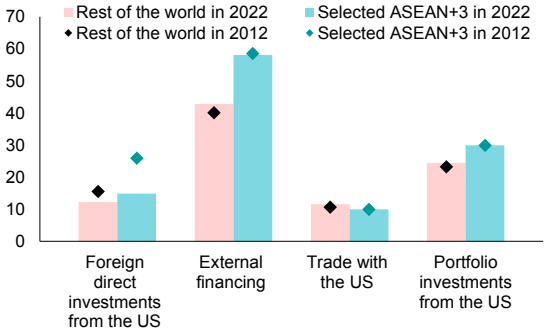
3 That said, the global averages are skewed due to the inclusion of data for European economies, where the euro has displaced the US dollar as the most used currency. On the other hand, Latin America is much closely integrated to the US due to its proximity and has a higher share of US dollar usage.

4 Includes ASEAN+3, Australia, India, and Taiwan Province of China (Park and others 2020).

5 The data for trade invoicing from Boz and others (2020) is available as of 2019. In ASEAN+3, Indonesia, Japan, Korea and Thailand publish regular data for currency shares in trade invoicing. The data shows that the average share of US dollars in import invoicing for these economies was at 82 percent in 2023 while that for exports was at 76 percent. These shares are on the lower side of the range seen since 2010.

Figure 3.1. World and ASEAN+3: Share of US Dollar in External Financing, and Fundamental Linkage with the US
(Percent)

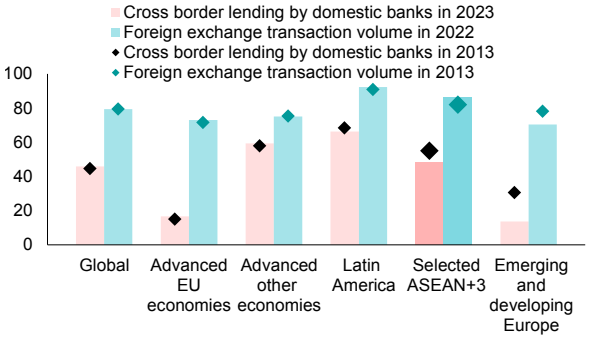
The use of the US dollar in external financing far exceeds the direct trade or financial linkages with the US.



Source: International Monetary Fund (IMF); Bank for International Settlements (BIS). AMRO staff calculations.
Note: The calculated value of each of the variables shown in the chart are simple averages. Selected ASEAN+3 includes China, Hong Kong, Indonesia, Japan, Korea, Malaysia, The Philippines, Singapore, and Thailand. Portfolio investments and FDI are adjusted using location-based methodology. See Annex 3.1 for detail.

Figure 3.2. World and Selected Regions: Share of US Dollar in Key Cross-Border Functions by Region
(Percent)

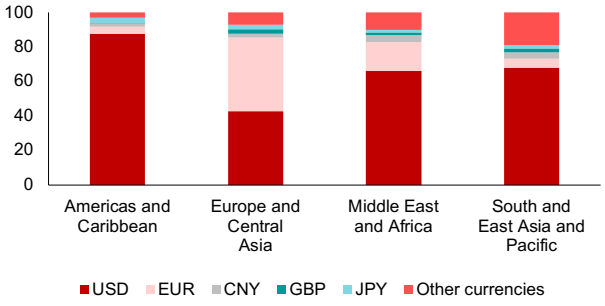
The US dollar is the most used foreign currency in ASEAN+3's financial system, …



Source: Bank for International Settlements (BIS) via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN+3 economies for foreign exchange transactions include China, Hong Kong, Japan, Korea, and Singapore. For the calculations of cross border lending, we also include Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Thailand and Vietnam.

Figure 3.3. Selected Regions: Currency Distribution of Reserves by Region, 2023
(Percent)

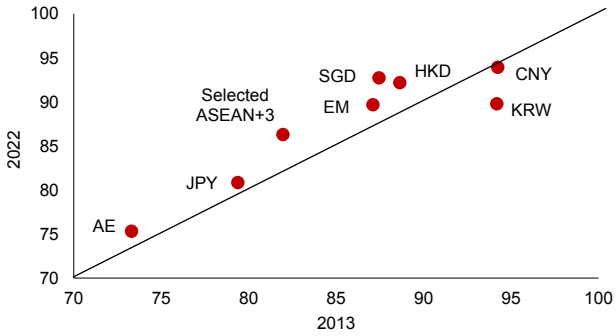
… foreign exchange reserves, …



Source: The World Bank Ramp Report (2023).
Note: The granular data for ASEAN+3 economies are unavailable. ASEAN+3 economies are included in the South and East Asia and Pacific region, as along with other major Asia Pacific region economies such as Australia, India, and New Zealand. CNY = Chinese renminbi; EUR = Euro; GBP = Pound sterling; JPY = Japanese yen; USD = US dollar.

Figure 3.4. Selected Regions: Share of US Dollar in Trading Against Regional Currencies
(Percent)

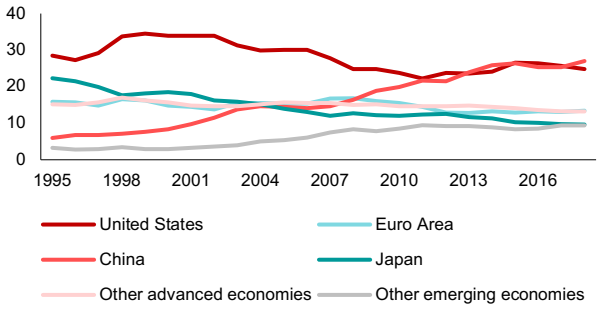
… and foreign exchange trading.



Source: BIS Triennial Central Bank Survey (2022); AMRO staff calculations.
Note: AE = Advanced economies; EM = Emerging economies; CNY = Chinese renminbi; HKD = Hong Kong dollar; JPY = Japanese yen; KRW = Korean won; SGD = Singapore dollar; Advanced economy currencies include EUR, GBP, AUD, CAD, CHF, SEK, NOK, and NZD. Emerging economy currencies include INR, MXN, TWD, ZAR, PLN, AED, and TRY. Selected ASEAN+3 currencies include JPY, CNY, HKD, SGD, and KRW.

Figure 3.5. ASEAN+3: Share of Exports by Destination
(Percent)

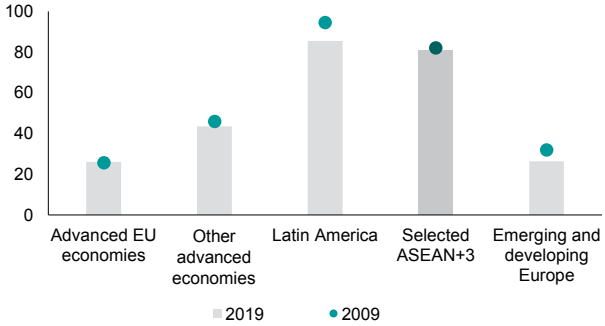
The US remains one of the most important export destinations for ASEAN+3 economies.



Source: OECD via Haver Analytics; OECD TiVA; AMRO staff calculations.
Note: The lines of the chart indicate the share of total exports to the respective final destinations represented by each line in the chart. Latest available data are as of 2018.

Figure 3.6. Selected Regions: Share of US Dollar in Trade as the Invoicing Currency
(Percent)

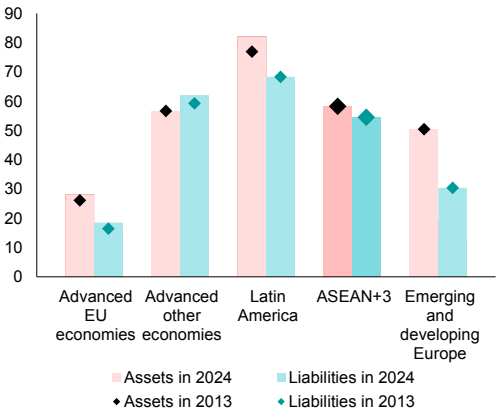
The US dollar is the most preferred vehicle currency for trade invoicing in ASEAN+3.



Source: Boz and others (2020); AMRO staff calculations.
Note: Simple averages of exports and imports of the countries in the region are calculated. Selected ASEAN+3 includes Cambodia, Indonesia, Japan, Korea, Malaysia, and Thailand.

Figure 3.7. Selected Regions: Share of US Dollar in Bank Cross-Border Assets and Liabilities
(Percent)

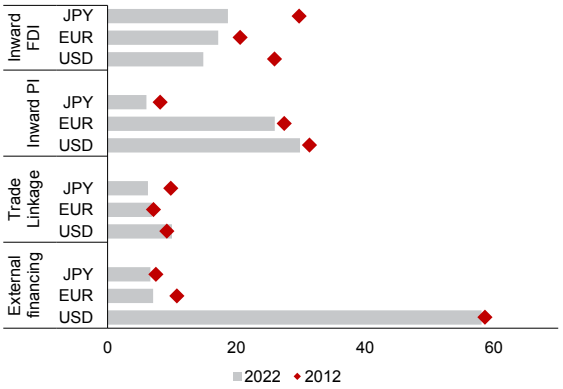
More than 50 percent cross-border assets and liabilities for ASEAN+3 are denominated in the US dollars.



Source: Bank for International Settlements (BIS); AMRO staff calculations.
Note: Simple averages are calculated for both assets and liabilities for 2013 and 2023 respectively across the region. ASEAN+3 countries include Brunei, China, Cambodia, Hong Kong, Indonesia, Japan, Korea, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. Data as of Q1-2024.

Figure 3.8. ASEAN+3: Share of Currency in External Financing, and Trade and Investment Linkage by Currency
(Percent)

The use of US dollar in external financing far exceeds that of other currencies with similar trade and investment linkages.



Source: International Monetary Fund (IMF); Bank for International Settlements (BIS); AMRO staff estimation.
Note: FDI = Foreign direct investment; PI = Portfolio investment; EUR = Euro; JPY = Japanese yen; USD = US dollar. Simple averages of ASEAN+3 region in 2022 and 2012. External financing shows the share of external bank borrowing denominated in each currency. Other variables are the share of the corresponding economy in various external activities, including trade (exports and imports), inward portfolio investment, and inward FDI. Portfolio investments and FDI are adjusted using location-based methodology. See Annex 3.1 for detail.

What factors are behind the prevalence of the US dollar in external financing?

The importance of the US dollar in ASEAN+3's external financing far exceeds the economic linkage of the region with the US. A dynamic panel regression (Annex 3.2) is used to analyze the factors influencing the share of a currency in external bank borrowings (Figure 3.8). The dependent variable is the share of currencies (US dollar, euro, and yen), while the independent variables include the share of the US, the euro area and Japan in ASEAN+3's exports, imports, and both inward and outward portfolio and direct investments.[6] The results show that:

- The share of a currency in external financing is heavily dependent on the existing share, thus indicating the role of inertia in the choice of currency.

- For ASEAN+3 economies, the source of inward portfolio investment and export destination significantly influences the choice of currency used in external financing. The choice of currency for Plus-3 economies depends more on the source of portfolio investment whereas for ASEAN-5 it depends more on the export destination.

The rest of the chapter focuses on the US dollar reliance in ASEAN+3, identifying vulnerabilities and potential policy actions. The US dollar's central role in the international monetary system facilitates the transmission of shocks from global financial markets to the ASEAN+3's financial system. Funding squeezes amplify these effects, whereas easy financial conditions can fuel asset bubbles and leverage. Over reliance on the US dollar makes ASEAN+3 economies more vulnerable to spillovers from global, and more specifically US macro financial developments. The chapter examines the entities involved in the ASEAN+3's dollar supply chain and the risks from their operations and interconnectedness, and it presents policies to manage and reduce dollar dependence. Due to limited publicly available data, the study heavily relies on inputs from market participants, supplemented by analysis where data are available.

[6] The methodology follows Iancu and others (2022), and the model is estimated using the Arellano-Bond 2-step robust GMM.

II. The Landscape of the ASEAN+3's US Dollar Supply Chain

Roles of key private participants

The US dollar supply chain in the region comprises various players performing different roles. They can be broadly classified into three categories:

- Corporates: The foreign exchange management practices of exporters, importers and firms issuing US dollar debt securities have a material impact on the US dollar supply chain in ASEAN+3. Exporters and importers are primary sources and users of US dollars in the region. Many firms borrow or issue debt securities in US dollars while debt repayments lead to the outflows of US dollars. They are also involved in investments (largely direct, but also portfolio in certain cases) which, depending on the location of the investing corporate, can constitute an inward or outward flow of the US dollars.[7]

- Nonbank financial intermediaries (NBFIs): Aramonte, Schrimpf, and Shin (2022) classify NBFIs into three categories (1) institutional investors and asset managers, which include pension funds, insurance companies, sovereign wealth funds, hedge funds, family offices, exchange traded funds, mutual funds, and securities firms, (2) market intermediaries which include broker-dealers and principal trading firms, and (3) financial market infrastructures i.e. exchange, electronic trading platforms and central counterparties. The NBFIs, along with banks, facilitate the flow of funds and trading activities. They provide clients with currency, maturity and credit risk transformation services.

- Banks: They are the largest counterparties for companies and NBFIs and provide a wide range of US dollar services such as loans and deposit facilities, and liquidity and foreign exchange risk management services. The banks may retain residual currency and maturity risk exposures from their client activities.

These players are interlinked through transactions and business needs. The transactions may vary across economies due to differences in sectoral compositions, risk preferences, instruments, and access to onshore and offshore US dollar products. Table 3.1 summarizes the major market participants in the private sector, their roles, preferred tools, and influencing factors. Figure 3.9 provides a simplified schematic of interlinkages between various entities in ASEAN+3.

US dollar liquidity management by institutions and related risks

The preferences of companies in the trade sector can impact domestic US dollar liquidity conditions. Exporters typically convert foreign currency proceeds to domestic currency, but they may delay doing so in periods of higher US interest rates and expected dollar strength, thus exacerbating domestic currency weakness. The US dollar deposits of domestic companies, when held in financial institutions within the country, improve domestic dollar financing conditions. However, if for regulatory reasons or because of exporter preferences the deposits are placed with offshore banks, this can cut off a key source of US dollars for domestic banks. Importers generally convert domestic currency into US dollars (in spot or derivative markets) to meet their obligations.

Institutional investors and asset managers ("investors") are providers of liquidity for the markets and their investment practices greatly influence the supply and demand of the US dollar. These investors channel funds from their clients into multiple assets across geographies. The ones relevant for US dollar supply chains in ASEAN+3 are foreign investors investing in ASEAN+3 assets and domestic investors from within the ASEAN+3 region who invest abroad.

[7] Some large corporations may even employ dedicated treasury desks to deploy their foreign currency proceeds into liquid assets which can provide better returns over deposit rates.

Table 3.1. Private Participants in US Dollar Supply Chains

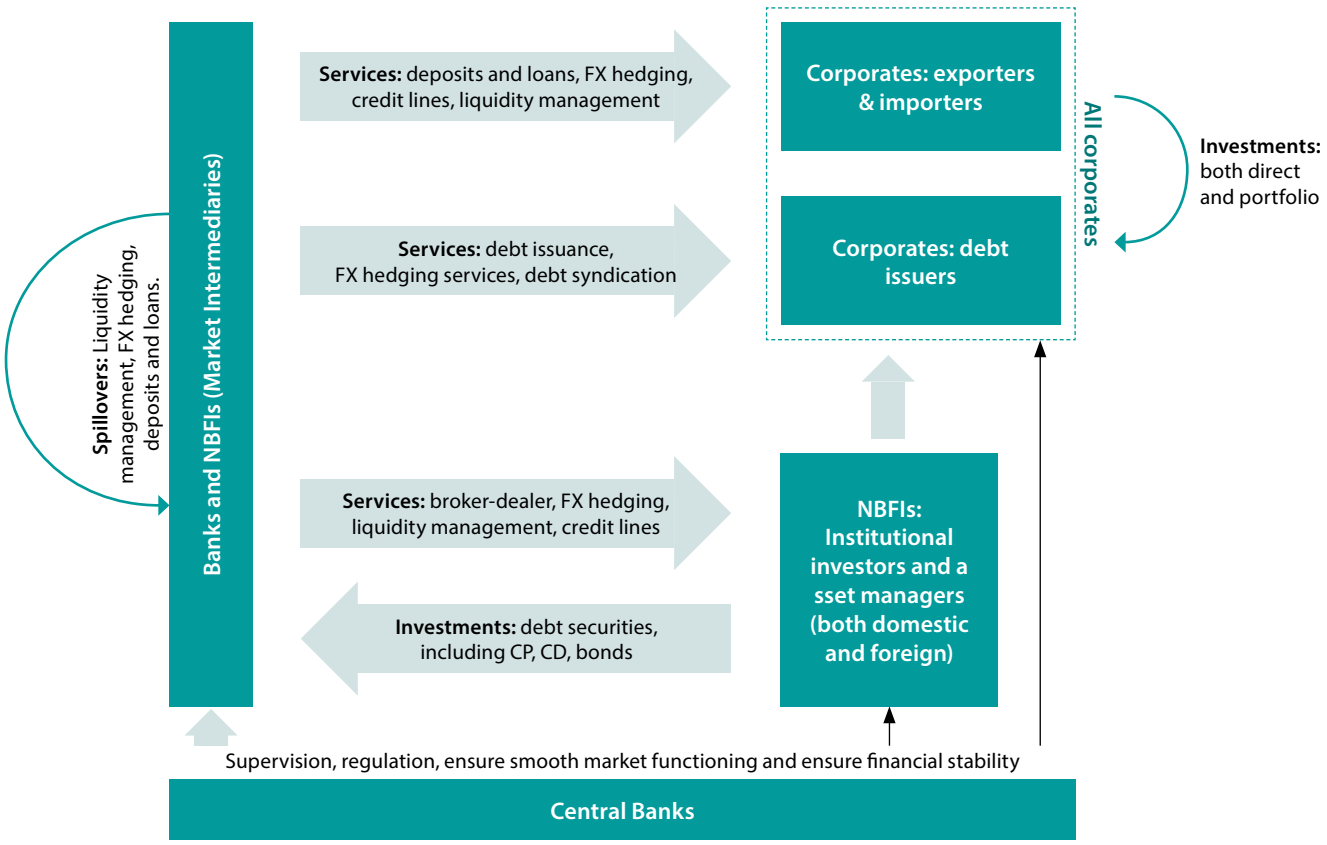
The private players use different tools to meet their foreign exchange requirements...

Participant	Tools used	Typical foreign exchange hedging practices	Factors considered
Corporates (Exporters and importers)	Deposits, spot conversions, derivatives	Discretionary	View on exchange rate, interest rate differentials, liquidity and hedging instruments, regulations
Corporates (Foreign currency debt issuers)	Syndicated loans, bonds, foreign exchange hedging instruments	Largely hedged for bonds, to the extent possible using available instruments	Cost of borrowing, synthetic yields, and hedging instruments
Investors (Both foreign and domestic)	Derivatives, deposits, onshore and offshore foreign exchange products	Generally, debt and short-horizon investments are hedged, equity and long-horizon investments are unhedged; Extent of hedging is discretionary	Interest rate differential, price of derivatives used, investment mandate or risk appetite, investment horizon, regulations
Financial intermediaries (Banks, NBFIs)	Short term instruments for liquidity management, provide products based on client requirements.	Banks typically strive to minimize currency and maturity mismatches; NBFIs may retain some exposure based on their mandate and risk-return profile.	Risk management (regulatory or prudential), instruments available, linkages with other intermediaries

Source: AMRO staff compilation, based on discussions with market participants.
Note: The tools, hedging practices and the factors considered are not all encompassing as they depend a lot on market conditions and preference of individual institutions. The table paints a generic landscape based on inputs received from private sector meetings. NBFI = nonbank financial intermediary.

Figure 3.9. Stylized US Dollar Supply Chain

… and in the process, create various interlinkages within the US dollar supply chains.



Source: AMRO staff compilation, based on discussions with market participants.
Note: The diagram is a simplified and stylized presentation of a complex network and is not all encompassing. Arrows represent services provided by the entity at the base of arrows to the entity at the tip. The participants and services provided are based on AMRO's understanding through discussions with market participants. CD = certificate of deposit; CP = commercial paper; FX = foreign exchange; NBFI = nonbank financial intermediary.

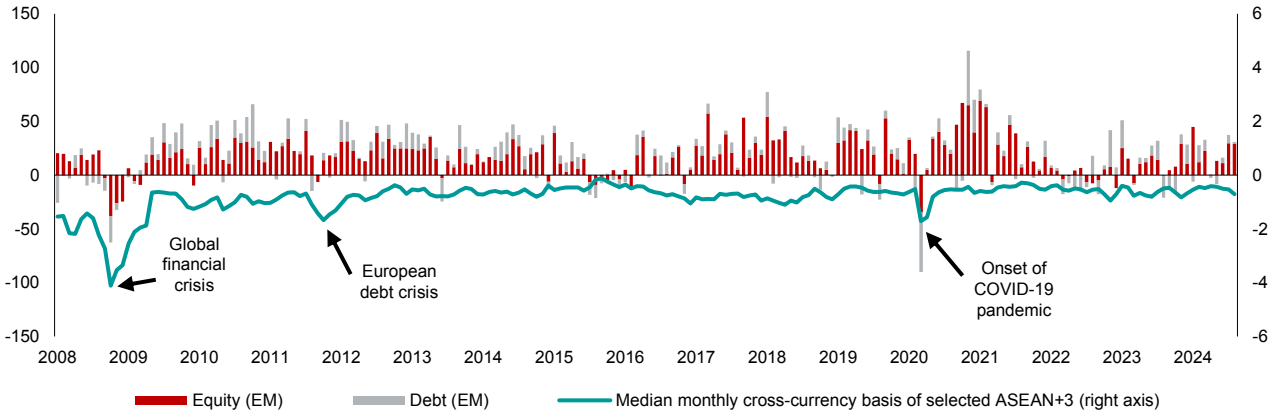
- Foreign investors: Foreign portfolio investments into emerging market assets (including ASEAN+3) have increased steadily since 2010, despite occasional outflows during episodes of market stress.[8] Tighter US dollar funding conditions accompanied outflows during the global financial crisis in August–November 2008, the deepening of the European debt crisis in 2011, and the onset of the COVID-19 pandemic in March 2020 (Figure 3.10). Foreign investors in most ASEAN+3 respond to stress episodes in the same way: they retreat from riskier assets to safe havens, and the resultant portfolio outflows worsen the US dollar funding environment.

- Domestic investors: Demand for foreign equity and debt instruments by ASEAN+3 portfolio investors have seen a marked increase (Figure 3.11) (McGuire and others 2021).

The behavior of domestic investors tends to be more diverse than that of foreign investors. Some investors (such as pension funds, hedge funds, family offices), driven by mandate or need for portfolio reallocation, will move to safe assets (such as US Treasuries) during market weaknesses and worsen US dollar availability in risk-off environments. Other investors are countercyclical, improving funding conditions during market stress by unwinding foreign investments and repatriating the proceeds. Asset managers and mutual funds with balanced portfolio allocations across asset classes and geographies will buy during domestic asset weakness. Investment funds and securities companies that mobilize domestic funds for investments abroad face redemption pressure from clients who retain a strong "home bias" during periods of markets stress.[9]

Figure 3.10. Emerging Markets: Equity, Debt Securities and Median Estimated Cross-Currency Basis
(Billions of US dollar; percent)

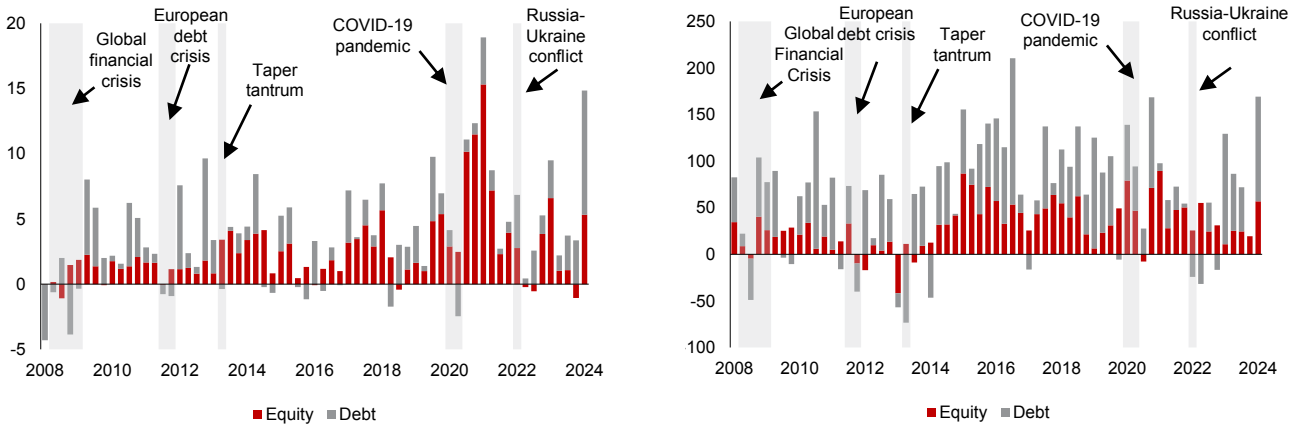
Tighter US dollar funding conditions have accompanied foreign portfolio outflows during episodes of markets stress.



Source: National authorities via Haver Analytics; Bloomberg Finance L.P.; AMRO staff calculations.
Note: EM = emerging markets. Data as of August 2024.

Figure 3.11. Selected ASEAN+3: Portfolio Investments in Foreign Securities by Domestic Investors
(Billions of US dollar)

Domestic demand for foreign equity and debt investments has increased over the past fifteen years.



Source: IMF via Haver analytics; AMRO staff calculation.
Note: Selected ASEAN economies include Indonesia, Malaysia, Singapore, Philippines, and Thailand. Selected Plus-3 economies include China and Korea. Data for China only starts in 2014. Data are updated as of Q1 2024.

[8] Direct investments may also be important for funding conditions, but they are structural and hence more stable. Portfolio investments are dependent on market sentiment, thereby exhibiting a high degree of volatility (FSB 2022; Wagas, Hashmi, and Nazir 2015). We, therefore, focus on portfolio investments in this chapter.

[9] Home bias is the tendency for investors to over-invest in domestic assets despite the benefits of diversifying into foreign assets.

Apart from foreign investors, other NBFIs outside the region may influence the dollar liquidity conditions in ASEAN+3.

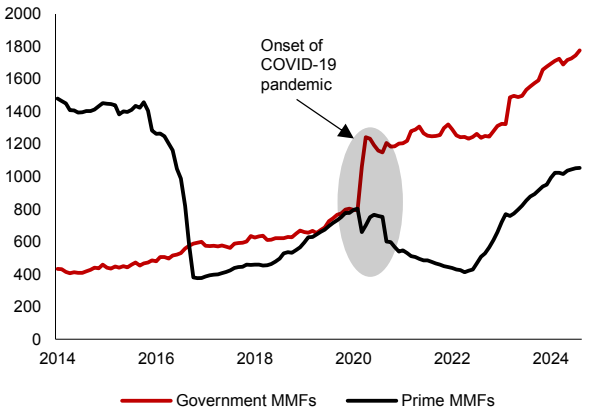
- Money Market Funds (MMFs): Prime MMFs provide short-term financing for non-US banks, corporations, and governments by investing in commercial papers, certificates of deposits, and repo markets. They may be forced to sell assets during times of stress to meet redemption demands (FSB 2021). The reallocation of investments from prime MMFs to government MMFs (which invest in US Treasury bonds) was a significant factor behind the funding stress in March 2020 (Figure 3.12), thus reducing the liquidity available for non-US banks.

- Central Counterparties (CCPs): During periods of severe market weakness, such as in March 2020, CCPs accumulate liquid assets through margin calls. Non-US CCPs place secured deposits with US banks, while US CCPs place them with the Fed, reducing access to US dollars for the ASEAN+3 financial system (Aldasoro, Eren, and Huang 2021).

Banks use a multi-layered system to manage residual liquidity risks and leverage on their cross-border relationships to manage liquidity efficiently. The interbank market allows them to address liquidity (and maturity) mismatches through instruments like repos, forwards, swaps, cross-currency swaps, commercial papers, and certificates of deposit. To manage these risks, many banks operate internationally, leveraging their branches and affiliates in financial centers in Hong Kong, Singapore, Tokyo, the US, and Europe (Figure 3.13). They rely on prime MMFs and other global banks to finance foreign currency liquidity deficits and park surplus liquidity. Notably, non-US banks (including large ASEAN+3 banks) use their branches to obtain liquidity from prime MMFs, customer deposits, and currency swaps. This extensive network gives banks access to US dollar sources and destinations for more optimal liquidity management. During stress episodes, liquidity obtained through central bank swap lines with the Fed is channeled to domestic banks in ASEAN+3 through affiliates or correspondent banks in the US (Figure 3.14).

Figure 3.12. US: Net Assets of Government and Prime Money Market Funds
(Billions of US dollar)

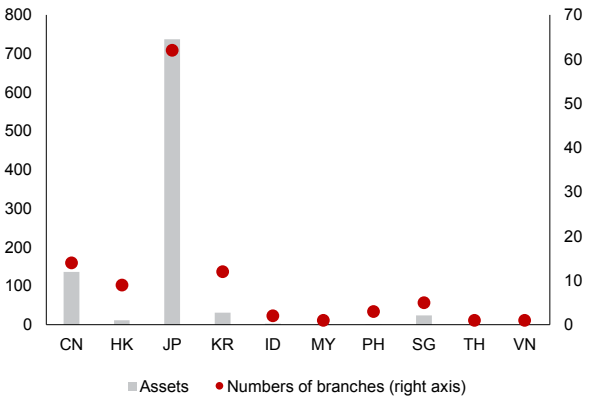
The investments from prime MMF were reallocated to government MMF in March 2020, during the onset of COVID-19 pandemic.



Source: Bloomberg Finance L.P; AMRO staff calculations.
Note: MMFs = money market funds. Data as of August 2024.

Figure 3.13. Selected ASEAN+3: Number of Bank Branches in US and Their Assets, 2023
(Billions of US dollar; number)

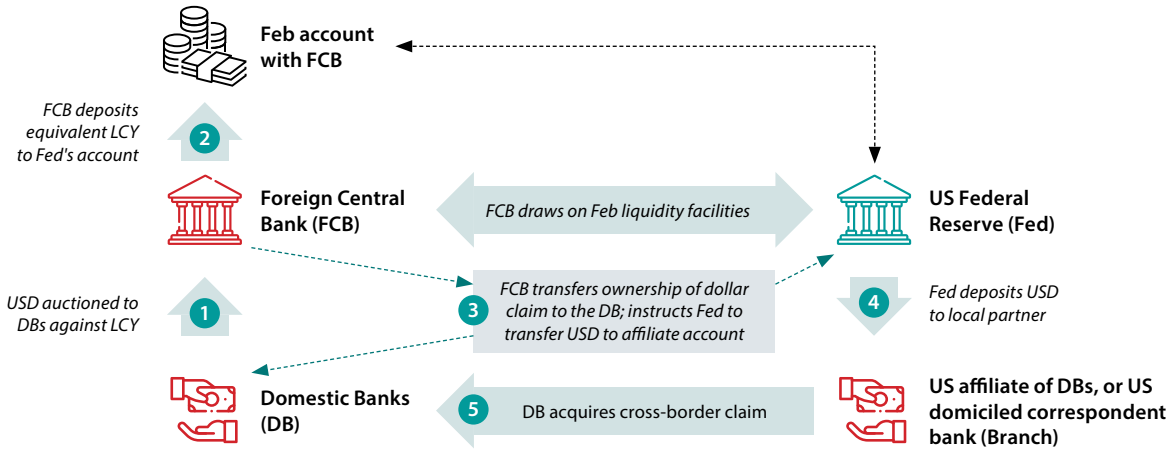
US branches of ASEAN+3 banks play an important role in the management of US dollar liquidity…



Source: The Federal Reserve.
Note: CN = China; HK = Hong Kong; JP = Japan; KR = Korea; ID = Indonesia; MY = Malaysia; PH = The Philippines; SG = Singapore; TH = Thailand; VN = Vietnam. Data as of March 2024.

Figure 3.14. Role of US Branches and Affiliates of ASEAN+3 Banks in Tapping Fed's Liquidity Facilities

… especially in channeling liquidity obtained through central bank swap lines during periods of market stress.



Source: Adopted from Aldasoro and others 2020.

Firms in ASEAN+3 issue foreign currency bonds to meet financing and liquidity management requirements. Typically, companies issue US dollar corporate bonds to satisfy business needs (such as paying for US dollar liabilities), diversify financing sources, or for more attractive terms of issuance (such as lower interest rates, lower cost of swapping US dollars to domestic currency). Accessibility to US dollar issuance markets and related costs are an important consideration, and ratings from international rating agencies allow firms to issue bonds at lower costs (tighter credit spreads). Banks and NBFIs may issue US dollar-denominated debt instruments to meet their short-term funding needs.

Foreign exchange hedging needs and practices in ASEAN+3

Foreign exchange hedging practices among ASEAN+3 entities depend primarily on business needs and the availability of hedging instruments. Business needs drive the demand for exchange rate hedging and the availability of instruments determines the sophistication of hedging practices. The demand for hedging practices varies across institutions.

- Corporates (trade sector): Across ASEAN+3, exporters and importers use spot and derivative markets to manage their foreign exchange exposure. Firms in advanced markets may employ complex structured products, including derivatives of up to two-year maturity. The choice of hedging tenors is driven by the extent of clarity of the firm's cash flow and liquidity of derivatives, which typically reduces for longer tenors and can make hedging expensive. The structure of the hedging instruments used can present risks for the currency and for the firms (Box 3.1).

- Debt issuers: Firms issuing long-term US dollar debt may choose to hedge the currency exposure on their liabilities through foreign exchange forwards (up to one year) and cross-currency swaps for longer tenors.[10] Unhedged debt exposes the firms to repayment risks due to currency depreciation, increasing the likelihood of a default (Bruno and Shin 2018). Firms face rollover risks due to changes in foreign currency interest rates, though this can be managed by switching currencies.

- Investors: According to market participants, investors tend to hedge more of their investments in debt securities, shorter-tenor investments, and portfolio investments, relative to equity securities, longer-tenor investments, and direct investments. Hedging instruments help offset the foreign exchange exposure of both foreign and domestic entities (investors and their counterparts). The unwinding of unhedged investments by foreign investors leads to outflows of US dollars creating a shortage of US dollars in the domestic financial system and further weakens the domestic currency. Some large domestic investors (such as pension funds) intentionally leave foreign investments unhedged to avoid high hedging costs, rely on domestic currency characteristics as a natural hedge, to prevent market disruptions from large hedging volumes and to diversify their currency risks. The hedging practices and business models of investors can aggravate US dollar shortages as seen during the onset of COVID-19 pandemic.[11]

- Banks: The residual exchange rate and maturity risks from the activities of businesses and investors end up in the banking system. Banks rely on the depth, liquidity and diversity of markets to minimize these risks but may not be able to mitigate them completely. For instance, banks may provide hedging services to longer tenor bond issuers through cross-currency swaps, but the lack of liquidity for longer tenor instruments limits their ability to find counterparties and offload the resultant duration mismatches.

[10] FX forward is an instrument used to fix the exchange rate for a particular date in the future. Cross-currency swap is an agreement between two entities to exchange interest and principal payments in one currency with those in a different currency. Both FX forwards and Cross-currency swap are over the counter derivatives and are typically provided by banks as part of their FX hedging services to their clients.

[11] The activities of NBFIs and their hedging practices was a key source of aggravated US dollar shortage in Korea in March 2020. As noted by McGuire and others 2021, the key factors behind the stress were the requirement to roll FX hedges by insurance companies, large margin calls in equity-linked securities (ELS) which asset managers and securities companies sold to their clients (AMRO 2021), and the sale of local currency assets by foreign investors. The lack of diversity in ELS products and lack of sufficient dollar credit lines of NBFIs with banks were identified as the key sources of vulnerabilities. In January 2021, authorities announced measures to address these weaknesses.

Recent developments during the Fed's hiking cycle

Surprisingly, the increases in the Fed's policy rate over the past two years have helped improve US dollar liquidity in the ASEAN+3 banking system. Fears of US dollar shortage due to rapid Fed rate hikes and resultant capital outflows did not materialize. While the strong external position of ASEAN+3 economies was an important underlying factor, many micro-market developments also helped support the US dollar liquidity situation. Domestic markets that allowed residents to hold US dollars saw an increase in dollar availability. The Fed's rate hikes largely outpaced interest rate increases by ASEAN+3 central banks. Three developments contributed to the improvement in US dollar financing conditions in the region.

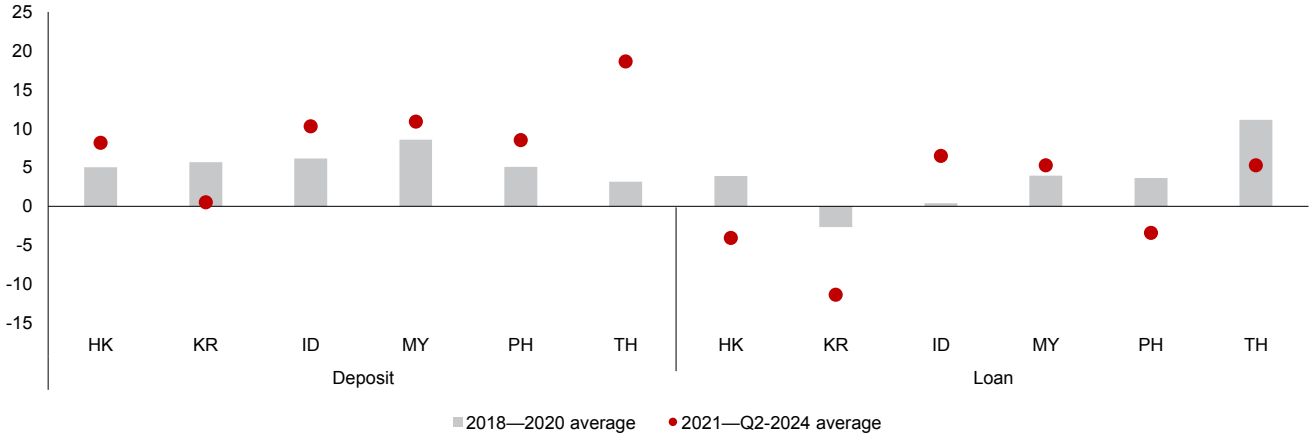
- Higher interest rates and expectations of US dollar appreciation made US dollar deposits attractive. The US dollar deposits held by residents increased due to attractive returns compared with domestic currency deposits, which helped the domestic banking system receive US dollar financing. Notably, exporters in a few economies delayed converting their export proceeds to domestic currencies. That said, the rise in resident US dollar deposits added to the depreciation pressures on domestic currencies. Authorities in some jurisdictions took measures to discourage exporters from hoarding dollars (Box 3.2).

- Higher interest rates reduced the attractiveness of US dollar borrowing. The growth in foreign currency deposits outpaced the foreign currency loan growth in ASEAN+3 economies (Figure 3.15). Elevated interest rates globally led to a slowdown in foreign currency bond issuances in 2023. The share of bonds denominated in US dollars declined as issuers preferred to raise bonds in other currencies (Figure 3.16). An uptick in US dollar bond sales in 2024 has been driven by ASEAN+3 banks. There is still much fewer issuance by nonfinancial companies than before Fed's hiking cycle started.[12]

- The Fed's hiking cycle led to an inverted yield curve which happens when short-term US dollar interest rates are higher than long-term bond yields. This made it less attractive for investors such as hedge funds and insurance companies to borrow US dollars to fund long-term investments, as they would incur a negative carry cost.[13] It also discouraged banks from borrow-and-buy strategies for US Treasuries.[14] The reduced short-term US dollar borrowing also contributed to easy financing conditions.

Figure 3.15. Selected ASEAN+3: Average Foreign Currency Deposit and Loan Growth
(Percent)

The foreign currency deposit growth has outpaced foreign currency loan growth in ASEAN+3 banking systems since the commencement of Fed's hiking cycle.



Source: National authorities via Haver Analytics: AMRO staff calculations.

[12] Though the lower issuance reduced the potential US dollar inflows, it also ensured that US dollar liquidity available from rising deposits was deployed in highly liquid securities instead of lower rated corporate debt. The decrease in issuance also reduced the price pressures on USD financing.

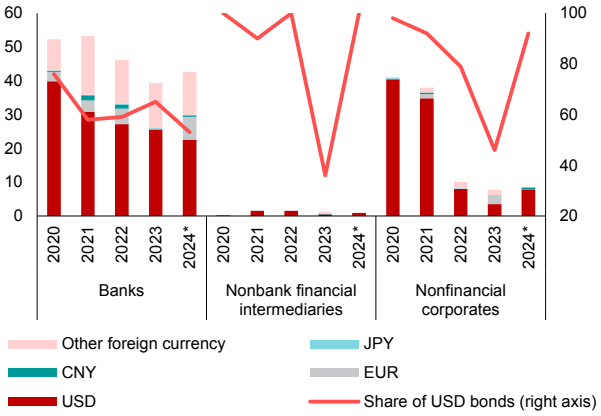
[13] Negative carry is a condition where cost of holding an investment is more than the income it generates. In the stated example, the investor will pay more for borrowing US dollars than the income it receives from holding the investment.

[14] A typical borrow-and-buy structure is used to secure funding and buy US dollar repo-able assets by banks that do not have US operations or partners. They would approach banks who have US branches to help facilitate these structures. The structure consists of two legs 1) purchase of US dollar assets and 2) secure funding by repo-ing out these assets. As the two legs are intertwined, these are done with a single counterparty. The banks entering these structures expect the US dollar asset return to be greater than the funding cost while the counterparty gains from earning the fees and interest on the funding it provides. An inverted yield curve leads to a higher funding cost than the yield on the long-term asset, thus making the structure less attractive. Such structures against US Treasuries have been unwound due to negative carry but those involving US MBS are attractive due to higher MBS yields. It is likely that the US treasury structures become attractive again when funding costs fall.

Figure 3.16. Selected ASEAN+3: Bonds Issued in US Dollar and Other Foreign Currencies
(Billions in US dollar; percent of total foreign currency bonds)

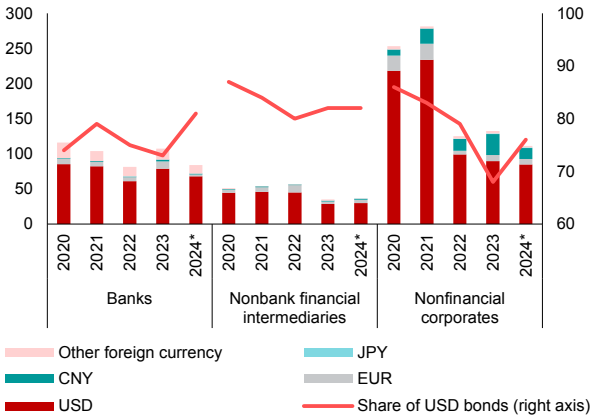
The share of US dollar denominated bonds in new issuances reduced after the Fed rate hikes started.

Selected ASEAN



Source: Cbonds; AMRO staff calculations.
Note: Economies included in the analysis are Malaysia, Singapore, Thailand, Indonesia, the Philippines, and Vietnam. CNY = Chinese renminbi; EUR = Euro; JPY = Japanese yen; USD = US dollar. Data for 2024 is as of 9 September 2024.

Plus-3



Source: Cbonds; AMRO staff calculations.
Notes: CNY = Chinese renminbi; EUR = Euro; JPY = Japanese yen; USD = US dollar. Data for 2024 is as of 9 September 2024.

Box 3.1:

Market Implications of Hedging Structures

Hedging structures used by Japanese importers may have exacerbated the sharp depreciation in the Japanese yen against the US dollar in 2022. In Japan, importers typically hedge against a stronger US dollar and would normally purchase knock-out options at much higher levels to reduce hedging costs.[1] Unprecedented yen weakness in 2022 triggered these knockouts, inflicting losses and prompting firms to rebuild the hedges at even weaker levels of the yen, which in turn drove exchange rate volatility and amplified the spillover from the US dollar to the yen. Likewise, prior to the global financial crisis, Korea's small and medium sized enterprise (SME) exporters had used knock-in and knock-out (KIKO) structures to manage exchange rate risks at a time when the won was appreciating. At the onset of the crisis in 2008, when the won depreciated and fell beyond the range defined by the KIKO structures, exporters incurred huge losses due to their options positions. Many SMEs, including shipbuilders, went bankrupt. The banks that sold the options suffered minimal losses initially, but the ripples from the crisis led to corporate defaults, which in turn impacted bank earnings. The US dollar stress increased as investors were concerned that Korean companies could not repay maturing short-term debt. In both the instances, companies used the same kind of hedging structures and so, were exposed to the same risks in unexpected market movements. This homogeneity exacerbated the pressures on the domestic currency and, in case of Korea, added to US dollar funding stress.

The author of this box is Chiang Yong (Edmond) Choo.

[1] A knockout option is an option with a built-in mechanism to expire worthless if a specified price level in the underlying asset is reached. A cap is set on the level the price can reach in the option holder's favour. As knockout options limit the profit potential for the buyer, the premium is typically lower than an equivalent vanilla option.

Box 3.2:

Exchange Rate Implications of Corporate US Dollar Deposits

The foreign currency deposits of companies based in Indonesia and Malaysia increased significantly during 2020–2023. The Fed's tightening cycle enhanced the yield on US dollars and fueled expectations of an even stronger US dollar, while rising geopolitical tensions and a slowdown in trade earnings may encourage exporters to keep high precautionary balance in uncertain times. A similar trend was reported among Chinese exporters. The expectations of a weaker yuan amid diverging monetary policies between the US and China encouraged exporters to hold on to high-yielding US dollars deposits and use currency swaps (i.e. swapping US dollars for yuan for a short period, say 3 months) to meet local currency business needs. These actions exerted depreciation pressures on domestic currencies. To alleviate pressures on domestic currencies, the authorities have taken measures such as offering better interest rates for dollar deposits through domestic banks (Indonesia) and conducting active engagement with corporates to encourage repatriation of foreign investment income (Malaysia).

The author of this box is Chiang Yong (Edmond) Choo.

Risks due to linkages between entities

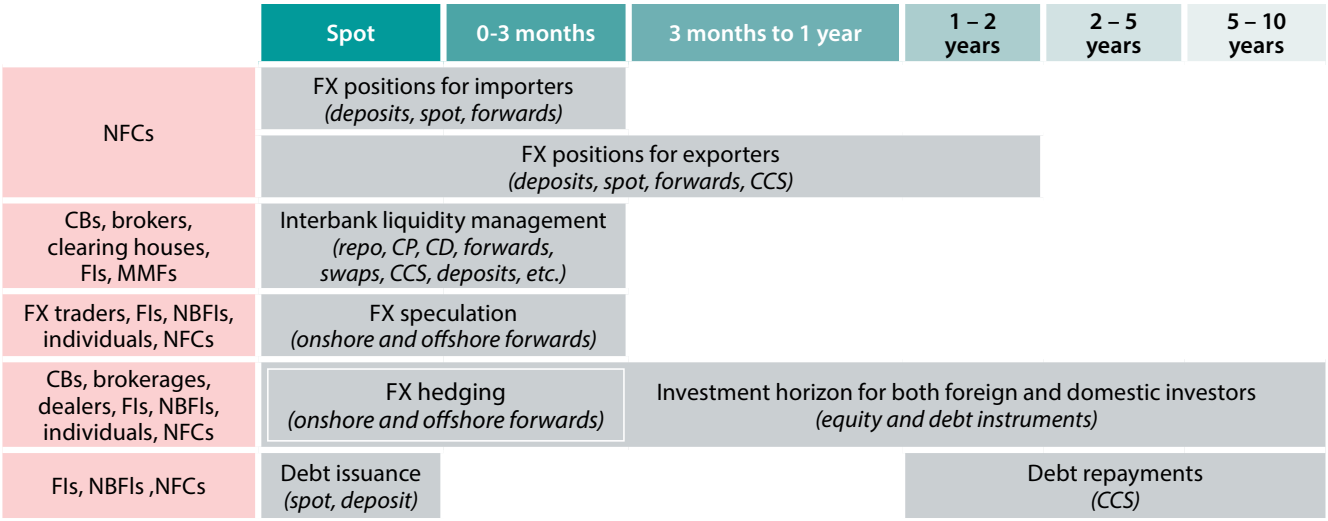
The US dollar supply chain in ASEAN+3 economies appear robust, but not without pockets of risk. Under normal conditions, regional entities do not face US dollar liquidity shortages. The primary concerns are managing currency and maturity mismatches, often leaving financial systems with these risks.

- Currency mismatches: The ASEAN+3 financial system historically holds more US dollar assets than liabilities. The resultant currency and maturity mismatches need to be managed frequently to account for changes in exchange rates by using tools such as cross-currency swaps, repos, and other market financing tools (IMF 2019), but these tools add to costs and expose institutions to rollover risks during market stress.
- Duration mismatches: Participants in the US dollar supply chain operate in different maturity buckets (Figure 3.17). Financial institutions tend to hold less-liquid positions themselves to meet client needs, contributing to duration mismatches in the financial system.

Banks and other financial institutions, even highly regulated ones, are exposed to amplified currency and duration mismatches in times of stress. NBFIs subject to less stringent prudential regulation may take on such risks willingly if the risk-to-reward ratios are favorable. These institutions could face stress even in mildly adverse market conditions, with resultant spillovers to the wider financial system.

Figure 3.17. Interaction of Various Entities in US Dollar Supply Chain and Resultant Maturity Mismatches

The participants in the US dollar supply chain operate in different maturities and may create duration mismatches in the financial system.



Source: AMRO staff's representation based on inputs from market participants.
Note: The diagram is a simplified and stylized representation of a complex network and is not all encompassing. CCS = cross-currency basis swap; CB = central bank; CD = certificate of deposit; CP = commercial paper; FI = financial institution; FX = foreign exchange; MMF = money market fund; NBFI = nonbank financial intermediary; NFC = nonfinancial corporate.

III. Issues Arising from US Dollar Reliance in ASEAN+3's Financial Systems

US dollar funding stress and risks for financial intermediaries

The global financial system has faced persistent US dollar shortages since the global financial crisis. The cross-currency basis ("basis", Box 3.3) for most major currencies has turned negative since 2008, which means borrowing US dollar through foreign exchange swaps carries a premium (i.e. more costly) over US dollar interbank borrowing. The basis has turned negative as domestic investors have swapped local currency for dollars, and banks have reduced their hedging services to clients due to low interest rates and tighter regulations (Avdjiev, Eren, and McGuire 2020). Regulatory limits on arbitrage activities have kept the basis negative. The negative basis indicates a persistent US dollar shortage in the global financial system (Borio and others 2016).

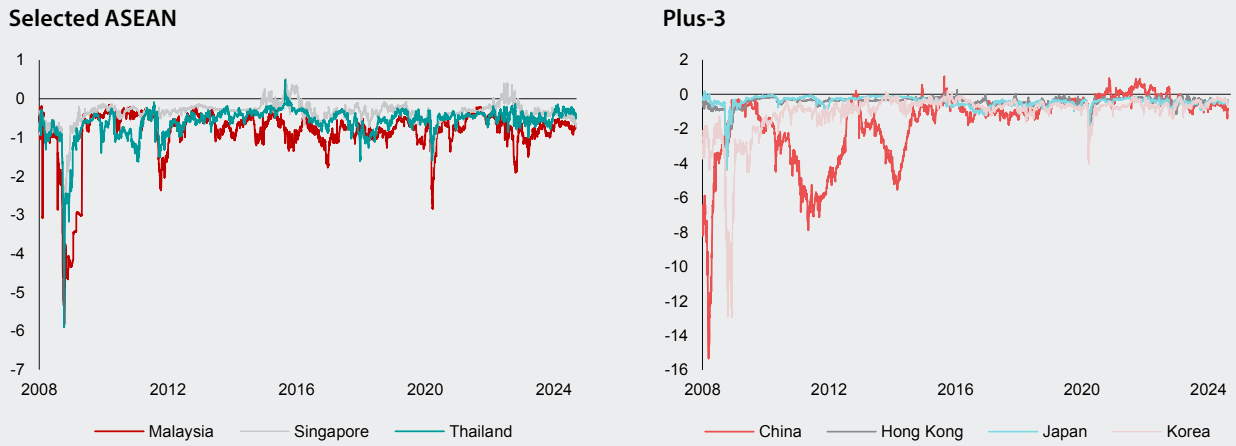
US dollar funding acts as a risk transmission channel and risk magnifier rather than a source of shock for financial markets. Major funding stress episodes in the past 15 years, such as the global financial crisis, European debt crisis, COVID-19 pandemic (del Rosario and Pande 2020), and the US regional banks crisis (2023), were triggered by global economic and financial shocks and accompanied by a rise in volatility (Figure 3.18). Although technical factors occasionally cause short-lived US dollar funding squeezes, like in September 2019, the spillover effects are less severe. The greater risk lies in a confluence of shocks stemming from both fundamental and technical factors causing a funding squeeze, which could magnify the original shock with significant consequences for global financial markets.

Box 3.3:

Why and How Is the Cross-Currency Basis Estimated?

The cross-currency basis is the difference between the cost of directly borrowing one currency in the cash market and the interest paid to borrow this currency by swapping it with another. If the covered interest rate parity holds, the basis should be zero. The basis for less- developed markets has two issues: lack of liquidity in less-developed markets makes price aggregator quotes unreliable, and the transition from Interbank Offered Rates (IBORs) disrupts time series data. To address this, the basis using foreign exchange spot and forward exchange rates, and interest rates is constructed for various ASEAN+3 markets.[1] The difference between the US dollar interest rate and the equivalent interest rate of borrowing in domestic currency and swapping them to US dollars using foreign exchange spot and forwards is calculated. Figure 3.3.1 show the estimated basis for selected ASEAN+3 economies.[2]

Figure 3.3.1. Selected ASEAN+3: Cross-Currency Basis Swap Estimates
(Percent)



Source: Bloomberg Finance L.P; AMRO staff calculations.
Notes: Data as of 9 September.

The author of this box is Prashant Pande.

[1] The following interest rates in the 3-month tenor are used: US (SOFR OIS), China (SHIBOR), Hong Kong (HIBOR), Japan (JPY OIS), Korea (KORIBOR), Malaysia (KLIBOR), Singapore (SIBOR), and Thailand (BIBOR). There is a possibility that some deviations in the estimates are due to the difference in the ways the forward and the basis markets operate. The forward markets can be influenced by factors other than US dollar funding, which can create some distortions.

[2] The basis estimated for Indonesia and Philippines were dropped because these markets do not have relevant interest rate derivatives. Secondly, the forwards for IDR and PHP were used by investors to hedge their domestic currency exposures. They did this by buying US dollars through forward transactions. Thus, the forward implied rates are not a true reflection of the interest rate differentials between these markets and the US.

What drives the US dollar funding stress in ASEAN+3?

A panel pooled regression model is used to explore the relationship between the basis and potential drivers such as liquidity, volatility, and expectations of the domestic exchange rate (against the US dollar), financial market volatility, and credit spreads. A quantile regression analyzes the change in drivers during extreme dollar funding stress episodes. Annex 3.3 lists the variables used and describes the methodology. The key findings are:

- Higher Libor-OIS spread, financial market volatility, a stronger US dollar and the widening of term spread differentials are associated with US dollar funding stress.[15] These results are intuitive and indicate that a spike in the perceived credit risk, risk-off investor sentiments, US dollar strength and more attractive returns on US dollar assets could lead to stress in the dollar funding market.

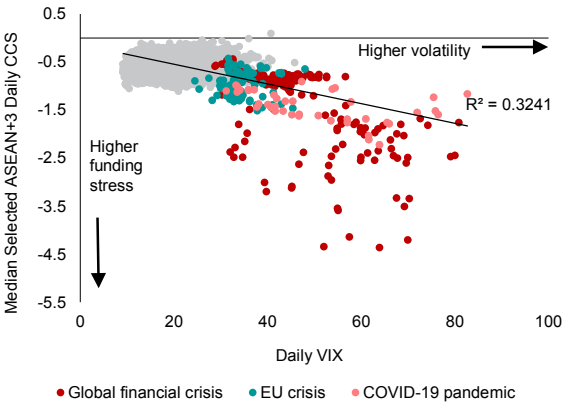
- The basis for ASEAN+3 international financial centers (IFCs) is less dependent on term spread differentials, whereas that for advanced economies shows a strong relationship with exchange rate volatility.

- The quantile regressions show that in periods of extreme funding stress, the volatility and expectations of the exchange rate (against the US dollar) are the most significant factors. Meanwhile the importance of US dollar strength, financial market volatility, and term spread differential, drops in comparison to the baseline model.

Financial intermediaries in ASEAN+3 face pressures on multiple fronts during stress situations. There is structural demand for US dollar funding in ASEAN+3 financial system from financial institutions having accumulated more US dollar assets, mostly in the form of loans to corporates, than liabilities, which are mostly in form of deposits and shorter term borrowings (Figure 3.19). This demand is met by tapping into global and intra-regional pools of liquidity through US dollar denominated debt instruments, foreign exchange swaps and cross-currency swaps. This cost rises as funding conditions tighten, and in extreme situations the funding may dry up, increasing liquidity risks for financial intermediaries. The situation may be worsened by the response of foreign NBFIs during stress scenarios, including: (1) foreign asset managers and institutional investors selling ASEAN+3 assets, (2) CCPs making margin calls on foreign investments of domestic investors, and (3) reduced liquidity from prime-MMFs as they face redemption pressures. During such periods, ASEAN+3 banks find it difficult to secure funding from banks in the US, Europe and other economies. The funding stress causes banks to scale down exchange rate hedging services to their clients who themselves may face drawdowns on corporate credit lines, and thus exposing nonfinancial companies to liquidity stress.

Figure 3.18. Selected ASEAN+3: Volatility Index versus Daily Median Cross-Currency Basis
(Index; percent)

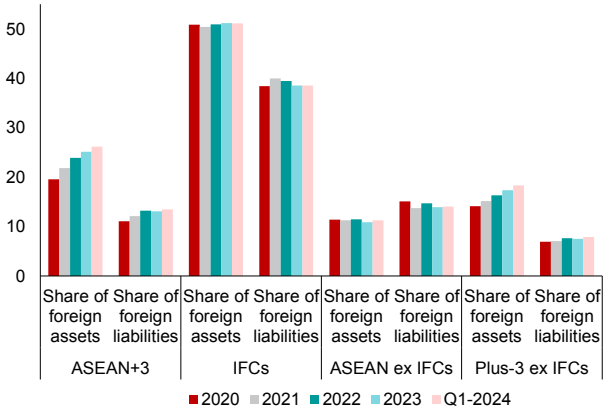
Funding stress tends to be higher in periods of higher market volatility.



Source: Bloomberg Finance L.P.; NUS Credit Research Initiative (NUS-CRI); AMRO staff estimates.
Note: The volatility index used is the index of expected volatility in S&P 50 Index (VIX Index) derived from option bid and ask quotes. Sample is for ASEAN+3 economies which includes China, Hong Kong, Japan, Korea, Malaysia, Singapore, and Thailand. Data as of 9 September 2024.

Figure 3.19. Selected ASEAN+3: Foreign Assets and Liabilities in the Financial System
(Percent of total assets and liabilities)

The ASEAN+3 financial system has more US dollar denominated assets than liabilities.



Source: Bank for International Settlements (BIS).
Note: ASEAN+3 includes Brunei, Cambodia, China, Hong Kong, Indonesia, Japan, Korea, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. IFCs include Hong Kong and Singapore. ASEAN ex IFCs include Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Thailand, and Vietnam. Plus-3 ex IFCs include China, Japan, and Korea. Data for 2024 is as of Q1.

[15] The Libor-OIS spread is the difference between the London interbank offer rate (Libor) and the overnight indexed swap (OIS). The Libor is the rate at which banks indicate their willingness to lend to other banks while the OIS is the rate on a derivative contract of the same tenor on the effective federal funds rate. The analysis used the 3-month tenor of these rates.

Does stress in US dollar funding conditions affect cross-border bank lending?

Tighter funding conditions can lead to sharper reductions in cross-border lending. Panel regressions (Annex 3.4) investigate if the lending behavior of banks in 20 advanced economies to recipient ASEAN+3 economies depend on dollar funding conditions. The key findings are:

- The reduction in lending to ASEAN+3 economies from advanced economy banks is larger than the reduction seen for rest of the world, possibly due to higher banking exposure to and greater reliance on US dollars from advanced economy banks (see Feature 1, Section II). Thus, the ASEAN+3 region is more vulnerable to credit rationing from foreign banks during episodes of funding stress.

- Sharper pullbacks in lending from the banks in the advanced economies to ASEAN+3 IFCs and advanced economies are observed compared to their lending to ASEAN+3 emerging market economies.

Does US dollar funding stress impact domestic banking sector stability?

ASEAN+3 banks are generally well capitalized and have strong domestic balance sheets. US dollar funding stress alone may not pose a significant direct risk to domestic financial stability. However, the spillover effects may not be negligible. A panel regression is employed to investigate the relationship between tighter dollar funding conditions and the probability of default of domestic banking systems in selected ASEAN+3 economies (Annex 3.5). A visual inspection of Figure 3.20 suggests some co-movement between the basis and the average probability of default in ASEAN+3, and the results of the panel regression confirm this observation. The results of the regression show that:

- Funding stress leads to a rise in the probability of bank defaults.[16]

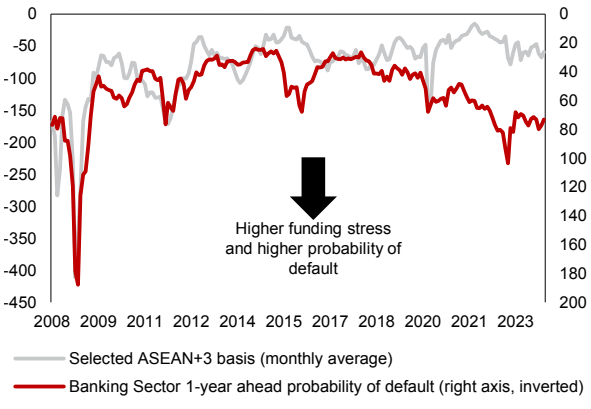
- The correlation is strongest in ASEAN+3's IFCs and advanced economies, possibly due to larger US dollar intermediation activities and cross-border exposure by banks in these economies.

- During major crises over the past 15 years (such as the global financial crisis and the onset of the COVID-19 pandemic), the link between funding stress and banking sector instability heightens for all ASEAN+3 economies in the sample. The magnitude of the change in probability of defaults is modest outside of crisis periods.

- The probability of default for ASEAN+3 IFCs is the most sensitive to funding conditions: an event like the global financial crisis (with the basis widening by 400 basis points) will increase the 1-year ahead probability of default by 1.5 percentage points.

Figure 3.20. Selected ASEAN+3: Average Cross-Currency Basis and Banking Sector 1-Year Ahead Probability of Default
(Basis points; basis points)

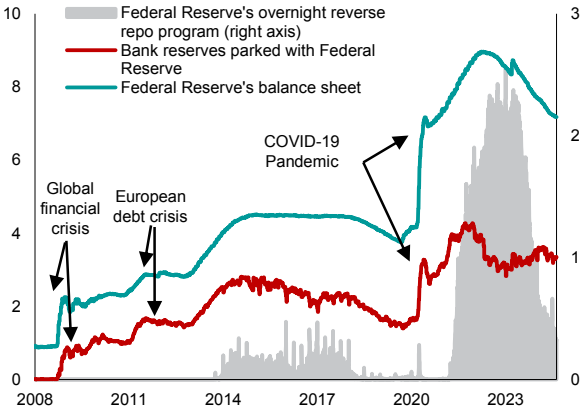
The probability of default for banking sector tends to rise when the US dollar funding stress.



Source: AMRO staff estimates; NUS Credit Research Initiative (NUS-CRI).
Note: Sample is for ASEAN+3 economies which includes China, Hong Kong, Japan, Korea, Malaysia, Singapore, and Thailand. The latest available data for probability of default is as of February 2024.

Figure 3.21. US: Proxies for Surplus US Dollar Liquidity
(Trillions of US dollar)

Stable bank reserves show that the liquidity remains surplus in the US banking system.



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: Data for Federal Reserve's overnight reverse repo program begins in September 2013. Latest data as of 9 September 2024.

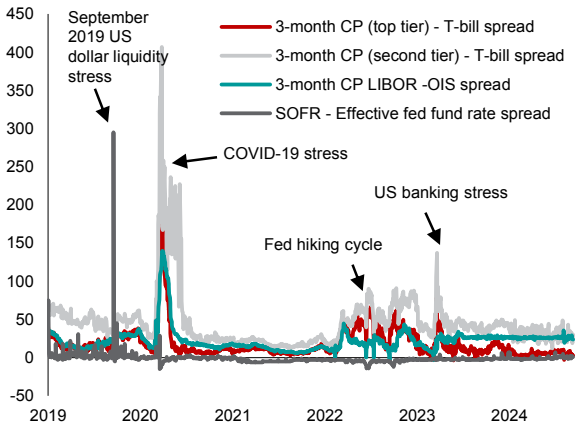
[16] The relationship strengthens significantly when year-effects are added to the model. This indicates that the relationship may not to be static and changes with financial market or macroeconomic conditions.

The funding landscape in the US has stabilized since the regional banking crisis in March 2023. Bank reserves have stabilized (Figure 3.21), indicating a liquidity surplus. Reserves remain "abundant", and the Fed aims for "ample" reserves.[17] Funds in the Fed's overnight reverse repo (ON RRP) facilities, an indicator of surplus liquidity, have continued to fall as MMFs prefer higher repo rates with banks and brokers over the ON RRP rate. This shift in ON RRP usage reflects a redistribution, not a decline in liquidity. With the Fed's balance sheet shrinking steadily, quantitative tightening may end by 2025, alleviating a key drag on US dollar liquidity. Credit spreads have remained stable even amid elevated interest rates (Figure 3.22), indicating benign funding conditions.

US dollar funding for ASEAN+3 appears stable but remains vulnerable to significant global growth shocks. As of September 2024, the basis is stable, spreads are narrow, and the trend of dollar assets versus liabilities in the banking system is favorable due to stronger US dollar deposit growth and slower US dollar loan growth, indicating no major stress. US dollar stress tends to spike during massive negative shocks to the global economy, as indicated by sharp declines in breakeven yields (Figure 3.23), increased financial market volatility, and poor returns on equities and emerging market currencies.[18] A major global economic shock can impact investor sentiment and banking flows and lead to a US dollar shortage. Geopolitical developments also pose risks, potentially disrupting US dollar supply chains and creating vulnerabilities. In extreme cases, loss of access to US dollars due to sanctions, technological failures, or cyber-attacks could have significant spillover effects on the region's US dollar funding.

Figure 3.22. US: Selected Interest Rate Spreads
(Basis points)

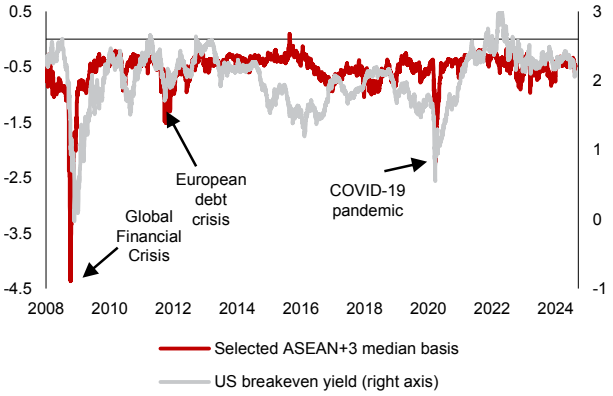
The credit rate spreads remain stable indicating benign funding conditions.



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: CP = commercial paper; LIBOR = London interbank offer rate; SOFR = Secured overnight financing rate; T-bill = treasury bill. Latest data as of 9 September 2024.

Figure 3.23. Selected ASEAN+3: Median Cross-Currency Basis and US Breakeven Yields
(Percent)

The funding stress spikes in periods of negative shocks to the global economy.



Source: Bloomberg Finance L.P; NUS Credit Research Initiative (NUS-CRI); AMRO staff calculations.
Note: Due to data unavailability, economies in selected ASEAN+3 only includes China, Hong Kong, Japan, Korea, Malaysia, Singapore, and Thailand. Latest data as of 9 September 2024.

US dollar as a channel of spillovers from US policies and other global shocks

US monetary policy has spillover effects on the global economy and financial system through various macro-financial channels. Changes in US monetary policy (both conventional and unconventional) affect cross-border capital flows, asset prices, and economic growth through several channels. These include (1) portfolio rebalancing driven by the search for yield, (2) the Fed signaling a reduction of the expected risk-neutral domestic interest rates prompts capital flows to emerging economies, (3) exchange rate changes due to portfolio flows and interest rate differentials, and (4) trade-flow alterations due to effect on US domestic demand (Lavigne, Sarker, and Vasishtha 2014). These channels are not independent and often operate simultaneously. The reliance on the US dollar amplifies the spillovers through portfolio rebalancing and exchange rate channels. Over the past 15 years, the markets experienced a prolonged period of easy US monetary conditions, followed by a relatively short period of sharp monetary tightening in 2022 and 2023. In both periods, US monetary policy conditions affected financial conditions in ASEAN+3 financial markets.

[17] Harris, Alex. 2024. "Powell Says It'll Soon Be Appropriate to Slow Pace of QT." Bloomberg, 21 March.
[18] Breakeven yield is defined as the difference between nominal and real yield of the same tenor. It is perceived as a market implied measure of inflation expectations.

US monetary policy affects asset valuations in ASEAN+3. The long period of quantitative easing and near-zero US interest rates flooded global markets with dollar liquidity, encouraged investors to take risks, and led to a massive buildup of leverage due to cheap and ample availability of credits. A prolonged period of easy financing conditions can lead to formation of asset bubbles (Powell 2013). Valuations of emerging market equities and bonds have tended to be richer during periods of zero-lower bound Fed policy and quantitative easing (Chari, Stedman, and Lundblad 2017). Though rich valuations may not be categorized as a bubble, overvalued assets are susceptible to a sharper correction when market conditions switch to risk-off. ASEAN+3 asset prices over the past two years have seen weaknesses and episodes of elevated volatility during periods of rapid change in Fed interest rates and expectations.

How do US dollar financial conditions affect portfolio flows?

US dollar financing conditions can alter ASEAN+3 portfolio flows. Foreign investors typically buy ASEAN+3 equity and debt instruments in times of easy financial conditions and sell them when conditions tighten. Although the financing environment is not the sole determinant of portfolio flows, the analysis shows that financing conditions have a material influence on foreign appetite for regional assets. A panel regression (Annex 3.6) on the relationships between the basis, and equity or debt flows in various ASEAN+3 markets, suggests that:

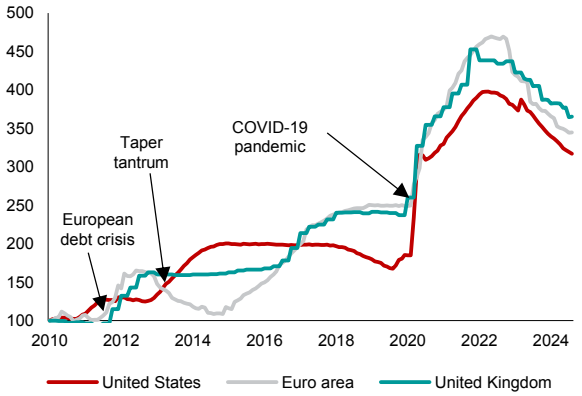
- The basis has a positive coefficient against various country-asset class combinations—i.e., a lower or more negative basis (tighter funding conditions) is associated with portfolio outflows from debt and equity markets in ASEAN+3.
- The relationship is most stable in Malaysia's debt and equity markets, and somewhat stable for equity flows in Korea and Thailand, and debt flows in China.
- The relationship between the basis and portfolio flows strengthens during times of financial stress. Outflows during funding stress could be severe while inflows during easier financing conditions would be slower.

The Fed's easy monetary policy and balance sheet expansion contributed to a rise in ASEAN+3 external debt. Fed balance sheet expansion (Figure 3.24) created large bank reserves (Wessel 2024) which found their way to offshore markets (Bhattarai, Chatterjee, and Park 2018). The increase in ASEAN+3 external debt (Figure 3.25) in ASEAN+3 economies made the economies more vulnerable to the risk of capital outflows and currency depreciation. Particularly for entities with liabilities denominated in US dollars but a revenue stream in local currency, a depreciation of the domestic currency during elevated interest rates could pose difficulties for debt servicing.

ASEAN+3's monetary policies often react to mitigate spillovers from US monetary policy changes. Domestic monetary policies in ASEAN+3 economies respond to the changes in domestic economic conditions and outlooks as well as to changes in the Fed's policy. Some ASEAN+3 central banks hike interest rates in periods of tighter Fed policy to ease depreciation pressures on their currencies, and vice versa. Spillovers from US monetary policy, while having more immediate impact for capital flows and exchange rates, may alter the medium-term trajectory for growth and inflation trajectory in the region.

Figure 3.24. Selected Advanced Economies: Balance Sheets of Major Central Banks
(Basis points)

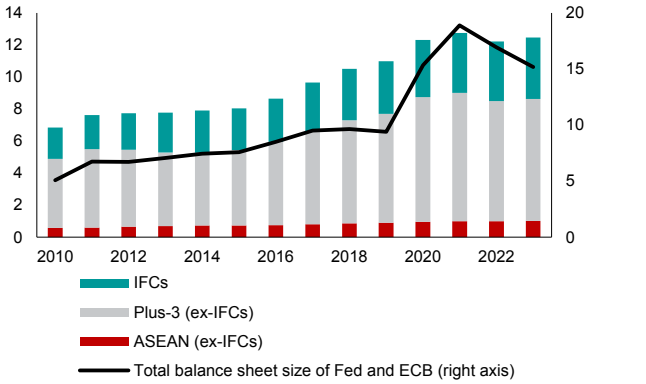
Major central bank balance sheets have expanded significantly since 2010…



Source: Haver Analytics; AMRO staff calculations.
Note: Data as of August 2024.

Figure 3.25. Selected ASEAN+3: Change in External Debt
(Percent of GDP; trillions of US dollar)

… and have been one of the drivers of the rise of external debt in ASEAN+3.



Source: International Monetary Fund (IMF); AMRO staff calculation.
Notes: ASEAN includes Cambodia, Indonesia, Malaysia, Philippines, and Thailand; IFC includes Hong Kong and Singapore; Plus-3 includes China, Japan, and Korea. Due to data unavailability, Brunei, Lao PDR, Myanmar and Vietnam are not included in the grouping. For Cambodia, China and Malaysia, the data are available starting 2015, 2015 and 2012 respectively. The data is backfilled with the first available data point. Fed = Federal Reserve; ECB = European Central Bank.

The US dollar can transmit global shocks to ASEAN+3 due to its safe asset status. The US dollar tends to strengthen during periods of stress (such as the onset of the COVID-19 pandemic or the March 2023 banking system stress) and increased market uncertainty, when investors turn to safe assets. Such episodes can be more disruptive to financial stability and generally require that authorities, either in the US or in domestic economies, take remedial measures to alleviate market stress. On the other hand, financial market volatility may also rise when markets rapidly adjust their expectations around Fed policy. Once the adjustment is complete, volatility eases back to normal levels. The US dollar safe asset channel may be a more potent transmitter of risk than that the channel of US monetary policy spillovers.

Reliance on the US dollar makes ASEAN+3 susceptible to US policy decisions that (rightly) serve US domestic economic and financial interests. Although the US Fed has helped to alleviate liquidity stress in global markets, its role as the global lender of last resort should not be taken for granted (Annex 3.7):

- During the global financial crisis, European debt crisis, and onset of COVID-19, the Fed announced swap lines to many advanced economy central banks to provide liquidity to meet exceptional demand for US dollar. The measures were effective in containing the stress in global markets and curbed spillovers including those to the US economy and financial markets.

- The allocation of swap lines is at the Fed's discretion. The US dollar swap facility is available only to some ASEAN+3 central banks during times of stress. The Fed considers various economic and political factors when allocating swap lines. Countries with strong economic ties to the US, substantial holdings of US assets (particularly treasury securities), and significant geopolitical interests are more likely to be given access. The Fed converted FIMA from a temporary facility to a standing facility in July 2021, allowing foreign central banks to repo US Treasuries with the Fed for liquidity. Using the FIMA facility as a dollar financing backstop incentivizes central banks to maintain or increase their holdings of repo-able US Treasuries, further entrenching the role of US dollars in the international financial system.

Regulatory actions by the US authorities can inadvertently impact US dollar financing conditions. For example, structural and operational reforms for US money market funds (MMFs) adopted in 2014 had significant spillover effects. These reforms aimed to prevent runs on prime MMFs (Cipriani, La Spada, and Mulder 2017), like those in 2008. However, the reforms led many prime MMFs to convert to government MMFs, which were exempt from the new rules, resulting in a USD 1 trillion outflow from prime MMFs. Since prime MMFs were major sources of short-term financing through commercial papers for many non-US banks, their shrinkage increased dollar financing costs (Penn Mutual, 2016). Many non-US banks compensated by raising dollar deposits outside the US and drawing down excess reserves with the Fed, which helped fill the gap created by the loss of MMF liquidity (Aldasoro and others 2017).

The international financial system depends not only on the US dollar as a currency, but also on the infrastructure and services that the US-based financial system provides. US commercial banks may hold deposits and act as the custodian of US dollar assets held by non-US entities, such as institutional investors, asset managers, sovereign wealth funds and central banks. Many non-US entities also depend on US counterparties for trading and settlement services for US dollar assets. The payment systems like CHIPS and messaging systems like SWIFT also form a part of the US dollar ecosystem. In a scenario where access to these financial services is cut-off, ASEAN+3 banks, NBFIs and companies could find it very difficult to conduct their cross-border business.

IV. Policy Discussion

The ASEAN+3 financial system's dependence on the US dollar is deeply entrenched, and resolving the resulting structural vulnerabilities requires both short-term and long-term strategies. In the short term, efforts should focus on improving resilience within the dollar-reliant environment. In the long term, authorities should work together to reduce the structural dependence on the US dollar.

Short-term policy direction—Boosting immunity to shocks

Policy considerations over the short term, to increase ASEAN+3 resilience in a US dollar-reliant international financial system, can focus on: (1) improving economic fundamentals to mitigate spillovers from external shocks, (2) strengthening surveillance and risk management strategies, and (3) enhancing regional financial safety nets to withstand liquidity shocks. These policies aim not to replace the US dollar but to strengthen the domestic financial system to mitigate spillover risks from global developments and exogenous shocks.

- Improving economic resilience to withstand external shocks: The 2022–2023 Fed hiking cycle demonstrated that robust domestic macro-financial fundamentals—strong economic growth, well-anchored inflation expectations, sound fiscal policies, well-capitalized banking systems with ample liquidity buffers, manageable levels of public debt, and ample foreign exchange reserves—have helped ASEAN+3 economies withstand external shocks and maintain financial stability. Specifically, while the Fed's action influenced ASEAN+3 monetary policy decisions, the required tightening was much smaller than in the US, thanks to well-anchored inflation expectations and clear central bank communications (Ahmed, Akinci, and Queralto 2021 2021). Financial spillovers were managed through selective FX interventions to control market volatility and minimize impacts on the real sector (Mohanty 2013). Robust foreign exchange reserves and a prudent intervention strategy enhanced domestic currency credibility.

- Strengthening surveillance framework and risk management strategies: Ongoing monitoring of US dollar financial conditions and cross-border capital flows is an essential component of this strategy. Regulatory authorities should monitor foreign exchange liquidity risks, conduct stress tests (to simulate sudden capital outflows), and enhance the macroprudential policy framework for banks and NBFIs. Improved risk monitoring should address vulnerabilities arising from crowded positions caused by uniform hedging practices or speculative activities, which can exacerbate market stress. The growing role of domestic investors in the US dollar financing landscape warrants closer scrutiny of investment and foreign exchange hedging strategies to understand if they could destabilize markets during stress periods. The domestic financial system must be robust enough for exporters, importers, and investors to manage foreign exchange risks effectively. Authorities should monitor foreign investments in domestic assets as high foreign positioning can increase vulnerabilities to external shocks. For assets with high foreign participation, facilitating smoother exits for foreign investors to normalize the positioning, can be done by deepening the domestic investor base. Stress periods may require intervention from authorities to support markets during selloffs by foreign investors.

- Enhancing regional financial safety net in times of localized funding stress. Although the Fed has often acted as the lender of last resort to meet global US dollar demand, it may not offer the same support during funding stresses that are localized within regions. The Fed's conversion of FIMA to a standing facility would still require participating central banks to hold repo-able US Treasury securities to access the facility. ASEAN+3's CMIM facility is a crucial part of the regional safety net for resolving balance of payment issues. This facility enables regional cooperation, allowing other members to provide US dollar liquidity to a member in distress to meet its balance of payments needs.

Long-term policy direction—Diversifying from the US dollar

A diversification from the US dollar has been a long-discussed topic, but progress has been slow. The diversification does not imply a complete shift away from US dollars but rather that other currencies could find meaningful space in the ASEAN+3 financial system. Diversification would provide the ASEAN+3 financial system with alternatives in periods of stress emerging from or transmitted through a particular currency and make the system more resilient and agile to respond to external shocks. However, other major currencies, such as the euro, yen, Pound sterling, and renminbi, have historically been unable to displace the US dollar. This has hindered the international financial system's ability to reduce reliance on the US dollar (IMF 2022). Therefore, diversifying away from the dollar requires changes on multiple fronts, including trade invoicing and settlement, issuing debt, development of alternative payment systems, exploring technological potentials, and enhancing regional cooperation.

The shift away from US dollars in ASEAN+3 can be gradually achieved by increasing the use of local currencies in cross-border commercial transactions. Despite steady growth, the widespread adoption of local currencies has been hindered by issues related to cost, convenience, speed, access, and transparency (Ong and others 2023). Regional authorities have implemented measures to encourage the use of local currencies in commercial transactions within the ASEAN+3 region. These include promoting local currencies in trade and investment, setting up a local currency settlement framework, and establishing cross-border payment linkages. While these are positive steps, they require strong collaboration and cooperation, as many are implemented bilaterally. An ASEAN+3-wide collaboration is essential to establish a common infrastructure and promote the use of local currencies.

The other side of the solution involves making local currencies suitable for cross-border financial transactions. The use of local currency in cross-border commercial transactions needs to be complemented with the ability to conduct cross-border financial transactions in the domestic currency. According to the Bank for International Settlements (2011), this may involve: (1) relaxing of restrictions to buy or sell the local currency, (2) use for export invoicing, (3) ability of foreign entities (banks, NBFIs, corporates and governments) to hold the currency and financial instruments denominated in it, and (4) foreign entities are able to issue marketable financial instruments in the local currency. In the case of ASEAN+3, whose members are mostly emerging market economies, meeting these conditions could imply a compromise on policy flexibility, which is essential in maintaining macro financial stability and achieving domestic policy goals. However, providing greater access to domestic currency and securities for key trading and investment partners in the region could be a possible alternative to enable a "localized internationalization". The development of deep and liquid securities markets will make the domestic currency more attractive to foreign entities.

The Chiang Mai Initiative Multilateralization (CMIM) facility is evolving and can now provide support in US dollars and in local currencies. It has made significant progress with greater flexibility in the available financing currencies. A new CMIM instrument, the Rapid Financing Facility (RFF), incorporates eligible freely usable currencies (FUCs) and is exploring a paid-in-capital structure.[19] These initiatives will enhance CMIM's effectiveness to meet short-term urgent financing needs and make CMIM resources more sustainable. It may also help reduce the region's vulnerability to US dollar liquidity shocks by strengthening the regional financial safety net.

Beyond traditional diversification methods, the region should explore technological advances to reduce reliance on the US dollar for cross-border payments and transactions. Many ASEAN+3 central banks are studying the potential of CBDCs for cross-border and cross-currency payments. Projects like mCBDC, Project Dunbar, and Inthanon-LionRock, examine CBDCs' use in cross-border payments, trade settlement, and capital market transactions. The potential of multi-CBDC systems in liquidity provisioning, market making, and foreign exchange payments is being explored. Also, multi-CBDC arrangements could strengthen liquidity buffers through regional financing arrangements like the CMIM to support robust cross-border payment systems. Indeed, the CBDCs will still be tied to domestic currencies but technology can help eliminate many frictions which exist in the conventional systems and hinder the use of local currencies for cross-border transactions. The involvement of corresponding central banks in the development of CBDCs and related infrastructure will enhance the credibility of such a system.

[19] Eligible FUCs are USD, JPY and RMB.

Annex 3.1. Enhancing the Accuracy of Cross-Border Investment Data[20]

The original data on cross-border investment by counterpart economy in this report is sourced from the IMF Coordinated Portfolio Investment Survey for portfolio investments and the Coordinated Direct Investment Survey for direct investments. These datasets report direct counterparts based on residency, often identifying shell companies in small offshore financial centers as major counterparts. This method, known as residency-based statistics, can obscure the true distribution of investment risks and patterns. For example, Alibaba's 2014 IPO on New York Stock Exchange, the largest IPO at that time, was recorded as an investment to the Cayman Islands, not China.

Recent efforts to enhance investment data accuracy by Coppola and others (2021) and Damgaard, Elkjaer, and Johannesen (2024) have used commercially available microdata to remap investment data to a nationality-based framework.[21] This report adopts their mapping matrices and applies them to the latest available data. However, this approach has limitations. The stability of the mapping matrix over extended periods has not been fully investigated, and reliance on microdata from a limited number of countries might not represent the economies of AMRO member states. Despite these constraints, this methodology aims to offer a clearer picture of investment dynamics by mitigating the distortions inherent in residency-based statistics.

[20] The author of this annex is Yoki Okawa.
[21] Mapping matrix for FDI is constructed based on Damgaard et al (2024)'s data, and various additional assumptions. Details are available upon request.

Annex 3.2. Factors Behind the Important Role of the US Dollar in External Financing[22]

A dynamic panel regression is performed to investigate if ASEAN+3's economic ties with the US influences the share of the US dollar in ASEAN+3's external financing. The analysis considers the effect of inertia, which may slow down a shift away from US dollar financing. The dependent variable is the share of US dollar in external bank borrowing (source: BIS locational database).[23] The independent variables capture the share of export and imports (IMF direction of trade database), inward and outward FDI (IMF CDIS database), and inward and outward portfolio investments (IMF CPIS database) from the corresponding economies.[24] The results are tabulated in Table A3.2.1. The analysis follows Iancu and others (2022) for dynamic panel specification to account for the persistence of the dollar share:

$$y_{it} = \beta_0 y_{it-1} + X_{it}\beta + \gamma_i + \varepsilon_{it}$$

The model is estimated with the Arellano-Bond 2-step robust GMM on the differenced data using y_{t-2} as instruments. y_{t-2} is uncorrelated with $\Delta\varepsilon_{it}$ even with first order autocorrelation in ε_{it}

$$\Delta y_{it} = \beta_0 \Delta y_{it-1} + \Delta X_{it}\beta + \Delta\varepsilon_{it}$$

Table A3.2.1. Relationship Between Currency Share of External Borrowing and Connection to Corresponding Economy

	(1) World	(2) ASEAN+3	(3) Plus-3	(4) ASEAN-5	(5) Advanced economies	(6) Emerging economies	(7) Low-income countries
Variable	Currency Share	Currency Share	Currency Share	Currency Share	Currency Share	Currency Share	Currency Share
Lagged Currency Share (inertia)	0.546***	0.631***	0.640***	0.385***	0.496***	0.417***	0.706***
	(0.0396)	(0.111)	(0.147)	(0.118)	(0.0393)	(0.0500)	(0.0446)
Exports	0.0781**	-0.261*	-0.125	-0.392*	0.196*	0.0638*	-0.0505
	(0.0375)	(0.155)	(0.124)	(0.218)	(0.118)	(0.0377)	(0.0753)
Imports	0.0996*	0.181*	-0.375	0.561	0.000782	0.121**	0.464***
	(0.0548)	(0.103)	(0.344)	(0.364)	(0.0831)	(0.0561)	(0.0947)
Portfolio investments (from)	0.0461**	0.169***	0.297*	0.0532	0.290***	0.0346*	0.0538*
	(0.0194)	(0.0621)	(0.160)	(0.108)	(0.0937)	(0.0196)	(0.0300)
Portfolio investments (to)	-0.0106	0.0515	-0.0325	-0.0426	0.0410*	-0.0421**	0.00263
	(0.0126)	(0.0601)	(0.0519)	(0.0491)	(0.0237)	(0.0173)	(0.0168)
Foreign direct investments (from)	0.00284	-0.00205	0.00822	-0.0378	0.0374**	-0.000641	-0.0163
	(0.00904)	(0.0109)	(0.0178)	(0.0724)	(0.0189)	(0.0109)	(0.0168)
Foreign direct investments (to)	0.0148	-0.0151	-0.244	0.0642	0.0279	0.0150	0.000594
	(0.0119)	(0.0175)	(0.246)	(0.207)	(0.0201)	(0.0191)	(0.0135)
Observations	6,961	669	195	260	1,842	3,607	1,512
Number of country-currency pairs	557	52	15	20	142	288	127

Source: AMRO staff estimates.
Note: Dependent variable is share of USD/EUR/JPY in economies' external bank borrowing. Independent variables are lagged dependent variables, share of exports and imports with corresponding economies (US/Euro area/Japan), share of Portfolio Investments and FDI from/to the corresponding economies. Estimated using 2-step robust GMM from Arellano-Bond. Unbalanced panel from 2009 to 2022.

[22] The author of this annex is Yoki Okawa.

[23] Due to the small number of data points, especially for the subsample from the ASEAN+3 region, the share of the euro and yen in ASEAN+3 external financing are also included along with the region's economic ties with the euro area and Japan as independent variables.

[24] IMF CPIS and CDIS data are adjusted as discussed in Annex 3.1.

Annex 3.3. Drivers of the US Dollar Funding Stress in ASEAN+3[25]

A panel pooled regression is used to identify the drivers of the US dollar funding stress in ASEAN+3, as estimated using the cross-currency basis. Note that a widening of the basis (i.e. falling deeper into negative values) could be a sign of dollar funding stress. The potential drivers considered for the analysis include credit risks, foreign exchange market liquidity, volatility and expectations of exchange rate (against the US dollar)[26], and financial market volatility.[27]

Data and methodology

To examine the drivers for the ASEAN+3 region, the baseline panel pooled regression model is specified as follows:

$$y_{it} = c + \beta_1 y_{it-1} + \beta_2 x_{1t} + \beta_3 x_{2it} + \varepsilon_{it}$$

where:

y_{it} = dependent variable (basis)
y_{it-1} = lagged dependent variable
c = intercept
ε_{it} = error term
x_{1t} = common explanatory variables for all sample economies
x_{2it} = economy-specific independent variables
β_1 = coefficient of lagged dependent variable
β_2, β_3 = coefficients of independent variables

The dependent variable y_{it} denotes the short-term dollar funding stress for the economy i proxied by 3-month basis of its currency i vis-à-vis the US dollar. x_{1t} is a set of common independent variables, comprising the US London Interbank Offer Rate and overnight indexed swap (Libor-OIS) spread, and the Chicago Board Options Exchange volatility index (VIX). x_{2it} represents the group of domestic currency i -specific variables which include spot exchange rate, exchange rate volatility, expected appreciation or depreciation, and liquidity. Term spreads between the US Treasury bonds and domestic government bonds are also included. Table A3.3.1 describes the data sources and calculations for the variables.

The economies in the sample are China, Hong Kong, Japan, Korea, Malaysia, Singapore, and Thailand with monthly data generated by averaging daily data spanning from January 2008 to January 2024. The data frame is unbalanced due to the differences in the length of the individual economy's data series. All the variables take the form of their first difference to address unit-root concerns and ensure stationarity. The results for the baseline model are tabulated in Table A3.3.2.

Quantile regression and findings

A quantile[28] regression is used to analyze the consistency of drivers of the dollar funding stress across different percentiles of the conditional distribution. Under extreme conditions, market participants can respond differently to various factors, making quantile regression particularly beneficial. Table A3.3.3 compares the results of the baseline pooled model with those of quantile regression across different percentiles.

[25] The authors of this annex are Chiang Yong (Edmond) Choo and Eunmi Park.
[26] The volatility, expectations and the level of exchange rates for domestic currency used in this analysis are all based on exchange rate against the US dollar, unless otherwise specified.
[27] The model and variable selection closely references Barajas and others (2020), and Tang and Wong (2022).
[28] In this analysis, a quantile refers to a point in the data distribution that divides the dataset based on a specified proportion. For example, the 1st percentile is the value below which 1 percent of the data falls, and the 25th percentile is the value below which 25 percentiles of the data falls.

Table A3.3.1. Data Sources and Calculations of Model Variables

Variable	Indicator	Data source	Calculation
y_{it}	Cross-currency basis	Bloomberg AMRO calculations	Construct based on spot and 3-month forward exchange rates, and 3-month annualized interest rates
x_{1t}	Libor-OIS spread (Perceived credit risk in the interbank lending market)	Bloomberg AMRO calculations	3-month US LIBOR – 3-month OIS rate
	Market expectations of volatility based on 30-day S&P 500 options *(CBOE VIX index)*	Bloomberg	
x_{2it}	Spot dollar rate with respect to currency *i (Bilateral exchange rate)*	FRED, CEIC AMRO calculations	Normalized to base January 2006 = 100
	Volatility of dollar with respect to currency *i*	Bloomberg	3-month 25-delta FX call option implied volatility of currency *i*
	Expected movement of dollar with respect to currency *i*	Bloomberg	3-month 25-delta FX option risk reversal of currency *i*
	FX market liquidity *(Bid-ask spread in spot market)*	Bloomberg AMRO calculations	For exchange rate of currency *i* against US dollar: (Ask price – Bid price)/Bid price x 100%
	Term spread differential *(spread between 10-year and 2-year yield)*	Bloomberg AMRO calculations	10-year and 2-year spread differential between currency *i* bond and UST

Source: Authors' compilation.
Note: FX = foreign exchange, UST = US Treasury

Table A3.3.2. Baseline Regression Results for 3-Month Basis (Pooled Panel Model)

Variable \ Group	Selected SEAN+3	ASEAN+3 AEs	ASEAN+3 EMs	ASEAN+3 IFCs
Intercept	1.017	0.604	1.802	0.052
	(0.893)	(1.602)	(1.708)	(0.472)
Lagged y_{it}	0.180***	0.200***	0.167***	0.008
	(0.023)	(0.036)	(0.038)	(0.025)
Spot dollar strength	-2.632***	-2.517***	-2.687**	-2.248***
	(0.560)	(0.726)	(1.247)	(0.571)
Exchange rate volatility	-0.122*	-0.480***	-0.018	0.042
	(0.064)	(0.168)	(0.114)	(0.034)
Exchange rate expectations	-0.001	-0.001	-0.001	0.002
	(0.003)	(0.003)	(0.0006)	(0.004)
Libor-OIS spread	-87.159***	-106.905***	-65.640***	-88.604***
	(5.556)	(10.454)	(10.602)	(2.893)
FX market liquidity	-0.007	0.023	-0.012	-0.007
	(0.011)	(0.040)	(0.015)	(0.011)
Financial market volatility	-0.123***	-0.130	-0.169**	-0.064***
	(0.043)	(0.091)	(0.080)	(0.023)
Term spread differential	24.515***	63.914***	19.696**	6.111*
	(5.318)	(11.361)	(8.893)	(3.203)
R^2	0.321	0.549	0.176	0.776
Observations	1,344	384	576	384

Source: AMRO staff estimates.
Note: Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent respectively. Numbers in parentheses denote standard errors. AE = advanced economy; EM = emerging market. Selected ASEAN+3 includes China, Hong Kong, Japan, Korea, Malaysia, Singapore, and Thailand. ASEAN-3 advanced economies include Japan, and Korea. ASEAN+3 emerging market economies include China, Malaysia, and Thailand. ASEAN+3 international financial centers include Hong Kong, and Singapore.

Table A3.3.3. Selected ASEAN+3: Quantile Regression Results for 3-Month Basis

Variable \ Model	Baseline model	Quantile regression			
		25th percentile	15th percentile	5th percentile	1st percentile
Intercept	1.017	-7.343***	-13.178***	-30.786***	-74.796***
	(0.893)	(0.627)	(0.811)	(2.959)	(7.570)
Lagged y_{it}	0.180***	0.140**	0.179***	0.145***	0.228***
	(0.023)	(0.056)	(0.059)	(0.028)	(0.060)
Spot dollar strength	-2.632***	-1.091***	-1.165**	-3.204***	-5.336
	(0.560)	(0.401)	(0.508)	(0.998)	(3.282)
Exchange rate volatility	-0.122*	0.010	-0.145	-0.384	-0.885**
	(0.064)	(0.054)	(0.124)	(0.241)	(0.398)
Exchange rate expectations	-0.001	-0.001***	-0.002***	0.004	-0.011***
	(0.003)	(0.0005)	(0.0004)	(0.038)	(0.001)
Libor-OIS spread	-87.159***	-74.609***	-73.001***	-83.602***	-101.653*
	(5.556)	(10.183)	(4.430)	(5.810)	(52.389)
Foreign exchange market liquidity	-0.007	-0.022*	-0.037***	-0.033*	-0.007
	(0.011)	(0.013)	(0.006)	(0.018)	(0.011)
Financial market volatility	-0.123***	-0.155***	-0.148**	-0.115***	0.173
	(0.043)	(0.027)	(0.060)	(0.044)	(0.218)
Term spread differential	24.515***	9.278**	12.218**	17.956	23.867
	(5.318)	(4.157)	(5.266)	(11.951)	(78.616)
R^2	0.321	0.187	0.225	0.313	0.421
Observations	1,344	1,344	1,344	1,344	1,344

Source: AMRO staff estimates.
Note: Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent respectively. Numbers in parentheses denote standard errors. Selected ASEAN+3 includes China, Hong Kong, Japan, Korea, Malaysia, Singapore, and Thailand.

Annex 3.4. Stress in US Dollar Funding Conditions and Effect on "Cross-Border" Bank Lending[29]

A panel regression is performed to investigate if stress in US dollar funding markets affects cross-border lending by banks in advanced economies to ASEAN+3 economies.

Data and methodology

Panel regressions with the following specification are estimated (Model 1):

$$y_{ijt} = \alpha_0 + \beta_1 CCB_{it} + \xi \text{Controls}_{it} + \theta_{jt} + \varepsilon_{ijt}$$

where y_{ijt} is total currency lending from home country i, to recipient country j, during quarter-year t. CCB_{it} is the quarterly average of daily cross-currency basis of country i, for quarter-year t. ξ_{it} is a vector of home (lender) economy macroeconomic and banking sector control variables such as real GDP growth rate, inflation, home economy banking sector size, equity, deposits, total loan, and profitability ratios that might affect cross-border lending. θ_{jt} are recipient economy-quarter fixed effect. This allows the specification to more cleanly capture the effects of US dollar funding stress in lender's economy on cross-border lending to recipient economies by holding time-varying demand-side factors constant (Khwaja and Mian, 2008).

The baseline lender sample consists of 20 advanced economies for which basis can be reliably constructed, and who also report their cross-border lending activities in the BIS locational data. Basis is constructed for the euro, Pound sterling, Australian dollar, Canadian dollar, Swiss franc, Danish krone, Swedish krona, Japanese yen, Korean won, and Hong Kong dollar.[30] These lenders lend to over 200+ recipient economies in total and include all ASEAN+3 economies. The sample is an unbalanced panel that runs from the first quarter of 2008 till fourth quarter of 2023.

Additional specifications that focus on if stress in US dollar funding markets differentially affects cross-border lending to ASEAN+3 economies are also estimated (Model 2):

$$y_{ijt} = \alpha_0 + \beta_1 CCB_{it} \, x \, (\text{ASEAN+3})_j + \beta_2 CCB_{it} + \beta_3 (\text{ASEAN+3})_j + \xi \text{Controls}_{it} + \theta_{jt} + \varepsilon_{ijt}$$

where ASEAN+3 is a dummy variable that equals 1 if the recipient economy is an economy in ASEAN+3. The same specification is also used to estimate various sub-economy groupings in ASEAN+3 (advanced economies, international financial centers, emerging market economies, and the BCLMV grouping of Brunei, Cambodia, Lao PDR, Myanmar and Vietnam). The results are tabulated in Table A3.4.1.

[29] The author of this annex is Wen Yan Ivan Lim.

[30] There are 11 lender economies in the sample that use the Euro. They are Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, Netherlands, and Luxembourg. The following interest rates in the 3-month tenor are used to construct the CCB (basis): US (SOFR OIS), Euro (EURIBOR), British Pound (ICE LIBOR), Australian dollar (AUD OIS), Canadian dollar (Canada Bankers Acceptances), Swiss Franc (CHF SARON OIS), Danish Krone (CIBOR), Swedish Krona (STIBOR), Japanese Yen (JPY OIS), Korean Won (KKRIBOR), and Hong Kong Dollar (HIBOR).

Table A3.4.1 Panel Regression Results of US Dollar Funding Stress (Basis) on Cross-Border Lending

Recipient economies	All			A+3	A+3 IFC	A+3 AE	A+3 EME	BCLMV
Variable	Log (Total Bank Loans to Recipient Economy)							
Basis	0.02***	0.11***	0.04***	0.03***	0.03***	0.03***	0.04***	0.04***
	(6.89)	(19.77)	(6.97)	(4.75)	(5.56)	(5.96)	(6.45)	(7.8)
Basis x ASEAN+3				0.12***				
				(6.37)				
Basis x ASEAN+3 IFC					0.50***			
					(11.26)			
Basis x ASEAN+3 AE						0.54***		
						(10.01)		
Basis x ASEAN+3 EME							0.06**	
							(2.07)	
Basis x BCLMV								-0.18***
								(-5.52)
Home Bank Equity/ Total Assets			9.86***	9.86***	9.86***	9.86***	9.86***	9.86***
			(59.04)	(59.06)	(59.09)	(59.06)	(59.04)	(59.05)
Home Bank Deposits/ Total Assets			-1.11***	-1.11***	-1.11***	-1.11***	-1.11***	-1.11***
			(-48.46)	(-48.50)	(-48.51)	(-48.53)	(-48.46)	(-48.46)
Home Bank Return on Assets			-5.93***	-5.94***	-5.94***	-5.96***	-5.93***	-5.94***
			(-15.10)	(-15.11)	(-15.11)	(-15.18)	(-15.10)	(-15.12)
Home Bank Total Loans/Total Assets			-0.83***	-0.83***	-0.83***	-0.83***	-0.83***	-0.83***
			(-41.56)	(-41.62)	(-41.60)	(-41.66)	(-41.57)	(-41.55)
Home Log Banking Sector Assets			0.21***	0.21***	0.21***	0.21***	0.21***	0.21***
			(92.31)	(92.31)	(92.37)	(92.28)	(92.31)	(92.32)
Home Inflation			0.08***	0.08***	0.08***	0.08***	0.08***	0.08***
			(43.58)	(43.57)	(43.62)	(43.56)	(43.58)	(43.6)
Home Real GDP Growth			0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
			(5.15)	(5.13)	(5.14)	(5.1)	(5.15)	-5.15
Intercept	0.51***	0.55***	-2.36***	-2.36***	-2.36***	-2.35***	-2.36***	-2.36***
	(205.3)	(165.76)	(-59.40)	(-59.39)	(-59.45)	(-59.30)	(-59.40)	(-59.40)
Quarter FE	No	No	No	No	No	No	No	No
Recipient Economy FE	Yes	No	No	No	No	No	No	No
Recipient Economy-Quarter FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	145,295	144,996	132,202	132,202	132,202	132,202	132,202	132,202
Adjusted R^2	0.490	0.458	0.515	0.516	0.516	0.516	0.515	0.516

Source: AMRO staff estimates.
Note: ASEAN+3 = all economies in ASEAN+3. ASEAN+3 IFC = Hong Kong and Singapore. ASEAN+3 AE = Japan and Korea. ASEAN+3 EME = China, Indonesia, Malaysia, Philippines, and Thailand. ASEAN+3 BCLMV = Brunei, Cambodia, Lao PDR, Myanmar, and Vietnam; FE = fixed effects. Total Bank Lending from Lender Economy to Recipient Economy data are from BIS Locational Data A.62. Inflation and GDP Growth data are from Haver Analytics while banking sector variables are from BankFocus. t-statistics are reported in parenthesis. Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent, respectively. The first three columns are estimated using Model 1 while columns 4–8 are estimated using Model 2.

Annex 3.5. Stress in US Dollar Funding Conditions and Impact on Banking Sector Stability[31]

A panel regression is deployed to study if the tightening of US dollar funding spills over to domestic banking sector stability in selected ASEAN+3 economies.

Data and methodology

Panel regressions with the following specifications are estimated:

$$y_{ijt} = \alpha_0 + \beta_1 CCB_{ijt} + \theta_i \text{ or } \phi_{it} + \varepsilon_{ijt}$$

where y_{ijt} the average one year ahead banking sector probability of default (PD) in basis points, calculated as the average PD for banks in country *i*, for month *j*, of year *t*.[32] Since the construction of bank PDs includes both macro- and bank-level variables, additional control variables are not included in the baseline. Instead, the specifications rely on various fixed effects to alleviate concerns related to omitted variables. Two models are estimated that incorporate different fixed effects: θ_i indicates economy, while ϕ_{it} are a set of country-year fixed effects. CCB_{ijt} is the monthly average of the daily values of the basis. The baseline regression includes seven ASEAN+3 economies (China, Hong Kong, Japan, Korea, Malaysia, Singapore, and Thailand) and is estimated with data from January 2008 till December 2023. Table A3.5.1 tabulates the results of the analysis. Interaction terms denoting three major crisis periods (global financial crisis, European debt crisis, and the onset of COVID-19 pandemic) are included in the main model to study if the effects of the basis on banking sector PD is more acute during these periods and the results are tabulated in Table A3.5.2.

Table A3.5.1 Panel Regression Results of US Dollar Funding Stress (Basis) on Banking Sector Stability

Dependent	Banking Sector 1-year Ahead Probability of Default							
Economy Variable	Selected ASEAN+3		ASEAN+3 International Financial Centers		ASEAN+3 Advanced Economies		ASEAN+3 Emerging Market Economies	
Basis	-0.0534	-0.1033**	-0.4033***	-0.2237***	-0.3143***	-0.3655***	0.0543***	0.0095
	(-1.4881)	(-2.4488)	(-9.4666)	(-3.4118)	(-7.4309)	(-7.8967)	(4.0631)	(0.7076)
Intercept	48.7361***	44.7451***	16.1550***	23.2130***	54.4071***	50.3913***	55.5227***	50.7158***
	(19.115)	(14.1367)	(8.7825)	(9.3242)	(15.6269)	(14.6272)	(34.6181)	(33.0722)
Economy FE	Yes	No	Yes	No	Yes	No	Yes	No
Economy-Year FE	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,351	1,344	386	384	386	384	579	576
Adjusted R^2	0.497	0.836	0.342	0.776	0.341	0.812	0.755	0.919

Source: AMRO staff estimates.
Note: Selected ASEAN+3 = China, Hong Kong, Japan, Korea, Malaysia, Singapore, and Thailand. ASEAN+3 IFC = Hong Kong and Singapore. ASEAN+3 advanced economies = Japan and Korea. ASEAN+3 emerging market economies = China, Malaysia, and Thailand. Banking Sector Probability of Default data is from NUS-CRI. t-statistics are reported in parenthesis. Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent, respectively.

[31] The author of this annex is Wen Yan Ivan Lim, with data support from Kit Yee Lim.

[32] Bank PD data is from NUS-CRI and is constructed using 12 bank-level attributes and 4 macro-financial factors. The 12 bank-level attributes are: distance-to-default (level and trend), cash-to-total assets (level and trend), current assets-to-current liabilities (level and trend), net income-to-total assets (level and trend), relative size (level and trend), relative market-to-book ratio and, idiosyncratic volatility. The 4 macro-financial variables are: stock-index returns, short-term risk-free rate, economy-level distance-to-default for financial and non-financial firms. See NUS-CRI (2022) for a description of the construction of bank PDs.

Table A3.5.2. Panel Regression Results of US Dollar Funding Stress (Basis) on ASEAN+3 Banking Sector Stability During Crises

Economy	Selected ASEAN+3	ASEAN+3 International Financial Centers	ASEAN+3 Advanced Economies	ASEAN+3 Emerging Market Economies
Variable	**Banking Sector 1-Year Ahead Probability of Default**			
Basis	0.0572***	-0.0973	-0.0697	0.0753***
	(3.4694)	(-1.3570)	(-1.4954)	(3.5541)
Basis x global financial crisis	-0.2906***	-0.3044***	-0.2067***	-0.1791***
	(-5.0641)	(-3.2656)	(-2.9935)	(-4.8727)
Basis x European debt crisis	0.0369**	-0.7485**	-1.0542***	0.0339*
	(2.2081)	(-2.1596)	(-5.7883)	(1.6693)
Basis x COVID-19	-0.2191***	-0.1092	-0.1440**	-0.2731***
	(-5.0310)	(-1.3306)	(-2.0833)	(-8.4329)
Global financial crisis	8.6755	11.2680	30.5635**	4.8904
	(0.9593)	(1.2218)	(2.1248)	(0.7665)
European debt crisis	12.1461***	-30.0443**	-43.7246***	7.3636**
	(2.8686)	(-2.1940)	(-4.3092)	(2.473)
COVID-19	-11.0252***	1.2372	-20.4766***	-14.2423***
	(-2.6644)	(0.2484)	(-3.2551)	(-3.8569)
Intercept	52.5544***	25.2767***	65.5258***	55.0216***
	(39.4626)	(10.1556)	(18.9948)	(26.8249)
Country FE	Yes	Yes	Yes	Yes
Observations	1,351	386	386	579
Adjusted R^2	0.630	0.431	0.432	0.806

Source: AMRO staff estimates.
Note: The global financial crisis (European debt crisis) is a dummy variable that equals 1 for June 2008 to June 2009 (May 2011 to June 2012) respectively while COVID is a dummy variable that equals 1 for the first six months of year 2020. t-statistics are reported in parenthesis. Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent, respectively.

Annex 3.6. Stress in US Dollar Financing Conditions and Effect on Foreign Portfolio Flows[33]

Data and methodology

Panel regressions with the following specifications are estimated to investigate if US dollar funding stress affects capital flows:

$$y_{ijt} = \alpha_0 + \beta_1 CCB_{ijt} + \varepsilon_{ijt}$$

where y_{ijt} is either debt or equity flows (in billions of US dollar, source: country authorities) for country *i*, for month *j*, of year *t*. CCB_{ijt} is the monthly average of the daily values of cross-currency basis (in basis points, "basis"). The baseline regression estimates four ASEAN+3 economies individually (China, Korea, Malaysia and Thailand) using an unbalanced panel from January 2008 to December 2023. The results have been tabulated in Table A3.6.1. Interacted *i* dummy terms denoting stress episodes are used to study if the relationship between portfolio flows and basis strengthens during these episodes. The results are tabulated in Table A3.6.2.

Table A3.6.1. Panel Regression Results of US Dollar Funding Stress (Basis) on Cross-border Debt and Equity Flows into ASEAN+3 Economies

Economy	CN	KR	MY	TH	CN	KR	MY	TH
Variable	Debt Flows				Equity Flows			
Basis	0.0045*	0.0026	0.0089***	0.0005	0.0049	0.0026*	0.0047***	0.0019*
	(1.6962)	(1.3473)	(4.2988)	(0.2493)	(0.4679)	(1.9379)	(3.3413)	(1.9209)
Intercept	3.6045***	1.8515***	1.0819***	0.6792***	3.3696***	0.3836	0.3205***	-0.0385
	(3.1207)	(6.1896)	(4.8813)	(4.2984)	(3.7777)	(1.5607)	(2.8102)	(-0.4966)
Observations	194	194	194	192	110	194	173	194
Adjusted R^2	0.00254	0.00630	0.0829	-0.00505	-0.00730	0.00833	0.0681	0.00508

Source: AMRO staff estimates.
Note: Debt and Equity Flows are from Institute of International Finance (IIF), obtained through Haver Analytics. t-statistics are reported in parenthesis. Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent, respectively. CN = China; KR = Korea; MY = Malaysia; TH = Thailand.

Table A3.6.2. Panel Regression Results of US Dollar Funding Stress (Basis) on Cross-border Debt and Equity Flows into ASEAN+3 Economies During Crises

Economy	CN	KR	MY	TH	CN	KR	MY	TH
Variable	Debt Flows				Equity Flows			
Basis	0.0075	-0.0168***	0.0151***	-0.0076*	0.0000	-0.0061	0.0065***	0.0026
	(1.3069)	(-3.8281)	(3.1008)	(-1.8013)	(0.0023)	(-1.0727)	(4.6576)	(0.831)
Basis x global financial crisis	-0.0090	0.0253***	-0.0088	0.0077*		0.0052		-0.0014
	(-1.5552)	(5.2481)	(-1.4981)	(1.7996)		(0.8542)		(-0.4401)
Basis x European debt crisis	-0.0113	0.0233**	0.0157	0.0169		0.0419	-0.0076***	0.0002
	(-0.8630)	(2.1815)	(1.0228)	(0.9282)		(1.3212)	(-3.2224)	(0.0276)
Basis x COVID-19	0.0303**	0.0297***	0.0035	0.0459***	0.1383***	0.0582***	0.0017	0.0254***
	(2.1186)	(5.3313)	(0.3827)	(4.438)	(11.2103)	(5.3827)	(0.9429)	(6.0147)
Global financial crisis	-4.3133***	4.1220***	-0.6230	-0.2391		-1.6687		-0.0950
	(-2.7348)	(2.7936)	(-0.5007)	(-0.9528)		(-1.1188)		(-0.3163)
European debt crisis	-5.2773	2.3907*	2.4082*	2.4978*		3.2490	-0.4858	0.2027
	(-0.7176)	(1.8492)	(1.7498)	(1.6941)		(0.9478)	(-1.4436)	(0.2897)
COVID-19	1.7044	4.4649***	-0.6283	1.3660	3.6350**	1.8254	-0.1080	0.7358**
	(0.712)	(5.0437)	(-0.3967)	(1.3128)	(2.5322)	(0.8522)	(-0.4213)	(2.1025)
Intercept	4.1361***	0.2957	1.4501***	0.2427	3.2904***	-0.0585	0.4435***	0.0001
	(2.7296)	(0.6899)	(3.9336)	(0.9908)	(3.6171)	(-0.1200)	(3.8459)	(0.0003)
Observations	194	194	194	192	110	194	173	194
Adjusted R^2	-0.0213	0.0608	0.115	0.110	0.0510	0.0859	0.0964	0.0328

Source: AMRO staff estimates.
Note: the global financial crisis (European debt crisis) is a dummy variable that equals 1 for June 2008 to June 2019 (May 2011 to June 2012) respectively while COVID-19 is a dummy variable that equals 1 for the first six months of year 2020. t-statistics are reported in parenthesis. Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent, respectively.
CN = China; KR = Korea; MY = Malaysia; TH = Thailand.

[33] The author of this annex is Wen Yan Ivan Lim.

Annex 3.7. The Federal Reserve as A Global Lender of Last Resort[34]

Over the past two decades, the Fed has intermittently assumed the role of the global lender of last resort, offering US dollar liquidity via swap lines and repos during crises, which helped stabilize international financial markets (Goldberg and Ravazzolo 2021). This annex examines previous instances of market stress and the Fed's response and tries to shed some light on the motivations behind its actions as a global lender of last resort during crises.

Historically, the Fed provided swap line or repos arrangements with five major central banks and nine other central banks to alleviate US dollar funding stress, during the global finance crisis (GFC), European debt crisis and COVID-19 crisis.[35] Swap lines were heavily used by central banks, particularly the five major central banks, which helped ease the dollar funding stress and avoid disorderly conditions in the forex market (Figure A3.7.1). Note that these three instances had led to weakness in global markets and could have potentially impacted the US financial system. The Fed's response to this external financial turmoil was motivated by the US economic interests, as it was aimed at mitigating the spillover to US economic and financial conditions (Cassetta 2022).

In comparison, there were also instances where the Fed opted not to intervene, even amid significant global disruptions. For example, during events such as the 2013 taper tantrum, the episode of emerging market stress in 2015, and the Fed's 2022 monetary tightening, the Fed did not act to soothe the markets despite notable capital outflows and currency depreciation in emerging market economies. This reflected a prioritization of domestic monetary policy goals over global financial stability concerns. Former Fed Vice Chairman Stanley Fischer once noted that the Fed was not mandated to support stability of the international financial system (Fischer 2015). Former Fed Chairman Ben Bernanke echoed this sentiment, asserting that "setting US monetary policy to achieve some set of global macroeconomic objectives seems both impractical and inconsistent with the Fed's mandate" (Bernanke 2015).

The criteria behind the Fed's choice of swap partners and the terms of swap lines are not clearly defined. Literature highlights various factors that may influence these decisions, including the exposure of US banks, US asset ownership, economic significance, bilateral trade with the US, reserves, economic policies, and political alignment (Aizenman, Ito, and Pasricha 2021). While the final determinants are still subject to debate, it is evident that the Fed tends to establish swap lines with advanced economies and on favorable terms.

Presently, the Fed maintains a standing swap line network with five major central banks, including the ECB and the Bank of Japan. By contrast, the Fed only established temporary swap lines with a few emerging market economies considered as systemically important for the global financial system and are linked to the US interests.[36] Furthermore, compared with swap lines that the Fed established with advanced economies, those with emerging market economies were collateralized, requiring foreign central banks to provide US Treasury bonds and other assets held with the Fed as collateral (Cassetta 2022). This additional requirement highlights a differentiated approach by the Fed towards advanced economies and emerging economies.

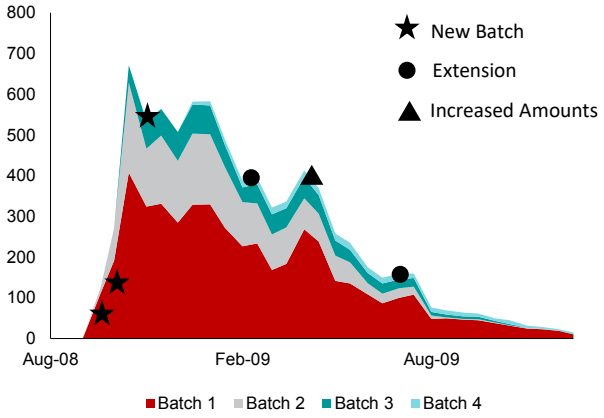
[34] The authors of this annex are Leilei Lu and Yang Jiao.

[35] Major central banks including those in Japan, Europe, the UK, Switzerland, and Canada had unlimited swap line arrangements with the Fed during the global financial crisis, European debt crisis and the COVID-19 crisis. Other central banks including those in Australia, Denmark, Korea, New Zealand, Norway, Singapore, Sweden, Brazil, and Mexico had a total of USD 225 billion and USD 450 billion swap line arrangements with the Fed during the global financial crisis and the COVID-19 crisis respectively.

[36] For example, the Fed established a swap line with Mexico during GFC because Mexico was a close neighbour which may pose national security threat and are economically intertwined with the US.

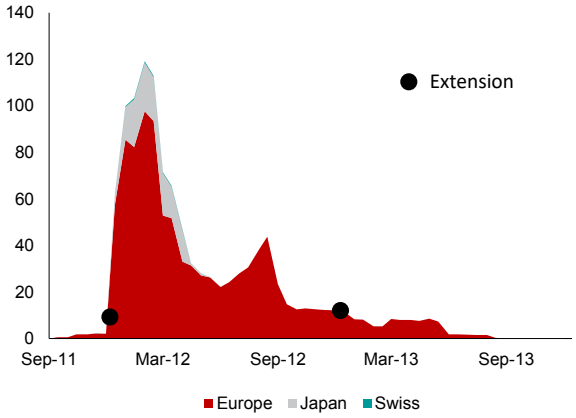
Figure A3.7.1 Selected Central Banks: Swap Line Amounts Outstanding
(Billions of US dollar)

Global financial crisis



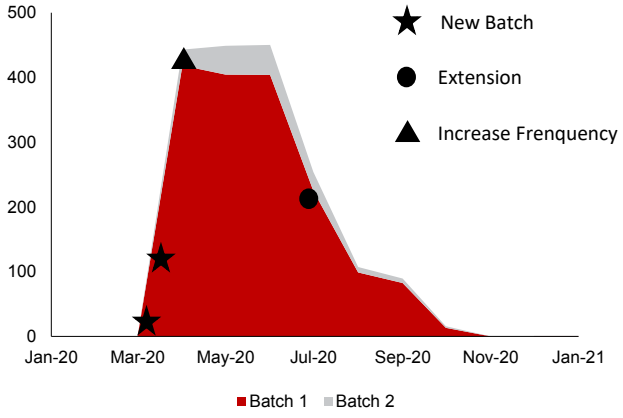
Source: Federal Reserve.
Note: Batch 1 includes the European Central Bank and the Swiss National Bank, whose announcement date was on 12 December 2007. Batch 2 includes Bank of Japan, the Bank of England, and the Bank of Canada, whose announcement date was 18 September 2008. Batch 3 includes Bank of Australia, the Sveriges Riksbank, Danmarks Nationalbank and the Norges Bank, whose announcement date was 24 September 2008. Batch 4 includes the Reserve Bank of New Zealand, Banco Central do Brasil, the Banco de Mexico, the Bank of Korea, and the Monetary Authority of Singapore, announced the swap lines on 28 and 29 October 2008. Fed extended the swap lines on 3 March and 25 June, and increased amounts on 6 April 2009.

European debt crisis



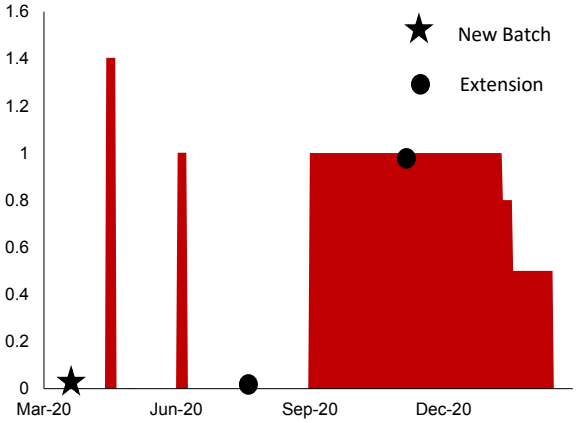
Source: Federal Reserve.
Note: During European debt crisis, Fed had announced swap lines with five major central banks on 9 May 2010, and extended them on 21 December 2010, 29 June and 30 November 2011, 13 December 2012, converted temporary bilateral liquidity swap arrangements to standing arrangements on 31 October 2013. Fed lowered the price and extended of the swap lines on 30 November and extended again on 13 December 2012.

COVID-19 crisis



Source: Federal Reserve.
Note: Batch 1 includes the European Central Bank and the Swiss National Bank, whose announcement date was on 12 December 2007. Batch 2 includes Bank of Japan, the Bank of England, and the Bank of Canada, whose announcement date was 18 September 2008. Batch 3 includes Bank of Australia, the Sveriges Riksbank, Danmarks Nationalbank and the Norges Bank, whose announcement date was 24 September 2008. Batch 4 includes the Reserve Bank of New Zealand, Banco Central do Brasil, the Banco de Mexico, the Bank of Korea, and the Monetary Authority of Singapore, announced the swap lines on 28 and 29 October 2008. Fed extended the swap lines on 3 March and 25 June, and increased amounts on 6 April 2009.

COVID-19 crisis (FIMA)



Source: Federal Reserve.
Note: The data source used for this chart is updated on a weekly basis. Fed announced Foreign and International Monetary Authorities (FIMA) Repo Facility on 31 March, extending it on 29 July and 16 December 2020. The facility was made a standing facility on 28 July 2021.

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