ASEAN+3 FINANCIAL STABILITY REPORT 2023

AMRO
ASEAN +3 MACROECONOMIC RESEARCH OFFICE

Navigating High Debt in Low Visibility

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Message from AMRO Director

The ASEAN+3 region is a bright spot in the world economy despite unprecedented risks and challenges. Having navigated the challenges posed by the Asian Financial Crisis and subsequent headwinds, our region has demonstrated wisdom and resilience through collective efforts aimed at fostering economic and financial stability.

Nonetheless, the risks and challenges are always lurking. The financial environment is changing rapidly and growing in complexity. As global and regional integration deepens, spillovers and contagion risks are on the rise.

Given the swiftly evolving global financial landscape and its substantial reverberations on the region, the significance of financial surveillance in ASEAN+3 cannot be overstated.

Enhancing financial surveillance plays a critical role in crisis prevention by facilitating the detection and assessment of financial vulnerabilities and risks. It reinforces the resilience of financial systems, ensuring the capacity to withstand shocks, in turn fostering economic growth and development within the region.

As the only international organization established under the ASEAN+3 Finance Process, AMRO must step up as a trusted policy advisor to our members, and strongly position itself as a thought leader with regional focus and global influence.

I am pleased to introduce the inaugural issue of AMRO's second flagship report, the *ASEAN+3 Financial Stability Report (AFSR)*. As the pioneer regional financial stability report in the ASEAN+3 region, the AFSR is a unique publication, embodying the principle 'of the region, for the region, and by the region'. Its release underscores our continuous commitment to monitor, protect, and enhance the financial stability of the ASEAN+3 region, a focus sharpened since the Asian Financial Crisis.

This flagship publication underscores our common objective to safeguard the financial stability of our region. It provides an extensive analysis of the current financial sector status, highlights risk factors, and delves into policy measures to address them effectively.

The AFSR launch is a substantial move toward reinforcing our core functions in financial surveillance, aligning with AMRO's Strategic Direction 2030. Under this framework approved by our Executive Committee in 2022, AMRO is set to contribute more significantly to secure the region's macroeconomic and financial resilience and stability. And the AFSR is among our high-priority initiatives in the coming years.

In light of the more complex and challenging financial landscape, we must continue to strengthen our surveillance capabilities, remain vigilant, and be ready to respond swiftly and decisively when needed to new shocks. Only then will we be able to navigate the treacherous journey ahead with confidence. We can expedite this journey by working together and supporting each other along the way.

Finally, I would like to take this opportunity to extend my heartfelt appreciation to AMRO's member authorities, Advisory Panel, and all who have contributed to this pivotal initiative.

As always, I look forward to hearing your feedback.

Kouqing Li
AMRO Director

Foreword from the Chief Economist

ASEAN+3 financial systems have been tested on multiple trials during the past two decades after the Global Financial Crisis but have remained resilient given the strengthened macroeconomic fundamentals, and improved regulatory and external buffers since the Asian Financial Crisis in the late 1990s.

Chapter 1 — *Market Conjunctural – Low Visibility of Challenges Ahead* — discusses recent market developments and notes the risks facing the ASEAN+3 economies within an evolving financial landscape. Over the last decade, global financial conditions have oscillated between tightening and easing, driven by factors such as the taper tantrum, Trump election, Brexit, COVID-19 pandemic, supply chain disruptions, rising inflation, and geopolitical events. However, since early 2022, global central banks led by the Federal Reserve, have responded to the escalation in headline inflation by rapidly tightening monetary policy, resulting in a marked shift from a state of "low-for-long interest rate with ample liquidity" to one characterized by "higher-for-longer interest rate with receding liquidity." This has led to spikes in risk aversion, market sell-offs and capital outflows, and large currency depreciation against the US dollar in both advanced and emerging markets, including those in ASEAN+3. Policymakers have responded to these heightened volatilities by intervening judiciously in the markets, providing liquidity as needed to avoid disorderly market conditions and an overshoot of exchange rates and bond yields.

Despite recent disinflation, the persistence or potential resurgence of inflation has raised concerns about prolonged high interest rates and their impact on financial stability. While the spillover effects from the recent banking stress in the US and Europe have been limited, concerns over the health of the banking sector in the US linger. The possible emergence of US dollar funding stress, particularly if investor confidence falters amid global monetary tightening and elevated market volatility, is also an area of concern. Furthermore, accelerated cross-border capital flows, driven by greater financial market integration and digitalization, can rapidly transmit shocks, creating new challenges for policymakers.

Chapters 2 to 4 of the AFSR are thematic studies focusing on more in-depth analysis of the risks facing the region. For this inaugural issue, we have chosen the theme of *Navigating High Debt in Low Visibility* to assess the financial stability implications from higher debt in the region. The zero interest rate and abundant liquidity unleased by the Quantitative Easing policy of the Fed and ECB in the aftermath of the Global Financial Crisis and European Sovereign Debt Crisis, had resulted in a low-for-long interest rate environment which enabled many businesses, households, and governments in this region to take on large amounts of debt at low costs. The exceptionally large monetary and fiscal stimulus measures during the COVID-19 pandemic fueled further increases in debt-to-GDP ratios in ASEAN+3. However, the phasing out of financial relief and regulatory forbearance policies and the shift to a higher interest rate environment, have led to concerns over the risk of financial distress and insolvencies, particularly in the context of the much higher level of debt stock in the region. Furthermore, the resilience of some banks and nonbank financial intermediaries (NBFIs) may be tested and could potentially exacerbate vulnerabilities in the financial market.

The higher debt levels amid tighter monetary conditions have created the potential for financial stability risks to emerge. Addressing these challenges effectively necessitates a well-balanced policy mix across monetary, fiscal, and prudential policy frameworks, with concerted efforts among authorities. Central banks should prioritize price stability while striving to maintain financial stability and support growth. Monetary authorities should stand ready to provide targeted liquidity support to financial institutions with clear communication during times of stress. The soundness of financial intermediaries, including NBFIs, must be ensured through strengthening regulatory, supervisory, and risk management. Furthermore, regional cooperation and external buffers are essential to ensure access to US dollar liquidity in times of crisis and reduce dependence on the US dollar in the long term.

In response to rising nonfinancial private debt and potential systemic financial risks, policymakers can employ macroprudential tools to manage household debt and curb excessive property developer leverage. For corporate debt, it is necessary to promote responsible corporate lending, foster independent ownership, and mitigate credit risks of small and medium enterprises with credit guarantee schemes. To mitigate financial stability risks stemming from high public debt, strategies should include medium-term fiscal consolidation, maintaining a robust debt structure, and diversifying the investor base.

Amid these turbulent times, the internal and external macrofinancial conditions surrounding the ASEAN+3 region are still subject to high uncertainty and volatility. The financial landscape is swiftly changing into a new normal with potentially higher inflation and higher interest rates. 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 pivotal 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.

Contributors to the report are Benyaporn Chantana, Chiang Yong (Edmond) Choo, Sean R. Craig (Chapters 2 and 4 co-lead), Chenxu Fu, Laura Grace Gabriella, Kimi Xu Jiang (Chapter 1 co-lead), Leilei Lu, Yoki Okawa, Prashant Pande (Chapter 1 co-lead), Eunmi Park (Chapter 3 lead), Siang Leng Wong (Chapters 2 and 4 co-lead), with inputs from Jorge A. Chan-Lau, Aziz Durrani, Ji Ke, Kit Yee Lim, Toàn Long Quách, Alex Liyang Tang, Wanwisa (May) Vorranikulkij and Pim-orn Wacharaprapapong. Jingwei Zhou, Yang Jiao, Junjie Shi, Huisheng Wang and Xiaofan Zhu provided research support.

Chiang Yong (Edmond) Choo and Leiliei Lu 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.

The authors would like to thank members of AMRO's Advisory Panel, chaired by Diwa C. Guinigundo, for their useful input; private sector and official counterparts during the financial surveillance missions for their insightful observations on country and regional developments; and member authorities for their factual corrections and comments.

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
ADB	Asian Development Bank
ADBC	Agricultural Develoment Bank of China
AE	Advanced Economy
AFSR	ASEAN+3 Financial Stability Report
Agrobank	Bank Pertanian Malaysia Berhad
AMC	American Multi-Cinema
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
AT1	Additional Tier 1
BAAC	Bank for Agriculture and Agricultural Cooperatives
BCLMV	Brunei Darussalam, Cambodia, Lao PDR, Myanmar, and Vietnam
BDPC	Brunei Darussalam Deposit Protection
BICS	Bloomberg Industry Classification Standard
BIS	Bank for International Settlements
BN	Brunei Darussalam*
BNM	Bank Negara Malaysia
bps	Basis points
BOE	Bank of England
BOJ	Bank of Japan
BOK	Bank of Korea
BOP	Balance of Payments
BSA	Bilateral Swap Agreement
BSN	Bank Simpanan Nasional
BTFP	Bank Term Funding Program
BPMB	Bank Pembangunan Malaysia Berhad
BVI	Bank Vulnerability Index
CAR	Capital adequacy ratio
CDB	China Development Bank
CDS	Credit default swap
CCB	Countercyclical capital buffer
CCPT	Climate Change and Principle-Based Taxonomy
CEXIM	Export-import Bank of China
CGB	China government bond
CGS	Credit guarantee scheme
CHF	Swiss franc
CIV	Collective Investment Vehicles
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
DBJ	Development Bank of Japan Inc.
DE	Germany
DICJ	Deposit Insurance Corporation of Japan
DIV	Deposit Insurance of Vietnam
DLP	Digital Leaders Programme
DPA	Deposit Protection Agency
DPO	Deposit Protection Office
D-SIB	Domestic Systemically Important Banks
DSR	Debt service ratio
DSTI	Debt-Service-to-Income Ratio
DXY	US dollar index
EA	Euro area
EBIT	Earnings before interest and taxes
ECB	European Central Bank
EEU	Eastern Europe

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

EM	Emerging Market
ESG	Environmental, social, and governance
EU	European Union
EUR	Euro
EXIM	Export-Import Bank of Thailand
FCI	Financial Conditions Index
FCY	Foreign currencies
FDI	Foreign direct investment
Fed	US Federal Reserve
FI	Financial Institution
FIMA	Foreign and International Monetary Authority
FMI	Financial Market Intermediary
FOMC	Federal Open Market Committee
FR	France
FSB	Financial Stability Board
FX	Foreign exchange
GBP	Pound sterling
GDP	Gross domestic product
GFC	Global Financial Crisis
GHB	Government Housing Bank
Govt.	Government
GSB	Government Savings Bank
G-SIB	Global Systematically Important Bank
HAI	Housing affordability index
HK	Hong Kong, China*
iBank	Islamic Bank of Thailand
IBK	Industrial Bank of Korea
IC	Investment company
ICR	Interest coverage ratio
ICT	Information and communications technology
ID	Indonesia
IDIC	Indonesia Deposit Insurance Corporation
IFC	International Finance Corporation/ international financial center
IFI	Independent fiscal institution
IFS	IMF International Financial Statistics
iMaPP	IMF Integrated Macroprudential Policy database
IMF	International Monetary Fund
IMF WEO	IMF World Economic Outlook database
IMF COFER	IMF Official Foreign Exchange Reserves database
IO	International organization
JGB	Japanese government bonds
JBIC	Japan Bank for International Cooperation
JP	Japan
JPY	Japanese yen
KBW	Keefe, Bruyette, and Woods
KDB	Korea Develoment Bank
KDIC	Korea Deposit Insurance Corporation
KEXIM	Export-Import Bank of Korea
KH	Cambodia
KLIBOR	Kuala Lumpur interbank offered rate
KR	Korea
LAT	Latin America
LA, Lao PDR	Lao People's Democratic Republic
LIBOR	London interbank offer rate
LCR	Liquidity coverage ratio
LGFV	Local government financing vehicles
LLP	Loan loss provision
LTV	Loan-to-value ratio
MGS	Mutual guarantee scheme
MM	Myanmar
MMF	Money market funds
MSME	Micro, small and medium sized enterprise
MY	Malaysia

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

MYR	Malaysian ringgit
MYOR	Malaysia overnight rate
NACF	National Agricultural Cooperative Federation
NAR	North America
NBB	Nayoby Bank
NBFI	Nonbank financial institution/ intermediary
NDRC	National Development and Reform Commision
NEER	Nominal effective exchange rate
NFC	Nonfinancial corporate
NFFC	National Federation of Fisheries Cooperatives
NIM	Net interest margin
NPL	Nonperforming loan
OLS	Ordinary least squares regression
OPR	Overnight policy rate
OTH	Others
PBC	People's Bank of China
PDIC	Philippine Deposit Insurance Corporation
P/E	Price-to-earning ratio
PH	The Philippines
PIDM	Perbadanan Insurans Deposit Malaysia
Plus-3	China (including Hong Kong), Japan, Korea
PPP	Public-private partnership
REER	Real effective exchange rate
ROA	Return on assets
ROW	Rest of the world
RRP	Reverse repo program
S&P	Standard and Poor's
SBGFC/SBC	Small Business Guarantee and Finance Corporation
SD	Standard deviation
SDIC	Singapore Deposit Insurance Corporation
SFI	Specialized financial institution
SFV	Structured finance vehicle
SG	Singapore
SGD	Singapore dollar
SGS	Singapore Government Securities
SGSS	Special Singapore Government Securities
SIFI	Systemically important financial institutions
SIFMA	The Securities Industry and Financial Markets Association
SME	Small and medium sized enterprise
SOE	State-owned enterprise
SOFR	Secured overnight financing rate
SSGS	Special Singapore Government Securities
SSO	Social Security Office
SuNWEI	Systemic Network of World Expected-Losses of Institutions
SVB	Silicon Valley Bank
TCG	Thai Credit Guarantee Corporation
TH	Thailand
T-bill	Treasury bill
UK	United Kingdom
US	United States
USD	US dollar
VBSP	Vietnam Bank for Social Policies
VDB	Vietnam Development Bank
VIX	Volatility Index
VN	Vietnam
WB	World Bank
WEU	Western Europe
YTD	Year-to-date
Δ	Change in

Executive Summary

Financial market stability under multiple trials

Global financial conditions over the past few years have oscillated between tightening and easing, underpinned by central banks shifting their monetary policy stances in response to the COVID-19 pandemic, higher inflation, and geopolitical tensions. Easy financial conditions in major markets started to gradually reverse in late 2021 amid the rise in global inflation (Figure E.1). Global central banks responded with forceful monetary tightening in 2022 leading to an aggressive tightening of financial conditions. Market perceptions that the Federal Reserve (Fed) would reduce its pace of monetary tightening saw conditions ease somewhat after November 2022.

By 2023, market focus had shifted from the pace and extent of monetary tightening to the spillover effects on financial stability. This shift was underscored by liquidity stresses that hit United States (US) regional banks in March 2023. Market concerns intensified with a run on a major global systemically important bank (G-SIB), Credit Suisse. Swift action by regulators in the US and Switzerland helped keep the broader financial system free of contagion, which enabled global markets to return to easier financial conditions.

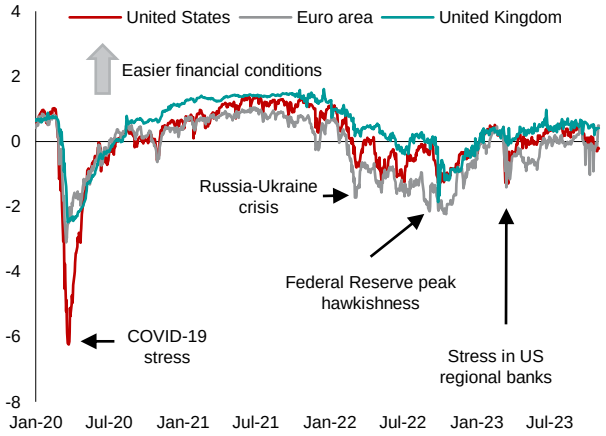
Despite this easing, potential disruption continues in the regime shift from a "near-zero interest rate with ample liquidity" to one where rates are "higher-for-longer with receding liquidity". This regime can be disruptive as it could expose hidden and/or less-visible financial vulnerabilities, manifested in elevated bond market volatility and underperformance in banking stocks that have yet to recover from the sharp falls in March (Figures E.2 and E.3). Meanwhile, global central banks have started again to reduce their balance sheets after expanding them during the pandemic (Figure E.4).

ASEAN+3 financial markets have weathered this global storm reasonably well. The effects of global monetary tightening and elevated market volatility on regional assets were notable but varied in scale and timing. Relative to US markets, most regional equity and bond markets experienced milder fluctuations in 2022 and 2023, partly because monetary policy tightening in the region was not as aggressive as in the US. Most regional currencies weakened against the US dollar, largely driven by a change in interest rate differentials as US policy rates rose at a faster pace (Figure E.5).

In light of milder inflationary pressures, improved external buffers, and the use of price subsidies and other non-monetary measures to contain inflation, monetary tightening was less aggressive overall in the ASEAN+3 region than in the US (Figure E.6). The pace of policy tightening has generally eased in the region in 2023 compared with 2022, reflecting a deceleration in inflation led by the decline in global fuel and food prices. Market pricing implies that the monetary policy tightening cycle is approaching its end in the US and in most economies in the region.

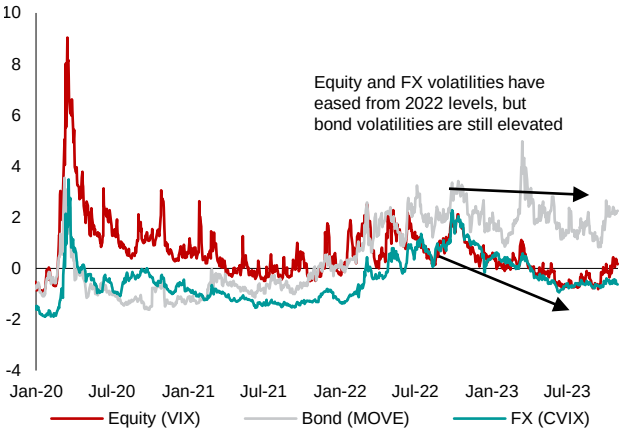
Emerging markets in the region have seen nonresident portfolio flows gradually recover, though there are some exceptions. Chinese debt markets saw a shift to large outflows in 2022, which have continued in 2023 despite the easing global financial conditions. Flows into Chinese equities have remained volatile. Asian emerging markets excluding China saw a strong recovery in debt flows but flows in equity markets moderated. The significant heterogeneity in flows across regional markets reflected differing monetary policy stances and other idiosyncratic factors.

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



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

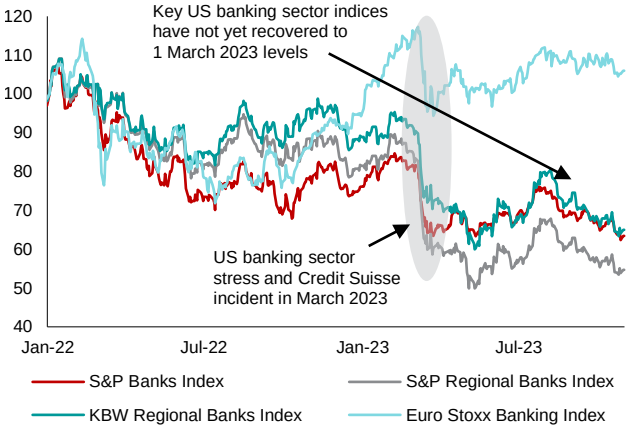
Figure E.2. US: Volatility in Key Assets and Corresponding Long-Term Averages
(Z-score based on data since 1 January 2010)



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.

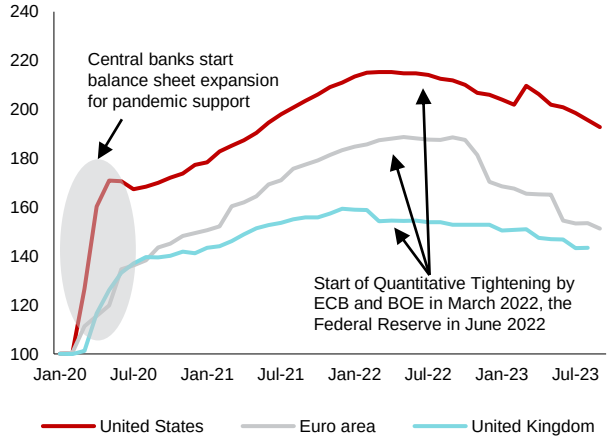
This summary was prepared by Kevin C. Cheng, Kimi Xu Jiang, and Eunmi Park, with input from Prashant Pande, Siang Leng Wong, Richard Sean Craig, Chiang Yong (Edmond) Choo, and Huisheng Wang.

Figure E.3. US and Euro Area: Banking Sector Stock Indices
(Index, 1 January 2022 = 100)



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

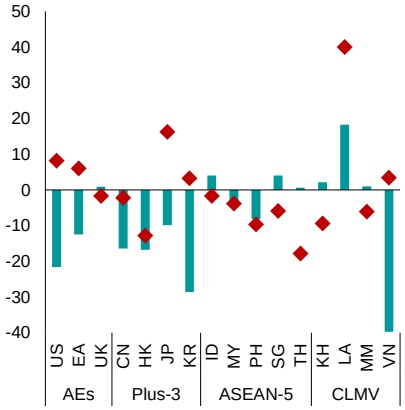
Figure E.4. Selected Advanced Economies: Balance Sheets of Major Central Banks
(Index, 31 January 2020 = 100)



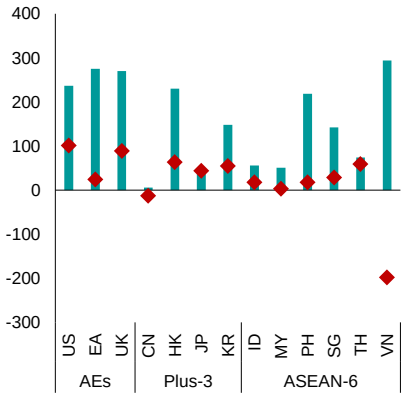
Source: Haver Analytics; AMRO staff calculations.
Note: BOE = Bank of England; ECB = European Central Bank.

Figure E.5. Selected ASEAN+3: Changes in Financial Markets, 2022 and 2023

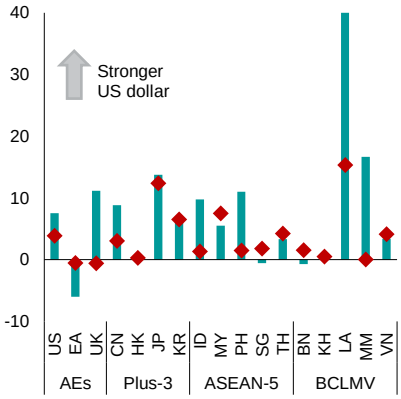
Equity Markets
(Percent, log changes)

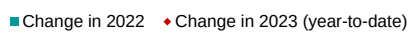


10-year Bond Yields
(Basis points)



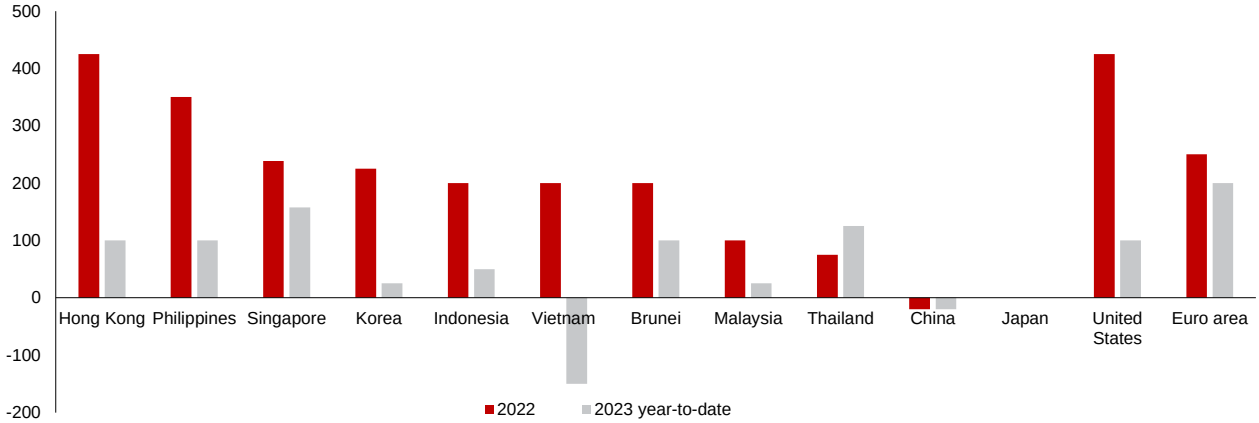
Exchange Rate against the US Dollar
(Percent, log changes)





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; PH = the Philippines; SG = Singapore; TH = Thailand; UK = United Kingdom; US = United States. VN = Vietnam. Data for 2023 (year-to-date) as of 31 October 2023.

Figure E.6. Selected ASEAN+3: Policy Rate Changes, 2022 and 2023
(Basis points)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: For Vietnam, we use the main refinancing rate. For Brunei, we use the standing facility lending rate. For Singapore, we use the overnight rate average. For China, we use the People's Bank of China (PBC) 7-day Reverse Repurchase yield. For Hong Kong, we use the Base Rate. Data for 2023 as of 31 October.

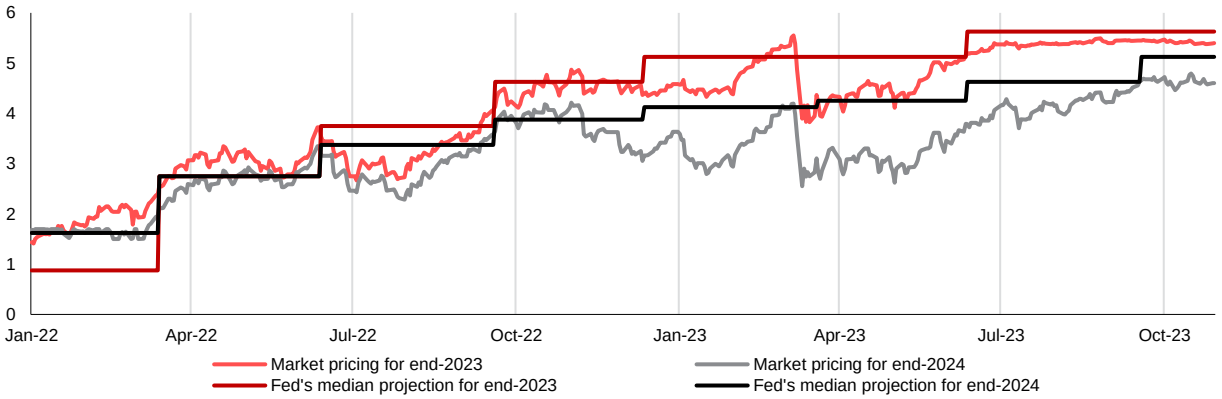
Low visibility of challenges to financial stability

Inflation provides a challenging backdrop for ASEAN+3 authorities in safeguarding financial stability, as it is for monetary authorities in many major economies outside the region. Headline inflation has receded after its rapid rise in 2022. However, the pace of disinflation has varied across economies, with above-target inflation persisting in several. A tight labor market and lagged effects of high inflation could push up wages and, together with a potential commodity price surge and geopolitical tensions, could fuel inflation. In an adverse scenario, a resurgence in inflation could put regional central banks in a challenging situation as they try to balance multiple objectives of managing inflation, promoting economic growth, and ensuring financial stability.

Financial markets consider the Fed to be close to the end of its tightening cycle, but the risk of further tightening cannot be dismissed amid uncertainty over how long inflation will remain elevated. Further upward revision in projections cannot be ruled out given the strength of the US economy, its robust labor market, and the risk of a resurgence of inflation. Market evaluation of the Fed's reaction function has changed over the years (Figure E.7), with a dovish bias of market expectation re-emerging in the latest hiking cycle. The realignment of market expectations to the "higher-for-longer" scenario can lead to increased volatility in the markets.

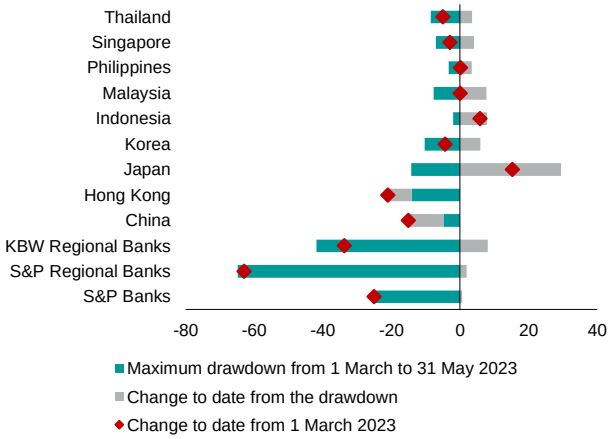
Banking stress in the US and Europe has had limited spillovers to ASEAN+3 markets, but risks remain. The March bank run raised significant concerns about the health of the banking system across the world. Although ASEAN+3 banks appear more resilient to the factors that cause US regional banks to fail, financial stocks still fell with the increase in investors' risk aversion (Figure E.8). The lack of recovery in US banking stocks highlights lingering investor concerns about the financial sector, as shown by elevated market betas (Figure E.9). As such, the risk of contagion from further stress in US banking sector to ASEAN+3 markets remains.

Figure E.7. Market and Fed's Projected Policy Rates Since the Start of the US Hiking Cycle
(Percent)



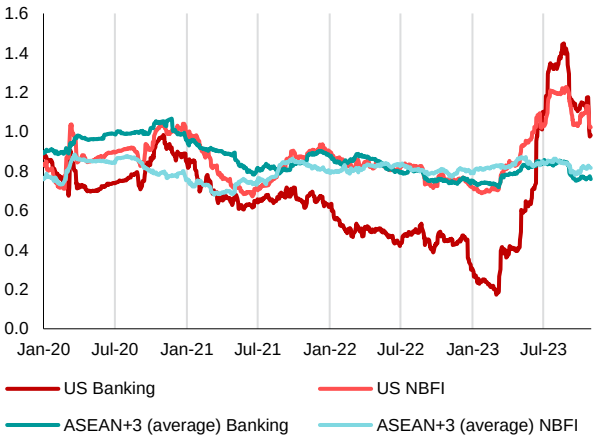
Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: The projected (at the start of the year) market pricing and median dots on 1 January for end-year policy rates are the latest available. The intra-meeting change in market projections shows the average and median change in the market projections for the policy rates of each meeting during the year from the day after the previous meeting. Data for 2023 is as of 31 October 2023.

Figure E.8. US and Selected ASEAN+3: Drawdown and Recovery in Banking and Financial Index after the Banking Turmoil
(Percent, log returns)



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: MSCI Financial Indices have been used for ASEAN+3 economies. KBW = Keefe, Bruyette, and Woods; S&P = Standard & Poor's. Drawdown refers to index changes from 1 March 2023 to the trough before 31 May 2023. The change to date is from the lowest level seen between 1 March 2023 and 31 May 2023 to the latest level (as of 31 October 2023).

Figure E.9. US and ASEAN+3: Market Betas for Banking and NBFI Sectors
(Index)



Source: Bloomberg Finance L.P; AMRO staff calculations.
Note: ASEAN+3 (average) is the simple average of the market betas for China, Hong Kong, Japan, Indonesia, Korea, Malaysia, Philippines, Singapore, and Thailand. NBFI = nonbank financial institution; US = United States. Latest level as of 30 October 2023.

Financial system risks and vulnerabilities could be amplified by increasingly interconnected and complex financial systems, and a high degree of dollar dependence in the region, where dollar finance increasingly is channeled through nonbank financial intermediaries (NBFIs). Faster cross-border capital movement boosted by more integrated financial markets and digitalization could propagate shocks much faster than before. Banks and NBFIs could face increasing risks of digital runs facilitated by social media and digital payments, with potential for a rapid deposit outflow. US dollar funding stress may re-emerge as monetary tightening and balance sheet rundowns in the US could combine with a sudden shift in risk sentiment to create a shortage of dollar supply. Lower rated financial institutions are more vulnerable to the "sudden stop" in access to dollar liquidity that can happen amid concerns over counterparty risks.

Higher debt spurred by ample liquidity and pandemic measures

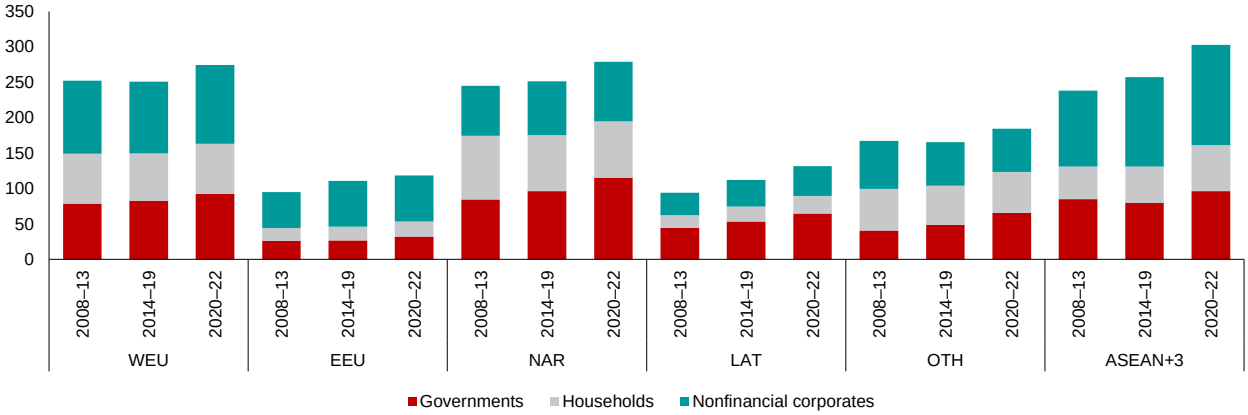
Ample and low-cost liquidity provided by global central banks in the aftermath of the global financial crisis had fueled a rise in ASEAN+3 debt. In these low-for-long interest rate conditions, many corporates, households, and governments in the region took on new debt to finance consumption and investments. During the pandemic, monetary and fiscal stimulus measures further increased debt-to-GDP ratios. Central banks in the region helped stabilize the economy and financial system by expanding their balance sheets and lowering policy rates. Governments issued more debt to finance pandemic relief measures. And the nonfinancial private sector increased its borrowing, taking advantage of cheap funding costs.

Against this background, the thematic chapters of this inaugural ASEAN+3 Financial Stability Report (AFSR) 2023 assess the financial stability implications of elevated private and public nonfinancial debt. Chapters 2 and 3 show how the region's total debt-to-GDP ratio—including corporate, household, and public debt—has steadily increased, peaking at 325 percent of the region's GDP during the pandemic before declining to 299 percent of GDP at the end of 2022.

The corporate debt-to-GDP ratio is notably higher in ASEAN+3 than in other regions, while the ratios for household and government debt are relatively moderate (Figure E.10). The corporate debt-to-GDP ratio reached about 140 percent while for households the ratio was 63 percent in 2022, an increase of 40 and 18 percentage points respectively from 2008. The rapid expansion of private sector debt has driven the increase in overall debt in Plus-3 economies and in the international financial hubs of Hong Kong and Singapore.

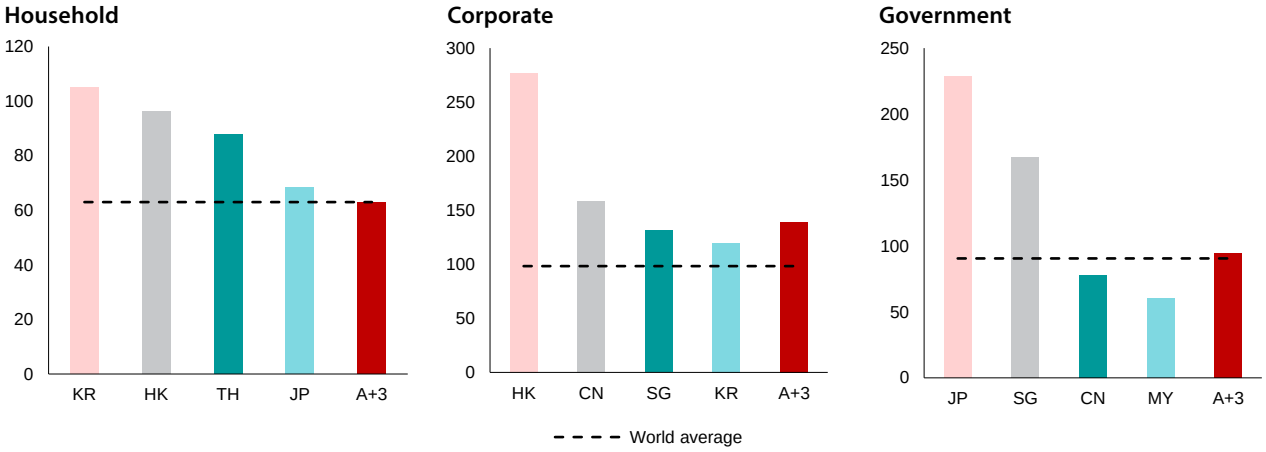
The composition of debt and associated risks vary greatly across ASEAN+3 economies (Figure E.11). Relative to world averages, Hong Kong, Japan, Korea and Thailand have higher household debt, while China, Hong Kong, Korea and Singapore have higher corporate debt. Japan maintains an exceptionally high public debt.

Figure E.10. World: Nonfinancial Sector Debt-to-GDP by Region
(Percent of GDP)



Source: BIS; IMF; AMRO staff calculations
Note: WEU = Western Europe; EEU = Eastern Europe; NAR = North America; LAT = Latin America; OTH = Others. ASEAN+3 includes China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore and Thailand.

Figure E.11. Selected ASEAN+3: Nonfinancial Sector Debt-to-GDP Ratios, 2022
(Percent of GDP)



Source: BIS; IMF; AMRO staff calculations
Note: For household and corporate debt-to-GDP ratios, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore and Thailand are included in ASEAN+3. For public debt ratios, all ASEAN+3 economies are included. A+3 = ASEAN+3; CN = China; HK = Hong Kong; JP = Japan; KR = Korea; MY = Malaysia; SG = Singapore; TH=Thailand.

Financial stability risks and vulnerabilities from higher debt

Rapid debt accumulation by private or public sectors makes financial systems more vulnerable to sudden shocks. Long periods of credit expansion and risk-taking could lead to financial instability that could eventually result in panic and crisis. The recent collapse of some US regional banks and the liquidity stress that hit Credit Suisse in Europe are reminders of the need for vigilance.

Chapters 2 and 3 warn that increased debt stocks and rising debt service in a high interest rate environment could threaten financial stability, especially when pandemic support measures for households and firms have been, or in some cases are still being, phased out.

- For households, corrections in housing prices and rising mortgage interest payments are major pressure points. Housing prices have fallen since the pandemic but may remain above levels consistent with macroeconomic fundamentals in some economies, which continue to face the risk of further price corrections. Interest rate increases raise the cost of servicing debt, with a faster transmission in economies with a high proportion of floating mortgage loans. In a recession, defaults could rise significantly among households with reduced incomes or high leverage.

- Corporates with relatively weak balance sheets owing to low profitability and cash buffers, or/and high leverage, could find it more difficult to refinance and pay interest expenses. These risks are more evident in the property and construction sectors, especially in economies where the housing market is in a downturn, and for unlisted micro, small and medium-sized enterprises.

- Governments with elevated debt-to-GDP ratios may face increased refinancing costs and rollover risk on maturing debt. The risk that an ASEAN+3 economy could have refinancing problems depends on factors such as the maturity and currency structure of its debt, investor composition, and market liquidity. Excessive debt levels raise concerns about debt sustainability and increase the likelihood of a fiscal crisis, which would erode investor confidence and impede credit availability.

Chapter 4 finds that while bank-based financing still dominates in ASEAN+3, the role of NBFIs has expanded. NBFIs have emerged as significant providers of foreign currency liquidity, particularly through the region's international financial centers, which represent an important channel in the propagation of financial shocks within ASEAN+3.

The resilience of some ASEAN+3 banks could be tested in a high interest rate environment despite building up capital buffers in the decades since the Asian Financial Crisis. Tighter financial conditions, combined with the exit from pandemic relief measures, could weaken banks' loan quality and increase nonperforming loans. Moreover, competitive pressures make the passthrough from high interest rates to net interest margins uncertain. Besides this, rising funding costs could exacerbate liquidity risks for banks from increased reliance on market and cross-border financing.

Risks to financial stability also arise from NBFI activities that involve substantial maturity and currency transformation. These can materialize, for example, with declines in NBFI asset values that lead investors to withdraw funds, or where declining assets values reduce access to market funding, which can force NBFIs to quickly deleverage. An associated fire sale of NBFI assets could trigger a broader fall in asset prices, further worsening liquidity and funding difficulties and impacting the broader economy.

Policy recommendations

The combination of high debt and rising interest rates means authorities need to strengthen defenses against financial stability risks. The policy mix requires a careful balancing of monetary, fiscal, and macroprudential policies, as well as good cooperation among authorities.

Chapter 1 recommends that ASEAN+3 central banks should prioritize price stability while preserving financial stability and supporting growth. Upside risks to the outlook for prices remain, where a resurgence in inflation could lead to higher for longer interest rates. When conflicts arise between inflation and financial stability objectives, a coordinated approach involving monetary, fiscal, and macroprudential measures is warranted to achieve the right balance.

To insulate the financial system from liquidity stress amid monetary tightening, central banks should make sure that regular liquidity facilities are available for banks. In economies where NBFIs are systemically important, authorities may need to strengthen regulatory, supervisory, and risk management measures. In a potentially systemic crisis situation, where these measures could prove insufficient, authorities should be prepared to provide temporary liquidity support for the orderly functioning of core financial markets and to limit contagion to the banking system or the broader economy. Such a liquidity backstop for NBFIs should be carefully designed with clear communication to avoid lending to insolvent institutions and to strike a delicate balance between crisis prevention and moral hazard concerns. Regional authorities should cooperate to ensure continued availability of US dollar liquidity in times of stress given that the dollar remains the dominant currency in trading and investment in the region. Reducing dependence on the US dollar can contribute to regional financial stability, although this will be a multiyear initiative requiring close cooperation among ASEAN+3 authorities.

Chapter 2 recommends that policymakers deploy a wide range of macroprudential tools to mitigate systemic risks to the financial system from higher nonfinancial private debt. These can target different sources of risk arising from high household and corporate debt, and help curb excessive leverage by property developers. Promoting responsible corporate borrowing and embarking on new initiatives such as digitalization to reduce costs and enterprise collaboration efforts to promote corporate competitiveness are important steps. Moreover, given that small and medium-sized enterprises are particularly vulnerable, credit guarantee schemes can directly promote their access to financing, which could facilitate the rollover of debts.

To rein in financial stability risks from higher public debt (Chapter 3), a medium-term fiscal consolidation plan may be warranted. In some cases, a fiscal rule can also be considered. In addition, public debt management should aim to establish a debt structure with a maturity profile and currency distribution that mitigates liquidity and currency risks. It should also develop a diversified investor base to reduce government reliance on a narrow group of investors—and so increase resilience against shocks. Lastly, efforts to promote a deep and liquid bond market should continue.

Safeguarding the soundness of financial intermediaries is paramount to ensure that credit intermediation is both stable and smooth (Chapter 4). For banks, keeping leverage in check, including through the continual use and refinement of macroprudential policies, is important to reduce vulnerabilities. Weaker banks are advised to either increase provisioning or improve their capital reserves. Learning from the experiences of US bank failures, the scope of the deposit insurance coverage could be widened to ensure depositor confidence in times of stress. NBFIs' growing systemic importance makes strengthening their supervisory and regulatory framework a priority. Their central role in the functioning of financial markets in the region, especially in dollar funding and hedging markets, requires close cooperation among regulatory and macroprudential authorities and central banks in ASEAN+3. Steps to close the major gaps in data on NBFIs can facilitate this cooperation.

Chapter 1

Market Conjunctural- Low Visibility of Challenges Ahead

Highlights

- Aggressive monetary tightening by global central banks led to tighter financial conditions, although the conditions eased after November 2022 as markets considered the stance of Federal Reserve (Fed) to be less hawkish. Swift action by policymakers alleviated market stress during the United States (US) bank failures in March 2023. However, the easier financial conditions may conceal hidden risks given that changes in the global monetary policy landscape have been drastic. Some of the risks include elevated volatility as the markets adjust to the higher-for-longer environment of interest rates, and potential stress in US banking sector and US dollar funding markets.

- Global market turbulence has had a varied but significant impact on ASEAN+3[1] assets, with local equity and bond markets experiencing less fluctuation than their US counterparts during 2022–23, and portfolio flows to emerging markets in the region (outside of China) gradually recovered. In light of weaker-than-expected economic recovery, milder inflationary pressures, and the presence of robust external buffers, regional central banks have generally been less aggressive than the Fed in tightening monetary policy.

- Despite recent disinflation, lingering inflation risks in the ASEAN+3 region could jeopardize financial stability by prolonging high interest rates and causing market volatility. Even as spillovers to ASEAN+3 from banking stress in the US and Europe have been limited, potential risks remain. Furthermore, the tighter monetary policy would heighten the risk of renewed US dollar funding stress, particularly if investor sentiment were to sour.

- Regional central banks should focus on maintaining price stability while carefully balancing domestic and external factors. They should maintain adequate liquidity for banks and in times of severe stress, provide appropriate regulatory oversight and take measures to minimize spillovers from systemically important nonbank financial institutions. While prioritizing inflation, central banks should also safeguard financial stability. If a conflict were to arise between inflation control and financial stability, a broader coordinated approach involving fiscal and macroprudential measures would be warranted.

- Regional authorities should maintain liquidity facilities for US dollar funding during stress periods, given the dollar's dominant role in trading and investments, notwithstanding the recent trend toward greater use of local currencies in regional cross border payments. To mitigate the financial stability risks posed by growing digital financial infrastructure, key measures should include liquidity backstops, effective communication, and streamlined and targeted digital asset regulations. Finally, a sustained commitment to green finance and climate change initiatives is essential.

This chapter is authored by Prashant Pande and Kimi Xu Jiang under the guidance of Kevin C. Cheng, with contributions from Benyaporn Chantana. Chiang Yong (Edmond) Choo (project manager), Junjie Shi and Xiaofan Zhu provide research assistance.

[1] For groupings of economies, AMRO follows the classification detailed by the IMF (refer to website here: https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates). The group presentations in charts and tables are for analytical purposes only and do not reflect the official position of AMRO or its member authorities on the classification of the economies.

"Fog is more dangerous than dark, as it gives the illusion of seeing."

Aleksandra Ninković, Author

I. Recent Developments

Global financial conditions have eased, although risks linger

Financial system and markets were tested on multiple occasions over the past few years. Easy financial conditions in major global markets started to gradually reverse in late 2021 (Figure 1.1) amid the rise in global inflation, which was exacerbated by geopolitical events in February 2022. Aggressive monetary tightening by global central banks, led by rate hikes by the US Federal Reserve (the Fed), tightened financial conditions. These eased somewhat after November 2022, only after signals that the Fed was nearing the end of its hiking cycle. Concerns gradually **shifted from the pace and extent of monetary tightening to the effects of prolonged tightness** in 2023. These materialized during the March 2023 stress in US regional banks, intensified by the fall of a major global systemically important bank (G-SIB)—Credit Suisse.

Swift policy action by policymakers helped ease market stress during the bank failures. Global central banks had to balance curbing inflationary pressures with maintaining financial stability. The Fed had softened its ultra-hawkish stance in November 2022, but the banking stress episode raised the hurdle for further tightening and prompted extraordinary measures to contain its impact. The Fed provided liquidity support (the new Bank Term Funding Program and existing discount windows) while other US agencies provided backstop for depositors to mitigate the contagion. The Swiss National Bank acted quickly too when panic selling gripped Credit Suisse by providing an immediate liquidity facility and later by facilitating the takeover by UBS. The success of authorities in containing the spillovers allowed the central banks to refocus on inflation and resume monetary tightening.

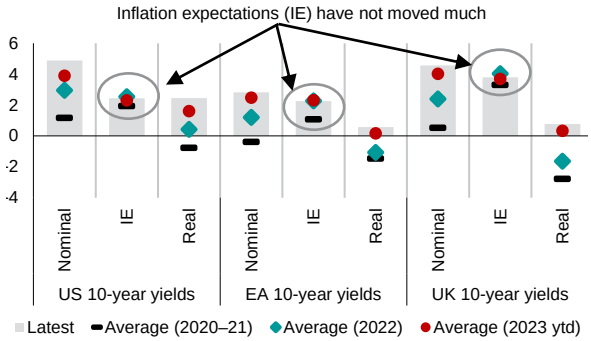
While financial conditions have eased since the banking turmoil, hidden risks may lurk amid the drastic shift in global monetary policy stance. This shift—**from the "near-zero interest rate with ample liquidity" to the "higher-for-longer interest rate with receding liquidity"** regime—can expose hidden financial vulnerabilities. Unanticipated failures of some regional US banks that were, triggered by the Fed's tightening policy illustrate how markets might have misjudged such risks and their potential for rapid, wide-reaching spillovers. Despite current market optimism, policymakers should avoid complacency and remain vigilant for hidden risks.

Indeed, despite the apparent stability for now, some indicators point to less-visible financial market risks. The unprecedented monetary tightening led real rates to rise in major economies and pushed bond yields higher, while inflation expectations have largely remained stable (Figure 1.2). Equities fell sharply, and the US dollar strengthened against major currencies through the first three quarters of 2022, (Figure 1.3) accompanied by increased volatility across asset classes (Figure 1.4). Since November 2022, markets have stabilized, except for a temporary reversal when banking came under stress in March. Most major asset classes have regained strength recently and volatility in equity and foreign exchange (FX) markets is now below its post-global financial crisis average. However, volatility in bond markets remains elevated, banking sector stocks have yet to recover from the sharp fall in March (Figure 1.5), and global central banks have resumed their balance sheet reduction (Figure 1.6). These signs point to vulnerabilities in the financial sector and the risk of renewed stress in the US-dollar funding markets. An escalation in geopolitical tensions remains a key risk for financial markets and can trigger episodes of severe risk aversion, which may create stress in the vulnerable parts of the financial system. One such potential escalation could emerge from the tension in the Middle East which started in October 2023.

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

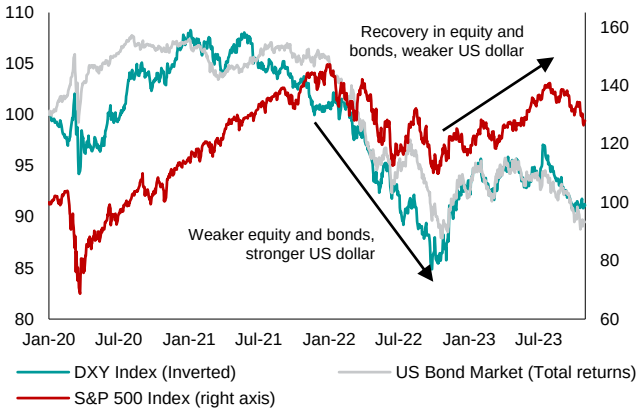
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: Data as of 31 October 2023.

Figure 1.2. Selected Advanced Economies: 10-Year Nominal, Inflation Expectations and Real Government Bond Yields
(Percent)



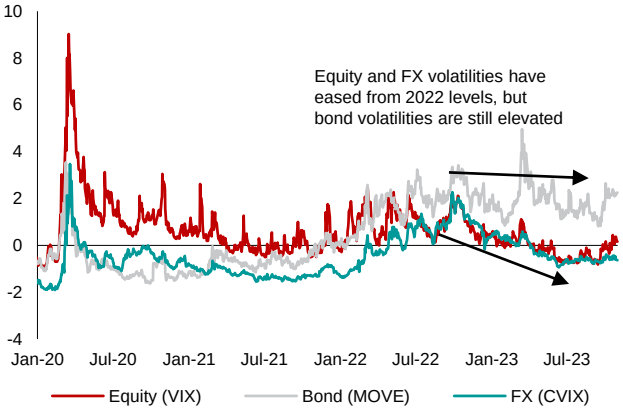
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: EA = euro area; UK = United Kingdom; US = United States. The latest and 2023 ytd (year-to-date) average is as of 31 October 2023.

Figure 1.3. Selected Advanced Economies: Equity, Foreign Exchange and Bond Market Indices
(Index, 1 January 2020 = 100)



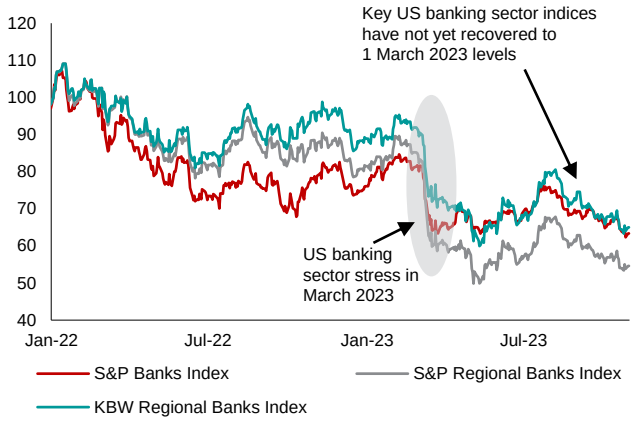
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: DXY index refers to US dollar index. Bloomberg US Aggregate Index is used for US bond market (total returns). AE = advanced economies. S&P index refers to Standard & Poor's 500 index. Data as of 31 October 2023.

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



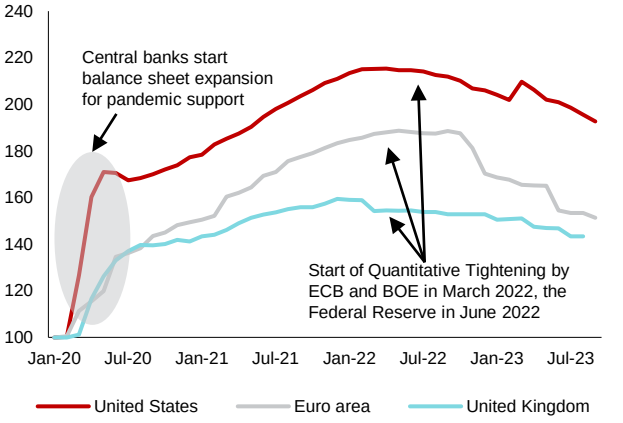
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: VIX refers to Chicago Board Options Exchange's Volatility Index. MOVE refers to Merrill Lynch Option Volatility Estimate Index. CVIX refers to Deutsche Bank Currency Volatility Index. Data as of 31 October 2023.

Figure 1.5. US: Banking Sector Stock Indices
(Index, 1 January 2022 = 100)



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: KBW = Keefe, Bruyette, and Woods; S&P = Standard & Poor's. Data as of 31 October 2023.

Figure 1.6. Selected Advanced Economies: Balance Sheets of Major Central Banks
(Index, 31 January 2020 = 100)



Source: Haver Analytics; AMRO staff calculations.
Note: BOE = Bank of England; ECB = European Central Bank.

ASEAN+3 markets have weathered the storm from global markets

The impact of global market turbulence on regional assets was significant, though varied in scope and timing (Figure 1.7). Most regional equity and bond markets experienced smaller fluctuations during 2022–23 relative to those in US markets, partly because the monetary policy stance in ASEAN+3 economies was less hawkish than in the US. Most regional currencies weakened against the US dollar, especially during the second and third quarters of 2022, driven largely by a change in interest rate differentials as US policy rates rose at a faster pace. The spillovers from global markets, however, varied across regional markets. The largest spillovers from US equity markets and interest rate differentials were experienced by Korean equities and the yen respectively (Box 1.1).

In line with the rise in volatility and low returns in global markets, ASEAN+3 assets also generally experienced an increase in volatility amid poor returns. A marked rise in volatility in ASEAN+3 assets and a broad fall in returns is apparent from the time period of the pandemic-induced market stress to recovery (April 2020 to December 2021) to the period of the Fed's monetary tightening (January 2022 to latest) (Figure 1.8). ASEAN equity markets were the exception; on average, volatilities declined. Annualized bond returns in ASEAN were lower than before but still better than returns in Plus-3 counterparts.

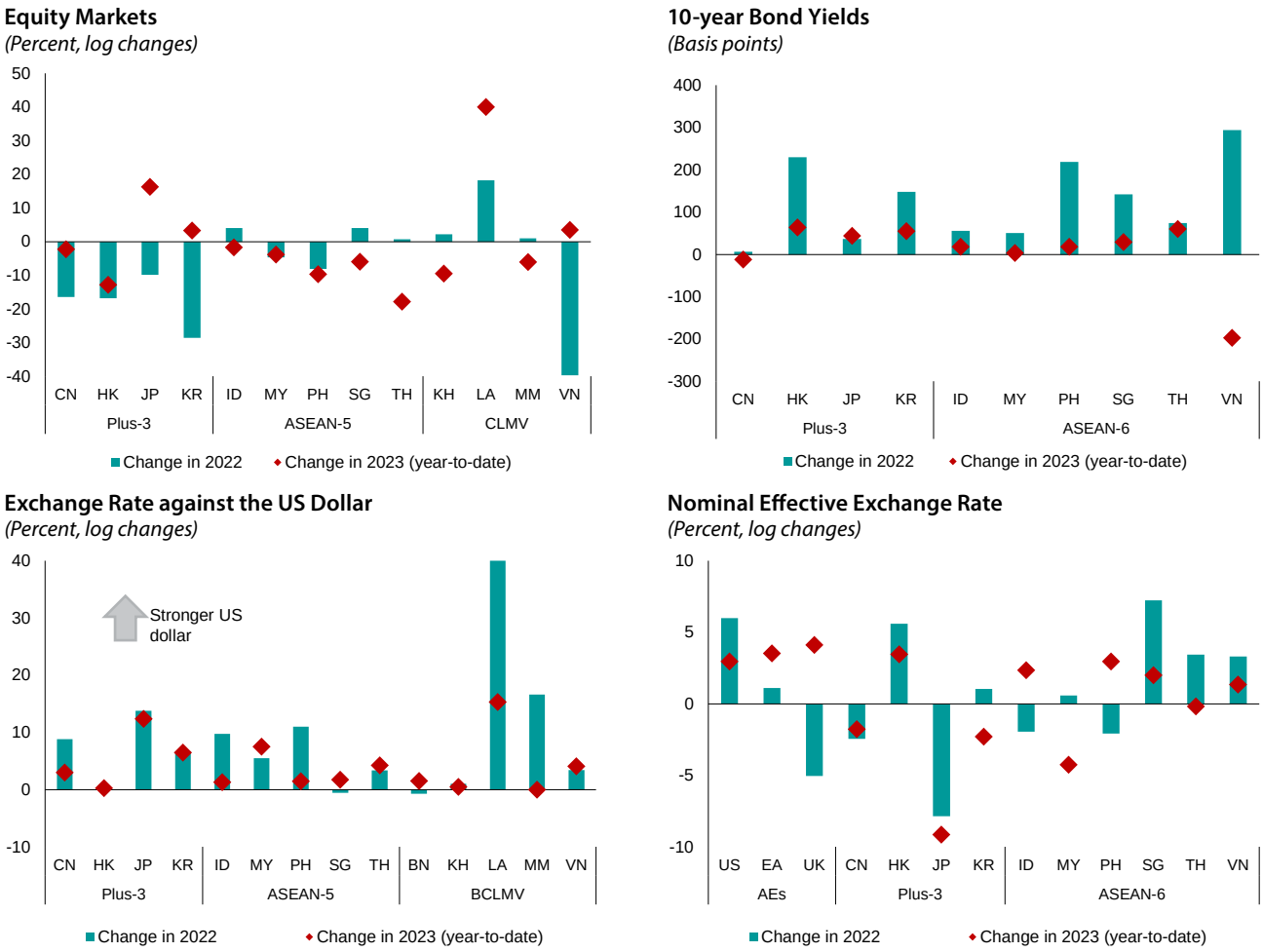
Beyond global common factors, market divergence across economies in the region also reflected idiosyncratic factors since January 2022. Market concerns around China's growth outlook have contributed towards the weakness in its equity markets and the renminbi. Indonesian equity markets found support from rising commodity prices while Korean equities underperformed due to weakness in the global tech sector weakness and credit stress in the fourth quarter of 2022. The Singapore dollar was supported by proactive tightening by the Monetary Authority of Singapore while Lao PDR external

imbalances contributed to sharp depreciation of the kip. Less aggressive monetary tightening in Indonesia and Malaysia and monetary easing in China supported bond markets, whereas inflationary pressures in the Philippines pushed yields much higher. Generally speaking, ASEAN-5 equities and currencies have tended to be more stable than those in Plus-3.

The divergence between market conditions in Plus-3 and ASEAN-5 can be explained using **estimates of market stress.** Based on the methodology laid out in Hennig, Iossifov and Varghese (2023),[2] the estimated indicator shows that the market stress declined across economies after the initial impact of the pandemic but started to rise again heading into and during the Fed's 2022 hiking cycle (Figure 1.9). The primary source of increased market stress across the region was FX market volatility, with property sector stress (proxied by real house price growth) contributing significantly to stress in Plus-3 markets (Figure 1.10). In 2023, market sentiment has improved in all components of the market stress index, (Figure 1.11), with the breakdown indicating that improved sentiment is primarily driven by lower real domestic bond yields and lower FX volatility. While market concern around known risks appears to be receding, hidden global risks could have a material impact on ASEAN+3 financial stability. That said, absent these, ASEAN+3 assets appear to be positioned to perform well amid improved valuations (Box 1.2) and lower growth risks (AMRO 2023a).

Meanwhile, ASEAN+3 property prices have been volatile, rising before the pandemic and then correcting during monetary tightening. Housing prices surged following the pandemic outbreak supported by loosening monetary conditions and supply constraints (Chapter 2). While housing price gains then began to wane, the turning points varied across economies. Growth of housing prices in most ASEAN economies turned negative in the second quarter of 2021. Cooling housing prices were more evident in China, Hong Kong, and Korea. In contrast, Singapore property prices remained resilient despite tightening in global monetary conditions.

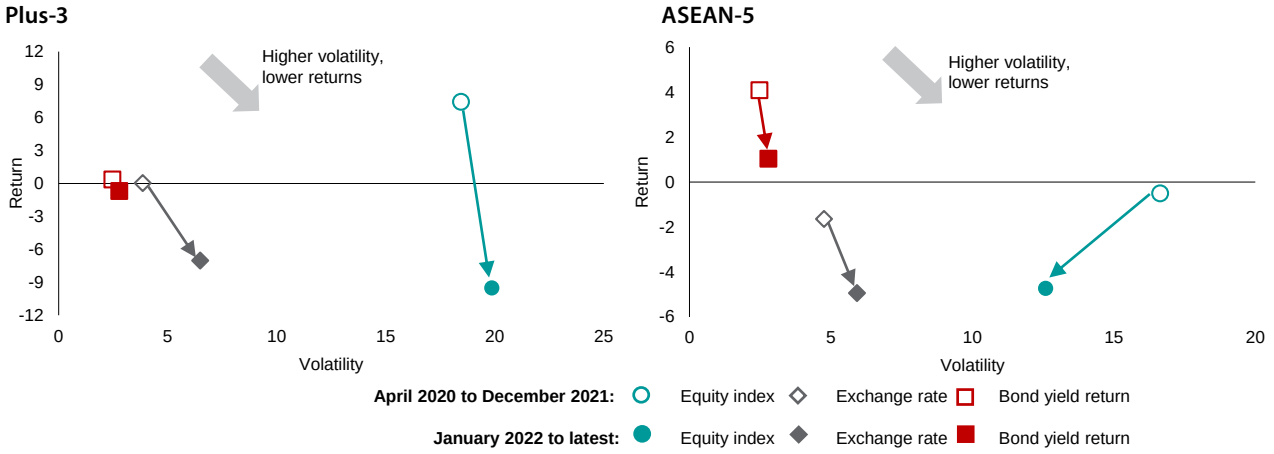
Figure 1.7. Selected ASEAN+3: Changes in Financial Markets, 2022 and 2023



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; PH = Philippines; SG = Singapore; TH = Thailand; UK = United Kingdom; US = United States. VN = Vietnam. Data for 2023 (year-to-date) as of 31 October 2023.

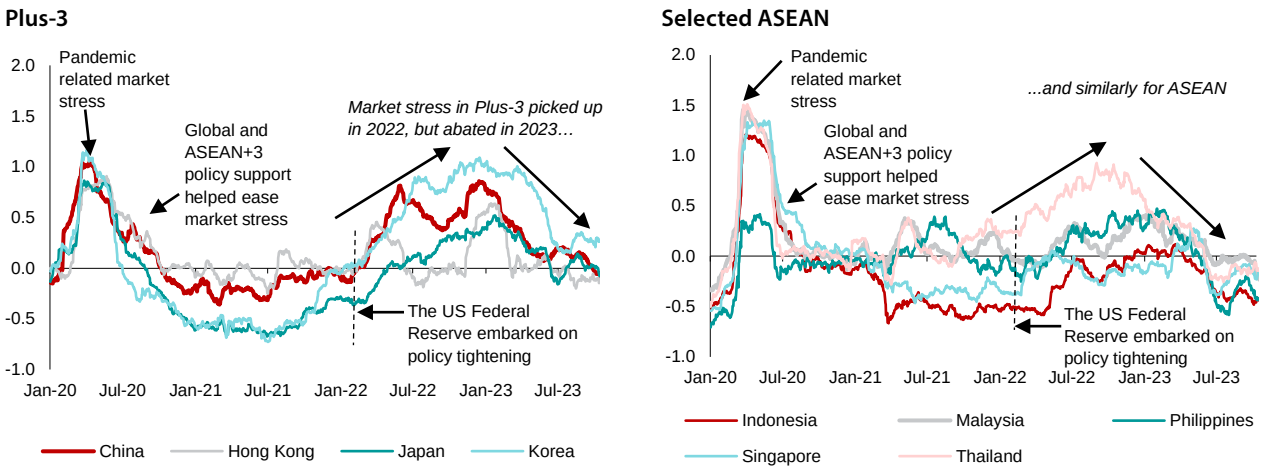
[2] The Market Stress Index is based on the Mispricing Risk (Refined) proposed in Hennig, Iossifov, and Varghese (2023) which attempts to capture the slack in financial conditions. The Mispricing Risk (Refined) is constructed using a simple average of indicators of price growth and volatility transformed into within-country percentiles. The measure of risk uses real equity market returns, equity market volatility, domestic sovereign bond yield volatility, sovereign FX risk spreads, FX 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.

Figure 1.8. Selected ASEAN+3: Realized Returns and Volatility in Financial Assets, 2020–2021 versus 2022–Now
(Percent, annualized)



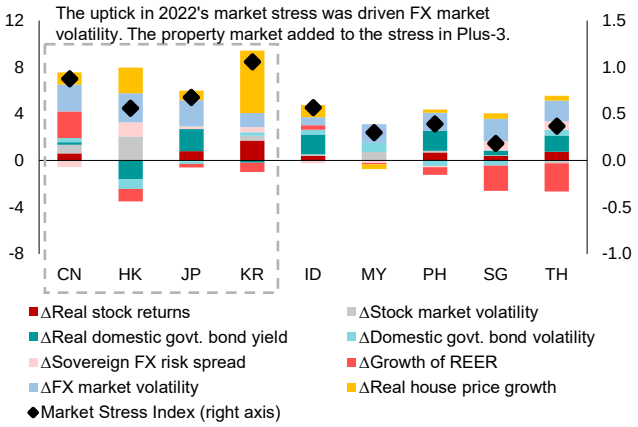
Source: Bloomberg, Haver Analytics; AMRO staff calculation.
Note: ASEAN-5 = Indonesia, Malaysia, Philippines, Singapore, and Thailand; Plus-3 = China, Hong Kong, Japan and Korea. The returns and volatilities for ASEAN-5 and Plus-3 are a simple average across the constituent markets. Latest data as of 31 October 2023.

Figure 1.9. Selected ASEAN+3: Market Stress Indicator
(Index)



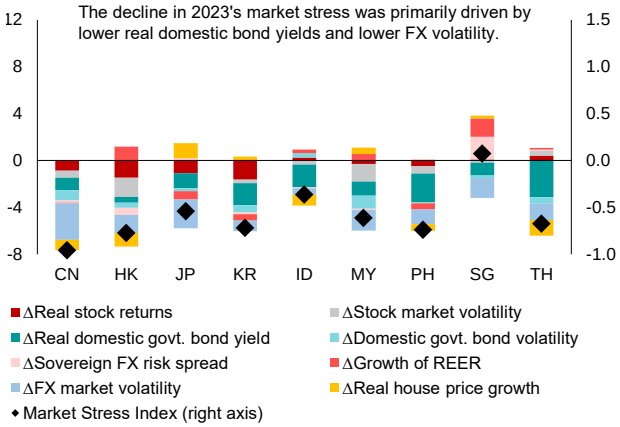
Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: The Market Stress Index is based on the Mispricing Risk (Refined) proposed in Hennig, Iossifov, and Varghese (2023) which attempts to capture the slack in financial conditions. The Mispricing Risk (Refined) is constructed 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 FX risk spreads, FX 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 30 October 2023.

Figure 1.10. Selected ASEAN+3: Contributors to Change in Market Stress in 2022
(Index)



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 FX risk spread, and FX 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; VN = Vietnam.

Figure 1.11. Selected ASEAN+3: Contributors to Change in Market Stress in 2023, January to October
(Index)



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 FX risk spread, and FX 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; VN = Vietnam. Data as of 30 October 2023.

Box 1.1:

Correlations of ASEAN+3 Asset Prices with US and China Markets

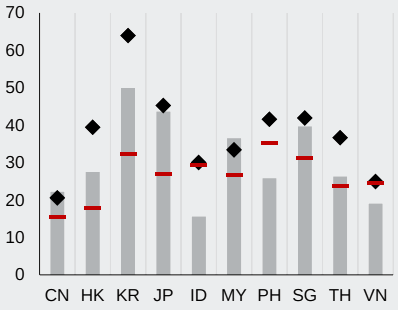
Spillovers from global markets generally increased for ASEAN+3 markets after the pandemic. ASEAN+3 markets (across asset classes) were less correlated with the global markets during 2020 and 2021 when domestic COVID-19 developments were more dominant. In 2022, however, the market focus shifted to high inflation and the Federal Reserve tightening. This deepened the correlation with US counterparts in the region's asset markets in. In 2023, these correlations have strengthened further for bond and currency markets, although have weakened somewhat in equity markets (Figure 1.1.1).

Similar analysis of China and other ASEAN+3 markets shows that the correlation between the renminbi and other ASEAN+3 exchange rates has strengthened (Figure 1.1.2). Indeed, a US dollar component is common between renminbi and other currencies, but recent correlations have tended to remain stable or rise for most currencies. On the other hand, the correlations between China and other regional equity markets are weaker in 2023 than in 2022, while those between China and other regional bond yields are mixed.

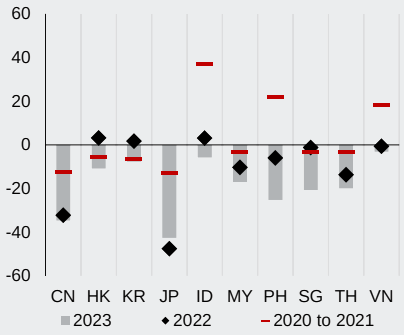
The weaker correlation during 2023 in equities (against the US and China) shows that market participants have shifted their focus to idiosyncratic factors. Easing monetary policies in China and Vietnam have been key in reducing correlations between their bonds markets and US Treasuries. Rising Treasury yields, however, continue drive US dollar strength and have pushed correlations between exchange rates and interest rate differentials higher.

Figure 1.1.1. Spillovers from the US to ASEAN+3 Markets

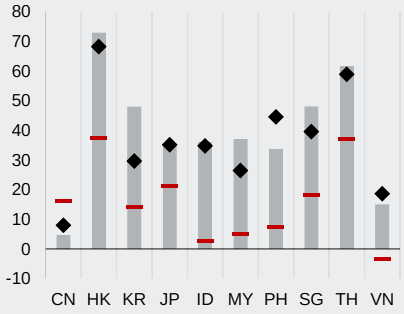
Correlation between Daily Changes in US and ASEAN+3 Equity
(Percent)



Correlation between Daily Changes in Interest Rate Differentials and ASEAN+3 Foreign Exchange
(Percent)



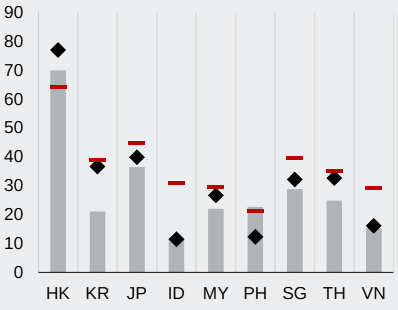
Correlation between Daily Changes in US Treasury Yields and ASEAN+3 Bond Yields
(Percent)



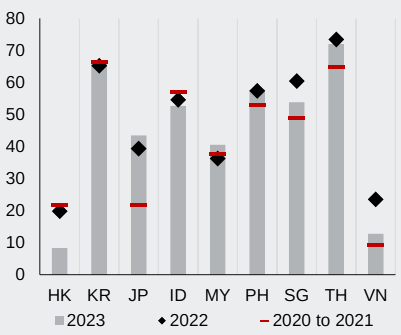
Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: The correlations are calculated using daily log changes for equities and exchange rates (against the US dollar); and daily change in yields and interest rate spreads. For equities, the correlations are on daily changes of benchmark indices, adjusted to minimize distortions from different snap timings. The correlations for daily changes in exchange rates are calculated against the daily change in spread between US Treasury 10-year and domestic government 10-year bond yields. The correlations for daily changes in bond yields are calculated using 10-year yields of US Treasury and domestic government bonds. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 1.1.2. Spillovers from China to ASEAN+3 Markets

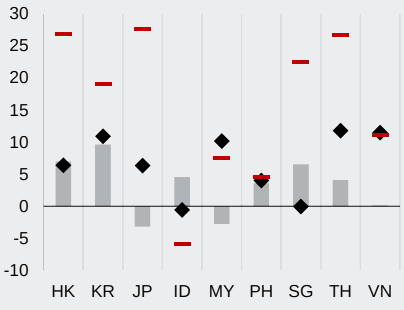
Correlation between Daily Changes in China Stocks and Other ASEAN+3 Equity
(Percent)



Correlation between Daily Changes in RMB Exchange Rate and Other ASEAN+3 Foreign Exchange
(Percent)



Correlation between Daily Changes in CGB Yields and Other ASEAN+3 Bond Yields
(Percent)



Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: The correlations are calculated using daily log changes for equities and exchange rates (against the US dollar); and daily change in yields and interest rate spreads. For equities, the correlations are on daily changes of benchmark indices. The correlations for daily changes in bond yields are calculated using 10-yier yields of China government and domestic government bonds. CGB = China government bond; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

The author of this box is Prashant Pande.

The pace of monetary policy tightening has generally slowed

Central banks in **the region have been less aggressive in tightening** their policy rates than the Fed, given the lower inflationary pressures and increased buffers in the external sector. Headline inflation in ASEAN+3 rose to a nine-year high in 2022 (AREO 2023b), but has been lower overall than in the US. With safety nets improving and a more resilient external sector since the Asian financial crisis, central banks in the region can focus more on managing domestic economic and financial conditions and worry less about currency devaluation and capital outflows. Indeed, while foreign currency reserves in the region have declined somewhat following the aggressive Fed policy tightening and resultant US dollar strength, the region's foreign exchange reserves remain generally ample, though with some exceptions (Figures 1.12 and 1.13).[3]

As such, the pace of monetary policy tightening in the region has generally eased during 2023, compared with 2022, though to different levels across economies (Figure 1.14). A varied speed in pace of disinflation across economies, coupled with differences in their economic and financial conditions and monetary policy frameworks (Tan 2023), led to differentiated monetary reactions. In particular:

- Thailand was an exception in the region as it increased rates by more in 2023 than in 2022. The increase in rates started later than regional peers as economic recovery from the pandemic was relatively weak given that inbound tourism was slow to pick up again.

- Korea was the early hiker because of concerns about the effects of higher-than-expected inflation and increased household debt, and had relatively less pressure to follow the Fed in 2023.

- Singapore and Brunei tightened their monetary policy stance in a manner more synchronized with the Fed as the anchor of their monetary policy on exchange rate management. As interbank rates in Hong Kong largely track their US dollar counterparts under the Linked Exchange Rate System, Hong Kong's monetary condition was also tightened.

- Meanwhile, Japan, China, and Vietnam deviated from the global tightening cycle by either maintaining or conducting monetary easing. Notably, the Bank of Japan has kept its negative interest rate policy unchanged and its balance sheet as a percentage of GDP remains much larger than for other major central banks (Figure 1.15).[4] China (Figure 1.16) and Vietnam conducted policy rate cuts mainly to support economic recovery.[5]

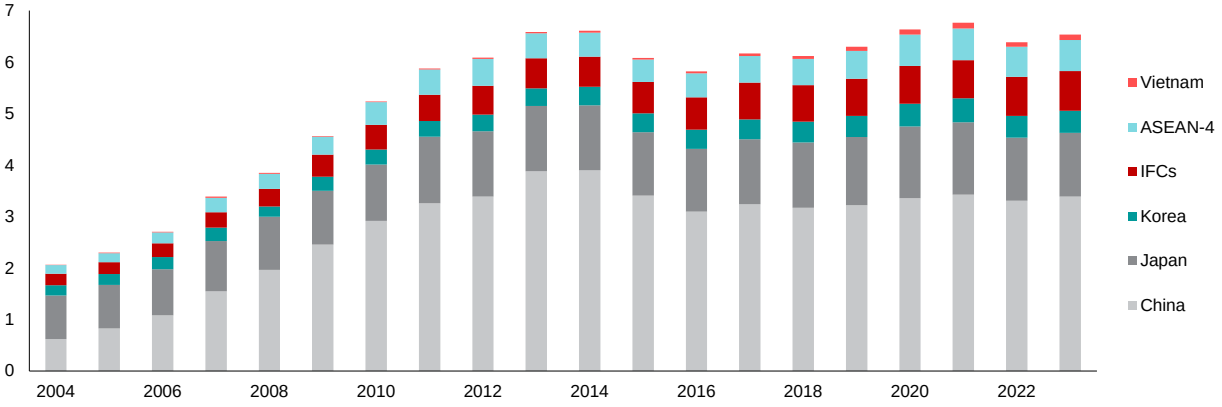
Market pricing implies that **monetary policy tightening is approaching the end** in the US and most economies in the region. The Fed is expected to stay on hold for the next few months and pivot toward an easing cycle from the third quarter of 2024. Markets currently price in a cumulative 75 basis points policy rate cut by January 2025 (Figure 1.17). In the ASEAN+3, while markets raised the odds of further policy rate hikes in Korea, and Malaysia, and expect the central bank in Thailand to remain on hold over the next 12 months, investors expect the Philippines to ease in the same period as headline inflation moderated as a trend while GDP growth in the second quarter of 2023 was below expectations. China is expected to continue policy easing to support its economy in the near term. Japan is widely expected in 2024 to end the negative interest rate policy introduced in 2016, as inflation has breached its 2 percent target and is expected to remain elevated although the Bank of Japan judges that sustainable and stable achievement of the price stability target 2 percent has not yet come in sight and thinks it is necessary to patiently continue with monetary easing under the framework of yield curve control. (Figure 1.18). That said, caution is warranted in interpreting the implied policy paths given that investor sentiment could be volatile amid an uncertain economic outlook for the global economy and that market pricing could reflect changes in technical factors, such as liquidity and investor positioning of underlying instruments.

[3] According to the International Monetary Fund's thresholds on reserves adequacy, the reserve coverage is challenging in Lao PDR in terms of month of imports. In Malaysia, the relatively low reserve cover to external short-term debt is mitigated by the significant holdings of liquid external assets and the profile of short-term external debt liabilities, Most of the debt is held by banking institutions and around a third consists of interbank borrowings within the same banking group, which reduces rollover risk. 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.

[4] To mitigate the side effects of the Bank of Japan's sizable Japanese government bond (JGB) purchases on bond market functioning and thereby to add to the sustainability of monetary stimulus measures, the BOJ in December 2022 decided to widen the 10-year JGB target yield band to around 50 basis points from around 25 basis points and in July 2023 to introduce greater flexibility to yield curve control operations with an effective cap of the 10-year JGB yield at 100 basis points. The cap at 100 basis points was further tweaked in October 2023 to be an upper bound as a reference rather than a strict cap.

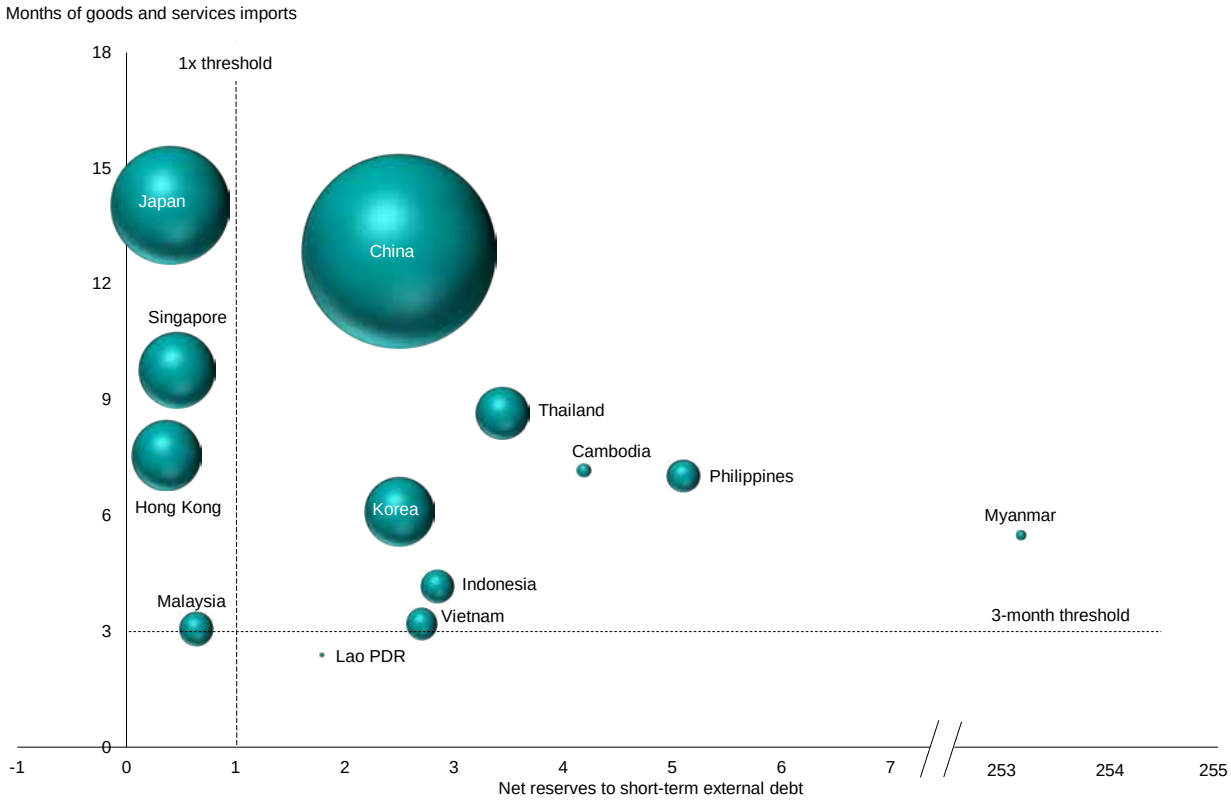
[5] Year to date, the People's Bank of China cut the 7-day repo rate by 20 basis points and guided banks to lower both one-year and five-year loan prime rates by 20 and 10 basis points, respectively. The State Bank of Vietnam cut its policy rate four times and lowered the main refinancing rate by a total of 150 basis points.

Figure 1.12. Selected ASEAN+3: Size of Foreign Exchange Reserves
(Trillions of US dollars)



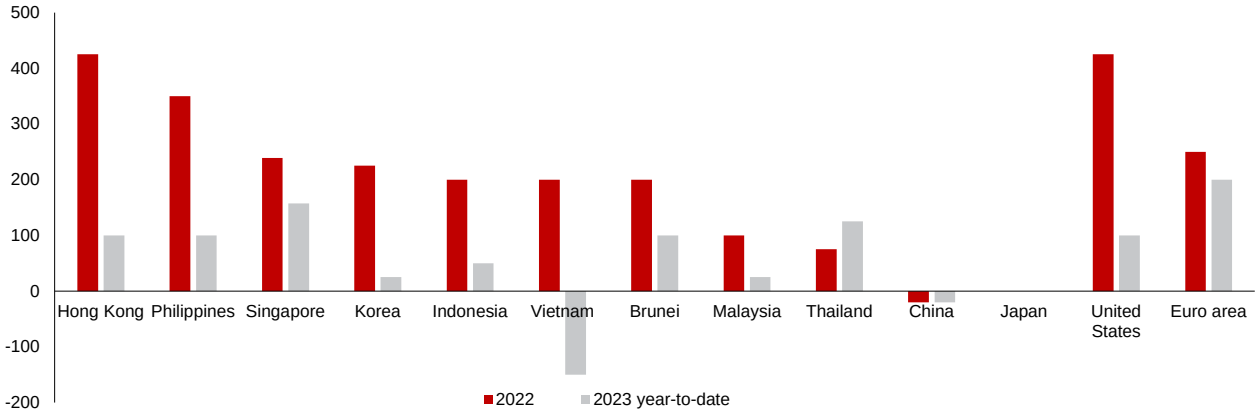
Source: National authorities; IMF; AMRO staff calculations.
Note: ASEAN-4 = Indonesia, Malaysia, Philippines, and Thailand; International financial centers (IFCs) = Hong Kong and Singapore

Figure 1.13. ASEAN+3: Reserve Adequacy



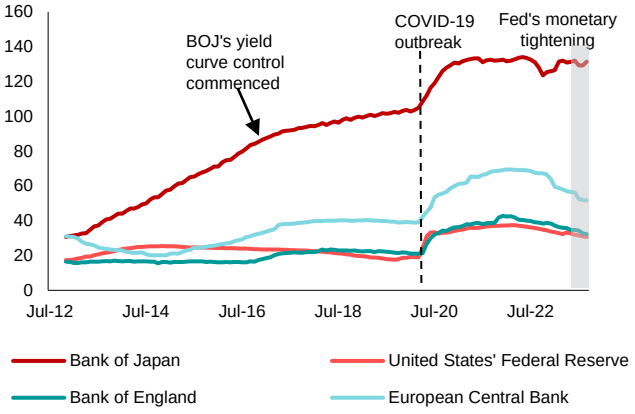
Source: National authorities; International Monetary Fund; World Bank; AMRO staff calculations.
Note: Data for reserves are sourced from either national authorities or IMF IFS database and they are as of September 2023, except Cambodia, Vietnam (July 2023), Lao PDR (June 2023) and Myanmar (March 2021). Data for short-term external debt are sourced from IMF Quarterly External Debt Statistics database and they are as of Q2 2023, except China, Thailand (Q1 2023), Laos, Myanmar and Vietnam (end-2021). Data for goods and services imports are sourced from either national authorities or IMF IFS database and they are as of Q2 2023, except Myanmar (Q3 2020). The size of the bubble denotes the relative amount of each economy's net international reserves in US dollars.

Figure 1.14. Selected ASEAN+3: Policy Rate Changes, 2022 and 2023
(Basis points)



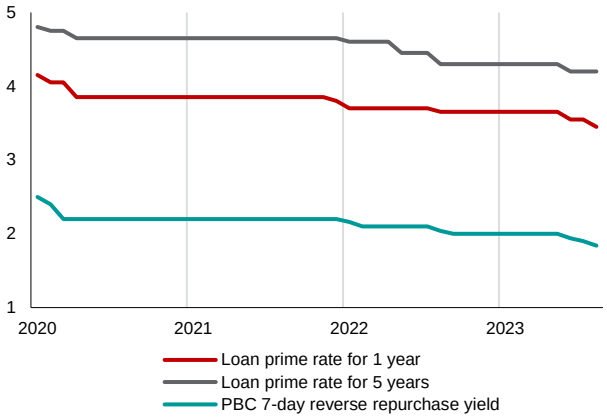
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: For Vietnam, we use the main refinancing rate. For Brunei, we use the standing facility lending rate. For Singapore, we use the overnight rate average. For China, we use the People's Bank of China (PBC) 7-day reverse repurchase yield. For Hong Kong, we use the Base Rate. Data for 2023 as of 31 October.

Figure 1.15. Selected Advanced Economies: Size of Balance Sheets of Central Banks
(Percent of GDP)



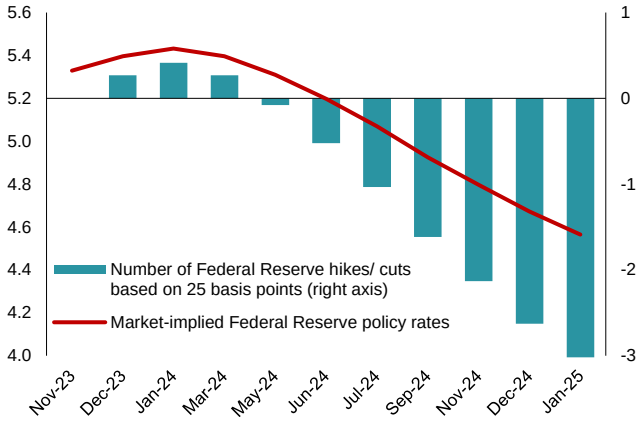
Source: Bloomberg Finance L.P.
Note: The size of the balance sheet as a percentage of GDP is reported as the month-end value of total assets divided by a four-quarter average of interpolated nominal GDP. Data as of September 2023. BOJ = Bank of Japan; Fed = US Federal Reserve.

Figure 1.16. China: Key Interest Rates
(Percent)



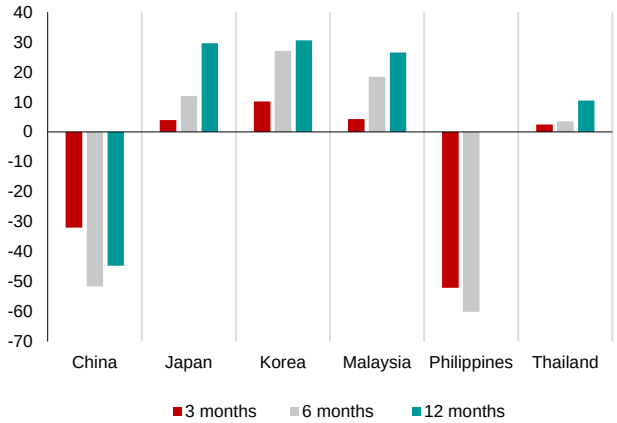
Source: People's Bank of China (PBC) via Haver Analytics
Note: Data as of October 2023.

Figure 1.17. US: Market-implied Policy Rates at Forthcoming FOMC Meetings
(Percent; number)



Source: Bloomberg Finance L.P.
Note: FOMC = Federal Open Market Committee. Data as of 31 October 2023.

Figure 1.18. Selected ASEAN+3: Market-implied Changes in Policy Rates
(Basis points)



Source: Bloomberg Finance L.P.; AMRO staff calculation
Note: Bars denote the cumulative changes in market-implied policy rates in a respective time horizon. We do not use the 12-month data point for the Philippines due to its pricing irregularities. Data as of 31 October 2023.

Portfolio investments ebb and flow

Emerging market (EM) portfolio inflows fell sharply in 2022 (Figure 1.19) as the Fed embarked on its monetary tightening cycle amid resurging inflation. Inflows into equity and debt markets fell sharply for most emerging markets. Notably, China's debt markets saw large outflows in 2022 (Figure 1.20), which have continued in 2023 despite the Fed easing its ultra-hawkish stance. Foreign interest in Chinese debt markets seems fixated on the spread against US Treasury yields, and its narrowing has made Chinese bonds less attractive to foreign investors. Optimism around China's reopening helped boost equity inflows in December 2022 and January 2023, but the growth momentum has since faltered. Recent market turbulence caused by concerns over the growth outlook, US-China tensions, and the property sector can lead to large outflows from Chinese equity markets.

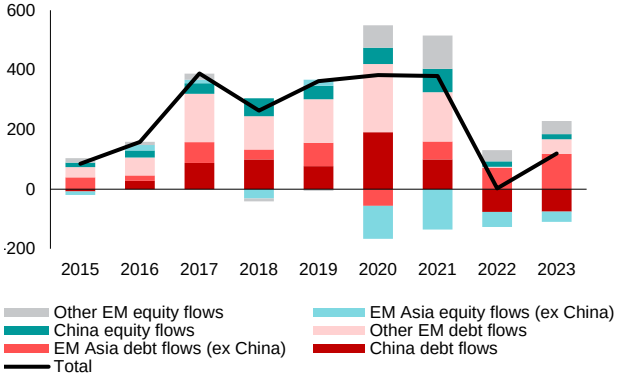
Outside China, the recovery in debt flows of ASEAN+3 markets has been strong but inflows into equity markets have eased. There was significant heterogeneity in the flow backdrop among ASEAN+3 markets through 2022 and 2023 (Figures 1.21 and 1.22). Since monetary policy was a key common driver across many economies other idiosyncratic factors led to the diverse volumes.

- The Bank of Thailand's delayed policy tightening (relative to regional peers) along with a reopening of the economy for tourists provided a favorable backdrop for equity and debt inflows in 2022 but the gradual shift toward hawkishness and political uncertainty drove outflows in 2023.

- Korean bond market inflows accelerated in 2023 amid expectations the Bank of Korea would ease monetary conditions. If the easing materializes, amid stable US interest rates, near-term returns of Korean bonds could outweigh the yield pickup provided by US Treasuries. The other important driver was sectoral developments, with equity outflows in 2022 and inflows in 2023 reflecting the performance of global tech stocks.

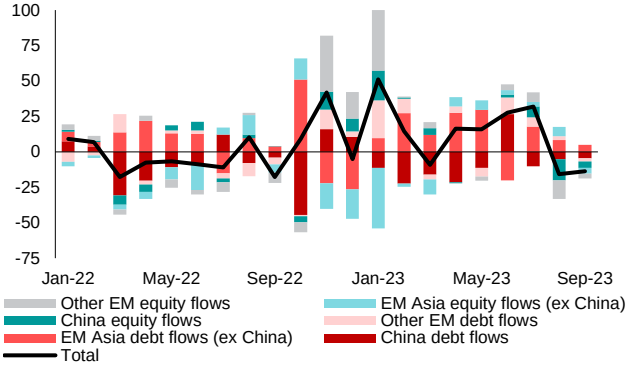
- Indonesia's strong equity inflows have reflected strong commodity prices. Valuations played an important role in determining flows into Indonesian and Malaysian bonds, both experienced outflows when valuations worsened in 2022 but that reversed in 2023 (Box 1.2).

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



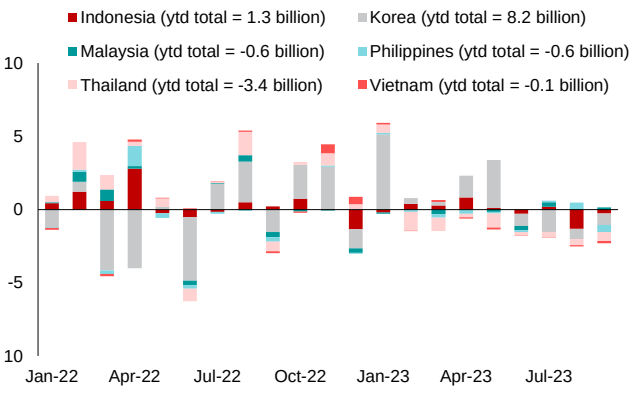
Source: The Institute of International Finance via Haver Analytics; AMRO staff calculations.
Note: Data for 2023 as of September 2023. EM = emerging market.

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



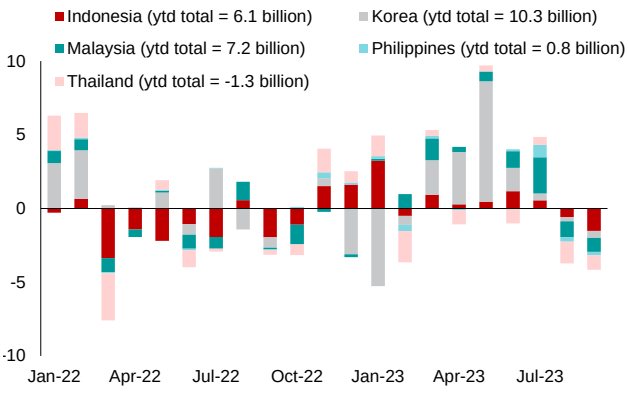
Source: The Institute of International Finance via Haver Analytics; AMRO staff calculations.
Note: Data for 2023 as of September 2023. EM = emerging market.

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



Source: National authorities; Bloomberg Finance L.P; Haver Analytics; AMRO staff calculations.

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



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 Philippines; and government and corporate bonds for other markets.

Box 1.2:

Valuations of Regional Equity and Bond Markets

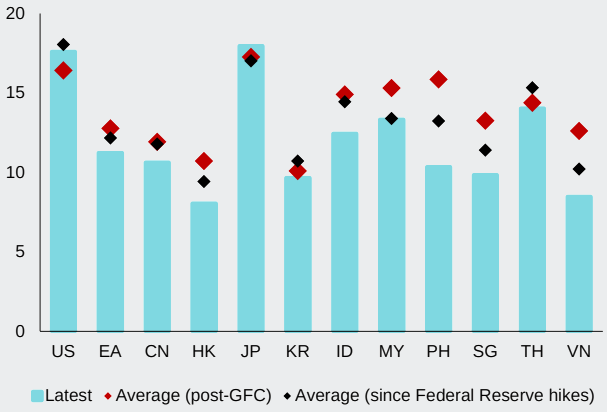
ASEAN+3 asset valuations have become more attractive amid a hawkish stance from the Federal Reserve.

- Equity market [1]: The US stock market's price-to-earning (P/E) ratio fell close to its post-Global Financial Crisis average in 2022 when the Fed maintained its ultra-hawkish stance. However, as that stance eased, equity markets recovered and helped P/E ratios improve. The current P/E ratio is higher than the average P/E seen after global financial crisis (Figure 1.2.1). On the other hand, US Treasury yields rose significantly and eroded the equity risk premium (Figure 1.2.2), which is now close to its lowest level since the GFC. Regional equity markets appear to be more attractive than their US counterparts. P/E ratios for most regional equity markets have not recovered as strongly as the US and are below their post-global financial crisis valuations. Most of these markets also provide a decent pickup over government bonds and should remain attractive to domestic investors.

- Bond markets: The sharp rise in US Treasury yields reduced the spread of local government bonds over US bonds (Figure 1.2.3), and has been among factors that also pushed regional bond yields higher (Box 1.1). The rise in US Treasury yields has been sharp enough that, barring Indonesia and the Philippines, ASEAN+3 10-year bond yields are now lower than the US and are much lower than the postcrisis average. However, since the US yield curve is inverted, foreign investors can hedge exposure to ASEAN+3 currencies for an additional yield pickup, which enhances yields on local currency bond investments (Figure 1.2.4).

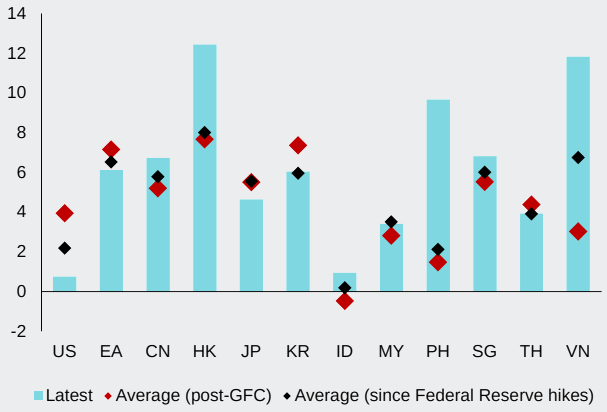
Valuations play an important role in investor decision-making but volatility in financial markets can override the valuation advantage for ASEAN+3 markets. ASEAN+3 equity and bond valuations appear attractive as compared to their own historical valuations and to US assets. However, valuations can benefit the assets only in periods of low market volatility. When volatility rises, the risk adjusted returns due to attractive valuations diminish and investors seek safer assets. In a low volatility environment, better valuations will be supportive of ASEAN+3 asset prices.

Figure 1.2.1. US, Euro area, and Selected ASEAN+3: Forward Looking Price-to-Earnings Ratio
(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. Data as of 31 October 2023.

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

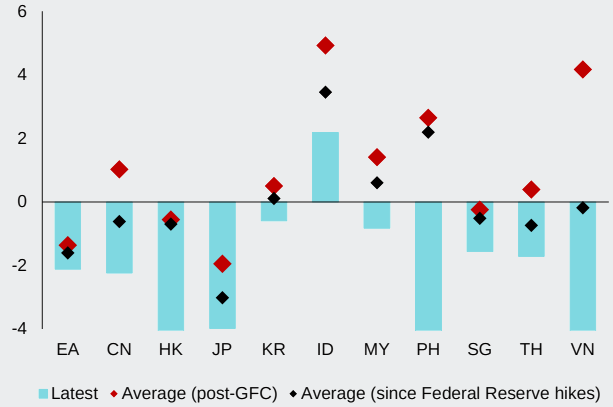


Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: The Equity Risk Premium is calculated as the difference between forward-looking earnings-per-share for benchmark equity indices of the respective markets and the domestic 10-year bond yield. EA = Euro area; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States; VN = Vietnam. Data as of 31 October 2023.

This author of this box is Prashant Pande.

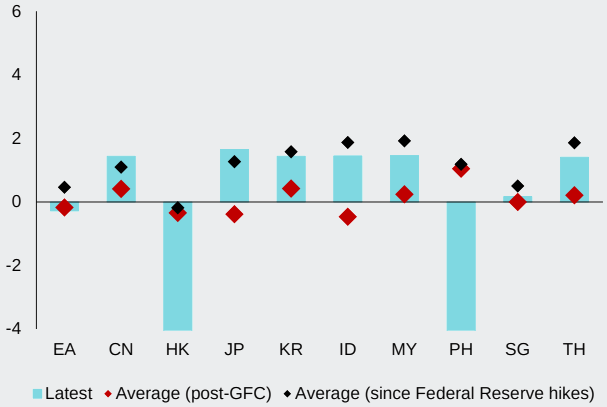
[1] Higher price-to-earnings ratio means that the stock is expensive; higher equity risk premium implies that the expected yield on the stock is more attractive than the government bond yield.

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; VN = Vietnam. Data as of 31 October 2023.

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 FX hedged for one-year using FX 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; VN = Vietnam. Data as of 31 October 2023.

II. Risks

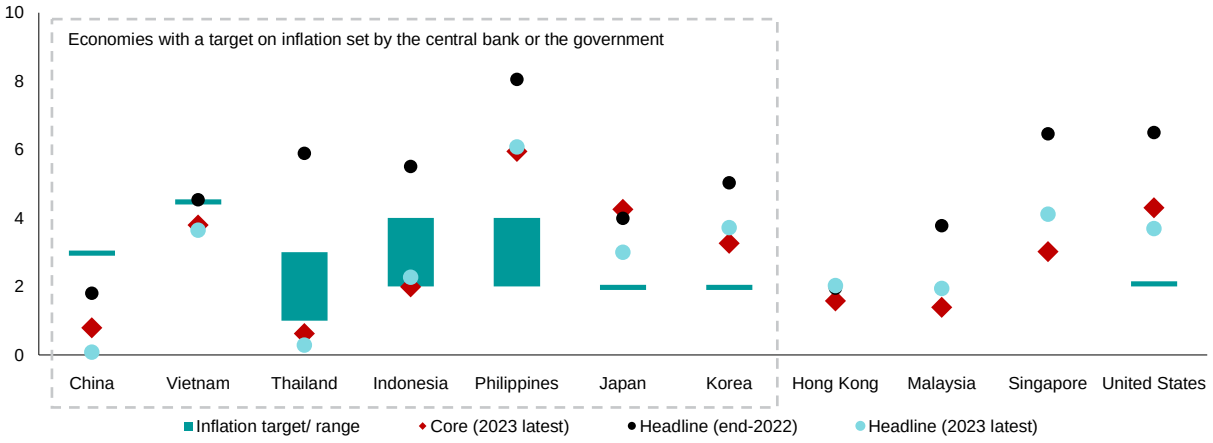
Inflation may persist and see a resurgence

Disinflation varied across economies in the region in 2023 (Figure 1.23). Headline inflation in 2023 has declined in ASEAN+3 after rising rapidly in 2022, though at a different pace across economies, while Indonesia and Thailand have brought headline inflations back to or below official target range, it remains above the price stability target in Korea, Japan, and the Philippines. China, which was little affected by global inflationary pressures in 2022, registered negative inflation in July 2023 but inflation turned positive in August before retreating to zero percent. Disinflation in core prices has also varied from economy to economy, depending on the degree of passthrough from headline inflation and second-round effects from wage growth and inflation expectations.

Against this backdrop, it is **still too early to claim victory over inflation in the region.** Upside risks to inflation remain. A tight labor market and the lagged effects of high inflation could push up wages and in turn spur inflation. The recent uptick in commodity prices (Box 1.3) poses another risk that could keep inflation high for longer.

A resurgence in inflation could put regional central banks in the challenging situation of having to balance multiple objectives in managing inflation, supporting economic growth, and ensuring financial stability. Inflationary pressure could arise from various sources such as exchange rate fluctuations, global commodity price increases, supply constraints (such as the result of weather-related issues), geopolitical tensions including the current one in the Middle East (which may exacerbate supply constraints and disrupt trade) and second-round inflation effects due to inflation expectations and nominal wage growth. Such a scenario might compel central banks to either intensify or maintain their restrictive monetary policies. This, in turn, would limit their flexibility to simultaneously support economic growth and financial stability. Furthermore, if major global central banks opt to tighten monetary policies in response to inflation, this could add to the headwinds faced for regional central banks trying to achieve a balance between controlling inflation and supporting growth.

Figure 1.23. Selected ASEAN+3: Headline and Core Inflation, Inflation Targets
(Percent)



Source: National authorities via Haver Analytics.
Note: Malaysia, Singapore and Hong Kong do not have an inflation target. Vietnam targeted a ceiling of 4.5 percent annual inflation in 2023. Headline and core inflation data for China, Japan, Korea, Indonesia, the Philippines, Thailand and Vietnam are as of September 2023. Data for the other economies are as of August 2023.

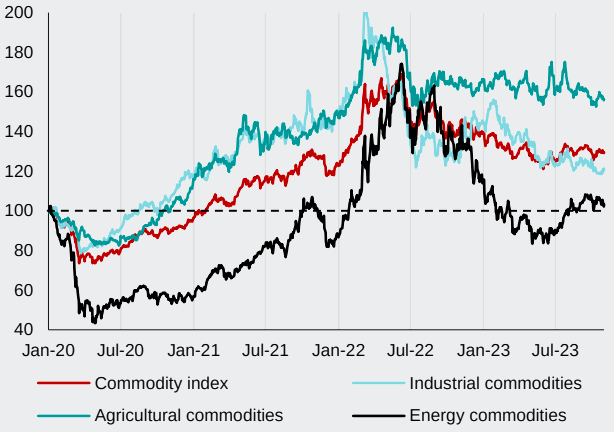
Box 1.3:

The Uptick in Commodity Prices

Commodity prices, in general, have eased since 2022. The surge in prices in 2022 was a combination of resurgent post-pandemic demand and supply chain disruptions. As these factors eased, commodity prices also normalized but have settled at levels much higher than pre-pandemic prices (Figure 1.3.1). The fall in commodity prices since mid-2022 has also been an outcome of poor demand outlook as markets positioned for weaker growth (even recession) as global central banks tightened monetary policy.

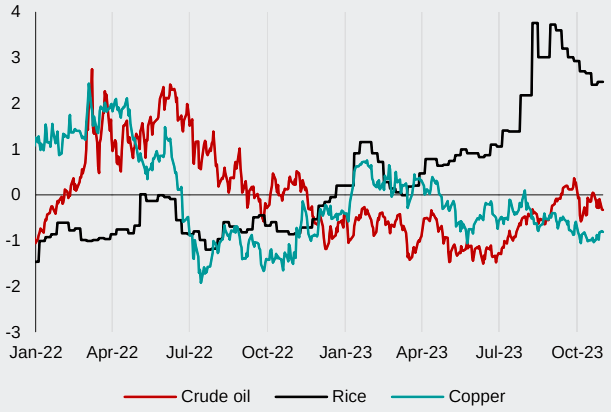
Looking at specific commodities (Figure 1.3.2), some price rises for crude oil and copper have occurred, while surges in rice prices are related to weather and an export ban from India. A continued resurgence cannot be ruled out as speculative net long positions are building (or net short positions are reducing) in some of these commodities (Figure 1.3.3). A closer look at oil prices shows the recent uptick is driven by supply side factors with minimal contributions from demand (Figure 1.3.4), which includes the geopolitical tensions which have increased since October 2023. Similarly, factors driving rice prices higher are related to weather conditions (Jadhav 2023), which have constrained supplies. Nevertheless, these commodity price rises can create inflationary pressures—or at the least decrease deflationary pressures—in the global economy.

Figure 1.3.1. Major Commodity Groups: Price Trends since 2020
(Index, 1 January 2020 = 100)



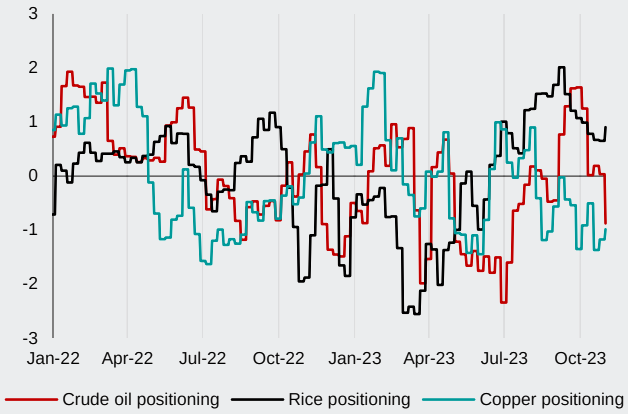
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: The indices are compiled by Bloomberg for broad categories of commodities. Data as of 31 October 2023.

Figure 1.3.2. Selected Commodities: Price Trends since 2022
(Z-score)



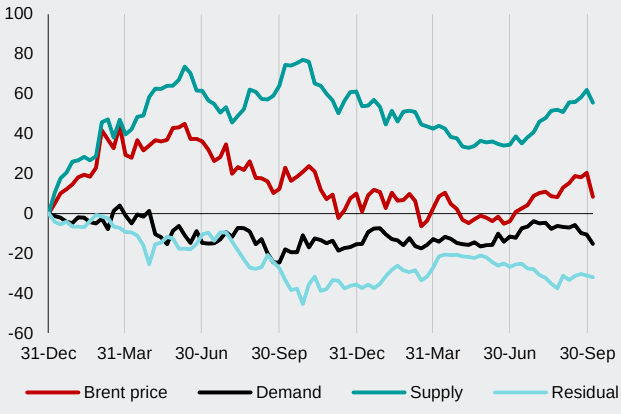
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: The first contract price is used for crude and copper prices, The price for rice used is based on white rice (5 percent) export price provided by Thailand's commerce ministry. The z-score is calculated for the prices from 1 January 2022 to latest. Data as of 31 October 2023.

Figure 1.3.3. Selected Commodities: Net Positions of Money Managers in Futures and Options
(Z-score)



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: Data as of 31 October 2023.

Figure 1.3.4. Oil Prices: Decomposition of Price Changes in Supply and Demand Factors
(Basis points)



Source: New York Federal Reserve; AMRO staff calculations.
Note: Data as of 31 October 2023.

The author of this box is Prashant Pande.

Markets may need to adjust to the "higher–for–longer" new normal

The Fed may be closer to the end of its tightening cycle but **the risk of further tightening cannot be dismissed** and uncertainty remains over how long interest rates will remain elevated. The market pricing for the Fed policy rate and its own projections show that the policy rate is close to (if not at) the peak. However, the risk of further hikes cannot be ignored. The Fed's policy rate projections have risen steadily since it embarked on a tightening path. An upward revision to projections in the June Federal Open Market Committee meeting came as a surprise, after the US regional bank turmoil in March when credit conditions would have tightened (Figure 1.24). Since then, the policy rate projection for end-2024 has been revised higher in September and a further upward revision in the projections cannot be ruled out given a strong US economy, robust labour market, and the risk of a resurgence of inflation. Even if the Fed pauses, markets will need to price out rate cuts in 2024. Momentum in the Fed dot plots suggests that the Fed may raise its forecasts for end-2024 policy rates, and currently implies a cut of about 50 basis points over 2024. The market will likely follow them.

Market evaluation of the Fed's reaction function has changed over the years. One recent trend in the interplay between market expectations and the Fed's policy rate forecasts has been the convergence between the two as markets chase the projections. From 2013 to 2017, markets typically would price in a less hawkish Fed stance than the Fed's median projections, and the actual interest rate rise was even lower. However, during 2017–2018 (the mid- and late- stages) of the 2015–2018 hiking cycle, the realized end-year policy rates were higher than both the Fed and market projections at the beginning of the year (Figure 1.25). The dovish bias of markets has re-emerged in the latest hiking cycle. Since mid-2022, markets have played catchup to Fed projections. Uncertainty around the policy decisions has also increased recently. The markets, on average, have lacked clarity on the extent of the central bank's hawkishness and typically have adjusted their expectations in the weeks before each policy meeting (Figure 1.26).

As markets realign to the "higher-for-longer" narrative, this can lead to increased market volatility. Such a scenario would make conditions unfavorable for strength in ASEAN+3 markets and could lead to an erosion of capital flows.

That said, while sustained high interest rates might appear to be problematic for ASEAN+3 markets, the situation is more nuanced. The US Treasury yield, decomposed into inflation expectations (a gauge of market evaluation of the macroeconomic backdrop of growth and inflation) and real yields (which reflect the US monetary stance) provides key insights:

- Data since late 2021 shows a decline in US inflation expectations that is less sharp than the rise in real yields (Figure 1.27). This suggests concerns over negative growth remain relatively steady relative to the more prominent effect of tightening monetary conditions.
- In the ASEAN+3 region, assets are more sensitive to inflation expectations than to real yields (Figure 1.28). Higher inflation expectations typically boost regional equities and currencies, while rising real yields generally weaken them. Rising inflation expectations and real yields both drive yields higher in regional bond markets.
- The relative steadiness of inflation expectations, combined with their higher influence on regional markets, has helped maintain market stability despite the breakneck pace of the Fed's rate hikes.
- A sudden economic downturn, which would push inflation expectations lower (as happened during the global financial crisis and early in the COIVD-19 pandemic), is likely to be more disruptive for markets than the Fed's monetary tightening. However, the likelihood of such a downturn has lessened due to recent robust US economic data, making a "higher-for-longer" interest rate scenario more probable.

Fed's Policy Rates: Comparison of Market and Fed's Projections

Figure 1.24: Market and Fed's Projected Policy Rates since the Fed's Hiking Cycle Started
(Percent)

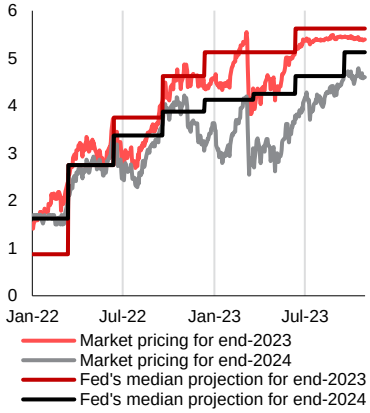


Figure 1.25: Projected (at the Start of Year) versus Actual (at the End of Year) Policy Rates
(Percent)

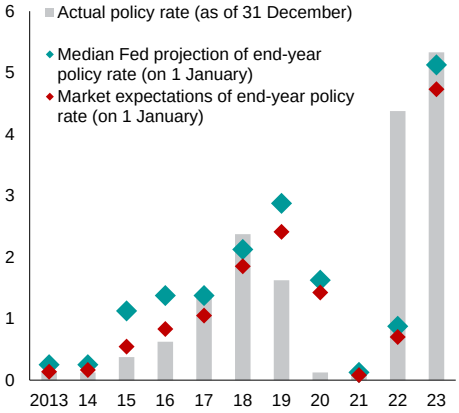
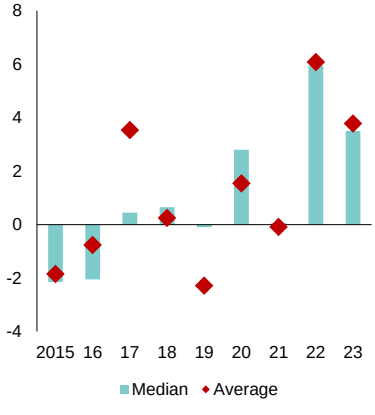
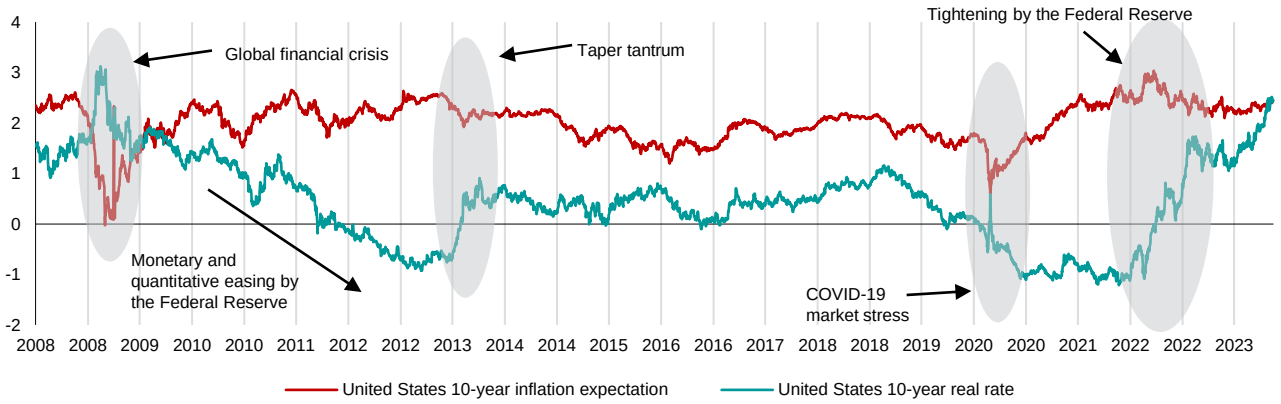


Figure 1.26: Intra-Meeting Change in Market Projections
(Basis points)



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 2023 is as of 31 October 2023.

Figure 1.27. US: Inflation Expectations and Real Rates since 2008
(Percent)



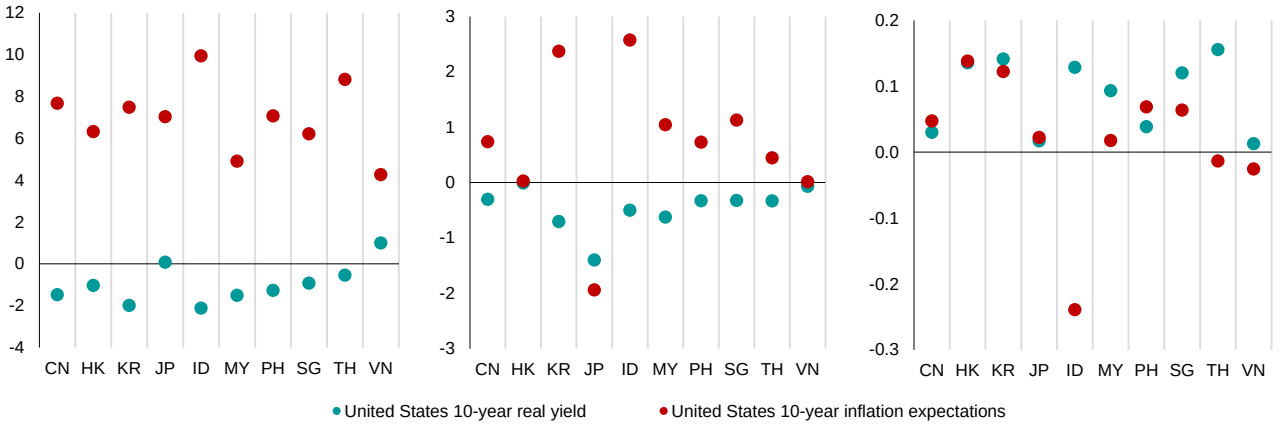
Source: Bloomberg Finance L.P.
Note: Data as of 31 October 2023.

Figure 1.28. Selected ASEAN+3: Sensitivity of Asset Prices to US Inflation Expectations and Real Yields

Equity
(Percent)

Foreign exchange (against US dollar)
(Percent)

Government bond yields
(Percentage points)



Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: The sensitivity is calculated using daily changes of ASEAN+3 assets (log changes for equity indices, exchange rate against the US dollar, and change in bond yields) and the daily change in US Treasury 10-year yield components (real yield and inflation expectations) using data from 1 January 2020 to the latest available. The changes in asset classes are estimated for a 100-basis points change in the US Treasury 10-year yield components. The exchange rate against the US dollar denotes the value of each currency in US dollar terms. Hence a positive [negative] sensitivity denotes a stronger [weaker] regional currency when the underlying yield component rises. The equity indices used for the analysis are Morgan Stanley Capital International (MSCI) economy-level indices.
CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam. Data as of 31 October 2023.

ASEAN+3 markets have avoided US and Europe banking stress but risks linger

Significant stress hit the banking sector in some advanced economies in March, particularly among US regional banks. This led to the collapse of Silicon Valley Bank, Signature Bank, and the liquidation of Silvergate Bank, followed by First Republic Bank's collapse in late April. These events also hurt Credit Suisse, a Global Systemically Important Bank (G-SIB). Though idiosyncratic factors contributed to each bank's failure, the Fed's tightening cycle was the common catalyst. These failures caught markets off guard and created a domino effect that started with Silicon Valley Bank. To mitigate widespread impact, the Fed and Swiss National Bank intervened promptly, aiming to curb risk aversion and market volatility.

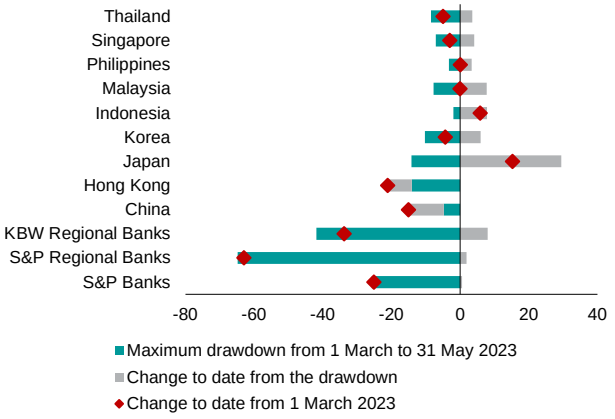
The banking turmoil caused significant turbulence in global markets, including ASEAN+3, although the recovery was also rapid. These ruptures raised significant concerns about the health of the banking system across the world and, triggered a sharp fall in banking stocks. Shares of ASEAN+3 financials fell because of the knock-on effects on asset prices via increased investor risk aversion. The drawdown in most ASEAN+3 financial indices was limited compared with US counterparts (Figure 1.29) and some are now stronger than that before the turmoil.

However, the lack of recovery in US' banking stocks indicates that investors remain concerned about the financial sector. Analysis shows that **market betas for US banks** have surged since the banking turmoil (Figure 1.30, Box 4.1) while those in ASEAN+3 banks have remained stable. It indicates that the markets see US banks as much riskier now than before the turmoil. One of the more visible risks arises from weakness in corporate real estate, which can cause further stress in US small- and mid-sized banks (Azhar and Tracy 2023). There is a risk that contagion from

these banks will spread to ASEAN+3, more from the investor sentiment channel than direct linkages.

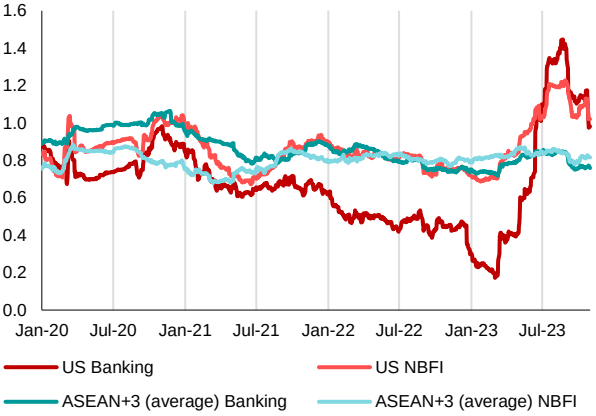
Turning to ASEAN+3, the banking system appears more resilient to factors that led to the collapse of US regional banks. These factors include: (i) business concentration risk on both the asset and liability sides; (ii) forced recognition of marked-to-market losses on hold-to-maturity securities; (iii) inadequate deposit insurance; and (iv) rapid deposit withdrawals. ASEAN+3 banks generally maintain a higher proportion of stable fixed deposits than those in the US and other advanced economies (Figure 1.31). More liquid current and savings deposits have sizeable share of retail deposits, which are usually more stable than institutional deposits. Due to a stronger focus on lending, they also hold a lower percentage of total assets in securities investments, which cuts their exposure to marked-to-market losses (Figure 1.32). Nevertheless, authorities are aware of the importance of deposit insurance and some have raised or are considering raising the insurance limits.

Figure 1.29. US and Selected ASEAN+3: Drawdown and Recovery in Banking and Financial Index after the Banking Turmoil
(Percent, log returns)



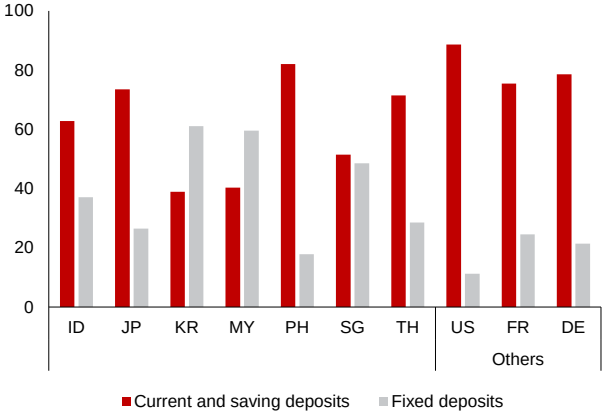
Source: Bloomberg Finance L.P; AMRO staff calculations.
Note: MSCI Financial Indices have been used for ASEAN+3 economies. KBW = Keefe, Bruyette, and Woods; S&P = Standard & Poor's. Drawdown refers to the change in index from 1 March 2023 to the trough in the index before 31 May 2023. The change to date is the change from the lowest level seen between 1 March 2023 and 31 May 2023 to the latest level (as of 31 October 2023).

Figure 1.30. US and ASEAN+3: Market Betas for Banking and NBFI Sectors.
(Index)



Source: Bloomberg Finance L.P; AMRO staff calculations.
Note: ASEAN+3 (average) is the simple average of the market betas for China, Hong Kong, Japan, Indonesia, Korea, Malaysia, Philippines, Singapore, and Thailand. NBFI = nonbank financial institution; US = United States. Latest level as of October 2023.

Figure 1.31. Selected ASEAN+3 and Selected Advanced Economies: Share of Banking Sector Loans and Securities, Q2 2023
(Percent of total assets)



Source: IMF International Financial Statistics via Haver Analytics; AMRO staff calculations.
Note: Fixed deposits for the US are represented by the share of large time deposits (time deposits in denominations of USD 100,000 or more). DE = Germany; FR = France; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States. Data for Korea as of Q2 2022.

Figure 1.32. Selected ASEAN+3: Composition of Deposits, Q2 2023
(Percent of total deposits)

Source: IMF International Financial Statistics via Haver Analytics; AMRO staff calculations.
Note: BN = Brunei; ID = Indonesia; KR = Korea; MY = Malaysia; PH = Philippines; TH = Thailand. Data for Philippines as of Q1 2023.

US dollar funding remains ample though is receding at the margin

Most headline indicators show US-dollar onshore liquidity to be plentiful. The Fed's balance sheet, though shrinking, is still almost twice the size as before the pandemic (Figure 1.33). Surplus liquidity is evident in the amount of bank reserves parked with the Fed, which have receded slightly but remain at elevated levels. Funds placed in the central bank's overnight reverse repo program are also close to record highs. The spreads (Figure 1.34) have stabilized after the recent stress in banking sector and although higher interest rates have made it costlier to procure funds, the normalization of spreads shows that the premium charged to compensate for uncertainties has stabilized.

However, market mechanics reveal that a US dollar funding crunch cannot be ruled out. Previous instances of such stress have been attributed to either US monetary policy tightening, as seen in the Fed's 2022 hiking cycle, or spikes in safe-haven demand for the dollar during periods of market uncertainty, such as the US banking crisis in March 2023 and the pandemic-triggered stress in March 2020. An exceptional case occurred in September 2019 amid falling bank reserves. That squeeze was set off by a confluence of quarterly corporate tax payments drawing funds from bank and money market accounts to transfer into the Treasury's Fed account, and the US Treasury issuing USD54 billion of long-term debt. The current situation bears similarities: the Fed's balance sheet, bank reserves, and its Reverse Repurchases are all tapering off. Moreover, since the debt ceiling was lifted in June 2023, US Treasury issuances has increased markedly. The inventory held by primary dealers is also rising, mirroring conditions in September 2019 (Figure 1.35), which could add stress to the repo market (Anbil and others 2020).

The Fed has sufficient tools to mitigate domestic dollar funding stress. In every instance of such stress since 2019, except during the 2022 rate-hiking cycle (Figure 1.36), the Fed has intervened using a variety of measures. These include emergency repo operations, rate adjustments like interest over excess reserves and reverse repurchase agreements, Treasury purchases through Quantitative Easing, and specialized lending facilities. These notably eased the March 2023 banking crisis. Banks have used both the Fed's discount window and the new Bank Term Funding Program (BTFP), with the latter still in use, possibly due to lingering bank liquidity problems. Thus, the Fed is well-equipped to manage domestic liquidity.

Compared with the US domestic situation, **the global landscape for dollar funding may pose greater challenges.**

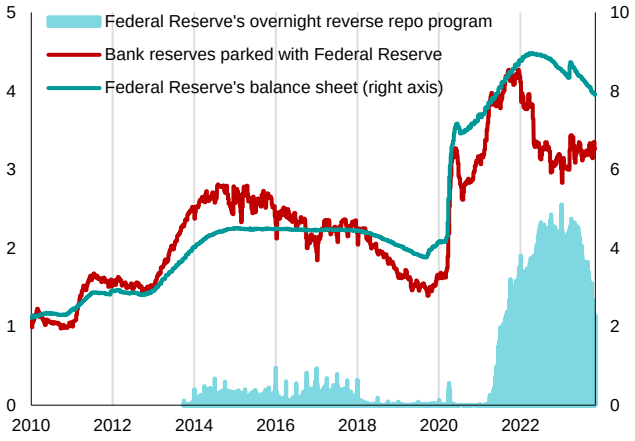
- Stress episodes in global funding markets have been more frequent than in the US, with prolonged high dollar funding costs after the pandemic and another spike in November 2021 (Figure 1.37). While these did not trigger major financial spillovers, they suggest that global and US domestic funding conditions can diverge. For example, it took months for the global US dollar funding shortage to resolve after the COVID-19 shock of March 2020. The yen cross-currency swap was notably impacted during these stress periods.

- Market concerns have increased with regard to counterparty risks among major banks offering dollar funding, especially for lower-rated institutions. Heightened risk aversion can affect both banks and nonbank financial institutions (NBFIs) with lower credit ratings, particularly during periods of stress. Regional central banks can attempt to calm widespread stress, yet may hesitate to in supporting lower-rated entities over a desire to avoid creating moral hazard.

Within the ASEAN+3, reliance on US dollar funding is a direct result of dollar dominance in global finance. The US dollar has a dominant role in global financial markets as vehicle currency, at 88 percent of FX trading (BIS 2022); as a reserve currency comprising 59 percent of all global FX reserves (IMF COFER 2023); as a medium of exchange, at 41.7 percent of SWIFT transfers, and as a unit of account for more than 70 percent of trade invoicing outside Europe (Baxter 2023). Though the share of US dollars in some of these roles has decreased over the past couple of decades, it remains much higher than other currencies. The ASEAN+3 region is no different. Beyond these functions, reliance on the US dollar is apparent in other parts of the financial system. Entities based in ASEAN+3 economies account for 35 percent of US treasuries held outside the US and are equal to 43 percent of the FX reserves of ASEAN+3 monetary authorities as of August 2023. (Figure 1.38). Moreover, within ASEAN+3, the US dollar remains the currency of choice for the overseas businesses of banks and in corporate bond sales denominated in foreign currencies (Figures 1.39 and 1.40).

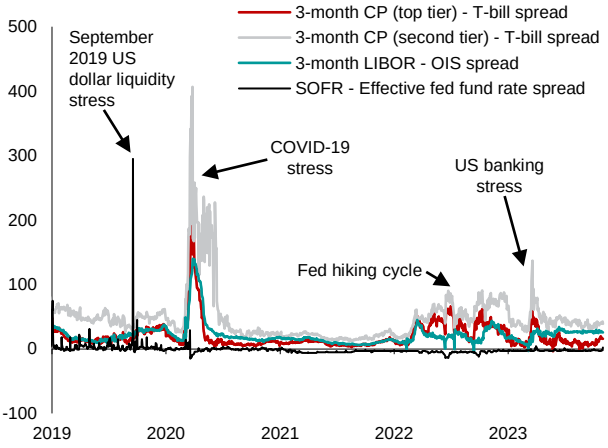
ASEAN+3 authorities have tried to address the overreliance on the US dollar, but there is still a long way to go. The authorities have **promoted the use of local currencies** in regional payment systems (Table 1.1), entered into various bilateral swap agreements (Figure 4.31 in Chapter 4), and established regional financing arrangements, which can help address US dollar liquidity shortages, balance of payment difficulties, and instil market confidence**.** However, progress on local currency uses has been slow as US dollar dependence is entrenched through international contracts, wide use of the US dollar in international payments for trade and financial transactions, and the deep financial markets in US dollar assets. ASEAN+3 authorities see the entrenched use of the US dollar as the biggest challenge in reducing its dominance.

Figure 1.33. US: Proxies for Surplus US Dollar Liquidity
(Trillions of US dollars)



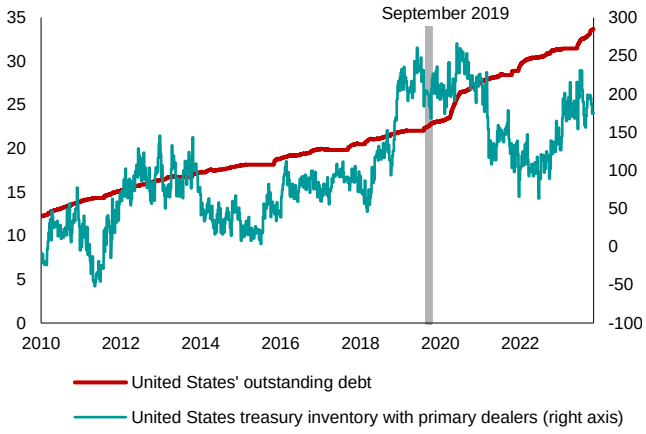
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: Data as of 31 October 2023.

Figure 1.34. US: Selected Interest Rate Spreads
(Basis points)



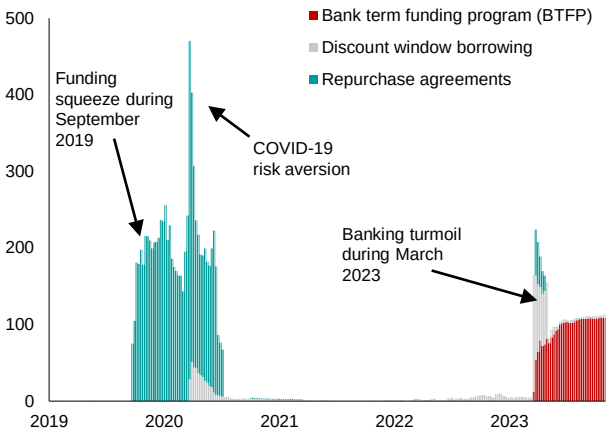
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: CP = commercial paper; LIBOR = London interbank offer rate; SOFR = Secured overnight financing rate; T-bill = treasury bill. Data as of 31 October 2023.

Figure 1.35. US: Outstanding Public Debt and US Treasury Inventory with Primary Dealers
(Trillions of US dollars; billions of US dollars)



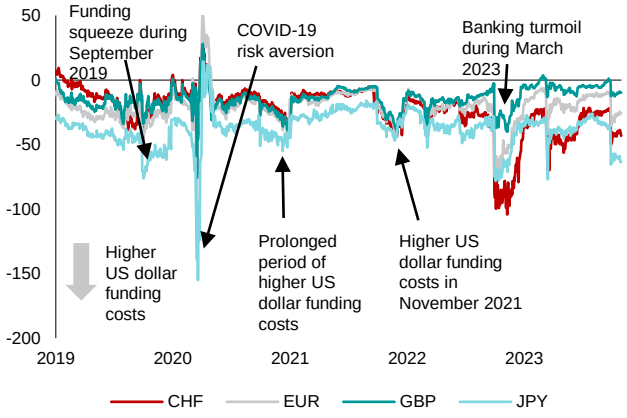
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: Data as of 31 October 2023.

Figure 1.36. US: Selected Liquidity Facilities Provided by the Fed since 2019
(Billions of US dollars)



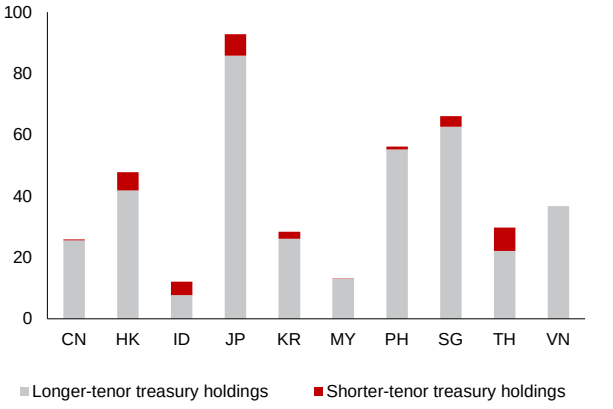
Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: Data as of 31 October 2023.

Figure 1.37. Selected Major Currencies: Cross Currency Swaps
(Basis points)



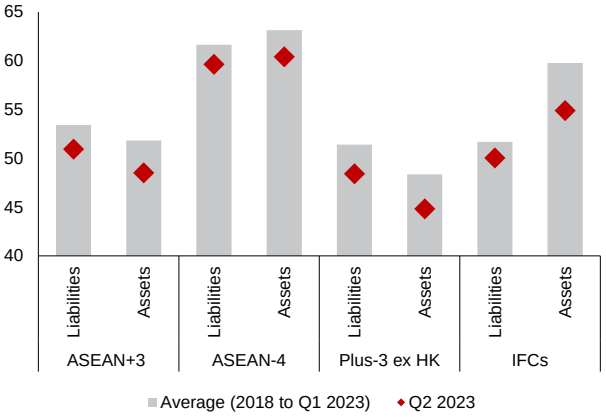
Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations. CHF = Swiss franc; EUR = euro; GBP = Pound sterling; JPY = Japanese yen. Data as of 30 October 2023.

Figure 1.38. Selected ASEAN+3: US Treasuries Held by Entities based in ASEAN+3
(Percent of foreign reserves)



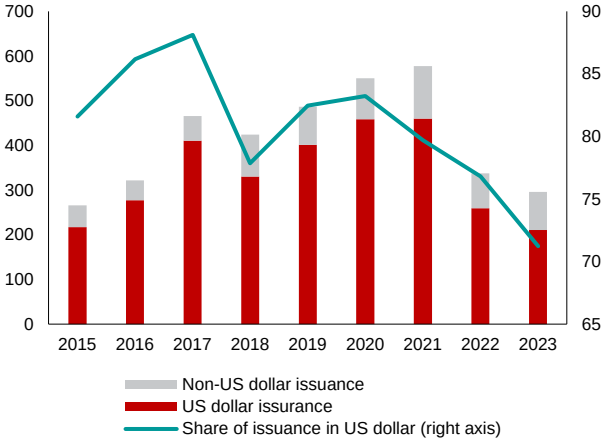
Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam. Data as of August 2023.

Figure 1.39. ASEAN+3: Share of US Dollars in External Assets and Liabilities of Banks
(Percent)



Source: Bloomberg Finance L.P.; Haver Analytics; AMRO staff calculations.
Note: ASEAN-4 = Indonesia, Malaysia, Philippines and Thailand; Plus-3 ex HK = China, Japan and Korea; International financial centers (IFCs) = Hong Kong (HK) and Singapore.

Figure 1.40. ASEAN+3: Share of US Dollars in Foreign Currency Bond Issuances
(Billions of US dollars, percent)



Source: Cbonds; AMRO staff calculations.
Note: Data for 2023 as of 31 October.

Table 1.1. ASEAN+3: Local Currency Promotion Schemes

Objectives	Modalities	Schemes
Providing flexibility in local currency transactions	Relaxing FX regulations for local currency transactions to lower transaction and regulatory costs, such as by waiving documentation requirements	• The Local Currency settlement Framework • Use of Appointed Cross Currency Dealers
Ensuring liquidity of local currencies	Liquidity support/backstop facilities	• Bilateral Swap Arrangements
Reducing conversion costs	Direct exchange rate quotation between local currencies to enhance price discovery and competition among banks	• Direct quotation
Enhancing the convenience of using local currencies	Cross-border payment connectivity and system interoperability	• Payment system linkages • Unified QR code payments

Source: National authorities; ASEAN+3 Finance Process Study Group 1 (2020)

Technological advancements present new opportunities and challenges

While technology has greatly improved financial system efficiency, it also creates new challenges for policymakers. Innovations have notably reduced transaction costs, sped up processes, and expanded financial access, all while making the system more resilient and transparent (AMRO 2023c). However, these advances introduce vulnerabilities. For example, the rapidity and ease of transactions allowed depositors in Silicon Valley Bank to withdraw over USD40 billion in a single day on 9 March, 2023, with an additional USD100 billion expected the following day, leading to its immediate closure (Federal Reserve 2023). Signature Bank suffered a dramatic loss of 20 percent of deposits in one day (Reyes 2023).

New communication channels can fuel financial contagion. While the unprecedented pace of deposit outflow allowed bank runs to happen, social media platforms were significant in spreading panic among depositors. Shares of the top trending banks on Twitter (now known as X) declined the most and those banks saw most outflows in the first quarter of 2023 (Cookson and others 2023). The social media site Reddit also played a part in the short squeeze of the so-called meme stocks like Gamestop and AMC Entertainment in January 2021 (Costola and others 2021). This short squeeze caused unwarranted volatility in broader markets.

The rising popularity of digital assets as an alternative asset class could threaten financial stability in the coming years. While spillovers to the real economy have been limited, the linkages have strengthened over the years. Digital assets will have increased influence on financial markets and on the financial system (Box 1.4).

Box 1.4:

Cryptocurrencies and Banking Sector Connectedness

The crypto ecosystem, which comprises cryptocurrencies, crypto platforms, stable coins, and smart contracts, has grown rapidly since its inception in 2009 (BIS 2023). Crypto holds the promise of improving the efficiency of the financial system by reducing transaction costs, streamlining settlement and record-keeping, decentralizing financial transactions, and deepening financial inclusion. However, there are serious concerns that realization of risks in the crypto ecosystem could spill over to the traditional finance. These risks are related to structural flaws in the ecosystem, such as fragmentation and congestion of validation processes that make it vulnerable to manipulation and runs (IMF 2022, BIS 2023).

Idiosyncratic shocks can spread widely and quickly in the crypto universe and, as its integration with the financial system continues, may lead to systemic risks. The Crypto Winter[1] spread widely as crypto firms faced a run by the users given that they are not backed by a lender of last resort (Brainard 2022). The failures did not have major repercussions outside of crypto. However, crypto firms are expanding into lending and borrowing services while banks gradually increase their cryptocurrency holdings driven by growing demand from clients. Banks' involvement in crypto activities is modest at present but could scale up rapidly (Auer and others 2022).

Limited understanding of the linkages and connections between the crypto ecosystem and the financial system could impair proper macroprudential management of crypto risks. Connections between the two systems could quickly evolve, mirroring mainly innovations and technological developments. Without a clear picture of the sources of risk and what firms or markets might be affected, it is difficult if not impossible to assess nascent threats, identify systemically important firms, review and broaden the perimeter of regulation, and design and implement adequate regulatory and supervisory frameworks.

Dynamic connectedness[2] between cryptocurrencies and global systemically important banks (G-SIBs) confirm the views of policy makers and markets that the traditional financial system and the crypto ecosystem have been mostly insulated from each other to date. The total connectedness, or spillovers, from cryptocurrencies to the G-SIB system is calculated as the sum of the cryptocurrencies' connectedness measures to each of the G-SIBs and normalized to values such that a value of 1 if the cryptocurrencies fully explain the forecast variance of the G-SIBs, and 0 if they explain none of it (Figure 1.4.1). Connectedness has been relatively small, seldom exceeding 4 percent when averaged across all G-SIBs. Periods during which connectedness peaked, though remaining significantly small, tend to coincide with periods of high market distress , such as the months preceding Brexit and the start of the COVID-19 pandemic in early 2020.

Connectedness measures show that the G-SIBs, on aggregate, have a larger impact on cryptocurrencies than the other way around. As a sector, the total connectedness from G-SIBs, on each cryptocurrency, Bitcoin and Ethereum, could take values of [0,1] (Figure 1.4.2), with the value 1 reached when all the G-SIBs combined fully explain the forecast variance of the cryptocurrencies. G-SIBs exert strong influence on cryptocurrencies and in several episodes, explain as much as 80 percent of the forecast variance of each cryptocurrency. The G-SIBs' connectedness dynamic is very similar to that of cryptocurrencies' connectedness. Both connectedness measures point to a sharp decoupling between G-SIBs and cryptocurrencies in early 2023, following the Crypto Winter.

The G-SIB system has been mostly connected within itself but substantial spillovers could occur from a single bank to cryptocurrencies. Maximum connectedness to a cryptocurrency during the sample period averaged less than 5 percent but in certain cases, such as in late 2015, exceeded 30 percent. G-SIB connectedness to cryptocurrencies (Figure 1.4.3), is driven mainly by connectedness from multiple G-SIBs to cryptocurrencies. Maximum connectedness between a pair of individual G-SIBs could range between 0.07 and 0.30, with an average value of 0.20 over the study sample. During 2015–23, US-based G-SIBs, followed by European G-SIBs, were the major sources of spillovers.

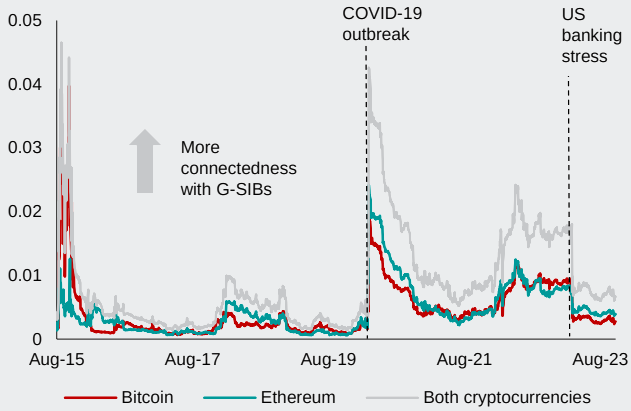
This box is authored by Jorge A. Chan-Lau with inputs from Toàn Long Quách and a review by Li Lian Ong.

[1] Failures of several stable coins and crypto firms in 2022 and 2023

[2] We examine the dynamic connectedness between cryptocurrencies and global systemically important banks using the time-varying parameter VAR (TVP-VAR) approach of Antonakakis, Chatziantoniou and Gabauer (2020), referred henceforth as ACG, to a sample that includes the two main crypto currencies, Bitcoin and Ethereum and 29 publicly listed global systematically important banks (G-SIBs) as designated by the Financial Stability Board (2022). The ACG approach is applied using daily log-returns of the cryptocurrencies and the G-SIB equity prices over the period 10 August 2015 to 16 June 2023. The TVP-VAR connectedness measures are calculated from a 1-day lag TVP-VAR assuming a 20-day forecast horizon. Results are not significantly different for other forecast horizons.

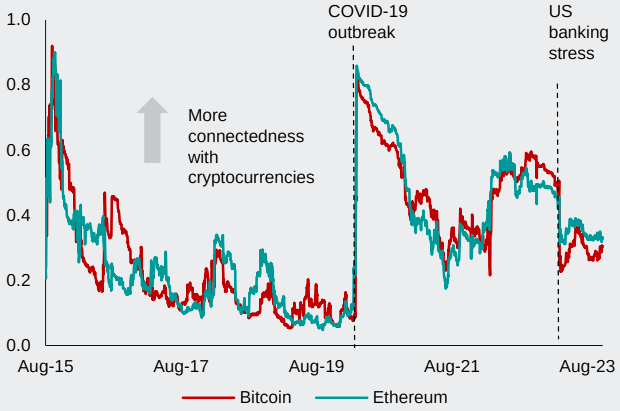
Weak connections between the crypto ecosystem and the G-SIB system suggest room for strengthening the regulatory framework before both systems integrate. Recent banking system turmoil, driven in part by policy rate hikes, calls for reevaluating the effectiveness of some regulatory measures and practices put in place after the global financial crisis of 2008-09. Meanwhile, staff at the Bank for International Settlements recommend options to address crypto risks and potential spillovers to the traditional financial system. These include banning specific activities, isolating crypto from traditional financial systems, and regulating crypto activities in a similar way to traditional financial activities (Aquilina and others 2023). Likewise, International Monetary Fund recommends to reduce macro risks by safeguarding the primacy of sovereign currencies over cryptocurrencies, not granting crypto assets legal tender status, and enacting tax policies that treat crypto assets without ambiguity (Adrian and others 2023).[3] Furthermore, the regulatory framework also needs to keep pace with technical advances in the crypto ecosystem as they could create significant vulnerabilities, particularly around decentralized finance and its applications, including for central bank digital assets (Capponi and others 2022; Chen and others 2022).

Figure 1.4.1. Cryptocurrencies Connectedness to G-SIBs
(Index, range between 0 to 1, with 1 indicating the maximum connectedness)



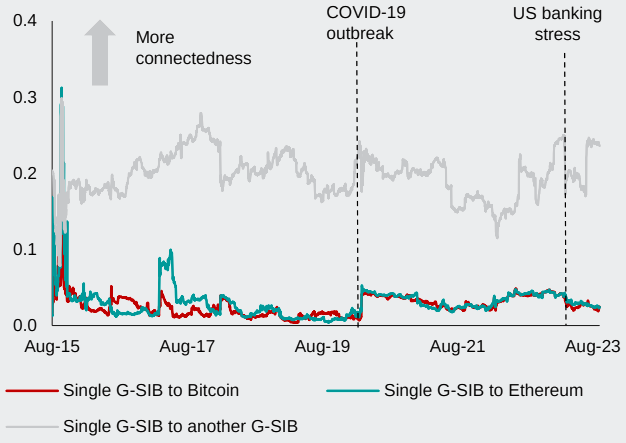
Source: CoinGecko; Bloomberg Finance L.P.; AMRO staff calculations.
Note: Data as of 31 October 2023.

Figure 1.4.2. G-SIBs Connectedness to Cryptocurrencies
(Index, range between 0 to 1, with 1 indicating the maximum connectedness)



Source: CoinGecko; Bloomberg Finance L.P.; AMRO staff calculations.
Note: Data as of 31 October 2023.

Figure 1.4.3. Single G-SIBs Maximum Connectedness to Cryptocurrencies and Another G-SIB
(Index, range between 0 to 1, with 1 indicating the maximum connectedness)



Source: CoinGecko; Bloomberg Finance L.P.; AMRO staff calculations.
Note: Data as of 31 October 2023.

[3] For a summary of official initiatives on crypto regulation, see the online appendix to Aquilina, Frost and Schrimpf (2023).

II. Policy Discussion

"Not how well you see in clear weather but how well you see in foggy weather that determines how better you are than others!"

Mehmet Murat İldan, novelist

Central banks should continue to prioritise price stability, carefully calibrating their policy paths based on domestic and external conditions. Despite market expectations that the Fed's tightening phase is near an end, the risk remains that unanticipated inflation shocks could compel the Fed to raise and maintain higher policy rates longer than expected. Given the varied impacts of the Fed's actions on ASEAN+3 economies (Box 1.5), central banks must calibrate their policies according to domestic circumstances:

- For economies that still have high inflation and robust growth, especially those with sticky core inflation, maintaining the current tight policy stance is prudent for bringing inflation down durably to the official target while preserving the policy buffer against future shocks.

- For economies with faltering growth momentum and a relatively benign inflation outlook, a shift in monetary policy stance to support economic growth may be warranted.

- For economies facing a delicate trade-off between inflation control and growth support, additional policy measures may be needed. In such cases, monetary policy should be used to contain inflation and support growth in coordination with other non-monetary measures, such as macroprudential policies, supply side measures, or fiscal policies.[6]

As liquidity stress could continue to surface in both bank and nonbank financial sectors, monetary authorities should stand ready to provide liquidity support when needed. While banks in the region are generally sound given their strong capital buffers and ample liquidity, some smaller and regional banks could still be hit by liquidity pressure. Central banks therefore should ensure regular liquidity facilities are available[7]. Nonbanks could face higher liquidity stresses than banks due to their higher leverage and vulnerability to liquidity and maturity mismatches. An example is the run on a branch of a nonbank financial institution in Korea in June 2023 due to a rise in nonperforming loans tied to real estate projects. Given the growing role of NBFIs in credit and liquidity provision, and dollar funding in the region (Chapter 4), authorities may need to strengthen NBFI regulatory, supervisory, and risk management frameworks. In a systemic crisis where these lines of defense prove to be insufficient, authorities should be prepared to provide temporary liquidity support to NBFIs in distress during monetary tightening to avoid spillovers to other financial institutions and maintain the orderly function of money markets[8]. This should be done through carefully designed credit lines that avoid encouraging moral hazard.

Monetary and financial stability can be compatible at the current juncture. While fighting inflation remains a priority, especially for economies adopting an inflation-targeting regime, central banks should also persist with efforts to preserve financial stability. For instance, financial conditions can be eased to mitigate liquidity stress effectively while maintaining a restrictive policy rate. Some cases illustrate this point. The Bank of Korea, together with other authorities, provided liquidity lines to security companies during rate hikes cycle amid market turmoil in late 2022. In the Philippines, Bangko Sentral ng Pilipinas cut the reserve requirement ratio to ease liquidity conditions on alternative modes of compliance with reserve requirements by June 2023[9] but kept the policy rate unchanged in June 2023. When the trade-off between price and financial stability is harder, concerted efforts involving fiscal and prudential measures from other authorities may be needed to allow central banks to focus on inflation control. Careful and proactive communication with markets is paramount in this process to avoid any misunderstanding.

ASEAN+3 central banks should continue to be ready to provide temporary US dollar liquidity support to financial markets during times of stress. Japan is the only regional economy to have a permanent swap line with the Fed. However, during the pandemic US dollar funding squeeze, the Fed introduced emergency swap lines and the Foreign and International Monetary Authorities (FIMA) Repo Facility to alleviate stress in global markets. Backed by these, monetary authorities in Japan (using permanent swap line), Hong Kong (FIMA facility) Korea, and Singapore (using emergency swap lines) introduced US dollar liquidity facilities to give dollar liquidity assistance to banks. While the emergency facilities have since closed,

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[6] Although the biggest burden of fighting inflation falls on monetary policy, other non-monetary measures can also provide some support. In the ASEAN+3 region, both price and income support measures were used to hold down inflation so that monetary policy could remain accommodative. Such measures continue to be used selectively and are targeted at those who are most affected while keeping an eye on the fiscal costs (Hong and others 2023).

[7] A case in point was the National Bank of Cambodia which introduced a marginal lending facility (MLF), as an element of ceiling rate in an interest rate corridor system, in September 2021 to provide short-term Cambodian riel liquidity to banks and microfinance institutions in emergency situation to carry out their business operations.

[8] As an example, the Bank of Korea announced to extend its liquidity lines to nonbank financial institutions in July 2023.

[9] Please refer to BSP Press Release on "BSP Reduces" Reserve Requirements" for further information. https://www.bsp.gov.ph/SitePages/MediaAndResearch/MediaDisp.aspx?ItemId=6743

the FIMA is now a standing facility. Most ASEAN+3 central banks have generally built sufficient FX reserves, largely in US Treasuries, which can be used to access the FIMA facility. Regional authorities can step into funding markets to provide temporary liquidity support to avoid disorder when financial stress is broad-based. Managing US dollar funding is easier for monetary authorities with larger FX reserves and holdings of US Treasury securities. Other central banks may need to rely on alternative sources of liquidity such as from the Chiang Mai Initiative multicurrency swap arrangement and the International Monetary Fund.

Reducing dependence on the US dollar will be a multiyear initiative requiring close cooperation among regional authorities. This would require coordinated policy action, especially in fostering intraregional trade and investment to increase natural demand for local currencies, resolving policy inconsistencies that hinder local currency internationalization, and developing financial and payment infrastructure in the region. That said, currency internationalization comes with potential economic risks, including more volatile capital flows and currency values, that could make the domestic financial system more vulnerable to capital flow volatility.

Keeping up with changes in the financial technology landscape is crucial for ASEAN+3 authorities as the region is at the forefront of financial innovation. Fast and convenient payment systems, digital banking applications, and cross border linkages can be a risk to financial stability, as shown by the recent digital bank run in the US. Traditional safeguards such as liquidity backstops and deposit insurance are essential. However, prompt, effective communication is equally vital. For instance, when Credit Suisse's Additional Tier 1 (AT1) bonds were written off, the stress of this event on the market was lifted when regional authorities quickly clarified that AT1 securities would take precedence over equity. Finally, authorities are also making strides in regulating digital assets, successfully preventing spillovers to the real economy.

Finally, over the medium term, the green economy transition will have implications for financial stability. A transition toward sustainability in finance can improve the management of various risks to the financial system by diversifying portfolios, improving risk assessment, and helping borrowers manage transition risks. Authorities in ASEAN+3 can promote the green finance market by improving lending standards, developing transition finance markets, and strengthening information disclosure, and capacity development (Box 1.6).

Box 1.5:

Impacts of Federal Reserve Policy Tightening on the ASEAN+3 Economies

To simulate the impacts of the Fed's policy rate tightening on GDP, inflation, and capital flows in the ASEAN+3, the AMRO Global Macro-Financial (DSGE) Model (Tang 2022) is employed.[1] The cumulative policy rate hikes of the Fed and regional central banks in the current (2022–23) and previous (2016–18) tightening cycles[2] are modelled as exogenous shocks (del Rosario and others 2022; Tang and Jiang 2023). Most regional central banks followed the Fed's policy tightening, but at a varied pace. In our estimates, we consider counterfactuals that assume no policy hikes by regional central banks, which differentiates impacts arising from the Fed and domestic central banks.

The Fed's policy tightening transmits to the region through a few key channels (Caldara and others 2022). The central bank's tightening could widen the interest rate gap and weigh on the exchange rate, leading to local currency depreciation against the US dollar. While weaker currencies would be conducive to exports and GDP growth, they could increase imported prices and add domestic inflationary pressure. Tighter financial conditions in the US would reduce aggregate demand and supress exports from the region into the US. Moreover, a stronger dollar, higher US bond yields, and weakening investor sentiment could prompt capital outflows[3] that would tighten domestic financial conditions, shrinking GDP and lowering inflation.

The relative strength of the overall transmission from the Fed's policy tightening varies among regional economies, reflecting their different economic structures. Facing spillovers from the Fed's policy tightening, domestic central banks decided their optimal responses, weighing domestic policy objectives and external effects.

Unsurprisingly, across policy tightening cycles, model estimates generally show larger impacts on GDP, inflation, and capital flows in the 2022-23 policy tightening cycle compared with 2016–18, given the current aggressive pace of policy tightening (Figure 1.5.1). Across economies, those that raised policy rates in a manner synchronized with the Fed would have deeper GDP losses and more likely to experience smaller imported inflation and capital outflows when comparing the counterfactuals that factor in Fed hikes, absent increased policy rates in the region.

GDP losses ranged from 0.3 percent (China and Japan) to 2.4 percent (Korea and the Philippines) with both Fed's and domestic policy changes during the 2022–23 cycle, as Korea and the Philippines generally followed the Fed more closely while China and Japan lost little GDP. It is partly because their monetary policy stance diverged from other economies and remained accommodative of GDP growth while inflation pressures were comparatively limited. In the counterfactual cases of only Fed hikes, growth losses are skewed more to the downside in the 2022–23 cycle although median impacts were similar in both tightening cycles.

Impacts on regional inflation from the Fed's and regional central banks' policy tightening are largely in the range of 1.0–2.5 percent. In counterfactuals with Fed hikes and no accompanying hikes in the region to narrow interest rate differentials, higher imported prices through the exchange rate channel would intensify inflationary pressures. Such effects would be more evident in the 2022–23 cycle than the counterfactual scenario in the 2016–18 cycle as a result of the surge in global commodity prices in 2022–23.

Regional central banks' policy hikes alongside the Fed helped mitigate pressure on capital outflows. Rising domestic interest rates helped to narrow interest rate differentials between the US and regional economies. In our estimates, regional central bank policy tightening in the region stemmed capital outflows and came with an upward shift of 0.1 percent of GDP in the 2022–23 cycle. The Philippines was an exception, with aggressive policy rate hikes estimated to have spurred capital inflows.

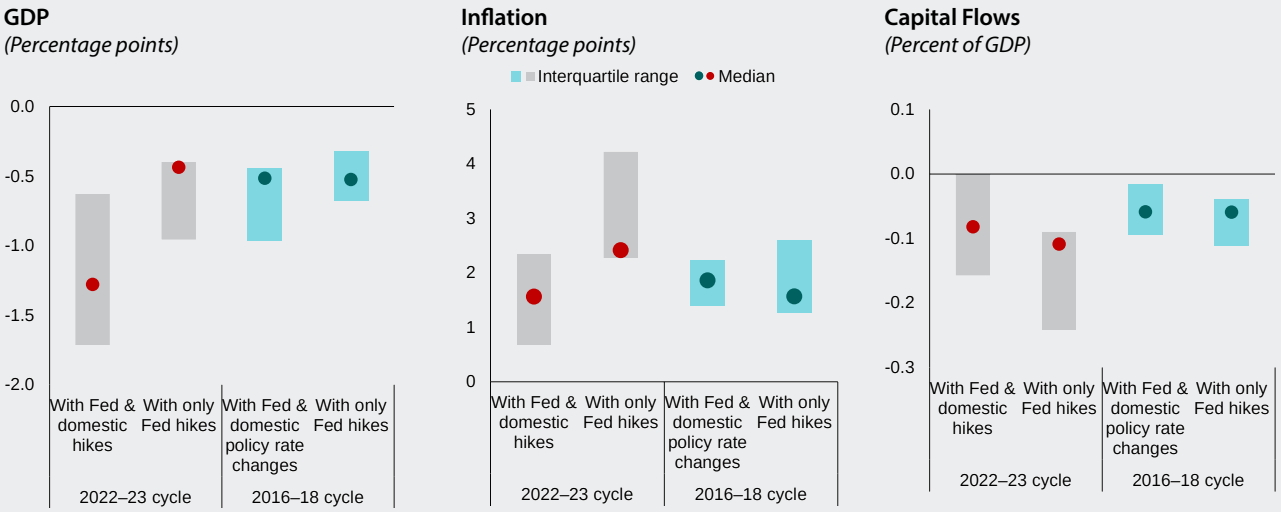
The authors of this box are Alex Liyang Tang and Kimi Xu Jiang.

[1] The analysis includes China, Japan, Korea, Indonesia, Malaysia, the Philippines, Thailand and Vietnam, based on data as of August 31, 2023.

[2] 2022–23 policy tightening cycle in this analysis started with the first quarter of 2022 and ended at the data cut-off of the second quarter of 2023, during which the Fed raised policy rates by 5 percentage points over about 18 months, and most regional economies closely followed. The 2016–18 cycle in this analysis started from the third quarter of 2016 (the first hike was in the fourth quarter of 2015 but with a three-quarter pause afterward) and ended at the fourth quarter of 2018. The Fed raised policy rates by 2 percentage points over two and half years. However, some regional economies were still in the process of rate cuts, especially in the early phase of the Fed's tightening.

[3] For more details about the model set-up and main transmission mechanisms, refer to Tang (2022).

Figure 1.5.1. Selected ASEAN+3: Impacts from US Fed's Policy Tightening on GDP, Inflation and Capital Flows



Source: National authorities and IMF via Haver Analytics and CEIC; OECD; AMRO staff calculations.
Note: Relative to original path without further Fed's and domestic rate hikes from the start of the 2022–23 or 2016–18 hiking cycles. Selected ASEAN+3 include China, Japan, Korea, Indonesia, Malaysia, the Philippines, Thailand and Vietnam.

Box 1.6:

The Impact of Green Lending on Financial Risk

Green lending, also known as sustainable or responsible lending, provides loans to projects, businesses, and individuals to fund low-carbon assets and projects, or the transition toward them. In its simplest definition, green finance products are debt and/or equity instruments or services that direct investment capital to one or more objectives around ensuring a better environmental outcome. Green finance instruments can help towards mitigating climate change, improving climate change resilience, or helping with adaption to climate change. Other environmental aspects that green finance can facilitate include:

- Renewable energy and energy efficiency
- Pollution prevention and control
- Biodiversity conservation
- Circular economy initiatives
- Sustainable use of natural resources and land

Green lending positively impacts financial risk in several ways. First, it mitigates environmental risks by funding projects that align with sustainability goals, so reducing potential disruptions from regulatory changes or public protests. Second, it diversifies risk by investing in projects less tied to fossil fuels, which helps to minimize the threat of stranded assets in a low-carbon economy. Third, lending to sustainable projects helps manage transition risks arising from shifts in policy, technology, and consumer preferences, which promotes long-term economic stability. Fourth, the practice encourages more comprehensive risk assessments, incorporating environmental, social, and governance (ESG) factors for making better-informed lending decisions. Lastly, it mitigates reputational risks by appealing to environmentally conscious customers.

Two major forms of green lending are through public-private partnerships (PPPs) and blended finance mechanisms. Given the well-publicized nature of the huge financing gap[1] in the transition to a low-carbon economy, governments inevitably will require private sector participation. In this regard, there have certainly been some positive developments in the region with a number of green PPP projects being financed, as well as initiatives to increase the take-up of such projects across the financial sector.[2] In addition to PPP instruments, Blended Finance can be defined as a structuring approach that allows organizations with different objectives to invest alongside each other, while achieving their own objectives, be it either financial return, social impact, or a combination of both. An important example of blended finance being utilised in the region is the Energy Transition Mechanism (ETM) of the Asian Development Bank. This aims to finance country specific funds needed to retire coal power assets on an earlier timeline compared to their initially expected asset life. However, the sector still faces multiple challenges including: a lack of commercial viability of many green PPP and blended finance projects; a shortage of tailored risk mitigation instruments such as insurance and guarantees to offset the additional risk; difficulties in institutional coordination; and challenges associated with navigating between the public and private sectors. In addition, policy structures and frameworks still remain of critical importance in order to facilitate such partnerships, albeit several initiatives are already underway in this regard.[3]

To strengthen the green finance market in the ASEAN+3 region, several key actions are essential. First, unified regional standards for defining "green" are needed to ensure consistency across credit markets, insurance, and other financial sectors, thereby mitigating the risk of greenwashing. Whilst the ASEAN Taxonomy on Sustainable Finance is a key factor in ensuring convergence along this path, a number of 'climate arbitrage' opportunities remain across the region. Second, policy frameworks and standards should be developed to support and track transition finance, facilitating the move from high to low-carbon economies.

This author of this box is Aziz Durrani.

1 The Asian Development Bank estimated in 2016 that countries in Asia have to invest around USD1.5 trillion annually from 2016 to 2030 to meet the Sustainable Development Goals. Of this, around USD434 billion was forecast to be needed annually for clean energy and climate projects (Tian and others 2021).

2 In Malaysia, for example, the Joint Committee on Climate Change (JC3), co-chaired by Bank Negara Malaysia and the Securities Commission, facilitates collaborative efforts among various stakeholders in the financial sector. JC3 encompasses several sub-committees, covering various aspects of climate resilience, including risk management, governance and disclosure, products and innovation, engagement and capacity building, bridging data gaps and a focus group on small and medium sized enterprises. PPP components are embedded within subcommittees' work, enabling the exploration of PPP solutions for climate-related projects, such as greening the value chain which helps support SMEs supply chain to start measuring and reporting their greenhouse gas emissions.

3 The ASEAN taxonomy for Sustainable Finance is one example. It aims to harmonize and standardize the assessment and classification of sustainable activities at the regional level. Such frameworks not only identify suitable projects but also encourage enhanced governance, disclosure, and the efficient allocation of capital. The taxonomy was originally published in November 2021, with a second version published in March 2023. Another example is Bank Negara Malaysia publication of the Climate Change and Principle-Based Taxonomy (CCPT). The CCPT is a framework for financial institutions to assess and categorise economic activities according to the extent to which their activities meet climate objectives and promote the transition to a low-carbon and climate-resilient economy. In keeping with the objective to support an orderly transition, the taxonomy recognises remediation measures and introduces a progressive system of transition categories to acknowledge concrete efforts and commitments by businesses to adopt sustainable practices at the regional level.

Third, central banks and regulators should establish mandatory standardized environmental disclosures to enhance market transparency. Towards this end, the newly introduced Sustainability Disclosure Standards issued by the International Sustainability Standard Board provide a clear path for authorities to apply.[4] This should also ensure that green bond issuers are transparent in their environmental assessments. Lastly, to close the skills gap in this rapidly growing sector, regional authorities should promote and seek opportunities for specialized training in green finance and climate-related governance and risk management for their own staff, as well as, encouraging financial institutions to do the same.

Green lending can improve a bank's credit quality by fostering sustainability, diversifying risk, and strenthening risk assessments. Despite these advantages, green lending is challenging given that the evaluation of innovative projects is complicated and that regulatory non-compliance is a risk due to changing standards. Effective implementation hinges on rigorous due diligence, skill development, close portfolio tracking, and guarding against greenwashing. When green lending is skilfully integrated into a bank's risk management approach, it can make a valuable contribution to credit quality.

Despite grappling with high inflation, rising interest rates, and other economic challenges, ASEAN+3 economies should not roll back their green finance and climate risk initiatives. Doing so could do long-term damage to growth and financial stability. Authorities in the region must enforce stronger guidelines, goals, and penalties to promote green lending and integrate climate risk management into financial institutions, whilst considering the implications and potential unintended consequences of transitioning to a low-carbon economy on small businesses, particularly micro, small and medium sized enterprises. Not only does this support the region’s orderly transition to a low-carbon economy, it also safeguards financial stability and energy security.

[4] https://www.ifrs.org/projects/completed-projects/2023/general-sustainability-related-disclosures/

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Chapter 2

Navigating High Debt in Low Visibility – Assessing Private Debt Vulnerabilities

Highlights

- Debt has increased over the past decade for the corporate and household sectors of several ASEAN+3 economies, and has made them more vulnerable to financial shocks and debt repayment challenges. High interest rates could further strain borrowers' ability to repay debt. Nonfinancial sector debt-to-GDP ratios are relatively high in some economies and may reach levels that could constrain economic growth.

- The financing landscape for businesses in ASEAN+3 has notably shifted, with increased reliance on bonds and higher leverage, which heighten market risks. As financial access grows, including through bond issuance, macroprudential policies can play a larger role in ensuring prudent lending. Addressing currency mismatches can reduce vulnerability to exchange rate fluctuations.

- Risks in the corporate sector in some economies are predominantly in the property and construction industries, which issue a large portion of corporate debt and whose lower credit quality and profitability than other industries heightens their credit risk. To counter these challenges, especially amid large price fluctuations in property markets, ASEAN+3 authorities should continue to expand the use of macroprudential policies to mitigate these risks.

- Household debt, while lower than corporate debt as a share of GDP, has been steadily increasing. The main risks come from growing debt burdens and potential declines in property values. Rising global interest rates could push up mortgage costs, and when combined with an increase in unemployment, may strain households' ability to repay debt. Property prices in ASEAN+3 have mostly fallen since the COVID-19 pandemic, and now are generally close to levels consistent with macroeconomic fundamentals. This has lessened default risk, except for households with high leverage.

- Macroprudential authorities in ASEAN+3 have used a wide variety of tools to manage risks from high household debt and corporate leverage. These target either credit demand or supply and may have mitigated risks of financial distress and they can be used in a countercyclical fashion. While macroprudential policy should play the primary role in managing risks to financial stability, central banks may need to consider these risks in setting monetary policies. Lastly, policy effectiveness can be improved by filling major gaps in household debt data to deepen the assessment of risks.

This chapter is authored by Siang Leng Wong and Richard Sean Craig under the guidance of Kevin C. Cheng, with contributions from Yoki Okawa, Leilei Lu (project manager), Laura Grace Gabriella, Chiang Yong (Edmond) Choo, Kimi Xu Jiang, Chenxu Fu, Kit Yee Lim, Jingwei Zhou, Huisheng Wang and Yang Jiao.

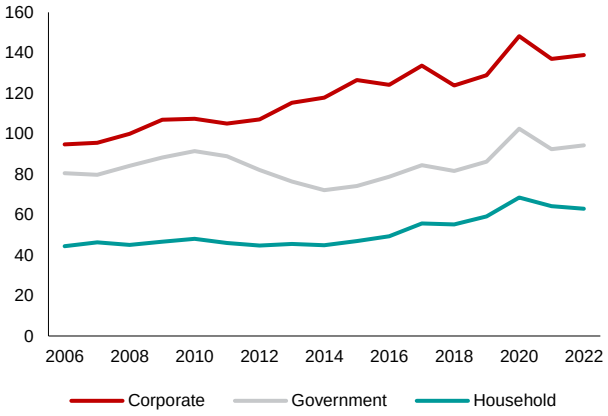
I. Overview

Household and corporate debt can weigh on financial stability in ASEAN+3 depending on economies' capacity to support it at high levels. Accounting for two-thirds of the region's total debt, private debt has surged due to robust economic growth, a rapidly growing middle class and urbanization, and favorable global financial conditions (Figures 2.1 and 2.2). Specifically:

- Corporate debt in the region increased before COVID-19 and the ones in Plus-3 economies have risen again in the past two years. ASEAN+3 experienced robust growth in nonfinancial firm debt prior to the pandemic (Figure 2.3). Currently, the ASEAN+3 corporate debt-to-GDP ratio is among the highest in the world (Figure 2.4). The average corporate debt-to-GDP ratio in ASEAN economies peaked at 89 percent in 2020, followed by a subsequent moderate decline. Conversely, the same ratio for Plus-3 economies continued to increase throughout 2022-23, after a slight decline in 2021. Among the ASEAN+3 economies, the debt-to-GDP ratios of Hong Kong and China are significantly higher than for other economies and regions (Figure 2.5), and the Chinese authorities have embarked on deleveraging campaigns a few years back.

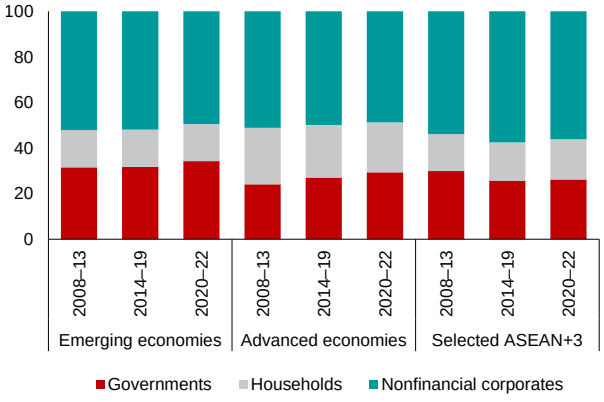
- The household debt-to-GDP ratio in ASEAN+3 has risen rapidly in recent years and is now approaching that in advanced economies (Figure 2.6), although household debt as percent of GDP is still well below that of the corporate sector. Within ASEAN+3 (Figure 2.5), the household debt-to-GDP ratio is notably higher than the global average in Korea, Hong Kong, and Thailand, but is low in most ASEAN economies. Household debt-to-GDP ratios peaked in 2020 (Figure 2.7).

Figure 2.1. Selected ASEAN+3: Corporate, Government and Household Debt
(Percent of GDP)



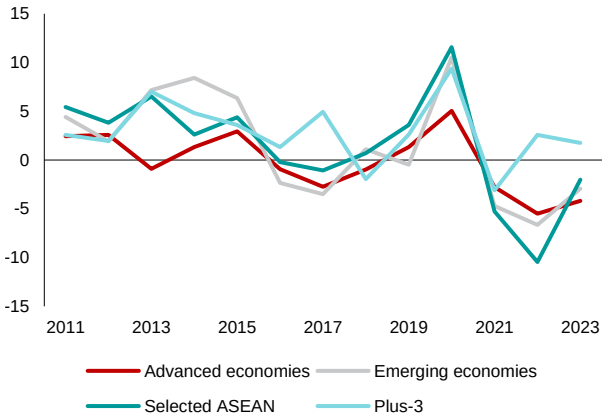
Source: Bank for International Settlements (BIS); AMRO staff calculation.
Note: Data covers all economies reporting nonfinancial debt data to the BIS. Selected ASEAN+3 includes China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, and Thailand. Government debt data include all the above economies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

Figure 2.2. Selected Regions: Share of Nonfinancial Debt of Corporates, Governments, and Households
(Percent)



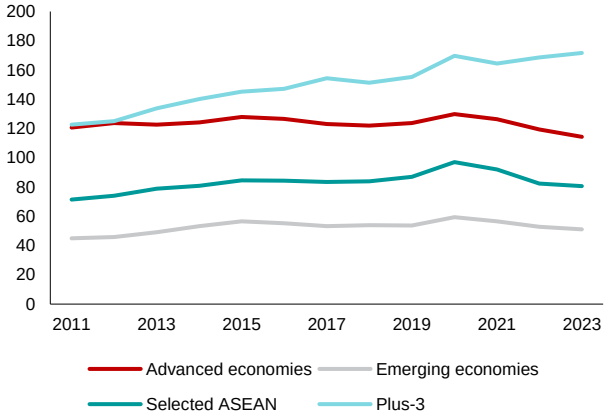
Source: Bank for International Settlements; AMRO staff calculation.
Note: Emerging markets (EMs) data exclude those in ASEAN+3. Advanced economies data excludes Japan. Selected ASEAN+3 includes China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, and Thailand.

Figure 2.3 Selected Regions: Annual Growth in Corporate Debt
(Percent, year-on-year)



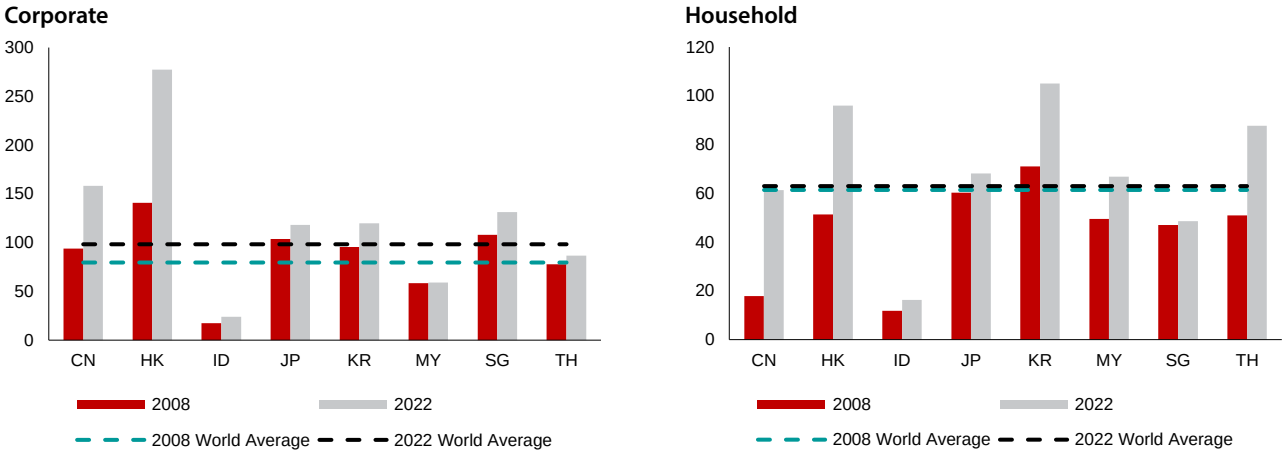
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, Singapore, and Thailand. Plus-3 includes China, Japan, and Korea. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

Figure 2.4. Selected Regions: Corporate Debt
(Percent of GDP)



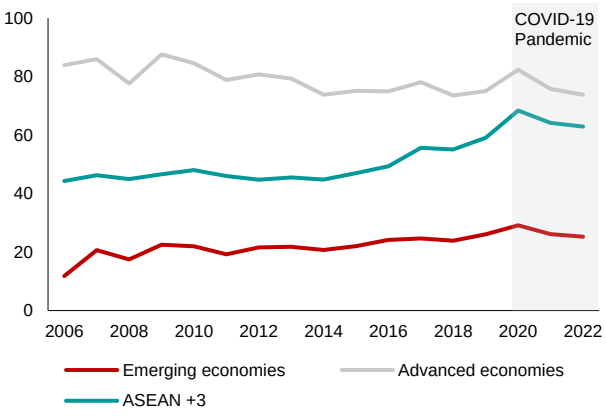
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, Singapore, and Thailand. Plus-3 includes China, Japan, and Korea. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

Figure 2.5. Selected ASEAN+3: Private Debt
(Percent of GDP)



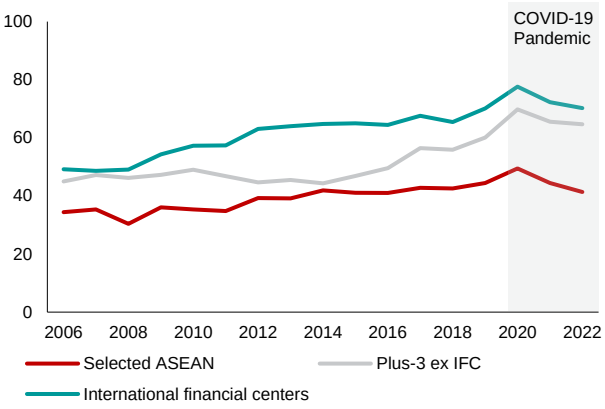
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; SG = Singapore; TH = Thailand.

Figure 2.6. Selected Regions: Household Debt
(Percent of GDP)



Source: Bank for International Settlements; AMRO staff calculations.
Note: Emerging markets data exclude EMs in ASEAN+3. Advanced economies data exclude Japan.

Figure 2.7. Selected ASEAN+3: Household Debt
(Percent of GDP)



Source: Bank for International Settlements; AMRO staff calculations.
Note: IFC = International financial centers. Selected ASEAN includes Indonesia, Malaysia, and Thailand. Plus-3 ex IFC includes China, Japan, and Korea. IFCs consist of Hong Kong and Singapore.

At what level is debt too high?

While debt financing is crucial for economic growth, excessive household and corporate debt can compromise financial stability and broader economic performance. High indebtedness makes borrowers more vulnerable to financial shocks and leads to financial distress and debt default. This can lead to cascading negative effects, including declining asset values and financial sector losses. Where household and corporate sectors are highly leveraged, they are particularly vulnerable to financial strains and economic downturns. Lastly, excessive private sector debt can indirectly undermine financial stability by distorting resource allocation and weakening demand, and by eroding the effectiveness of countercyclical financial policies.

Statistical analysis of countries indebtedness points to a debt-to-GDP ratio threshold above which further increases can constrain economic growth. This threshold is difficult to estimate with precision, and is likely to vary across countries, reflecting differences in national saving rates and returns to investments of the debt financing. To indicate where this threshold may be for ASEAN+3 economies, the correlation between real GDP growth and the debt-to-GDP ratio is estimated and a statistical method used to identify the threshold at which this correlation turns negative (and is statistically significant).[1] Figure 2.8 illustrates threshold estimates as a range to convey the degree of uncertainty associated with this methodology, with black dots used to show private debt-to-GDP ratios in ASEAN+3 economies at end-2022 (Annex 2.1). Results for the financial centers (Hong Kong and Singapore) are shown separately from the rest of ASEAN+3 since nonresidents hold a substantial share of their debt, resulting in higher sustainable debt ratios. Overall, Figure 2.8 suggests that ASEAN+3 private debt-to-GDP ratios are generally in a range where they are unlikely to be undermining economic growth, but several countries are near the top of this range.

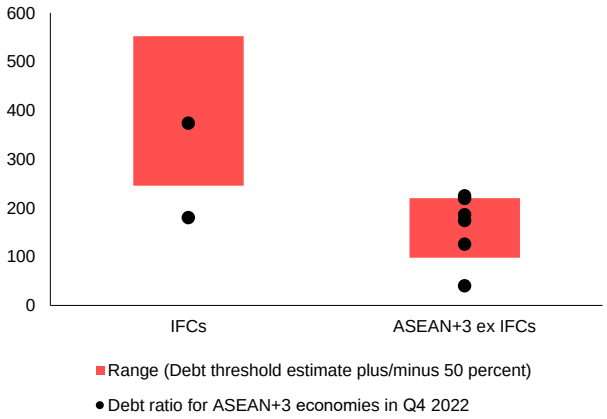
[1] This is done with a panel regression with bootstrapping methodology for ASEAN+3 economies from 1996 to 2022, controlling for per capita GDP, and with dummies to capture country fixed effects, the Asian financial crisis, the global financial crisis, and COVID-19 pandemic (Annex 2.1 has the details).

Threshold estimates for each ASEAN+3 economy need to account for economy-specific factors that can increase debt-carrying capacity. Each economy's threshold will reflect the strength of its institutions and macroeconomic fundamentals. Figure 2.8 can help guide this analysis by indicating a range for this threshold based on the collective experience of ASEAN+3 economies over 26 years. ASEAN emerging markets have maintained good GDP growth despite having private debt-to-GDP ratios higher than other emerging markets, which may reflect their strong returns on investments and sound financial systems. Strong macroeconomic fundamentals may also have helped, alongside favorable external positions, low inflation, and sustainable fiscal policies.

The rest of the chapter examines the vulnerabilities of private debt. Specifically:

- The next section analyzes corporate debt in the ASEAN+3 region, exploring its drivers and assessing corporate resilience through a deep dive into profitability and liquidity. It also stress-tests how rising interest rates affect corporate health and evaluates risks from shifts in bond market financing, concluding with policy implications.
- The final section studies household debt in ASEAN+3, identifying its drivers, including common factors such as capital inflows. It evaluates financial stability risks associated with rising debt service ratios amid global monetary tightening and assesses the likelihood of housing price corrections. The section concludes by examining the impact of macroprudential policy on household debt vulnerabilities.

Figure 2.8. Selected ASEAN+3: Nonfinancial Debt-to-GDP Ratio and Standard Deviation
(Percent of GDP)



Source: AMRO staff calculations.
Note: IFC = International finance centers. IFC covers Hong Kong and Singapore. ASEAN+3 ex IFC includes China, Indonesia, Japan, Korea, Malaysia, and Thailand.

II. Corporate Debt

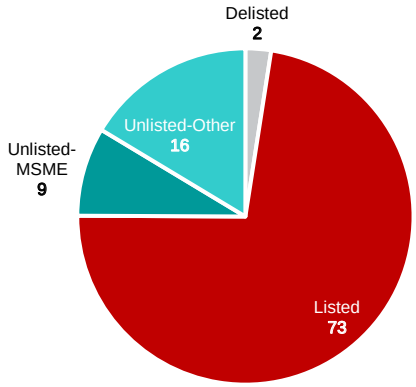
Which firms are most vulnerable?

The financial vulnerabilities of corporations vary widely in ASEAN+3. Listed firms, which are generally larger and more focused on growth, are the primary recipients of corporate loans and tend to have more robust interest coverage ratios (ICRs) (Figure 2.9). Conversely, unlisted firms, especially micro, small and medium sized enterprises (MSMEs), have lower ICRs and a greater likelihood of their loans turning nonperforming (Figures 2.10 and 2.11). As MSMEs typically receive less credit and might be exposed to refinancing risks, Annex 2.2 describes the set of policies to facilitate lending to MSMEs.

The top few sectors with the most concentrated corporate debt within ASEAN+3 are manufacturing, property/construction, and raw materials. Higher debt taken up by manufacturing and property-related firms is likely driven by capital-intensive activities, such as machinery purchases and longer production times, and their relative size in the corporate sector (Figure 2.12). Elevated debt of large property developers may also partly stem from substantial bank ownership in these firms in some economies, where banks' business decisions might be influenced by shareholders (Ho 2022). As for the significant shares of debt in raw materials, they could be related to several ASEAN+3 economies being major producers of commodities such as oil, steel, coal, and palm oil.

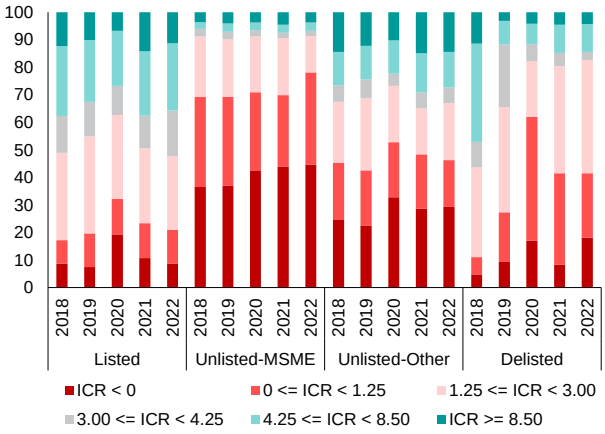
While credit ratings of most firms have remained stable, property firms have become riskier. Manufacturing firms, which hold the largest share of corporate debt, are mostly rated as investment grade (Figures 2.13 and 2.14). In contrast, property firms—particularly in ASEAN—increasingly receive speculative ratings. This trend can raise borrowing costs and limit capital market access due to perceived repayment risks. Historically, developers with low ratings have struggled to issue bonds for debt restructuring (Vietnam News Agency 2023), which if not handled well could have destabilizing implications for the financial system. When the real estate market is financially stressed, it may be necessary to encourage financial institutions to maintain credit support to ease the refinancing pressure of solvent developers (Vietnam Investment Review 2022; Xinhua 2022), especially since a significant portion of corporate debt is held by property-related firms. Continuous efforts to improve lending standards and credit quality among such firms should be part of the longer-term agenda.

Figure 2.9. Selected ASEAN+3: Share of Corporate Debt by Firm Type, 2022
(Percent)



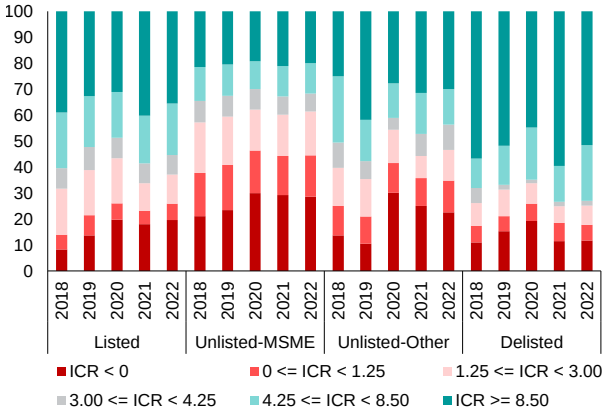
Source: Orbis; AMRO staff calculations.
Note: MSME = micro, small, and medium enterprise. ASEAN+3 economies covered are China, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. Due to data availability, Brunei, Cambodia, Lao PDR, and Myanmar are excluded from the analysis.

Figure 2.10. Selected ASEAN: Interest Coverage Ratio
(Percent of debt)



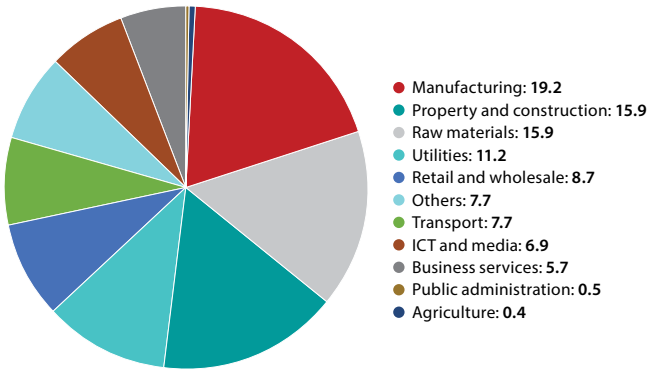
Source: Orbis; AMRO staff calculations.
Note: MSME = micro, small, and medium enterprise; ICR = interest coverage ratio. Due to data availability, Brunei, Lao PDR, and Myanmar are not included in the analysis.

Figure 2.11. Plus-3: Interest Coverage Ratio
(Percent of debt)



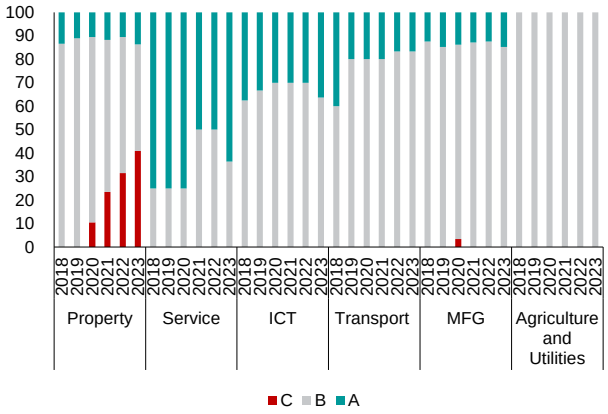
Source: Orbis; AMRO staff calculations.
Note: MSME = micro, small, and medium enterprise; ICR = interest coverage ratio.

Figure 2.12. Selected ASEAN+3: Share of Corporate Debt by Sector, 2022
(Percent)



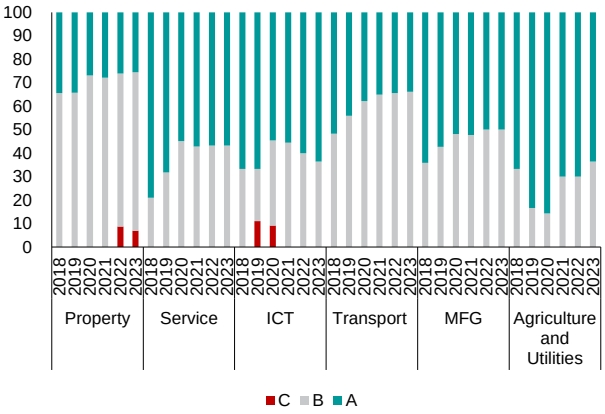
Source: Orbis; AMRO staff calculations.
Note: ICT = information and communication technology. ASEAN+3 economies covered are China, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. Due to data availability, Brunei, Cambodia, Lao PDR, and Myanmar are excluded from the analysis.

Figure 2.13. Selected ASEAN: Corporate Credit Ratings
(Percent)



Source: Moody's Analytics; AMRO staff calculations.
Note: ICT = information and communication technology; MFG = manufacturing. Due to data availability, firms from Brunei, Cambodia, Lao PDR, and Myanmar are not included in the analysis.

Figure 2.14. Plus-3: Corporate Credit Ratings
(Percent)



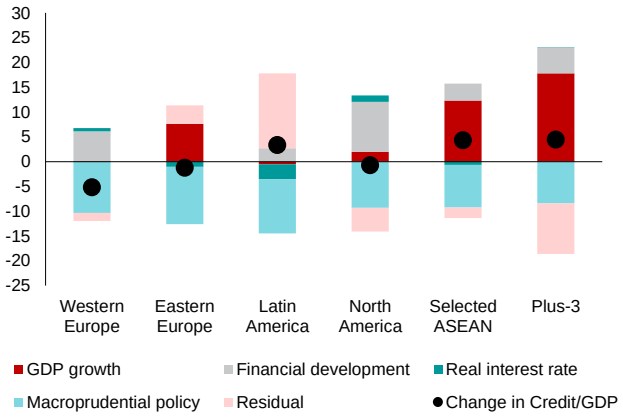
Source: Moody's Analytics; AMRO staff calculations.
Note: ICT = information and communication technology; MFG = manufacturing.

What drives corporate debt in ASEAN+3?

Panel regression assesses the determinants of corporate debt in ASEAN+3. Economic growth is a key driver based on estimation of five regions during 2001–22, especially before the pandemic (Figure 2.15). Kho and Chong (2023) note that during the pandemic, that role shrank or even became negative, likely due to declining exports and economic activities (Figure 2.16). Real interest rates had less influence on corporate leverage. Additional details on the methodology are in Annex 2.3.

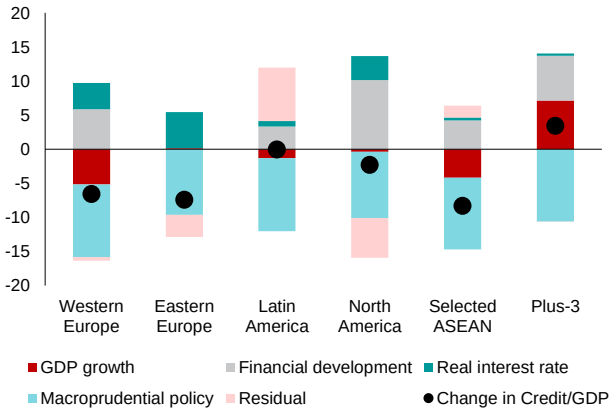
The empirical analysis also indicates that more developed financial markets and relaxed macroprudential policies contribute to rising corporate credit. Tightening macroprudential measures during economic recovery can curb credit growth, as credit controls and capital requirements limit loan disbursement. Strong microprudential regulation and supervision ensure prudent lending in more developed financial markets, but in some circumstances, additional macroprudential measures may be needed to temper excessive corporate credit growth.

Figure 2.15. Selected Regions: Decomposition Analysis of Change in Credit-to-GDP, Pre-COVID
(Percent)



Source: AMRO staff estimates. Refer to Annex 2.3 for more details.
Note: Selected ASEAN includes Indonesia, Malaysia, the Philippines, and Thailand. Pre-COVID period is from 2011 to 2019.

Figure 2.16. Selected Regions: Decomposition Analysis of Change in Credit-to-GDP, COVID
(Percent)



Source: AMRO staff estimates. Refer to Annex 2.3 for more details.
Note: Selected ASEAN includes Indonesia, Malaysia, the Philippines, and Thailand. COVID period is from 2020 to 2022.

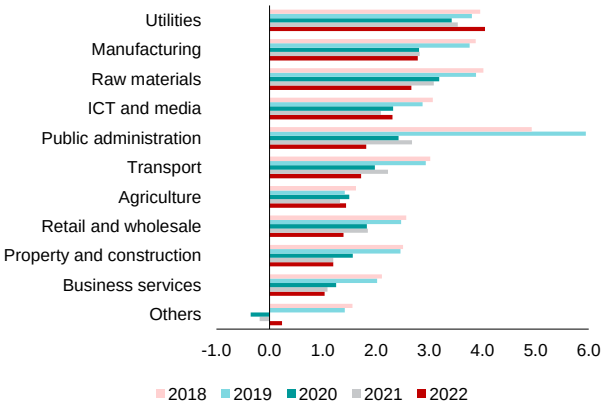
How are corporate profitability and liquidity performing?

While the profitability of ASEAN+3 firms remain largely lower than before the pandemic, it is no longer on a steep declining trajectory. The median returns on assets of most sectors and economies have remained relatively stable between 2021 and 2022 (Figures 2.17 and 2.18), likely attributable to the gradual reopening of economies and the resumption of consumer demand. Stable profits will help firms that are refinancing, as banks are more willing to extend credit to those with a proven track record of generating profit (Goldin 2014).

That said, property and construction firms remain relatively risky. Credit risks associated with property-related firms' lower ICRs and credit ratings might not be mitigated completely by higher profits, given that their profitability appears rather mediocre compared with other sectors such as raw materials or manufacturing.

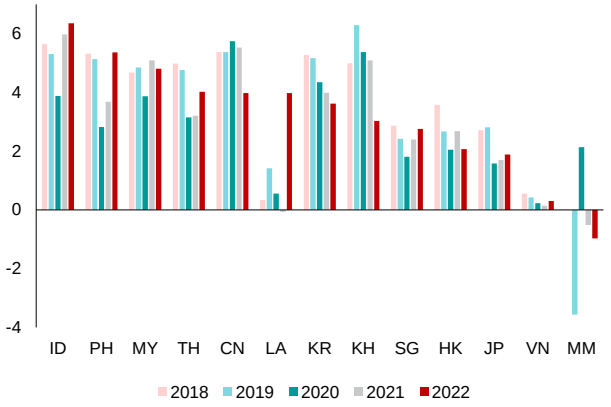
Corporate liquidity has improved since the pandemic, but pockets of vulnerability exist. The median current ratios (current assets over current liabilities) and cash coverage ratios (cash and cash equivalents over short-term debt) have both increased from pre-pandemic levels (Figures 2.19 and 2.20). Corporate liquidity has improved across sectors. Hence, firms are now in a better position to repay liabilities, with more working capital to meet their short-term obligations. That said, complacency should be avoided given the lower liquidity in some sectors, including raw materials and manufacturing, that although rather profitable, could see their debt servicing ability compromised since a substantial portion of their working capital is tied up in inventory.

Figure 2.17. ASEAN+3: Median Return on Assets by Sector
(Percent)



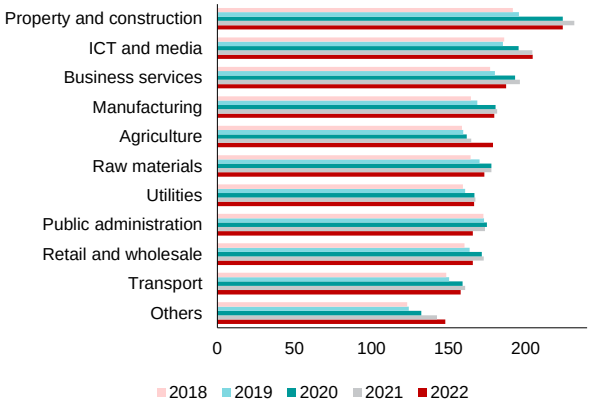
Source: Orbis; AMRO staff calculations.
Note: ICT = information and communication technology.

Figure 2.18. Selected ASEAN+3: Median Return on Assets by Economy
(Percent)



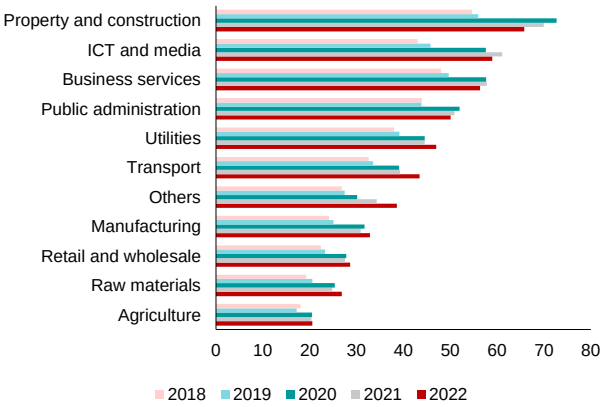
Source: Orbis; AMRO staff calculations.
Note: CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = the Philippines; SG = Singapore; TH = Thailand; VN = Vietnam. Due to data availability, information on Brunei is not included.

Figure 2.19. ASEAN+3: Median Current Assets to Current Liabilities by Sector
(Percent)



Source: Orbis; AMRO staff calculations.
Note: ICT = information and communication technology.

Figure 2.20. ASEAN+3: Median Cash Cover by Sector
(Percent)



Source: Orbis; AMRO staff calculations.
Note: ICT = information and communication technology.

What drives change in corporate financing vulnerabilities?

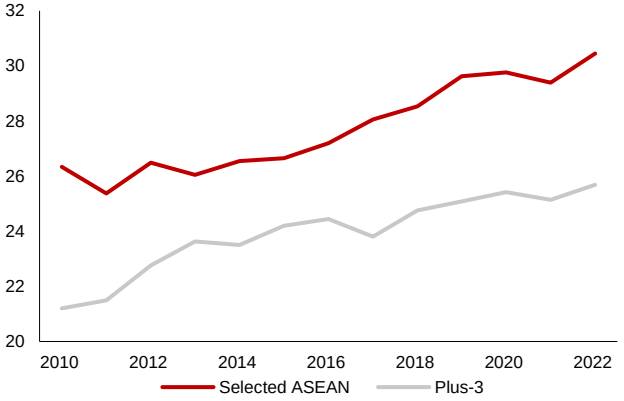
The financing landscape for private firms has undergone notable transformation recently in ASEAN economies, where corporate debt through bonds has risen gradually in the past decade (Figure 2.21). This trend aligns with global observations, such as those in Europe.[2] During the pandemic, economies like China and Thailand have increased corporate bond financing (Figure 2.22). As a result, ASEAN+3 firms may face increased market risks. Notably, 30–40 percent of these bonds are set to mature within three years (Figure 2.23).

For ASEAN countries, a panel regression shows that financial development is the primary driver of corporate bond sales (Figure 2.24 and Annex 2.4). The share of corporate bonds within this region that are denominated in foreign currencies is low overall and has grown only slightly from a decade ago (Figure 2.25). However, substantial differences can be seen across ASEAN+3 economies, with some more exposed to foreign exchange (FX) risk (Figure 2.26).[3] The risk is more acute when a firm's revenue is in domestic currency but its bonds are denominated in US dollars.

Depreciation of the domestic currency against the US dollar can complicate the borrower's ability to meet debt obligations. This is described in Box 2.1.

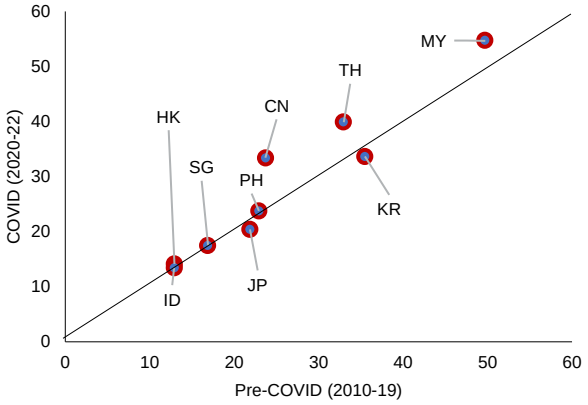
[2] See, for example, the European Central Bank Financial Stability Review (2023).
[3] Figure 2.26 reports the outstanding corporate bonds at the point in time but does not capture the latest trend developments. In some economies, the more recent bond issuances could be mostly denominated in domestic currencies, which would reflect a reduction in FX risk exposure (e.g., the Philippines).

Figure 2.21. Selected ASEAN+3: Share of Corporate Credit in Bonds
(Percent)



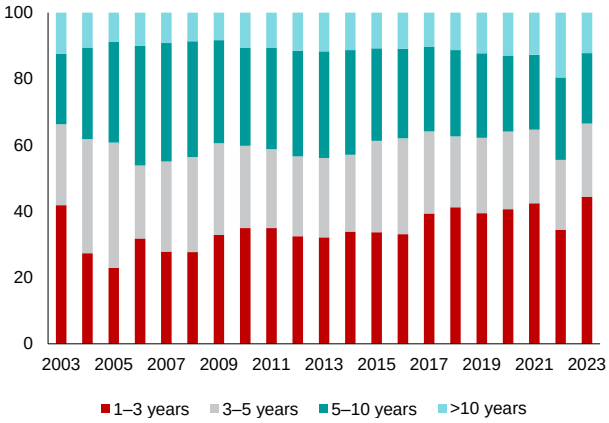
Source: AsianBondsOnline; IMF International Financial Statistics (IFS) and Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

Figure 2.22. Selected ASEAN+3: Share of Corporate Credit in Corporate Bond by Economy, Pre-COVID versus COVID
(Percent, year-on-year)



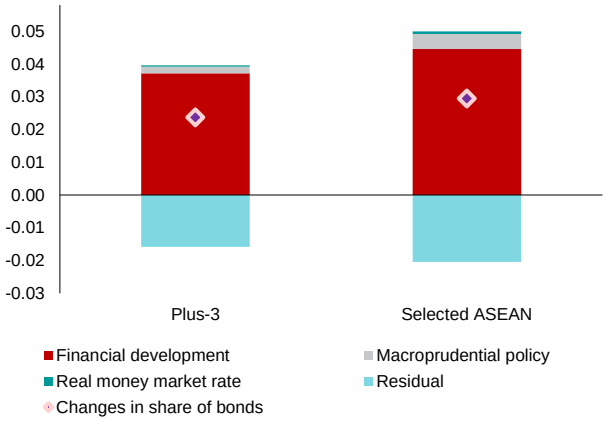
Source: AsianBondsOnline; IMF International Financial Statistics and Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Due to data availability, information on Brunei, Vietnam and Lao PDR are not included.

Figure 2.23. Selected ASEAN+3: Share of Corporate Bond by Maturity
(Percent of total bonds issued)



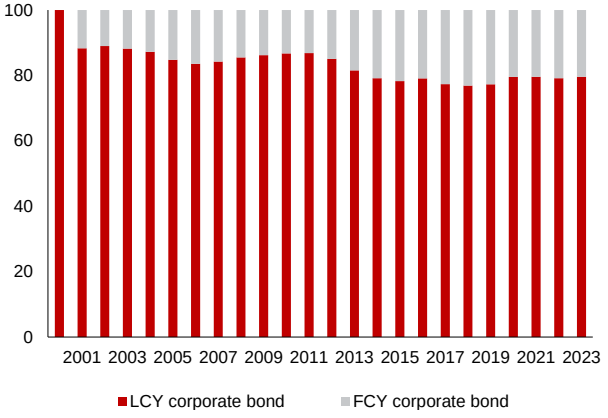
Source: AsianBondsOnline; AMRO staff calculations.
Note: Due to data availability, information on Brunei, Cambodia, Lao PDR, and Myanmar are not included. Data for 2023 is using 2023Q1 data.

Figure 2.24. Selected ASEAN+3: Drivers of Corporate Bonds, 2012–22
(Percent)



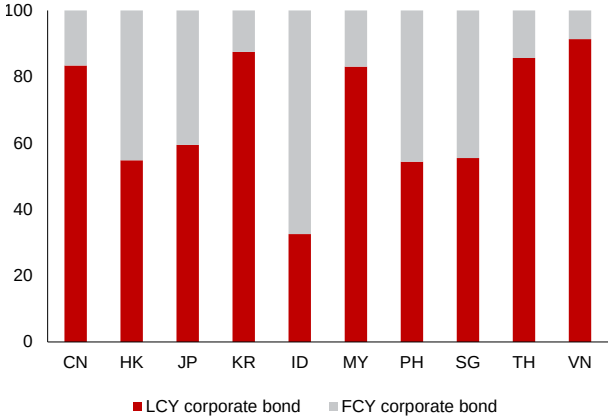
Source: AsianBondsOnline; IMF International Financial Statistics and Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

Figure 2.25. Selected ASEAN+3: Share of Corporate Bond by Currency
(Percent)



Source: AsianBondsOnline; AMRO staff calculations.
Note: LCY and FCY represent local currency and foreign currency, respectively. Brunei, Cambodia, Lao PDR, and Myanmar are not included. Data as of 2023Q1.

Figure 2.26. Selected ASEAN+3: Share of Corporate Bond by Currency, Q1 2023
(Percent)



Source: AsianBondsOnline; AMRO staff calculations.
Note: LCY and FCY represent local currency and foreign currency, respectively. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = the Philippines; SG = Singapore; TH = Thailand; VN = Vietnam. Due to data availability, 2022Q4 data was used for calculations for China.

Box 2.1:

US Dollar Debt of Chinese Corporates

China has been a major contributor to the growing offshore US dollar corporate bond market since the GFC. Chinese nonfinancial corporates (NFCs) have significantly increased foreign currency bond financing since the global financial crisis, with most denominated in US dollar and issued offshore. This reflects China's capital account liberalization and relaxation of restrictions on foreign currency bond financing. As a result, the total outstanding US dollar offshore bonds of Chinese NFCs now amounts to USD585 billion, representing 34 percent of the total US dollar denominated bonds by NFCs from emerging market economies. Although the risk seems manageable at the aggregate level—with the outstanding US dollar bonds less than 3.5 percent of GDP and 18 percent of FX reserves—pockets of vulnerability remain in riskier groups of borrowers.

US dollar bonds issued by Chinese NFCs are concentrated in specific sectors. Notably, local government financing vehicles (LGFVs) and property developers comprise about 44 percent of the total issuance (Figure 2.1.1). These are the same groups of borrowers identified as having experienced liquidity issues (The Economist 2023) and having substantially ramped up offshore US dollar bond issuance until recently, when Fed rate hikes caused funding cost to surge. Property developers and LGFVs are particularly vulnerable to currency risks because their primary activities are within China, which results in limited or no foreign currency income, thereby constituting a high degree of currency mismatch between assets and liabilities. Issuing US dollar bonds allows firms to benefit from lower funding costs, gain access to the broader offshore market and investors, and to engage in carry trade transactions (Ding 2019) that make them more vulnerable to US dollar strengthening (Bruno and Shin 2017).

A strong US dollar and its higher funding cost could lead to a surge in defaults of offshore bonds issued by NFCs in China. Notably, defaults rose to USD6.6 billion in 2018 as the US dollar appreciated and borrowing costs increased, alongside a decline in incomes as GDP growth fell to a 28-year low (Yao and Chen 2019). In 2022, the aggressive tightening of US monetary policy, combined with a downturn in the property market in China and tightened regulation on developers' leverage and debt financing, led defaults on Chinese NFC offshore dollar bonds to jump to USD52 billion, a record high. The defaults are primarily from property developers (Figure 2.1.2). Debt vulnerabilities on property developers could persist should the US dollar gain further strength and real estate market weaknesses continue. From November 2023 until the end of 2025, USD78 billion worth of US dollar bonds from property developers will come due, while USD248 billion of US dollar bonds of all Chinese NFCs will also mature. Difficulties in refinancing these bonds can increase insolvency risks for the more vulnerable firms and hit investors with high exposure.

Near-term risks for leveraged property developers are likely to stay elevated, although efforts to strengthen the overall regulatory framework on the foreign debt of Chinese NFCs are commendable.

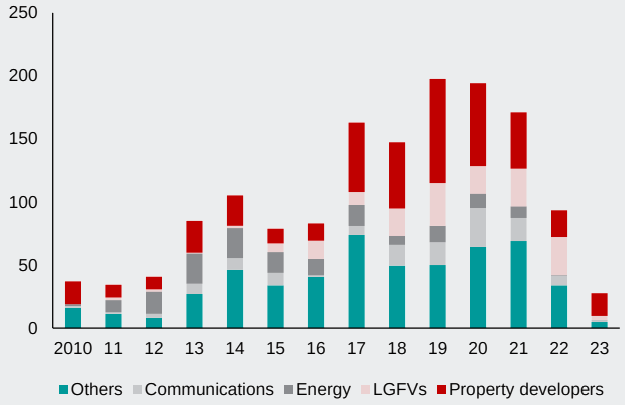
- First, at the broad level, government policy measures, including an easing in bank financing to property developers and relaxation of purchase requirements (Cheng 2023), should instill some confidence in the short term. Stability in the real estate market could then support local government balance sheets by improving revenue from land sales.

- Second, the authorities have strengthened regulatory framework aimed at improving risk management.[1] In January 2023, the National Development and Reform Commission (NDRC) announced new rules on Chinese firms' foreign debt which entail enhanced pre-issuance scrutiny, particularly when borrowers are classified as "offshore entities" but conduct their principal business in China, as well as LGFVs conducting offshore financing. Also, firms are now required to regularly report their use of proceeds and any major developments that could undermine their ability to repay debt. Refinements to regulations should continue to address dynamic market activities. Moreover, execution of these regulations should be aligned with other rules on corporate borrowing.

The authors of this box are Ke Ji and Siang Leng Wong.

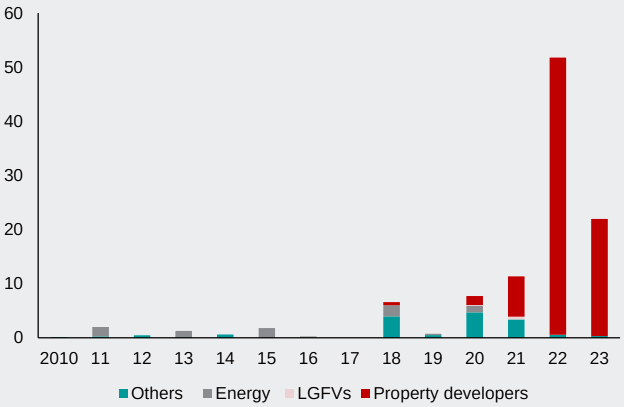
[1] NDRC 2023 No. 56: "Administrative Measures for the Approval and Registration of Medium to Long-term Foreign Debts of Enterprises".

Figure 2.1.1. Chinese NFCs' Offshore US Dollar Bond Issuance
(Billions of US dollar)



Sources: Bloomberg; AMRO staff calculations.
Note: 2023 data is as of 31 October. LGFVs = local government financing vehicles.

Figure 2.1.2. US Dollar Bond Defaults by Chinese NFCs
(Billions of US dollar)



Sources: Bloomberg; AMRO staff calculations.
Note: 2023 data is as of 31 October. LGFVs = local government financing vehicles.

Are higher interest rates putting firms under stress?

Simulation on the impact of elevated interest rates reveals that a non-negligible share of borrowers may struggle with debt payments.

- In a **baseline scenario** with a 100 basis points (bps) rate increase, an additional 5 percent of firms could face financial difficulties, which in the baseline is defined as having an ICR below 1.25 times. This is equivalent to Standard & Poor's ratings of "CCC" and below (Damodaran 2016). A larger rate hike of 350 bps could stress at least an extra 5 percent of firms (Figure 2.27).

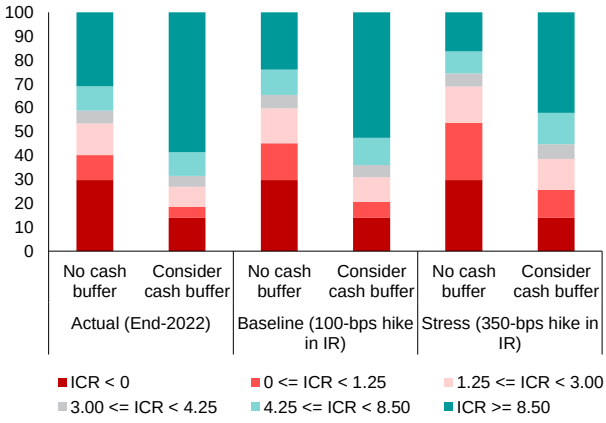
- As of the **end of 2022,** while about 40 percent of firms have ICRs below 1.25 times, these account for a smaller 20 percent of debts. The finding is consistent with earlier results indicating that listed firms have better ICRs while smaller firms with less debt are more vulnerable and have lower ICRs (Figure 2.28). The simulation exercise also suggests corporate nonperforming loan (NPL) ratios in the banking sector, although currently low, may experience some rise should borrowing costs suddenly increase.

- Substantial cash reserves in the corporate sector help most firms to service their debts in the current higher interest rate environment. When the cash buffers of firms are considered, this significantly reduces the proportion of those at risk. In that regard, less than 10 percent of the corporate debt remains susceptible when subject to the interest rate hike.

Firms with higher profits should be able to secure bank financing and attract investors to fund and grow business. This is corroborated by a machine learning approach based on a decision tree model to uncover the key predictors of corporate insolvency in ASEAN+3 economies. The results underscore the importance of profitability in predicting corporate solvency across economies and sectors (Figures 2.29 and 2.30), which is consistent with previous studies (Goyal and Packer 2017). Management-related metrics, encompassing aspects like asset and revenue turnover, as well as liability factors, such as debt obligations, also contribute to corporate resilience. Although macroeconomic factors generally have a minor role in predicting solvency, they are more significant in identifying vulnerabilities in specific sectors like retail and wholesale (Annex 2.5).

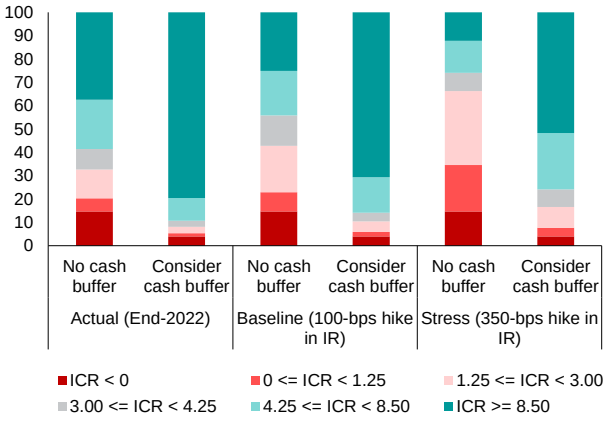
Machine learning analysis underscores that near-term default risks could rise (Figures 2.31 and 2.32). While the nature of data used could limit this analysis, risks could have risen as firms' profitability falls to below pre-pandemic levels. Consequently, reduced corporate profitability necessitates swift initiatives to improve profit margins and reduce financial leverage. Digitalization can help by curbing costs but only to a limited extent when aggregate demand is weak. Government-backed programs such as Singapore's SMEs Go Digital Programme and Malaysia's SME Ecosystem Programme can expedite this transition by offsetting digitalization expenses and fostering enterprise collaboration (Singapore Business Review 2021; Liew 2022). These targeted initiatives aim to boost efficiency and productivity. That said, the decline in default risks during the pandemic was an anomaly, likely attributable to loan moratorium initiatives rolled out by governments and banks to alleviate corporate cashflow stresses through the temporary suspension or waiver of debts (including interest payments).

Figure 2.27. Selected ASEAN+3: Share of Firms Under Stress, 2022 (Simulation Results)
(Percent of firms)



Source: AMRO staff calculations.
Notes: ICR= Interest coverage ratio (equivalent to EBIT/interest expense); IR = corporate borrowing rate. The scenarios with hikes in IR are assumed to affect interest expense but not EBIT. The scenarios indicating "no cash buffer" takes only account EBIT in servicing interest expense. Due to data availability, Brunei, Lao PDR, and Myanmar are not included in the analysis.

Figure 2.28. Selected ASEAN+3: Share of Debt Under Stress, 2022 (Simulation Results)
(Percent of debt)



Source: AMRO staff calculations.
Notes: ICR= Interest coverage ratio (equivalent to EBIT/interest expense); IR = corporate borrowing rate. The scenarios with hikes in IR are assumed to affect interest expense but not EBIT. The scenarios indicating "no cash buffer" takes only account EBIT in servicing interest expense. Due to data availability, Brunei, Lao PDR, and Myanmar are not included in the analysis.

What are the recommended policy responses?

To strengthen corporate resilience, the focus should be on increasing profits and reducing liabilities. To contain risks to financial stability from high corporate leverage, policymakers in ASEAN+3 should strengthen the use of macroprudential tools. The region, in particular the Plus-3 economies, has taken a proactive approach with these policies (Figure 2.33). Throughout the COVID-19 crisis, the ASEAN+3 economies were reluctant to ease these regulatory measures (Figure 2.34), based on fewer episodes of loosening compared to the longer history (including pre-pandemic) of tightening. This finding highlights the region's commitment to risk management and financial stability.

Second, to improve risk management in the property market, ASEAN+3 authorities are encouraged to implement a broader array of unconventional tools. The mix of policies could differ, depending on economy-specific circumstances. The concentration of debt among property developers could mean disproportionately large exposure of property market risks to the financial system. To mitigate this, a multipronged approach has been adopted:

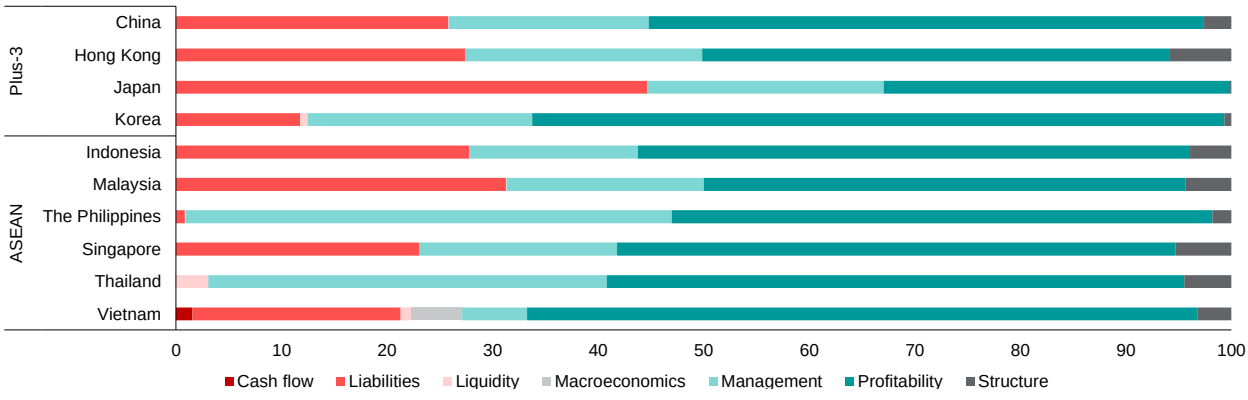
- Cambodia deferred tax payments to help developers better manage cashflow, reducing immediate financial stress (Yutharo 2023).
- Cambodia, Vietnam, and China have announced loan restructuring initiatives. These include measures such as extending loan maturities to offer some relief to struggling developers (Liu 2023; Yutharo 2023).
- China has facilitated easier access to escrow accounts to address liquidity concerns among the more vulnerable developers (Liu 2023).
- Interest rates have been lowered to reduce borrowing costs and attract more demand in the property market. For instance, China reduced its five-year loan prime rate, commonly used in mortgage calculations (He 2022).
- Thailand cut sale and mortgage registration fees to stimulate the real estate sector and promote homeownership (Katharangsiporn 2023).
- China allowed local governments to scrap a rule disqualifying buyers from being considered a first-time homebuyer (even if the mortgage is fully repaid), to provide support for the residential property market (The Business Times 2023).

By adopting this wide range of measures, authorities can target support to the property sector while monitoring for signs of market overheating and/or unintended consequences. Such an approach is more important for ASEAN economies where recent insolvency risk has risen among property developers. That said, it should only be provided for solvent firms dealing with temporary liquidity problems. For firms with unsustainable business models, it may be preferable to wind down or restructure them as solvent and viable entities so that they do not become "zombie" firms.

To ensure long-term financial stability, banks should clearly separate their management and ownership structures. Banks and key stakeholders such as developers should avoid significant cross-ownership to prevent conflicts of interest. This is crucial as some developers could influence lending strategies through their substantial holdings of bank shares (Ho 2022). Independent ownership structures will enable banks to manage lending risks more effectively.

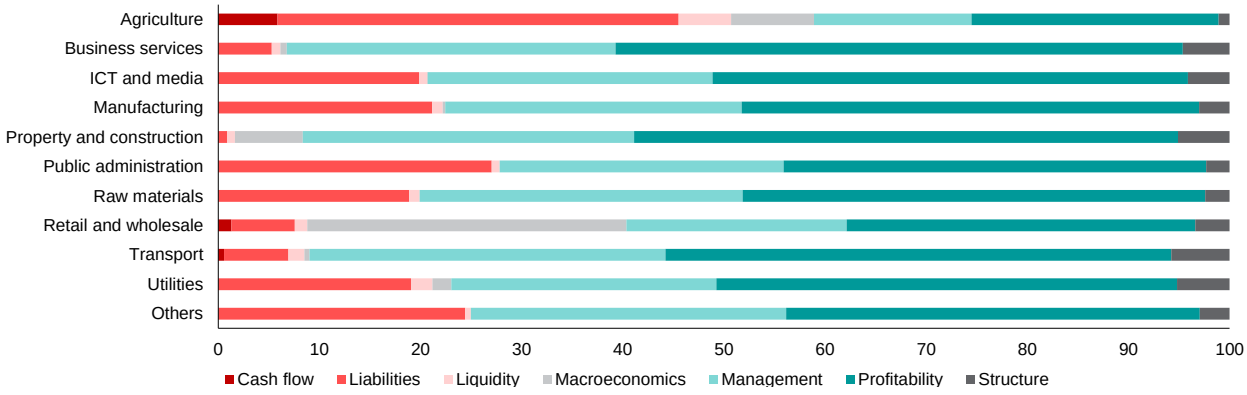
Finally, structural changes are needed to make credit more available to smaller borrowers while strengthening credit risk assessment capacity to avoid lending to inviable firms. While a single small firm failure may not be systemic, multiple funding issues could affect larger networks. Therefore, initiatives such as enhancements to credit guarantee schemes and policy banks (Annex 2.2) are crucial for overall economic health.

Figure 2.29. Selected ASEAN+3: Importance of Indicators to Predict ICR<1.25X by Economy
(Percent)



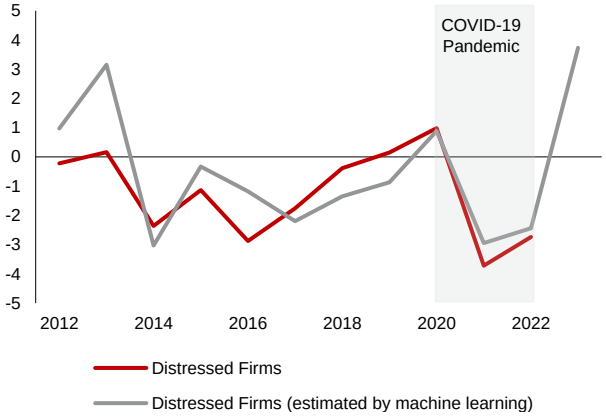
Source: AMRO staff estimates.

Figure 2.30. Selected ASEAN+3: Importance of Indicators to Predict ICR<1.25X by Sector
(Percent)



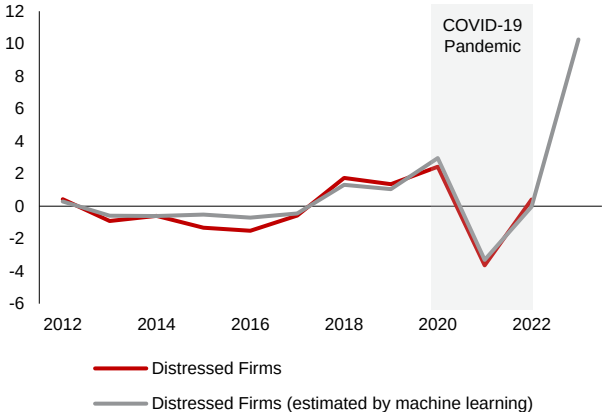
Source: AMRO staff estimates.
Note: ICT = information and communication technology. Due to data availability issue, the estimation does not include Brunei, Cambodia, Lao PDR, and Myanmar.

Figure 2.31. Selected ASEAN: Change in Share of Distressed Firms
(Percentage points, year-on-year)



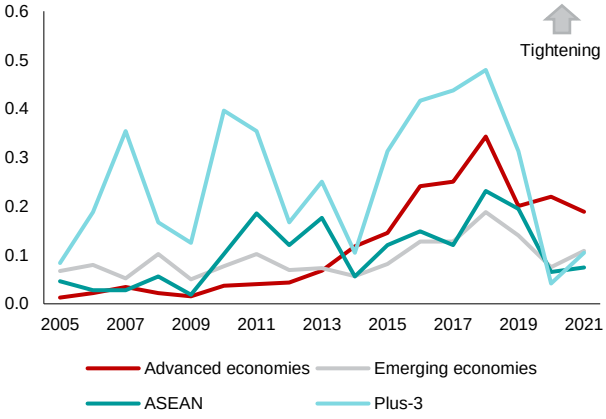
Source: AMRO staff calculations.
Note: Due to data availability, Brunei, Cambodia, Lao PDR, and Myanmar are excluded from the analysis.

Figure 2.32. Plus-3: Change in Share of Distressed Firms
(Percentage points, year-on-year)



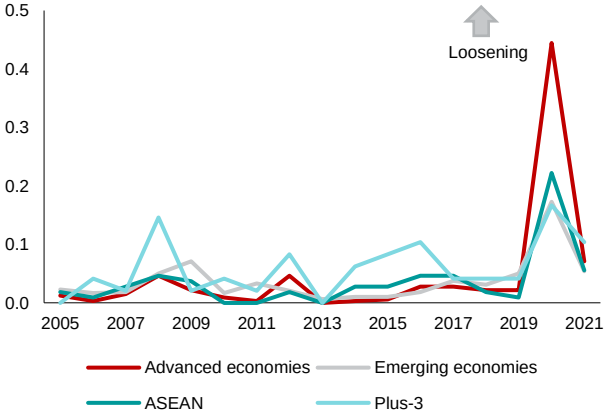
Source: AMRO staff calculations.

Figure 2.33. Selected Regions: Average Tightening of Macroprudential Policies
(Percent)



Source: IMF; AMRO staff calculations.
Note: The number of tightening in macroprudential policies is divided by the number of economies within the same regional group. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

Figure 2.34. Selected Regions: Average Loosening of Macroprudential Policies
(Percent)



Source: IMF; AMRO staff calculations.
Note: The number of loosening in macroprudential policies is divided by the number of economies within the same regional group. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

III. Household Debt

While ASEAN+3 household debt is lower than corporate debt as a share of GDP, it has increased significantly in some economies. Risks from high household debt are also likely to have increased amid the sharp rise in interest rates globally and elevated property prices in some economies. The two primary sources of systemic risk for ASEAN+3 stemming from household debt are analyzed below:

- A rise in the debt burden—both interest and principal repayment by households—that results from a rise in interest rates or a fall in income. A higher debt burden raises the risk that household debt distress can become systemic when widespread.

- A fall in house prices, which reduces the value of property assets relative to debt, increasing the incentive for default. This balance sheet risk to financial stability rises substantially when households become more highly leveraged as the value of property as collateral is more likely to fall below that of debt.[4]

A variety of indicators help evaluate these risks, although critical data gaps prevent a more comprehensive assessment or risk in some economies. Some ASEAN+3 economies do not produce household debt data and only a few report the debt service ratio, making it necessary to estimate the debt burden for them. An initiative to close these gaps would strengthen financial surveillance and enable authorities in ASEAN+3 to more effectively implement policies to curb these risks.

What drives the dynamics of household debt in ASEAN+3?

Empirical analysis using a panel regression (Annex 2.6) shows that the primary drivers of household debt include GDP growth, inflation, and bank capital inflows (Figure 2.35). Specifically:

- The econometric model finds that real GDP growth and bank capital inflows are the primary domestic and foreign drivers of household credit growth. The former has by far the largest quantitative effect, while the latter is more volatile and thus has a relatively large impact on changes in household credit growth. Inflation has a small impact and may be proxying for the effect of real interest rate changes.[5]

- The analysis underscores the significant role of foreign bank capital inflows in ASEAN+3, as illustrated by a positive correlation between debt and bank flows (Figure 2.36). Growth in household credit in the region may be partially driven by sustained capital inflows, which have been stronger in ASEAN+3 than in other regions (Figure 2.37). These inflows tend to be procyclical and synchronized across ASEAN+3. As such, they act as a common factor that influences the household credit cycle in the region. Consequently, a sudden halt in capital inflows could lead to a region-wide slowdown in household credit growth, heightening systemic risk.

- Other potential drivers identified in the empirical literature – interest rates, property prices and net portfolio capital inflows – are not statistically significant.[6] This result for ASEAN+3 holds true for regional sub-groups.[7]

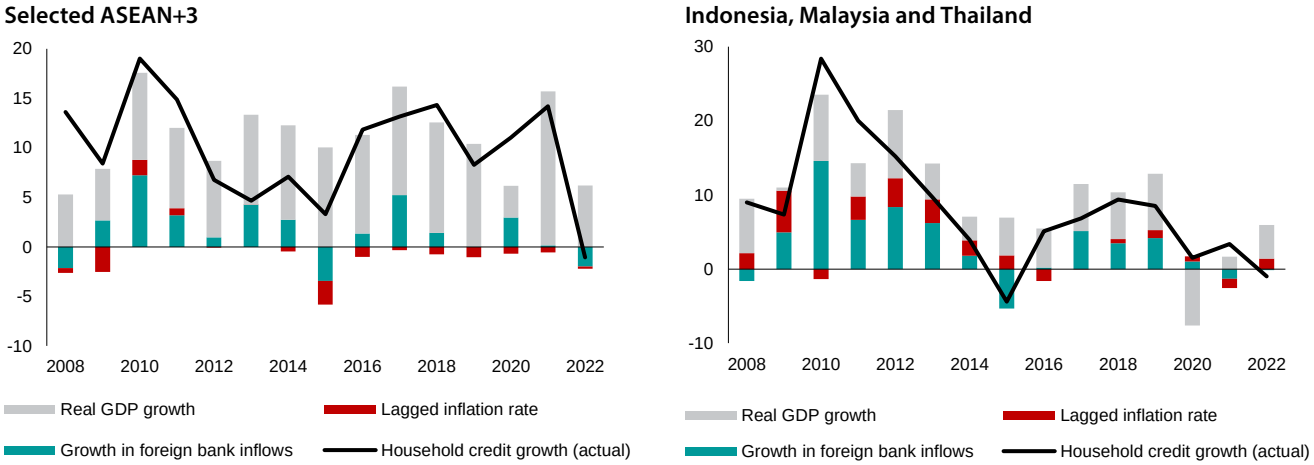
[4] In Asia, household default rates are lower due to cultural factors and institutional features (e.g., full recourse mortgages).

[5] The analysis focuses on macroeconomic drivers relevant to policy, rather than long run structural factors such as financial deepening. Capital inflows may be contributing to currency mismatches in the banking sector that could bring additional risks to banking sector risks.

[6] Model results are presented in Annex 2.6. The portfolio capital inflow variable is taken from IMF Balance of Payments (BOP) Statistics while the bank capital inflow variable is from the BIS Banking Statistics and would be included in other investment flows in IMF BOP data.

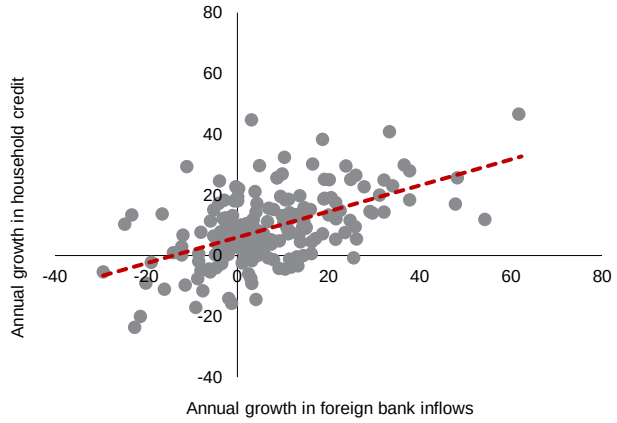
[7] Other variables include unemployment, the wage-productivity gap, household wealth, demographics, and education. A literature review of candidate variables is provided in "The Macroeconomic Drivers of the Household Debt to Income Ratio: Evidence from OECD Countries" (2018) by Piotr Bolibok, Copernican Journal of Finance & Accounting, and "Macroeconomic Determinants of Household Debt in OECD Countries," (2022), by Bogdan, Andrei; Adrian Enciu; Cătălina Hândoreanu; Carmen Obreja; and Florin Blaga. Sustainability. One notable difference between panel estimates for ASEAN+3 and other regions is the lack of statistically significance of the interest rate variable in the former, although it is significant in some individual economy regressions. As noted above, this could reflect the role inflation is playing as a proxy for the effect of the real interest rate.

Figure 2.35. Selected ASEAN+3: Contribution of Macroeconomic Driver to Household Credit Growth
(Percent points, year-on-year)



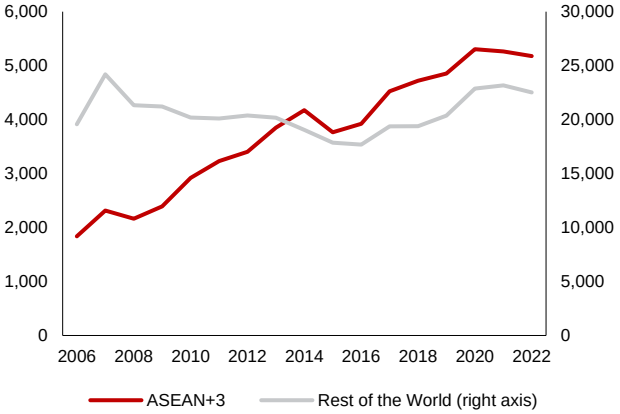
Source: AMRO staff estimates.
Note: Selected ASEAN+3 = China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, Thailand. The bars show the contributions of statistically significant variables but not the model residual and do not sum to the actual household credit growth shown in the chart.

Figure 2.36. Selected ASEAN+3: Correlation of Household Debt Growth and Foreign Bank Inflows
(Percent, year-on-year)



Source: Bank for International Settlements; AMRO staff calculation.
Note: Selected ASEAN+3 = China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, Thailand. Data includes all annual pairs of data points of the eight ASEAN+3 economies, spanning from 2006 to 2022. Foreign bank inflows refer total claims on an immediate counterparty basis by foreign banks in reporting economies. The flows are denominated in US dollars.

Figure 2.37. World and ASEAN+3: Capital Inflows from Banks
(Billions of US dollar)



Source: Bank for International Settlements.
Note: Data for the rest of the world is calculated based on the 65 economies, excluding ASEAN+3 economies, surveyed by the BIS.

How do higher interest rates affect household debt burdens?

The first key risk from high household debt stems from a rise in the debt burden. This can result from a rise in interest rates or a fall in household disposable income. While interest rates vary substantially across ASEAN+3, borrowing costs have generally risen with the tightening of global monetary conditions. This could strain household balance sheets, raising the risk of household default. In situations where banks have not provisioned sufficiently and capital ratios are close to regulatory minimums, this can trigger a correlated cycle of defaults, increasing banks' nonperforming loans and threatening the stability of financial systems.

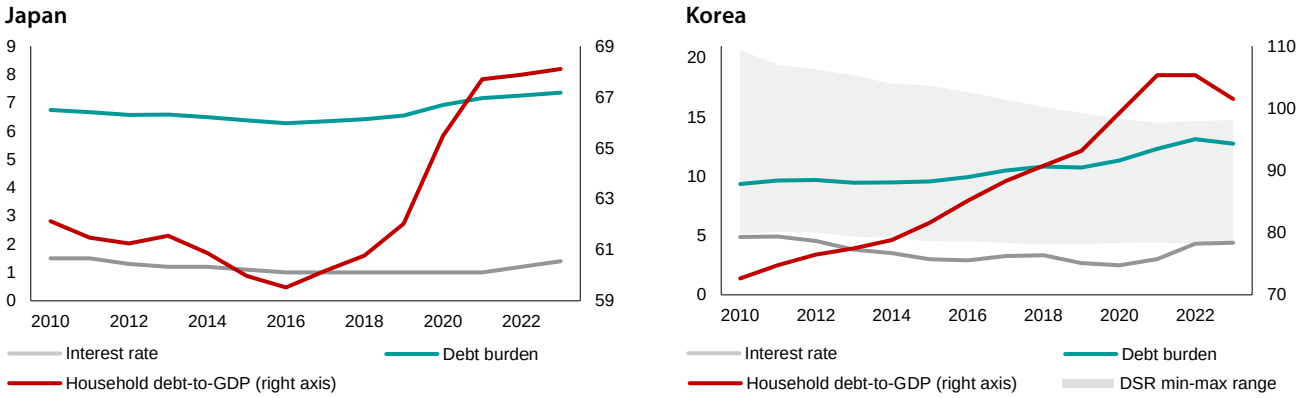
Household's capacity to absorb a heavier debt burden from higher interest rates can be assessed using the debt service ratio (DSR). The risk to financial stability from this increase is hard to assess in ASEAN+3 as only Japan and Korea publish this ratio.

- In Japan, the DSR remained steady despite the rise in the household debt-to-GDP ratio as mortgage rates have stayed very low and flat at around one percent. However, this could change with the Bank of Japan widening the Yield Curve Control band on the 10-year Japanese government bond yield.[8]

- In Korea, the DSR climbed to 14.1 percent in the first quarter of 2023, the second highest in the range of economies reporting DSRs (Figure 2.38, shaded area). Over the past two years, rising mortgage rates have driven this increase.[9]

[8] The increase in the DSR appears larger than that for Korea owing to the much lower initial level of Japanese interest rates and different scaling of the axis in each chart.
[9] The speed with which interest rate rises pass through into higher DSRs depends on average residual maturity of mortgages and the share with a floating rate. In Korea, 80 percent of mortgages carry a floating rate so the passthrough is relatively rapid.

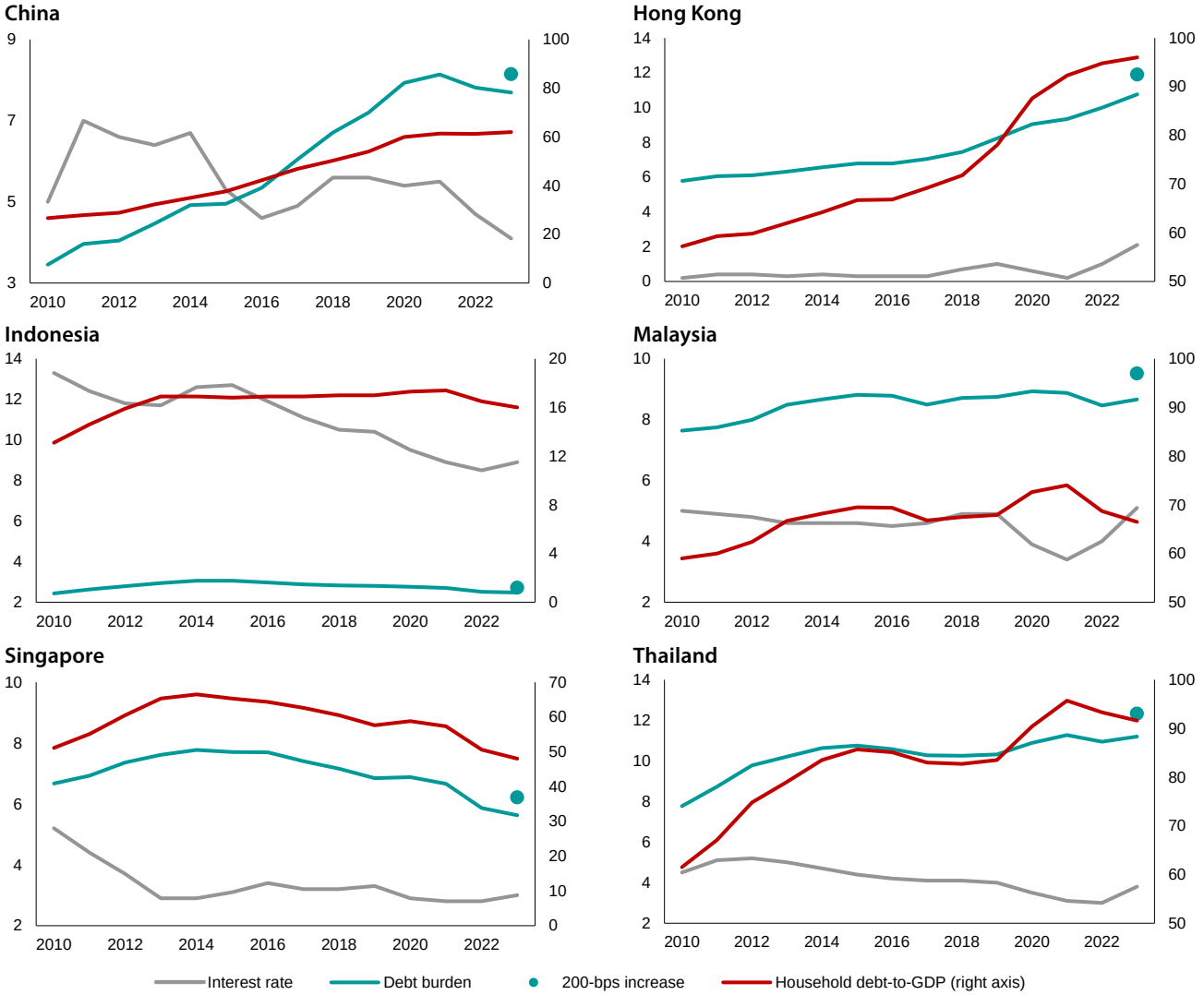
Figure 2.38. Japan and Korea: Household Debt-to-GDP, Debt Service Ratio, and Interest Rate
(Percent; percent of GDP)



Source: National authorities; Bank for International Settlements; AMRO staff calculations.
Note: DSR = debt service ratio. The latest DSR and household debt data are for Q1 2023. The shaded area of DSR min-max range is the difference between the highest and lowest DSR for all economies reporting data.

For ASEAN+3 economies that do not report DSRs, an estimate of the debt burden can be produced using market interest rate and household debt data. This estimate assumes an average residual maturity of 10 years to calculate contribution of principal repayment to total debt repayment. The estimated debt burdens appear manageable in countries with higher debt-to-GDP ratios as their interest rates remain relatively low (Figure 2.39). A risk is that interest rates could rise further. The impact of this is illustrated in a scenario of a further 200-bps rise in interest rates in 2023. This exercise underscores the importance of closing data gaps by complementing debt data with other critical indicators, such as the DSR, for making a more reliable assessment of systemic risk from rising debt burdens.

Figure 2.39. Selected ASEAN+3: Estimated Debt Burden, Household Debt-to-GDP, and Interest Rate
(Percent; percent of GDP)



Source: National authorities; Bank for International Settlements; AMRO staff calculations.
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). The latest household debt data are for 2023Q1. The red dot labelled "200-bps increase" shows a scenario in which the interest rates rises a futher 200-bps in 2023. For the chart on Thailand, data for 2010–2011 is from the BIS, while data for 2012 onwards is from the Bank of Thailand.

What are the risks of a major real estate correction?

The second key source of risk associated with high household debt is a sharp drop in housing prices. ASEAN+3 property prices rose before the pandemic and then corrected as growth slowed and global monetary conditions were tightened (Figure 2.40, Box 2.2). Anecdotal evidence suggests that speculative investments in apartments have inflated property prices and leverage in some ASEAN+3 economies. The rise in housing prices encourages speculative purchases and a surge in mortgage borrowing that drives household debt-to-GDP ratios and prices higher. When this process reverses and house prices fall, the value of collateral backing household debt declines, increasing the incentive for the borrowers with high leverage to default. Also, as many households hold a substantial portion of their wealth as property, a steep price drop can have a wealth effect that slows economic activity, which contributes to further price declines in a negative feedback loop. This can lead to recession and raise default risk further as households' struggle to service their debt.[10] Banking supervisors often impose loan-to-value (LTV) ratio limits on banks' mortgage lending to curb risks from high household debt. However, there is anecdotal evidence that leveraged investors making speculative purchases of multiple properties sometimes can circumvent LTV limits.

To evaluate the risk of a correction, the actual increase in prices is compared with the "fundamental value" predicted in a model of the macroeconomic drivers of house prices.[11] In this panel "error correction" model, real house price behavior in the short run is driven by business cycle variables such as real GDP growth, credit growth, interest rates, and equity prices, while in the long run it depends on a proxy for housing affordability. Using a panel regression methodology means that the estimated coefficients reflect the average impact of each variable across ASEAN+3 economies. It includes a fixed-effect variable to control for differences across economies (Annex 2.7). This facilitates analysis of the risk of a correction in the region as a whole and a comparison of risk across countries.

The risk of a housing price correction can be gauged by the gap between the actual rise in real house prices and the increase predicted by model fundamentals. Figure 2.41 traces these price gaps since 2015 when actual and predicted prices were generally aligned. Results are shown for two economy groups: the ASEAN economies of Indonesia, Malaysia, the Philippines, and Thailand, where the trend in housing prices was quite similar; and the Plus-3 economies together with the IFCs. In both groups, house prices declined to levels close to that predicted by fundamentals. The contribution of drivers of the fundamental house price are similar across the two groups as shown in Figure 2.42.[12] In the ASEAN economies of Indonesia, Malaysia, Philippines, and Thailand, credit growth and the cost of capital had the largest quantitative impact. In the other group, GDP growth was an important driver in recent years.

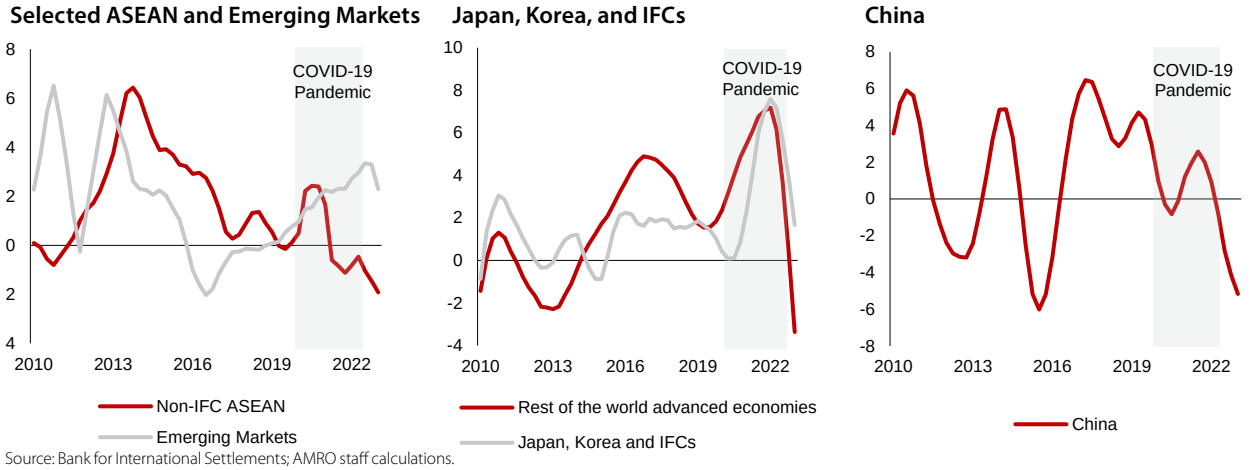
Overall, the risk from high household debt associated with real estate markets has declined. This is suggested by the narrowing gap between actual and model-predicted housing prices, as house prices fell amid monetary tightening. The reduction of risk in the ASEAN economies of Indonesia, Malaysia, the Philippines, and Thailand contrasts with other emerging markets where house prices continued to rise until recently (Figure 2.41). The Plus-3 economies and financial centers also experienced house price corrections that largely closed the gap between actual and the fundemental property price predicted by the model. This lowers the likelihood of large corrections that could threaten financial stability. The model does not capture factors beyond the influence of economic fundamentals on property prices, such as housing policies, and financial stresses on property firms. Each ASEAN+3 economy can develop its own model to better capture features specific to its economy.

[10] Defaults have remained low in some ASEAN+3 economies even in the face of large price declines owing to institutional and cultural factors such as bankruptcy stigma and the prevalence of full-recourse mortgages that gives creditors a claim on all assets of the borrower (not just the property collateral). And, to avoid default, households often draw on family resources and sharply cut expenditures, which can have a large macroeconomic impact on growth. This highlights the need to take into account the insolvency regime and cultural factors in analyzing the impact of house price declines.

[11] The model is based on that in the paper "Global Housing Cycles" by Deniz Igan and Prakash Loungani, (August 2012). IMF Working Paper WP/12/217.

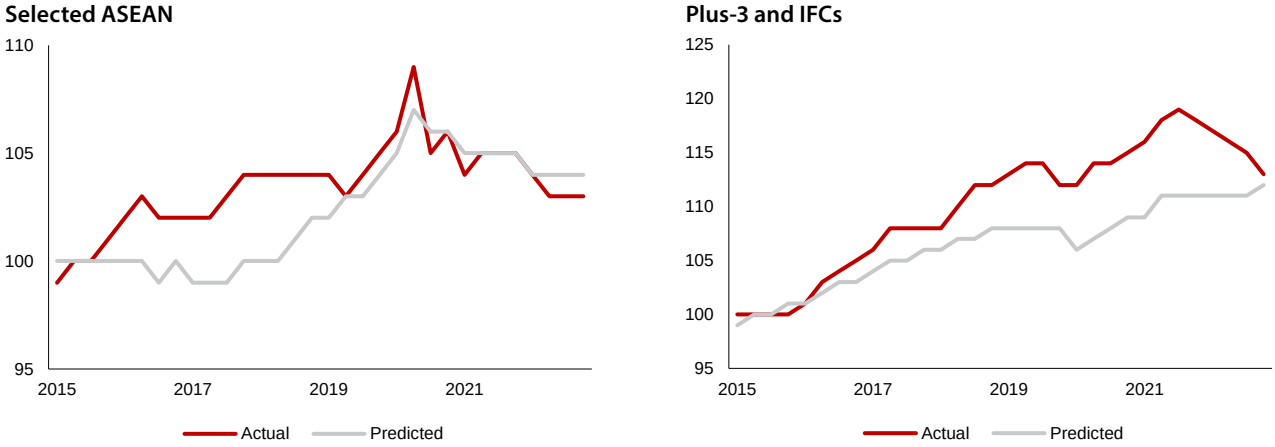
[12] See Annex 2.7 for a detailed presentation of the model. The cost of capital bar in Figure 2.43 comines the effect of interest rates and equity prices, which are separate variables in the panel regression model.

Figure 2.40. World and Selected ASEAN+3: Housing Price Growth
(Percent, year-on-year)



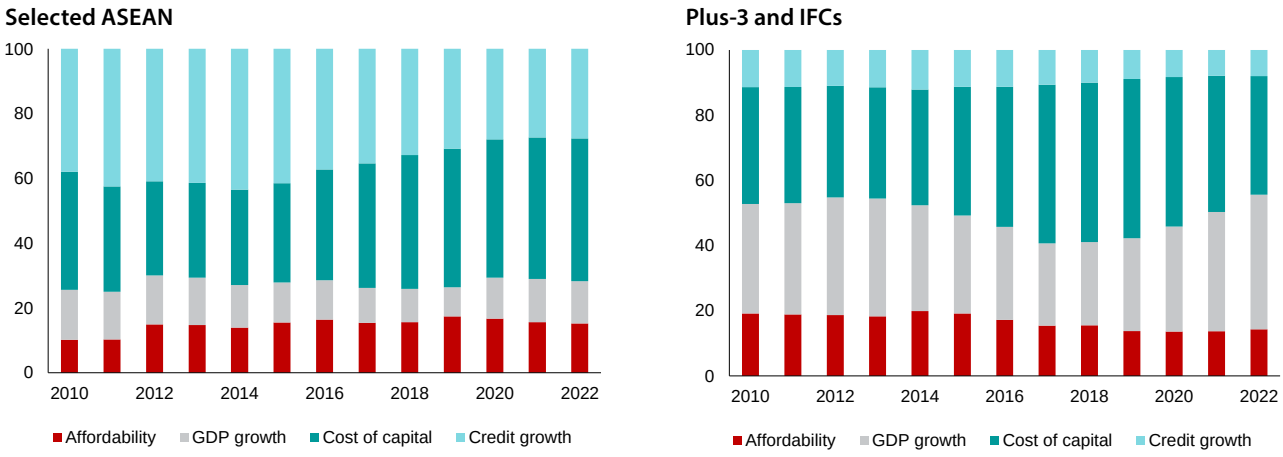
Source: Bank for International Settlements; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, Philippines, and Thailand. Emerging markets data exclude those in ASEAN+3. IFCs include Hong Kong, and Singapore. Rest of the world advanced economies excludes Japan.

Figure 2.41. Selected ASEAN+3: Real House Price versus Predicted Value from a Model of Fundamental House Prices
(Index, 2015 = 100)



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

Figure 2.42. Selected ASEAN+3: Drivers of House Price Growth
(Percent share of contribution)



Source: AMRO staff estimates.
Note: The cost of capital bar combines the effects of the interest rate and the equity price variables in the model. Only Japan and Korean publish a housing affordability index, thus, a proxy for affordability is used as the error correction term in the model, which is the deviation of house prices from trend (calculated using an Hodrick-Prescott filter). Selected ASEAN economies included are Indonesia, Malaysia, Philippines, and Thailand. Plus-3 and IFCs include China, Japan, Korea, Hong Kong, and Singapore. See Annex 2.7 for details.

Box 2.2:

Behind Korea's Housing Market Cycle

Amid prolonged monetary easing, Korea experienced a housing market boom during the COVID-19 pandemic. The nationwide apartment prices surged 21.5 percent year-on-year in 2021. Housing prices rose rapidly from the onset of the pandemic to peak in December 2020. The median sale price soared well above its long-term trend during the second half of 2020 to the first half of 2023 (Figure 2.2.1). The market boom started in metropolitan areas before spilling over to other parts of the country. Similar to other advanced economies, Korea's housing affordability index (HAI) also declined in 2021, primarily because household income fell during the pandemic. However, the decline of Korean index was larger as the average housing price rose to more than twice the average annual household income (Figure 2.2.2).

The housing market cooled down after the Bank of Korea (BOK) began normalizing monetary policy in the middle of 2021. Transaction volumes in both Seoul and areas outside the capital weakened persistently from mid-2021 to the end of 2022. Consequently, nationwide housing prices continued to trend down. In July 2023, nationwide apartment prices dropped by 10.5 percent year-on-year, and the median apartment price per square meter shrank by 17.8 percent from its peak in 2021. The price of apartments in many areas has returned to the pre-pandemic level.

What factors have underpinned Korea's housing prices since the pandemic?

- Financial conditions are a main determinant, among others. During the pandemic, the housing market boom was fueled by low interest rates and ample liquidity injected by the BOK (Figure 2.2.3). The central bank cut the base rate by 100 bps within three months to support the economy. Although financial regulatory authorities maintained tight macroprudential measures–including lending regulations, relevant taxes, and housing regulations–to curb speculative demand, home loans still expanded by about 10 percent in 2020–21. Conditions in the housing market have reversed since the second half of 2022, with a drastic weakening of demand and prices following BOK tightening.

- The recent shift toward solo living in Korea has fueled housing demand. Demand for single-person homes has surged, with one- to two-person households rising from 35 percent of total households in 2000 to 48 percent in 2022. This trend is most pronounced in Seoul, where the housing stock[1] cannot satisfy strong demand for micro-sized households (AMRO 2021).

- Speculative demand spurs housing prices. Low interest rates in 2020–21 fueled a boom in Korea's housing and equity markets, attracting retail investors, some using leverage. Despite stricter lending rules and higher property taxes, multiple homeownerships increased in 2020 due to appealing rental income. The jeonse[2] (leasehold deposit) market also surged (Figure 2.2.4), particularly in Seoul, encouraging gap investment.[3] However, the trend reversed after the BOK's rate hikes. Since the fourth quarter of 2021, jeonse deposits have declined faster than housing prices, as rising interest rates make monthly rent more attractive over large jeonse lump-sum deposits (BOK 2022).[4]

- Lagging housing supply adjustments intensify price volatility. Due to the time required for land transfers and construction, supply struggles to keep pace with demand shifts (Figure 2.2.5). Even in periods of high demand, Korea's housing supply expands only by 2 percent annually. Regulatory restrictions on housing redevelopment from 2017–21 and jeonse contracts further limited supply. The situation improved in 2022 with increased supply and relaxed regulations.

The author of this box is Wanwisa (May) Vorranikulkij.

1 According to data published by Ministry of Land, Infrastructure and Transport, the housing penetration rates – the number of houses in the percentage of the number of households—in Seoul Metropolitan Area was 96.8 percent in 2022, remaining below 100 percent.

2 Jeonse is a unique Korean housing rental system where tenants pay a large deposit, usually between 50 percent and 80 percent of the property's value, instead of monthly rent. This deposit is returned at the end of a two-year contract. Landlords can profit by investing this deposit, especially during housing market upturns and strong financial markets.

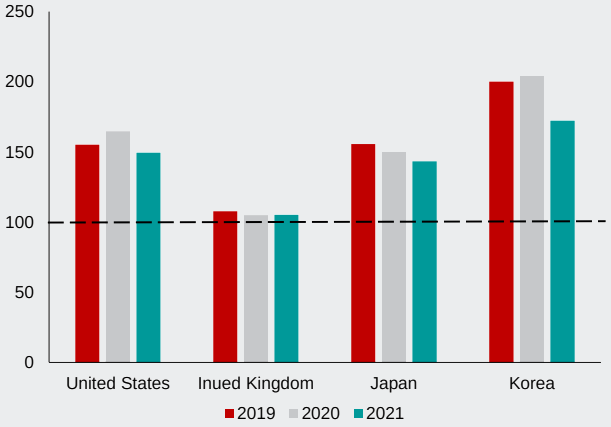
3 Gap investment refers to using the Jeonse deposit to buy another property for rent. This strategy gains popularity when housing prices and Jeonse deposits are rising. Landlords with multiple contracts can collect a higher deposit from new tenants to repay old ones, profiting from the difference between the two deposits.

4 Many Korean households borrow money from banks and nonbank financial institutions to pay jeonse deposits. This is why the change in interest rates also affect the jeonse market conditions.

Figure 2.2.1. Monthly Change in Housing Price and Housing Price Gap
(Percent; percent, month-on-month, seasonally adjusted)

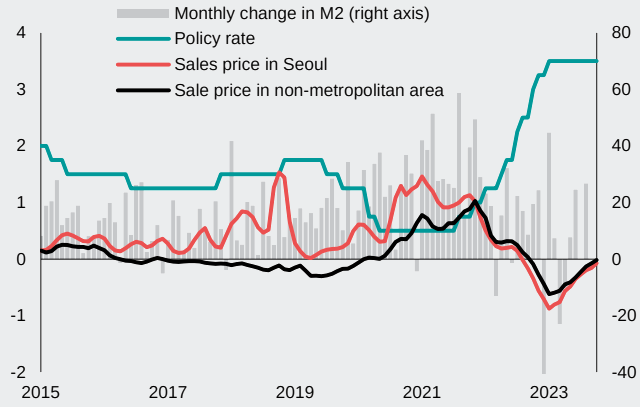
Source: Kookmin Bank; AMRO staff calculations.
Note: The long-term housing price trend is estimated using the Hodrick-Prescott filter.

Figure 2.2.2. Housing Affordability Index (HAI)



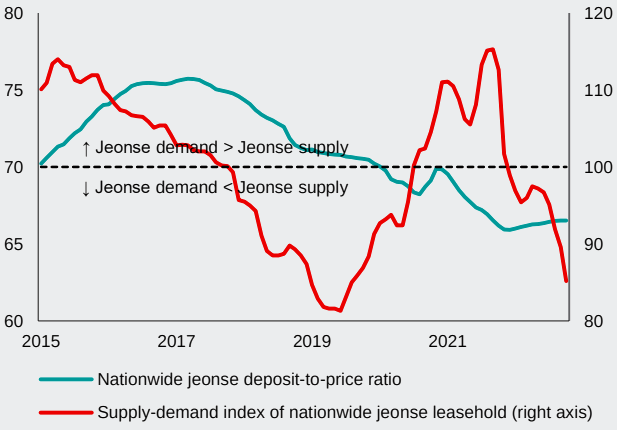
Source: Biljanovska and others, 2023.
Note: The HAI measures a household's capacity to make regular mortgage payments required for purchasing a home while ensuring the ability to meet other essential needs and maintain an income buffer. The higher the index, the more affordable housing is in that country.

Figure 2.2.3. Financing Conditions and Housing Prices
(Percent; trillions of Korean won, seasonally adjusted)



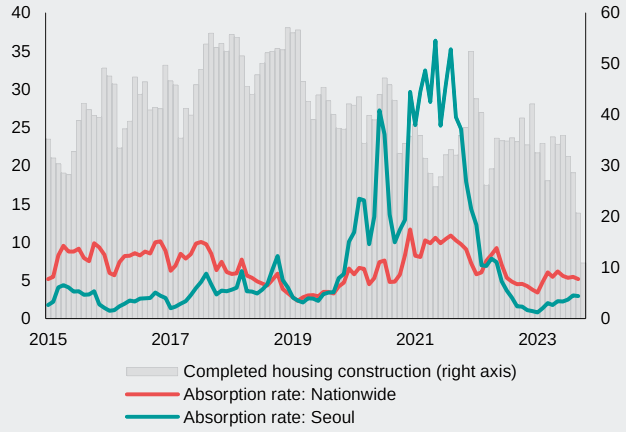
Source: Kookmin Bank; BOK; AMRO staff calculations
Note: Units for sales prices are month-on-month, seasonally adjusted percentage change at the three-month moving average.

Figure 2.2.4. Demand and Supply Condition in Jeonse (Leasehold) Market Conditions
(Percent; index)



Source: Korea Real Estate Board; Bank of Korea; AMRO staff calculations
Note: Supply-demand index of jeonse leaseholds ranges from from 0 to 200, which 100 indicates the balance between demand and supply of jeonse units; index < 100 indicates excess supply; and >100 indicates excess demand.

Figure 2.2.5. Housing Demand and Supply
(Times; thousands of units, three-month moving average)



Source: Ministry of Land, Infrastructure and Transport; AMRO staff calculations
Note: Housing absorption rate is the ratio of the average number of sales per month to the total number of unsold housing units.

Household debt vulnerabilities and macroprudential policies

The decline in financial stability risks due to high household debt in ASEAN+3 may partly reflect macroprudential policies. These policies work by controlling household leverage, with macroprudential authorities in ASEAN+3 using a variety of tools to affect credit demand or supply (Table 2.1). These policies have been used countercyclically in the region as illustrated in Figure 2.43, which show tightening and loosening actions: policies were tightened in the boom following the global financial crisis when global monetary conditions were ultra loose, eased in 2014 in response to the "Taper Tantrum" when the US Federal Reserve (Fed) tightened monetary policy, and then tightened gradually until the pandemic led to widespread easing in 2020. A number of economies relied heavily on the loan-to-value ratio as a macroprudential policy to curb household leverage (Figure 2.44). Empirical studies covering many economies show these policies have reduced risks to financial stability.[13]

Other policies can play an important role in curbing risks to financial stability from high household debt:

- Central banks and monetary policy: Many ASEAN+3 central banks have a financial stability mandate. While macroprudential policy should play the primary role in managing risks from high household debt, central banks may need to consider these risks in setting monetary policies. This involves assessing of the impact of a policy rate on the debt service burden, particularly when the household debt-to-GDP ratio is already high. Also, when the policy rates are kept very low for an extended period, they need to assess the risks of excessive credit growth and build-up of leverage, which could help drive property prices higher.
- Market mechanisms and regulatory oversight: These could be strengthened to better manage household default risk. This could involve using the insolvency regime to promote market resolution practices that facilitate debt restructuring, especially for vulnerable borrower groups. This is preferable to broad-based relief measures, which can involve fiscal costs and raise concerns about moral hazard. Regulation can be used to promote responsible lending practices, including by strengthening financial intermediaries' capacity to assess the ability of borrowers to repay debt under different risk scenarios.
- Address household debt data gaps: ASEAN+3 authorities could strengthen their data collecting capacity to assess risks from high household debt by publishing essential indicators. These include: (1) the household debt-to-GDP ratio; (2) the debt service ratio; (3) the share of mortgages in household debt; (4) a representative interest rate (e.g., the mortgage rate); and (5) the residential price index. There are gaps in the publication of these indicators, as shown in Table 2.2, even though many countries collect the source data needed to compile them. Scope also exists to improve data quality by better implementing established compilation methodologies. Closing data gaps would allow policymakers to assess risks from household debt and implement more targeted macroprudential policies to mitigate the risks. These essential indicators can be combined with other relevant information and models to deepen the analysis of risks.

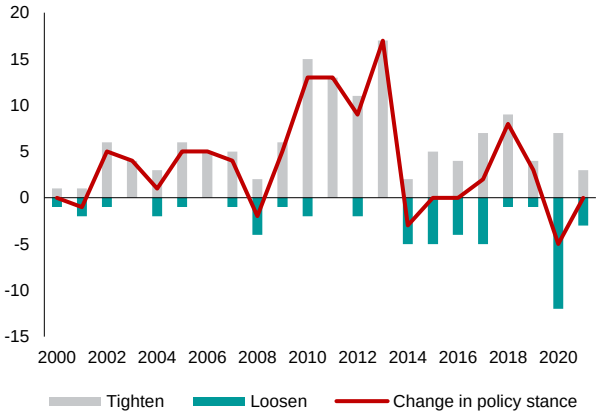
Table 2.1. Macroprudential Policy Tools Targeting Risks from Household Debt

Policies	Impact	Use in ASEAN+3
Demand-Side Measures		
Loan-to-Value (LTV) ratio	Limits the credits to households for purchasing real estate	Yes (see Figure 2.45)
Debt-Service Ratio (DSR)	Limits the size loan repayments as a share of income	Yes
Transaction Taxes	Taxes on house purchases, raising their cost. Higher stamp duties are often used to target foreign borrowers.	Yes
Supply-Side Measures		
Provisions on housing loans	Banks hold higher provisions against real estate loans	Yes
Limits on credit to specific sectors	Quantitative limits on the growth rate of lending to households	Yes
Capital Adequacy Ratio (CAR) Risk weights	Increase the risk weight on property loans requiring banks to hold more capital against this lending	Yes

Source: IMF iMaPP database; AMRO staff compilation.

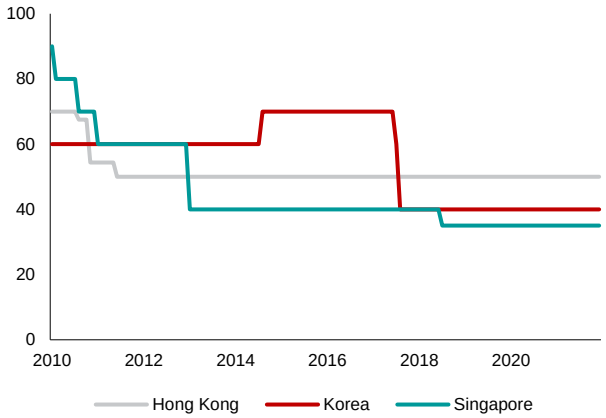
[13] The IMF database on macroprudential policies only reports announced tightening and loosing actions, except for LTV for which actual settings are reported. Figure 2.44 shows these actions for the six macroprudential tools targeting the housing sector in Table 2.2. When this variable was included panel regression equation this variable was not statistically significant. This may reflect limitation of the data, where for much of the sample there were few policy changes. Studies on a broader sample of economies show a strong effect of policies on household debt and housing markets. See "Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database" (2019) by Alam, Zohair, Adrian Alter, Jesse Eiseman, Gaston Gelos, Heedon Kang, Machiko Narita, Erlend Nier, and Naixi Wang IMF Working Paper No. 19/66.

Figure 2.43. ASEAN+3: Change in Stance of Macroprudential Policies Targeting Household Debt
(Number of macroprudential measures)



Source: IMF iMaPP database; AMRO staff calculations.

Figure 2.44. Selected ASEAN+3: Loan-to-Value Ratio
(Percent)



Source: IMF iMaPP database; AMRO staff calculations. In Singapore, the LTV is tiered, with LTVs for the first, second and third housing loans set at 75, 45 and 35 percent, respectively.

Table 2.2. ASEAN+3: Gaps in Data Needed for Effective Surveillance of Risks from High Household Debt

	Household debt to GDP	Debt service ratio	Mortgage loan to GDP	Mortgage interest rates	Residential house price index
Brunei	**			**	**
Cambodia	**				**
China	*		**	**	*
Hong Kong	*		**		*
Indonesia	*				*
Japan	*	*	**	-	*
Korea	*	*	**	**	*
Lao PDR					
Malaysia	*	***	**		*
Myanmar					
Philippines	**		**	**	*
Singapore	*		**	-	*
Thailand	*		**		*
Vietnam					

Note: * indicates data is available from the Bank for International Settlements and ** is from national sources via Haver Analytics or CEIC. – indicates data is discontinued. *** indicates availability only from national sources

Annex 2.1. Estimation of Nonfinancial Debt Thresholds

This annex seeks to identify statistically the debt to GDP ratios above which further increases may constrain economic growth. High leverage allows firms to invest and expand production; however, excessive debt accumulation may eventually constrain economic growth as debt burdens rise (Dudley 2011). Specifically, the correlation between real GDP growth and the debt-to-GDP ratio is estimated and a bootstrapping methodology used to identify the threshold beyond which this correlation turns negative (and is statistically significant).

Statistical analysis covering eight economies in ASEAN+3 estimates the correlation between nonfinancial debt and economic growth. Annual data between 1996 and 2022 are used from the Bank for International Settlements (BIS), while data on the other macroeconomic indicators are mainly from the International Monetary Fund (IMF) and the World Bank.

The empirical model is:

$$\Delta\gamma_{it} = -\emptyset\gamma_{it} + \beta'_1 x_{it} I(x_{it}<\tau) + \beta'_2 x_{it} I(x_{it}\geq\tau) + \mu_i + T_t + \varepsilon_{it}$$

The dependent variable $\Delta\gamma_{it}$ is the growth rate of real GDP, γ_{it} and x_{it} represent the log of GDP per capita and nonfinancial debt-to-GDP ratio respectively. $I(\cdot)$ equals 1 when the proposition is true (i.e.,$(x_{it}<\tau)$); otherwise, it takes the value 0. In this model, nonfinancial debt ratio has a threshold effect, and the threshold value is τ. μ_i refers to the country-fixed effects and T_t includes three event dummies: the Asian financial crisis, the global financial crisis, and the period of the COVID-19 pandemic. ε_{it} stands for the residual term.

Two panel regressions were run for the eight economies in the ASEAN+3 region. In the first, only Hong Kong and Singapore are included. They are international financial centers (IFCs) and have a higher carrying capacity than others owing to the high proportion of nonresidents issuing debt in these jurisdictions. The other six economies are grouped in a separate regression. In the regressions, the log of GDP per capita and three major crises that impacted economic growth are controlled for. As a robustness check, foreign direct investment (FDI) and population growth were tested as additional explanatory variables and were not statistically significant. The threshold is estimated by the Bootstrapping methodology through a grid search; and, therefore, it is possible that multiple equilibriums may result. In both cases, we allow for two and compare the effect on growth if debt is below or above the identified thresholds (i.e., β'_1 vs β'_2). A threshold is reported if debt significantly undermines growth only when above the threshold (i.e., $\beta'_2<0$). Only one equilibrium threshold meeting these conditions is found for both the IFCs and other ASEAN+3 countries.

Table A2.1.1 summarizes the results of the estimated threshold. GDP growth appears to be constrained at higher debt ratios for the IFCs (368 percent) than the rest of ASEAN+3 economies (147 percent), probably attributable to the credit intermediation role of the IFCs. These estimates do not consider how specific factors might affect a country's debt carrying capacity. Rather, they estimate the correlation between real GDP growth and the debt-to-GDP ratio for countries in the group and then use a bootstrapping methodology to identify the threshold at which this correlation turns negative and statistically significant. The high degree of statistical uncertainty associated with these estimates is hard to quantify. Therefore, a range based on the estimated debt ratio is constructed as an indicator where this threshold could lie across countries, as was shown in Figure 2.1. Specifically, to illustrate this uncertainty, the lower/upper bound is assumed to be plus/minus 50 percent of the estimated debt ratio.

Table A2.1.2 shows the panel regression result in the two groups. It reports the "beta1" and "beta2" shown in the regression equation estimated for the threshold identified from Bootstrapping, where the debt-to-GDP ratio is negatively associated with economic growth. Quantitatively, a 10-percent increase in the debt-to-GDP ratio above the thresholds comes with a cost of 0.3 percent real GDP growth in the non-IFC economies and 0.4 percent in the IFCs. Lastly, Table A2.1.3 provides summary statistics of the actual debt-to-GDP ratio across the sample period in the two regions.

Table A2.1.1. Estimation of Nonfinancial Debt-to-GDP Thresholds

Region	Point Estimation (Percent)	Range	
		Debt threshold minus 50 percent	Debt threshold plus 50 percent
IFCs	368.30	245.53	552.45
Selected ASEAN+3	146.70	97.80	220.05

Source: AMRO staff calculations

The authors of this annex are Jingwei Zhou, Chenxu Fu, Kit Yee Lim, under the guidance of Siang Leng Wong and Richard Sean Craig.

Table A2.1.2. Regression Results

Regressors	Selected ASEAN+3	IFCs
Threshold multiplied by debt		
Beta 1	-0.021 (0.016)	-0.024 (0.012)
Beta 2	-0.032* (0.013)	-0.041*** (0.011)
GDP per capita	0.473 (0.529)	2.935 (1.884)
Asian financial crisis	-3.253** (1.006)	-2.041 (1.796)
Global financial crisis	-1.392 (0.713)	-2.314 (1.425)
COVID-19 pandemic	-2.365** (0.753)	0.013 (1.865)
Economy fixed effects	Yes	Yes
Observations	162	54
Start year	1996	1996
End year	2022	2022
R-squared	0.35	0.47

Source: AMRO staff estimates.
Note: Selected ASEAN+3 = China, Indonesia, Japan, Korea, Malaysia, and Thailand; IFCs = Singapore and Hong Kong; Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent respectively. Numbers in parentheses denote standard errors.

Table A2.1.3. Summary Statistics of Debt-to-GDP Ratio

Region	Mean	SD	Min	Max	P95	N
Selected ASEAN+3	136.7	52.6	26.2	242.4	210.9	162
IFCs	205.4	66.8	135.1	383.6	368.3	54

Source: AMRO staff estimates.
Note: Selected ASEAN+3 = China, Indonesia, Japan, Korea, Malaysia, and Thailand; IFCs = Singapore and Hong Kong; SD = standard deviation; P95 = 95th percentile of a dataset; N = Number of observations.

Annex 2.2. Policies to Facilitate MSME Financing

Micro, small, and medium sized enterprises (MSMEs) are important segments of the economy but not significant recipients of funds in the financial system. MSMEs form more than 96 percent of businesses and provide two out of three private-sector jobs (Yoshino and Taghizadeh-Hesary 2018) but hold only 3 percent of debt. Hence, more could be done to plug this financing gap (World Bank 2023). Insufficient financial/audit invoicing information that limits assessment of MSME creditworthiness and higher administrative cost per loan are often cited as reasons why financial institutions do not lend much to MSMEs (Sen and Mangla 2023).

As the MSME loans are assessed as having higher risk of turning into NPLs, it is necessary to provide credit support for the MSME segment, in particular for ASEAN economies that have higher share of at-risk MSMEs than the Plus-3 economies. The next few paragraphs highlight the types of support measures that could be put in place.

First, enhancing the effectiveness of MSME credit guarantee schemes (CGSs) is crucial. These incentivize lenders to extend credit to MSMEs by absorbing losses on lenders' balance sheets in case of MSME defaults. CGSs are proven to support MSME access to funding that might otherwise be unattainable (The World Bank 2016). Also, governments favor CGSs for closing the MSME financing gap, as they are less of a fiscal burden than direct government financing (Panyanukul, Promboon, and Vorranikulkij 2014). Best practices for such schemes should have the following:

- Fee structure—High front-end fee to deter moral hazard and early termination (ADB 2022), but subsidized annual fees serve to fund CGS administrative costs, to ensure uninterrupted support for the MSMEs.
- Loan coverage—CGS should cover a significant portion of the loans, to incentivize both the MSMEs and banks in seeking CGS protection, while ensuring that lenders (i.e., banks) have skin in the game.
- Risk sharing—Losses should be distributed so that the CGSs and banks share losses equally on a pro-rata basis.

The setups of CGSs differ across jurisdictions (Table A2.2.1), mainly in ownership and funding sources (i.e., the nature of CGS guarantor). The summary in Figure A2.2.1 gives more details.

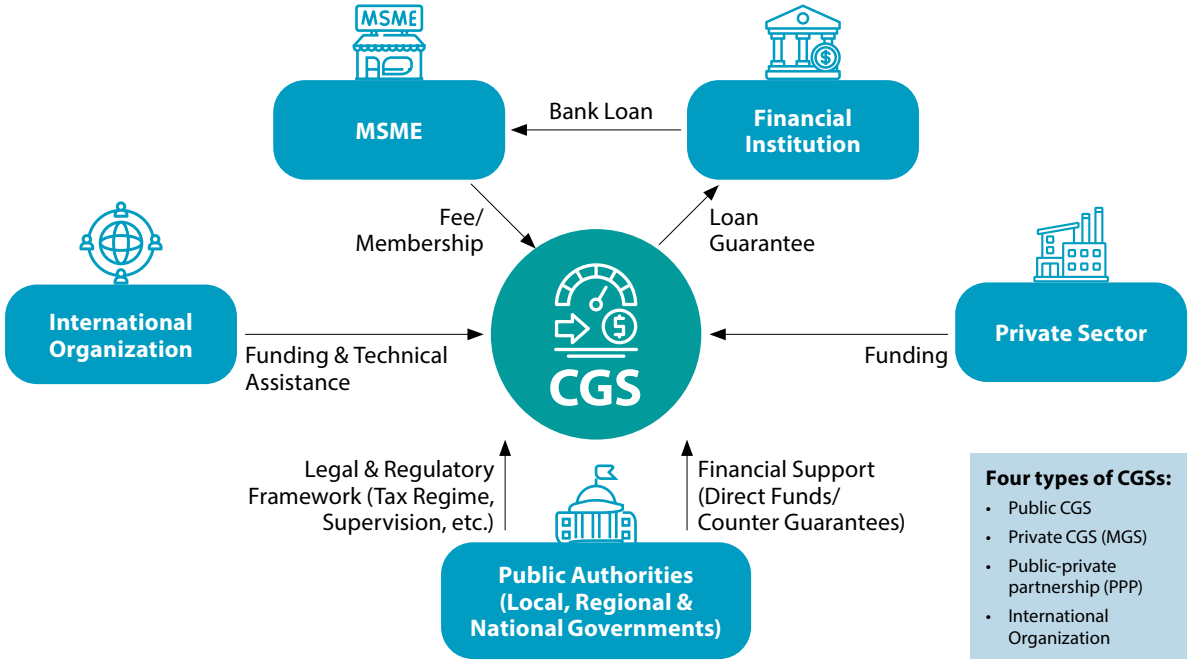
i. **Predominantly publicly funded and supervised CGSs:** They are the most prevalent, with involvement of public authorities spanning local, regional, and national government.

ii. **Public–private partnerships (PPPs):** These are the CGGs in which private sector entities have more involvement, joining forces with the government to contribute funds to the CGSs.

iii. **CGSs sponsored partially or entirely by international organizations such as the World Bank:** More commonly seen in low-income countries that have limited resources.

iv. **Mutual Guarantee Schemes (MGSs):** Mostly by developed economies (e.g., Confidi in Italy) with robust private sectors, where the smaller firms pool resources to form the CGSs.

Figure A2.2.1. Summary of the Mechanism of CGSs



Sources: OECD (2013); AMRO staff compilation.

The authors of this annex are Leilei Lu, Kit Yee Lim, Jingwei Zhou, and Siang Leng Wong.

Table A2.2.1. Selected ASEAN+3: Overview of CGSs

Economy	Institution	Established	Ownership Structure	Max Coverage Ratio (Percent)	Max Fee (per annum percent)	Max Loan (USD millions)	Remark
China	6000+ Credit Guarantee Firms	2001	Different forms – Both Public and Private	---	5.00	---	Small size relative to SME financing needs and uneven distribution and high cost due to multi-layer system.
Hong Kong	SME Financing Guarantee Scheme	2011	Public	100	0.65	2.30	Shown to have provided strong support for SMEs in obtaining financing.
Japan	National Federation of Credit Guarantee Corporations	1953	Public	100	0.90	6.70	Recognized as successful.
Korea	Korea Credit Guarantee Fund	1976	PPP	100	3.00	5.27	Recognized as successful.
Indonesia	People's Business Credit	2007	Public	80	---	0.03	Evaluation of unsubsidized loans should be conducted, to ensure that CGSs are more targeted and loan approvals to repeated debtors are prevented.
Thailand	Thailand Credit Guarantee Corporation	1991	Public	---	3.00	1.40	---
Malaysia	Credit Guarantee Corporation Malaysia Berhad	1972	PPP	90	Secured: 3.2 Unsecured: 4.00	3.21	Recognized as successful.
Philippines	Credit Surety Fund Cooperative	2015	PPP	100	5.00	---	Enable the MSMEs, cooperatives and NGOs to have easier access to credit from banks despite lack of collaterals.
	Philippine Guarantee Corporation (PhilGuarantee)	2019	Public	50*	1.00 (plus gross receipts tax for approved guarantees until December 2020)*	0.9 per borrower*	PhilGuarantee was established by consolidating the finances of 5 state agencies performing guarantee function.
Singapore	Temporary Bridging Loan Programme	2020	Public	90 until 31 March 2021,70 from 1 April 2021 to 30 September 2022	---	Until 31 March 2021: **3.68** 1 April 2021 – 30 September 2021: **2.21** 1 April 2022 to 30 Sept 2022: **0.74**	Shown to have positive impact on employment.The government covers 70 percent of the loan extended.
Cambodia	Credit Guarantee Corporation of Cambodia	2020	Public with IO support	80	---	1.00	---
Vietnam	Credit Guarantee Fund	2015	Public	100	1.00	---	Low uptake due to lack of cooperation and risk sharing between lenders and the CGS. The government has been evaluating the shortcomings and limitations of the scheme, to enhance its feasibility and suitability over time.

Source: National authorities; AMRO staff compilation.
Note: The list of CGSs is not comprehensive, given that several economies have more than one CGS in place. CGS is not present in some economies (e.g., Lao PDR). * refers to terms and conditions covered by the PhilGuarantee's MSME Credit Guarantee Program (MCGP). After 30 September 2022, the Temporary Bridging Loan Programme for Singapore is no longer active.

Second, transparency and reporting of MSME balance sheets should be strengthened. MSMEs face heightened vulnerability and frequently have to contend with cautious lenders (OECD 2021). This susceptibility largely arises from factors like insufficient credit history, limited collateral, and unreliable financial reporting. To address this, one effective approach could involve aligning government support for SMEs with comprehensive advisory services, encompassing initiatives like digitalizing businesses (Lin and others 2022).

Third, effective policy banks ought to be in place. Policy banks operate on a nonprofit basis. Several economies have already implemented these types of banks (refer to Table A2.2.2). Nonetheless, the efficacy of such institutions relies on their robust capitalization and whether procedures are sufficiently streamlined to process MSME loan applications.

Table A2.2.2. Selected ASEAN+3: Summary of Policy Banks

Economy	Policy Bank	Established	Mandate
Cambodia	Small and Medium Enterprises Bank of Cambodia (SME Bank) Agricultural and Rural Development Bank	SME Bank, 2020. Agricultural and Rural Development Bank, 1998 – first called "Rural Development Bank".	In line with the policies set by The Royal Government of Cambodia, to provide reliable and sustainable banking services for all small and medium enterprises.
China	Agricultural Development Bank of China (ADBC), China Development Bank (CDB), and the Export-Import Bank of China (CEXIM)	ADBC, 1994; CDB, 1994; CDB, 1994.	Provide targeted loans in areas seen by authorities as needing help.
Japan	Japan Bank for International Cooperation (JBIC), Japan Finance Corporation(JFC)	JBIC, 1999; JFC, 2008.	Provide financial support for Japanese firms' overseas business activities; provide financial services to support the growth and development of Japan's SMEs and micro/small businesses and those engaged in business in the fields of agriculture, forestry, or fisheries.
Lao PDR	Nayoby Bank (NBB)	NBB, 2006.	Provide credit to the poor and those intending to invest in poor cities and provide support to agriculture, forestry, small-scale industry, handicrafts, and services.
Malaysia	Bank Kerjasama Rakyat Malaysia Berhad (Bank Rakyat), Bank Pertanian Malaysia Berhad (Agrobank), Bank Pembangunan Malaysia Berhad (BPMB), Bank Simpanan Nasional (BSN), Export-Import Bank of Malaysia Berhad (EXIM Bank), and Small Medium Enterprise Development Bank Malaysia Berhad (SME Bank).	Bank Rakyat, 1954; Agrobank, 1969; BPMB, 1973; BSN, 1974; EXIM Bank, 1995; SME Bank, 2005.	Implement the state's financial support tasks for various sectors of the national economy.
Korea	Korea Development Bank (KDB), Industrial Bank of Korea (IBK), Export-Import Bank of Korea (KEXIM), National Agricultural Cooperative Federation (NACF), and National Federation of Fisheries Cooperatives (NFFC).	KDB, 1954; IBK, 1961; KEXIM, 1976; NACF, 1961; NFFC, 1962.	Implement the state's financial support tasks for various sectors of the national economy.
Thailand	Government Savings Bank (GSB), Government Housing Bank (GHB), Bank for Agriculture and Agricultural Cooperatives (BAAC), Thai Credit Guarantee Corporation (TCG), Export-Import Bank of Thailand (EXIM), Small and Medium Enterprise Development Bank of Thailand (SME Bank), and Islamic Bank of Thailand (iBank).	GSB, 1913; GHB, 1953; BAAC, 1966; TCG, 1991; EXIM, 1993; SME Bank, 2002; iBank, 2002.	Provide financial services, especially loans to people who are unable to obtain source of fund from commercial banks.
Vietnam	Viet Nam Bank for Social Policies (VBSP), and Vietnam Development Bank (VDB).	VBSP, 2002; VDB, 2006.	Provide microfinance, to facilitate financial inclusion; finance and support priority sectors of the economy, such as infrastructure, energy, agriculture, and manufacturing.
Brunei	Bank Usahawan (SME Bank)	SME Bank, 2017	Provide financial and advisory services exclusively to micro, small and medium enterprises (MSMEs), support entrepreneurs in technical assistance (e.g., financial education).

Source: National authorities; AMRO staff compilation.

Annex 2.3. Methodology for Identifying Correlates of Credit Growth

This annex delineates the methodology employed to identify factors that influence corporate credit growth, represented by the change in corporate credit-to-GDP ratio.

A fixed-effect unbalanced panel regression is conducted on 75 economies, spanning 2001 to 2022, with a total of 1,567 observations. The regression takes the following form:

$$\frac{Credit_{it}}{GDP_{it}} - \frac{Credit_{it-1}}{GDP_{it-1}} = \beta_0 + \beta_1 real\ interest_{it-1} + \beta_2\ financial\ development_{it-1} + \beta_3\ GDP\ growth_{it-1} + \beta_4\ macroprudential\ policy_{it-1} + a_i + \delta_t + \varepsilon_{it}$$

Where $Credit_{it}$ corresponds to the claims on the private sector from deposit money banks. GDP_{it} represents the GDP of economy i. $real\ interest_{it-1}$ refers to the CPI inflation-adjusted short-term money market interest rate. $financial\ development_{it-1}$ refers to an IMF financial development indicator, which is meant for measuring financial development. $macroprudential\ policy_{it-1}$ reflects the macroprudential policy, which receives a score of 1 when policies are tightened, -1 for policy loosening episodes, and 0 in the event of policies remaining unchanged or when different macroprudential policies are simultaneously tightened or loosened. A number of independent variables are lagged by 1 period, to mitigate the issue of endogeneity.

The findings (Table A2.3.1) are as follows:

- Both financial development and GDP growth positively correlate with credit expansion, which corroborates conventional theoretical expectations.
- Short-term real interest rates negatively correlate with credit growth. Although the theoretical relationship between real interest rates (the price of credit) and credit quantity is ambiguous, short-term interest rates are introduced as exogenous variable that affect commercial bank funding costs and the credit supply curve.
- Macroprudential policies do not have a statistically significant relationship with credit growth.

Robustness checks show that the results remain consistent across different model specifications, such as the removal of country/time fixed effects or running regressions with single independent variables.

Table A2.3.1. Empirical Results: Determinants of Change in Credit-to-GDP Ratio

Regressors	Model 1	Model 2	Model 3
Real Interest	-0.1810** (-2.0369)	-0.1159 (-1.6252)	-0.1078* (-1.7328)
Financial Development	37.630*** (2.6002)	21.409** (2.1592)	2.0947** (2.1897)
Macroprudential Policy	-0.1895 (-0.3109)	0.5427 (0.9461)	0.7099 (1.1150)
GDP Growth	0.4374*** (3.7847)	0.5691*** (7.0103)	0.4847*** (7.6023)
Constant	-18.866*** (-2.6428)	-11.010** (-2.2287)	-1.1178* (-1.7787)
Economy Fixed Effect	Yes	Yes	No
Time Fixed Effect	Yes	No	No
Number of observations	1088	1088	1088
F-statistic	12.652	15.228	11.628
P-value (F-stat)	0	0	0

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

The author of this annex is Yoki Okawa, under the guidance of Siang Leng Wong.

Annex 2.4. Empirical Study to Assess the Drivers of Corporate Bonds

In ASEAN+3 economies, the share of outstanding bonds out of total corporate credit has risen over time. Hence, this annex conducts panel regressions to investigate the determinants of corporate bonds in the region.

Three panel regressions covering ASEAN+3 and the subsets (i.e., ASEAN and Plus-3 economies) were conducted, spanning 1998 to 2022. The regressions take the following form:

$$\frac{Corporate\ bonds_{it}}{Corporate\ credit_{it}} = \beta_0 + \beta_1 Financial\ development_{it} + \beta_2 Macroprudential\ policy_{it} + \beta_3 Real\ money\ market\ rate_{it} + \varepsilon_{it}$$

Where *corporate bonds* correspond to total outstanding bonds obtained from the Asian Development Bank's AsianBondsOnline platform. *Corporate credit* represents the total corporate credit, measured as the sum of outstanding corporate bonds and banking loans (sourced from the IMF and the BIS). *Financial development* refers to an IMF financial development indicator, which measures the depth of financial markets, individuals and firms' access to financial services, and the cost of providing financial services. *Macroprudential policy* receives a score of 1 when policies are tightened, -1 for loosening episodes, and 0 in the event of policies remaining unchanged or when different macroprudential policies are simultaneously tightened or loosened. *Real money market rate* is the CPI inflation-adjusted short-term money market interest rate. This simple specification excludes a range of potentially important explanatory variables that are reflected in the error term of the regression. These include institutional factors that, for example, influence the corporate funding mix.

The regression result shows the depth of financial development affecting corporate bond issuance in ASEAN, while other explanatory variables are not statistically significant. (Table A2.4.1).

Table A2.4.1. Empirical Results: Determinants of Corporate Bond Share

Regressors	Variable	Coefficient	P-value	R-square
ASEAN+3	Financial development	0.5610	0.156	0.300
	Macroprudential policy	0.0083	0.139	
	Real money market rate	-0.0004	0.929	
	Constant	-0.1250	0.613	
Plus-3	Financial development	0.527	0.451	0.256
	Macroprudential policy	0.022	0.130	
	Real money market rate	-0.0022	0.811	
	Constant	-0.164	0.749	
Selected ASEAN	Financial development	0.600***	0.009	0.533
	Macroprudential policy	-3.24e-05	0.990	
	Real money market rate	4.38e-05	0.978	
	Constant	-0.081	0.328	

Source: AMRO staff estimates.
Note: Asterisks (*, **, ***) denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively. Selected ASEAN includes Indonesia, Malaysia, Myanmar, the Philippines, Thailand, and Singapore. Plus-3 economies include China, Hong Kong, Korea, and Japan. ASEAN+3 economies refer to the economies in the ASEAN and Plus-3 regions.

The author of this annex is Kit Yee Lim, under the guidance of Yoki Okawa and Siang Leng Wong.

Annex 2.5. Machine Learning for Early Prediction of Corporate Distress

This annex summarizes the approach used to predict which firms have solvency issues.

First, firms with Interest Coverage Ratio (ICR) less than 1.25 times are identified as "risky", which are equivalent to Standard and Poor's rating of "CCC" and below (Damodaran 2016).

Second, a list of corporate and macroeconomy type of indicators is selected (Table A2.5.1). The selection and classification of indicators are based on existing studies, such as Chen, Chen, and Lien (2020) and Hosaka (2019). Macroeconomic variables are obtained from the IMF and corporate balance sheet indicators are sourced from Moody's Orbis.

Third, a machine learning technique (decision tree) is employed. The approach is a nonparametric supervised learning algorithm. The data are partitioned into two subsets—a training set and a testing set. The training set uses actual data between 2010 and 2021, and the estimates for 2022 are compared with the actuals. The trained machine learning model has an accuracy rate of 94 percent with a lead time of one year.

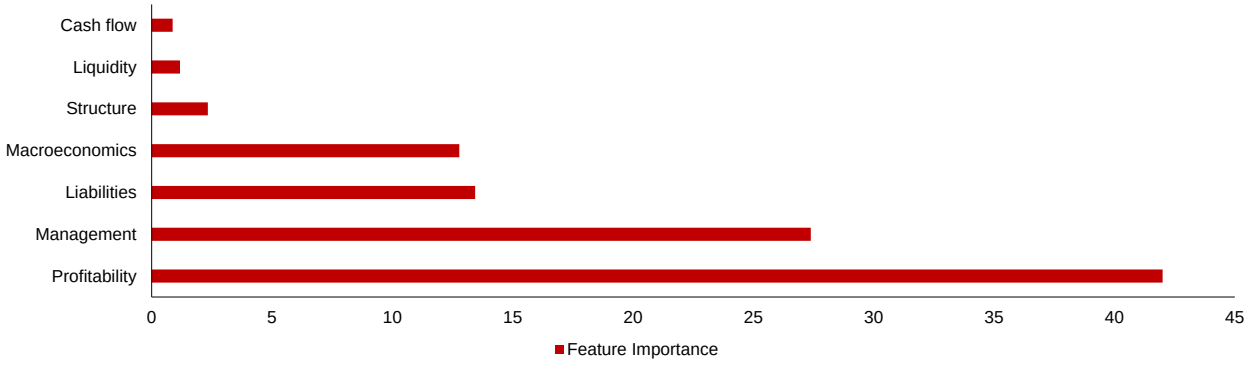
Main findings are that liabilities and profitability are key in determining the riskier firms (Figure A2.5.1). Also, based on the reported 2022 corporate balance sheet data, the share of riskier firms is expected to increase in 2023.

Table A2.5.1. List of Indicators

Type	Category	Indicator
Corporate financial metrics	Cash flow	Cash flow/total debt
		Cash flow/total asset
	Liabilities	Earnings before interest and taxes (EBIT)/total liabilities
		Long term debt/total asset
	Liquidity	Quick ratio
		Current ratio
	Profitability	EBIT
		Earnings before interest, taxes, depreciation, and amortization (EBITDA)
Corporate organizational metrics	Management	Cash flow / Operating revenue
		Asset turnover
		Revenue turnover
	Structure	Current asset/total asset
		Current liabilities/total liabilities
		Total liabilities/total asset
		Working capital/total asset
		Capital/total asset
		Shareholder funds/total asset
Macroeconomy		GDP growth
		Inflation

Source: AMRO.

Figure A2.5.1. ASEAN+3: Share of Feature Importance
(Percent)



Source: AMRO staff estimates.

The author of this annex is Laura Grace Gabriella, under the guidance of Siang Leng Wong.

Annex 2.6. Empirical Study on The Drivers of Household Credit

The motivation for this study is to identify the drivers of the build-up in household credit in the region after the global financial crisis. A panel regression based on data from 8 ASEAN+3 economies finds that real GDP growth, inflation and capital inflows from foreign banks are the key driving forces of household borrowing.

The dataset is organized into a cross-sectional panel for China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, and Thailand. These economies are selected as household credit data are available in the BIS Credit to Nonfinancial Sector database. An unbalanced panel including dependent, explanatory and control variables from 1995 to 2022 was used to feed our regression model as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 X_{it-1} + \beta_3 D_i + \alpha_i + \varepsilon_{it}$$

The dependent variable Y_{it} denotes the percent year-on-year change in household credit of individual economy in the sample. X_{it} and X_{it-1} represented contemporaneous and one-period lagged explanatory and control variables. These include annual percentage change in real property prices, real GDP, and the consumer price index, which are commonly included in many related papers such as Dumitrescu and others 2022. Net cross-border balances in portfolio assets and lending rates (or mortgage rates if available) are also included for their tendencies to influence consumer borrowing. Data show a high correlation between household debt growth capital inflows by foreign banks (Figure 2.35) and this variable is included in the model. D_i denotes dummies representing each year of global financial crisis, the European sovereign debt crisis, and the COVID-19 pandemic. Lastly, α_i and ε_i refer to fixed effects economy *i* capturing time-invariant characteristics and error term, respectively.

The results indicated the significant tendencies for real GDP growth, previous period's inflation and percentage changes in capital inflows by foreign banks[1] to increase ASEAN+3 household credit (Table A2.6.1). Through regressing the change in household credit on the six independent variables,[2] changes in real residential property price, lending rate and net cross-border flow in portfolio assets were found not to be statistically significant. On the contrary, real GDP growth, inflation in the previous period and foreign bank inflows turned out to be highly significant and positive drivers of the build-up of household debt. For foreign bank inflows, the results are significant at the one-percent significance level for the entire region and sub-regions in Plus-3 and ASEAN. This suggests regional authorities could monitor the procyclical behaviour of foreign bank lending in assessing risks from high household debt.

Table A2.6.1. Regression Results of Panel Regression on Drivers of ASEAN+3 Household Credit

Variable \ Group	Selected ASEAN+3	Plus-3 and IFCs	Indonesia, Malaysia and Thailand
Intercept	1.10 (2.23)	2.67 (2.32)	−8.35 (6.59)
Capital inflows from foreign banks[1,3]	0.32*** (0.05)	0.27*** (0.05)	0.49*** (0.11)
Real GDP[1]	0.94*** (0.27)	0.88** (0.34)	1.42** (0.57)
Inflation rate with 1 period lag	1.30*** (0.37)	0.90** (0.43)	1.65** (0.74)
Real resident property price[1]	−0.03 (0.11)	0.01 (0.12)	0.37 (0.37)
Lending rate[3]	−0.41 (0.35)	−0.55 (0.45)	0.32 (0.77)
Net cross-border balance in portfolio assets[4]	0.01 (0.004)	0.01 (0.004)	0.22 (0.14)
Dummy for 2008	7.68*** (2.87)	8.76** (3.47)	6.27 (5.54)
Dummy for 2009	−3.20 (3.17)	−1.54 (3.74)	−4.02 (6.09)
Dummy for 2010	8.67*** (8.67)	5.92 (3.65)	12.39** (6.00)
Dummy for 2020	3.03 (3.51)	2.42 (3.99)	8.32 (7.72)
Dummy for 2021	2.60 (2.94)	1.37 (3.53)	8.71 (5.73)
R-squared	0.59	0.62	0.63

Source: AMRO staff estimates.
Note: Selected ASEAN+3 = China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore and Thailand; Plus-3 and IFCs = China, Hong Kong, Japan, Singapore and Korea. Superscript (1) denotes annual percentage change for variable; (2) Capital inflows from foreign banks refer to the consolidated positions of foreign banks on total claims on an immediate counterpart basis in a particular economy reporting to the Bank for International Settlements; (3) Lending rate refers to prime lending rates in all economies, except Korea and Singapore (both mortgage rates); (4) Net cross-border flows in portfolio assets refer to the net balance of portfolio assets in IMF International Financial Statistics Balance of Payments (BPM6) database. Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent and 1 percent respectively. Numbers in parentheses denote p-values.

The author of this annex is Chiang Yong (Edmond) Choo, under the guidance of Richard Sean Craig.

[1] Foreign bank inflows refer total claims on an immediate counterparty basis by foreign banks in reporting economies. The flows are denominated in US dollars.

[2] While we recognized that tightening and loosening stances of macroprudential policy could affect households' behaviour in undertaking debt, the data series from IMF's iMaPP database (spanning from 2000 to 2021) were rather short and could compromise our results. Therefore, the author decided to drop the associated variables.

Annex 2.7. House Price Misalignment Model

This annex analyses the deviation of house price misalignment from economy's fundamentals using a methodology documented by Igan and Prakash (2012).

The following regression equation is used.

$$\Delta HP_{it} = \alpha + \beta_1 A_{t-1} + \beta_2 \Delta YPC_{it} + \beta_3 i_{it} + \beta_4 \Delta Stock_{it} + \beta_5 \Delta Credit_{it} + x_i + \epsilon_{it}$$

Where ΔHP_{it} is the quarter-on-quarter change of real house price of economy i in time t. A_{t-1} is the affordability level of housing in the previous quarter, measured by the deviation from Hodrick-Prescott trend. ΔYPC_{it} is the quarter-on-quarter change of real GDP per capita. iit is the interest (mortgage) rate in natural log. $\Delta Stock_{it}$ is the year-on-year change of real stock price index, while $\Delta Credit_{it}$ is the quarter-on-quarter change of real credit to household sector. In the economic literature, demographic factors such as population growth play an important role in house prices. However, this variable is found not to be statistically significant with different specifications and economy groups. Therefore, population growth variable is not included in this model. Lastly, x_i is the economy fixed effect that captures heterogeneity across economies.

Data contains an unbalanced quarterly panel for 9 ASEAN+3 economies, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, and Thailand. House price and credit data are taken from the Bank for International Settlements. GDP per capita is obtained from the IMF World Economic Outlook database. Mortgage rates are collected from national sources, and the lending rate is used if the mortgage rate is not available. Stock index data are drawn from respective economies' stock exchanges. Our analysis shows that house price dynamics are driven by different factors for the selected ASEAN+3 economies of Indonesia, Malaysia, Philippines, and Thailand; the IFCs, and the Plus-3 economies.

After the estimation of the model, real house price growth is predicted for each economy from the estimated coefficients and historical data. This predicted real house price index is then compared with the actual one, and the gap between the two is interpreted as housing price misalignment. A larger positive gap might indicate a greater risk of house price correction in the economy (see Figure 2.42).

Table A2.7.1 shows the panel regression results for all 9 economies in our sample as a group and for different sub-regions separately in columns 1–5. For all columns, lagged affordability, which is a price correction term, is significantly and negatively associated with the real house price growth. Real household income, proxied by real GDP per capita, and stock price growth drive the house price in the Plus-3 region but have a smaller impact in the selected ASEAN+3. In comparison, real credit growth is an important driver of house prices in the selected-ASEAN+3, while its impact in Plus-3 economies (see also Figure 2.43) is muted.

Table A2.7.1. Panel Regression Results on House Price

Dependent	Real house price growth (quarter-on-quarter)				
Economy	ASEAN+3	Plus-3	ASEAN-5	Plus-3 and IFCs	Indonesia, Malaysia, Philippines, and Thailand
L. Affordability	**-0.199***** (-0.038)	**-0.167***** (-0.05)	**-0.221***** (-0.053)	**-0.180***** (-0.04)	**-0.204*** (-0.079)
Real GDP per cap (quarter-on-quarter)	**0.191**** (-0.068)	**0.579***** (-0.121)	0.067 (-0.076)	**0.387***** (-0.088)	0.041 (-0.096)
Real interest rate	**-0.006***** (-0.002)	**-0.005*** (-0.002)	**-0.011**** (-0.004)	**-0.004*** (-0.002)	**-0.013**** (-0.004)
Real stock price (year-on-year)	**0.021***** (-0.005)	**0.021**** (-0.007)	0.017 (-0.009)	**0.033***** (-0.007)	-0.001 (-0.01)
Real credit (quarter-on-quarter)	0.16 (-0.115)	0.072 (-0.126)	**0.262**** (-0.083)	0.083 (-0.131)	**0.299**** (-0.094)
Economy FE	Y	Y	Y	Y	Y
Cluster	robust	robust	robust	robust	robust
R^2	0.22	0.28	0.23	0.29	0.2
Economy-Quarter	897	434	463	533	364
Economies	9	4	5	5	4
Start	1991	1991	1994	1991	1994
End	2022	2022	2022	2022	2022

Source: AMRO staff estimates.
Note: Standard errors are reported in parentheses. Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent respectively. Plus-3 = China, Hong Kong, Japan and Korea; ASEAN-5 = Indonesia, Malaysia, Philippines, Singapore and Thailand; Plus-3 and IFCs = China, Hong Kong, Japan, Korea and Singapore.

The author of this annex is Chenxu Fu, under the guidance of Richard Sean Craig.

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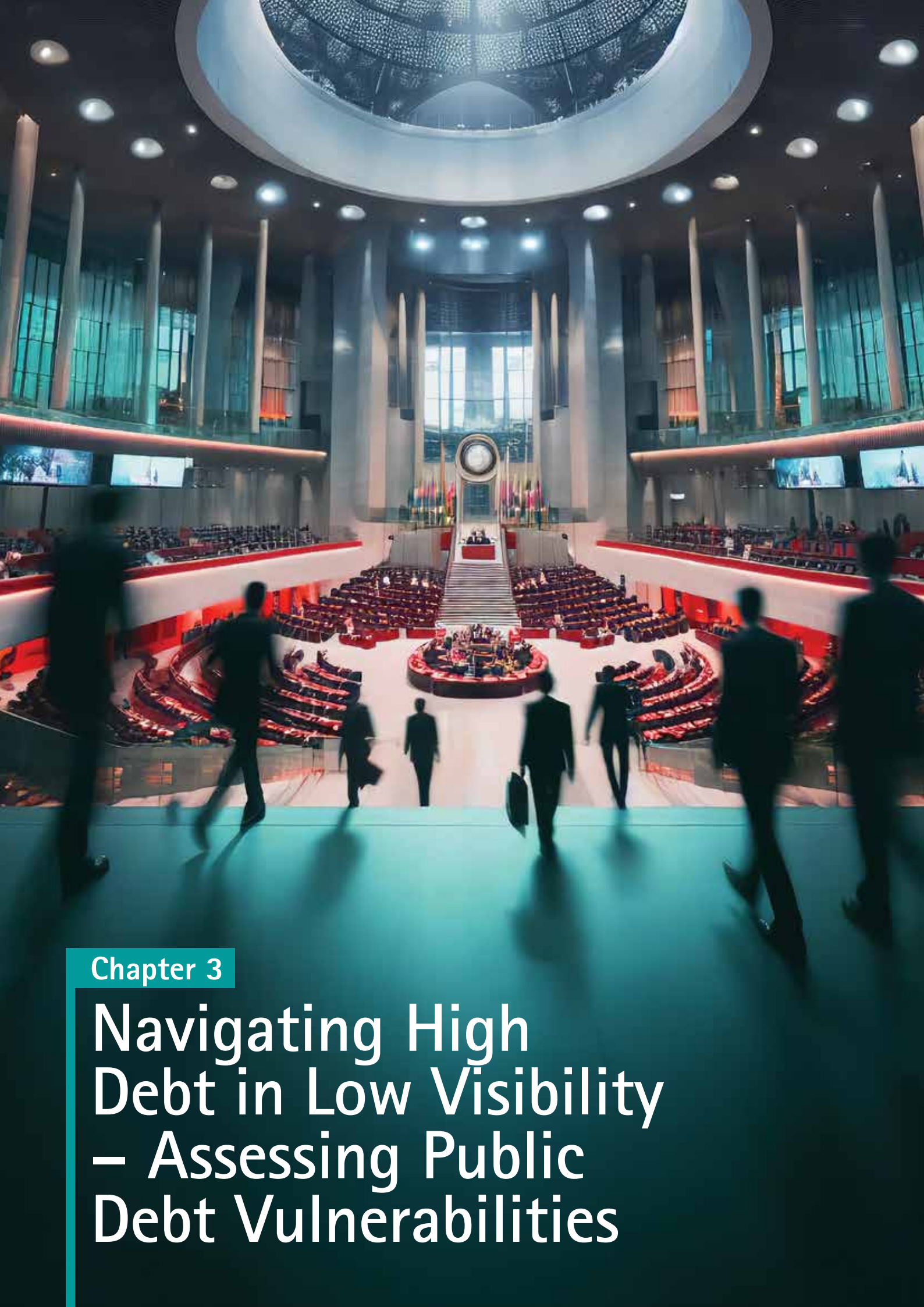


Chapter 3

Navigating High Debt in Low Visibility – Assessing Public Debt Vulnerabilities

Highlights

- The ASEAN+3 public debt-to-GDP ratio is moderate compared to other regions, with the notable exception of Japan. However, public debt-to-GDP has shown a marked upward trend in Plus-3 economies and it has remained higher than the pre-pandemic levels in several ASEAN economies.

- Fiscal debt overhang and financial instability can form a negative feedback loop. Empirical analysis indicates that the higher the debt-to-GDP ratio, the more likely a fiscal crisis. Nevertheless, even as debt has increased, most ASEAN+3 economies have a lower probability of a fiscal crisis than the global average within their respective economy classification groups.

- A sound debt structure can help mitigate risks in ASEAN+3's public debt market, particularly during financial downturns. While the region's refinancing risk is generally low, some economies have declining average debt maturities or maturing bonds concentrated in the near-term, which warrant careful risk management. Interest rate increases not only raise government borrowing costs but also amplify financial market risks because banks have significant holdings of government bonds. However, robust capital buffers in banks mitigate this risk. Lastly, exchange rate risks are uneven across the region. Some economies rely heavily on foreign currency debt, but most appear to have sufficient capacity to address the risks.

- Our empirical analysis indicates that an increase in the share of foreign investors in the ASEAN+3 debt market could heighten the sovereign default risk. That said, foreign investors comprise a low share of such investors compared with other regions.

- To bolster financial stability, ASEAN+3 nations should build a resilient public debt framework. Key steps include optimizing debt maturity and currency of borrowing, diversifying the investor base while tracking foreign investor activity, and deepening debt markets. A rapid emergency response system for market stress is also vital to avoid disorderly market conditions. Lastly, a medium-term fiscal consolidation plan should be implemented to rebuild fiscal space and to put public debt at sustainable levels.

This chapter is authored by Eunmi Park under the guidance of Kevin C. Cheng, with contributions from Chiang Yong (Edmond) Choo, Leilei Lu (project manager), and Richard Sean Craig. Jingwei Zhou and Kit Yee Lim provide research assistance.

I. Introduction

During the COVID-19 pandemic, public debt[1] in ASEAN+3 economies surged, reversing previous downward or relatively stable trends. The region's average public debt-to-GDP ratio dropped from 101.0 percent in 2009 to 83.2 percent in 2015 but spiked to 104.4 percent in 2020 due to spending on COVID-19 pandemic relief efforts. Although decreasing slightly to 100.4 percent in 2022, it remains elevated. On a country-by-country basis, debt-to-GDP ratios increased in all but four ASEAN+3 economies during 2020–2022.

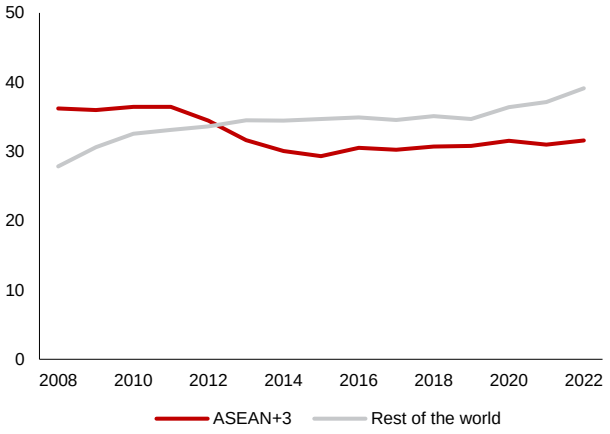
Public debt constitutes about one-third of the total debt stock of ASEAN+3, slightly lower than the average for the rest of the world. The ratio of public debt to total debt (public debt plus private debt) had declined notably before increasing a little after the mid-2010s, likely reflecting faster growth of private than public sector debt (Figure 3.1).

ASEAN+3 economies generally have moderate public debt compared with global standards (Figure 3.2, Figure 3.3). The only exception is Japan, where debt was 261.3 percent of GDP at the end of 2022 (Figure 3.3).[2] Despite this, **public debt-to-GDP is heading higher**, especially in the Plus-3 economies. The ratios for ASEAN economies increased during the pandemic and have **remained elevated** (Figure 3.2, Figure 3.4).

The objective of this chapter is to assess the financial stability implications of fiscal debt in ASEAN+3. Specifically, it will:

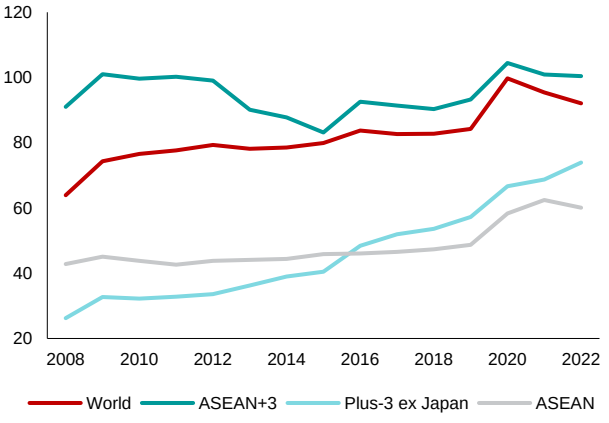
- Assess the public debt level and growth rate of ASEAN+3 relative to other regions and conduct empirical analysis to evaluate its effect on financial stability.
- Investigate the composition, market liquidity, and investor base of public debt in ASEAN+3 to understand potential risks amid tighter financial market conditions.
- Provide policy recommendations based on ASEAN+3 case studies to mitigate the impact of growing public debt on financial stability.

Figure 3.1.Selected ASEAN+3 and Rest of World: Share of Public Debt in Total Debt Stock
(Percent)



Source: Bank for International Settlements, AMRO staff calculations.
Note: Selected ASEAN+3 = China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, and Thailand. Rest of the world data is calculated based on the 34 countries, excluding 8 selected ASEAN+3 economies out of 42 economies surveyed by Bank for International Settlements.

Figure 3.2. World and ASEAN+3: Trend of Public Debt-to-GDP Ratios
(Percent)

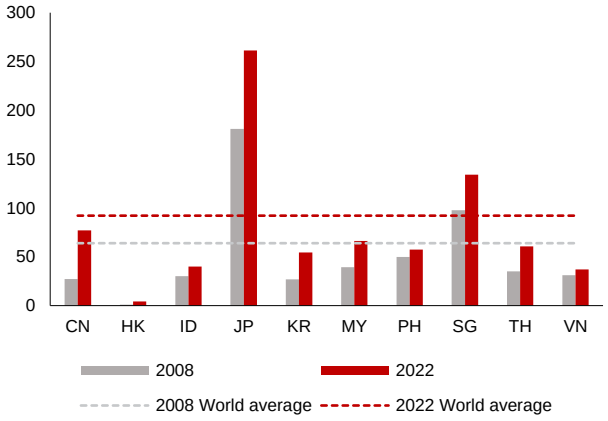


Source: IMF *World Economic Outlook* April 2023; IMF *Fiscal Monitor* April 2023; IMF *Global Debt Monitor* 2022; AMRO staff calculations.
Note: A country group's average is calculated as a GDP-weighted average of individual economies' debt-to-GDP ratios. Plus-3 ex Japan = China, Hong Kong, and Korea.

[1] By "public debt", this chapter focuses on general government gross debt as defined by the IMF. The general government includes all government units, social security funds, and government-controlled nonprofit institutions. Its debt encompasses various liabilities such as SDRs, currency, deposits, securities, loans, and insurance, among others. However, due to data constraints or the need for targeted analysis, some sections may narrow the focus to only central government or specific debt instruments like government bonds.

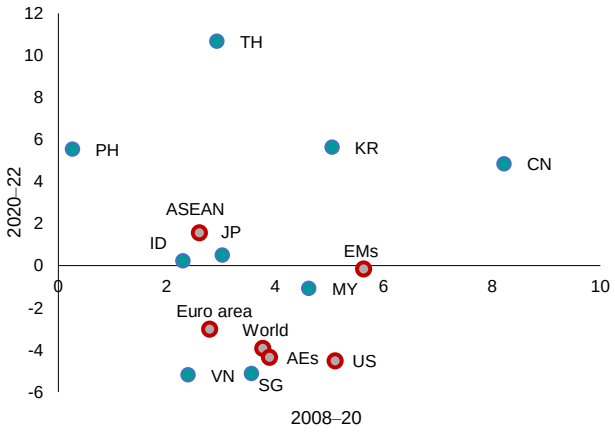
[2] While Singapore's public debt-to-GDP ratio is also high by global standard, at 134.1 percent at the end of 2022, the debt mainly consists of Special Singapore Government Securities and Singapore Government Securities, which are issued for non-budgetary purposes (such as investment) and not to finance the budget deficit.

Figure 3.3. World and Selected ASEAN+3: Level of Public Debt-to-GDP Ratios
(Percent)



Source: IMF *World Economic Outlook* April 2023; AMRO staff calculations.
Note: World averages are calculated as GDP-weighted averages of individual economies' debt-to-GDP ratios. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 3.4. World and Selected Economies: Average Annual Change Rate of Public Debt-to-GDP Ratios
(Percent, annualized)



Source; IMF *World Economic Outlook* April 2023; IMF *Fiscal Monitor* April 2023; IMF *Global Debt Monitor* 2022; AMRO staff calculations.
Note: AEs = Advanced economies, EMs = Emerging market economies, CN = China; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam; US = United States.

II. Assessing Financial Stability Risks from Fiscal Debt in ASEAN+3

Fiscal debt overhang and financial instability can form a negative feedback loop. Excessively high debt level can undermine the government's fiscal sustainability. This raises the risk of fiscal crisis, which can, in turn, erode investor confidence. Moreover, if the value of debt falls due to concerns about the government's debt repayment capacity, financial sectors including banks, would incur valuation losses in their holdings of government debt. Foreign investors may take fright and pull out from the market, leading to capital outflows. The heightened volatility in exchange rates and increased capital flight would compound the difficulties. The economy may go into a downturn and the government may face severe pressure on its budget by needing to bail out financial institutions or due to a fall in tax revenue. The spillovers and feedback loop could be amplified through the nexus between the government and the financial sector, and result in a vicious cycle.

Indeed, many fiscal crises have coincided with financial crises, underscoring the interconnection between fiscal and financial stability. Out of 75 episodes of sovereign debt crises between 1970 and 2017, 33 (44 percent) coincided with financial crises such as banking or currency crises (Laeven and Valencia 2018).

Does a higher debt–to–GDP ratio increase the likelihood of fiscal crisis?

Empirical analysis shows that increases in the debt-to-GDP ratio raises the risk of a fiscal crisis. Using the fiscal crisis[3] data between 1980 and 2015 of 185 countries by Medas and others (2017), a panel logit regression is performed by regressing the binary dependent variable of a fiscal crisis (i.e., 1 = fiscal crisis, 0 = non-fiscal crisis, for a country in a given year) on the explanatory variable of debt-to-GDP ratio, and control variables including lagged GDP growth, current account balance, and CPI inflation (Annex 3.1).

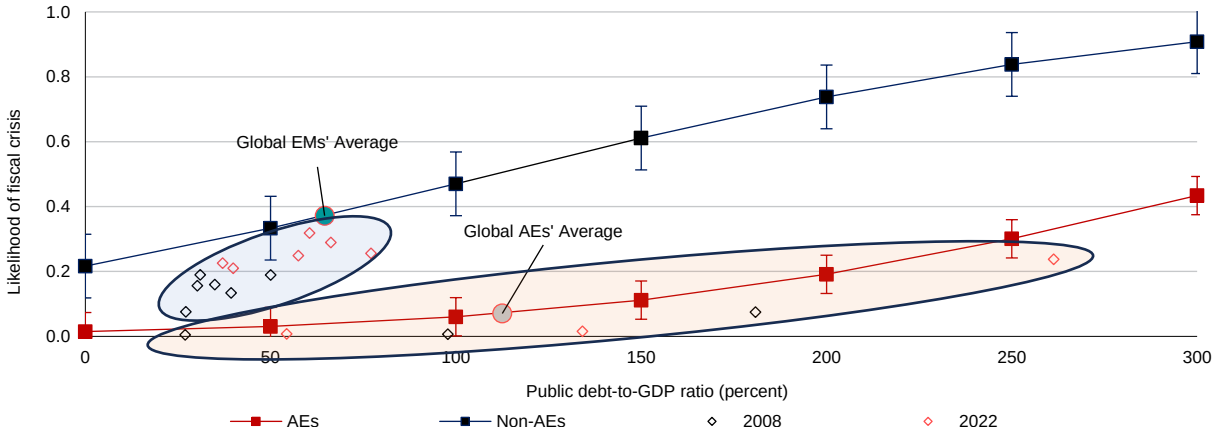
The estimation suggests that as the **debt-to-GDP ratio in ASEAN+3 countries increases, the likelihood of fiscal crises does too.**

- Overall, the result reveals that the higher the debt ratio, the higher the probability of a crisis (Figure 3.5), with that experience less likely in developed economies than emerging market economies. At their respective debt levels as of 2022, the average probability of a fiscal crisis is estimated to be 37 percent for an average emerging market economy and 7 percent for an average developed economy (Figure 3.5).

[3] In the analysis, the definition of fiscal crisis follows Medas and others (2017). It includes credit events such as default and debt restructuring, exceptionally large official financing, implicit domestic public default, and loss of market confidence. Accordingly, 2,266 observations (34 percent) out of 6,660 observations (i.e., 185 countries over 36 years) were identified as fiscal crisis years.

- Applying the estimated coefficients to the actual data of the explanatory and control variables for the ASEAN+3 members,[4] the average probability of a fiscal crisis for the region's emerging market economies is estimated to have increased from 15 percent in 2008 to 26 percent in 2022, which is still lower than the average of global emerging market economies. In addition, the average probability of a fiscal crisis in developed economies in the region also increased from 3 percent in 2008 to 9 percent in 2022, which is around the global advanced economies average.[5]

Figure 3.5. World and Selected ASEAN+3: Predictive Probability of a Fiscal Crisis Happening at Different Public Debt-to-GDP Levels



Source: Fiscal crises database (Medas and others, 2017); IMF *World Economic Outlook* April 2023; AMRO staff calculations.
Note: Vertical lines refer to 90 percent confidence intervals. Black dots and magenta dots represent the predictive fiscal crisis probabilities of selected ASEAN+3 countries as of 2008 and 2022, respectively. The blue and orange oval regions represent the emerging markets and advanced economies respectively in ASEAN+3.

How vulnerable is ASEAN+3 fiscal debt to a worsening in financial market conditions?

The current financial market conditions could amplify the potential risks associated with rising public debt, with the extent of the impact contingent upon various factors within the public debt market. The following three factors underpin the extent of vulnerabilities in the public debt market:

1. The structure of debt—including **maturity, interest payment types, and currency composition**—determines the magnitude of the refinancing risks, and interest and exchange rate risks, as well as the size of the government debt burden.[6]

2. **The composition of debt holders** is also important. A government bond market with limited or similar investors increases the risk of sudden mass withdrawals. High foreign debt ownership can worsen financial instability in stressful situations.

3. **Market liquidity** is vital for absorbing shocks, and the size of foreign reserves and other foreign assets such as sovereign wealth funds is also instrumental in buffering shocks. Government policies that alleviate market volatility and reinforce fundamentals could play a pivotal role in reducing risks.

The following discussion examines these three factors for ASEAN+3.

1. Structure of Debt

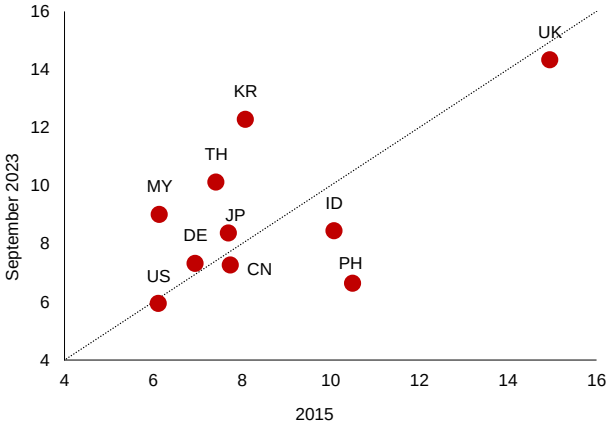
Refinancing risk

Shorter-term debts can elevate refinancing risk by increasing the likelihood of higher costs when debt is renewed amid conditions where interest rates are rising. This risk is gauged by a bond portfolio's average maturity, with shorter maturities indicating greater vulnerability to shocks. Since government bonds serve as market benchmarks, any sovereign distress can ripple through corporate bonds and affect the entire financial market.

The overall refinancing risk of ASEAN+3 assessed by the weighted average maturity of government bonds **is not relatively high** compared to other economies (Figure 3.6). Most ASEAN+3 economies have similar or higher average bond maturities to other major countries, and these are increasing. However, Indonesia and the Philippines demonstrate a trend to shorter average maturities. Furthermore, over one-fifth of bonds in Singapore, Japan, and China are set to mature by 2024 (Figure 3.7).

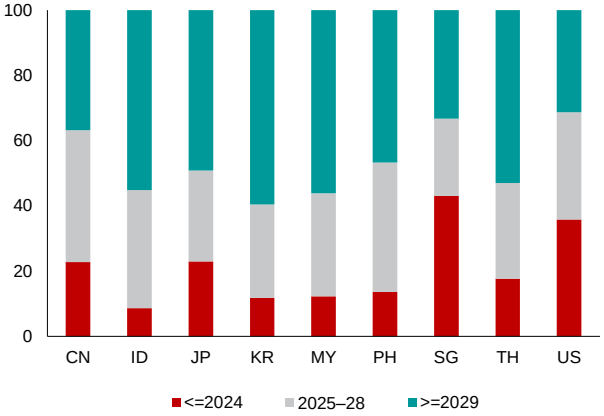
[4] Selected ASEAN+3 countries included in this calculation are China, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam, and are grouped in accordance with IMF classification (https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates). The average probability of a fiscal crisis for each economy classification group is calculated as a simple average of the probabilities of individual countries within that group.
[5] It is slightly higher but, considering the margin of errors, is around the global average.
[6] For example, Borensztein and others (2004) contends that certain features of the fiscal debt structure could become channels or sources of vulnerability to the financial system.

Figure 3.6. Selected ASEAN+3, US, UK and Germany: Weighted Average Remaining Maturity of Government Bonds
(Year)



Source: Bloomberg L.P.
Note: The weighted average remaining maturities are calculated based on the outstanding treasury/ sovereign bonds, excluding loans, and bonds issued by government-related agencies. CN = China; DE = Germany; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; TH = Thailand; UK = United Kingdom; US = United States.

Figure 3.7. Selected ASEAN+3 and US: Maturity Profile of Government Bonds
(Percent of total outstanding government bonds)



Source: Bloomberg L.P; AMRO staff calculations.
Note: Data as of 30 September 2023. Bond outstanding ratios maturing by 2024, between 2025 and 2028, and in or after 2029, 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.

Interest rate risk

Interest rate risks undermine the stability of financial institutions holding government bonds. Rate changes can drive up public debt costs and market volatility. For example, Silicon Valley Bank collapsed partly due to a sharp drop in the value of its US Treasuries and a subsequent bank run. Banks have also increased government bond holdings to comply with Basel III regulations and to finance fiscal deficits during the COVID-19 pandemic. The effect of a rate hike varies by institution but generally reduces profits due to a decline in the marked-to-market value of tradable government bonds held by banks, which increases financial system vulnerability. Longer bond durations also amplify price declines when rates rise.

For the region, interest rate risks have limited effect on the existing fiscal debt of ASEAN+3 economies, although rate changes can still affect the funding rates of newly issued debts across all coupon types and influence government borrowing costs.

- Economies with more floating-rate bonds are at higher interest rate risk. Most ASEAN+3 nations, except Hong Kong, mainly issue fixed-rate debt securities (Figure 3.8), reducing the direct effect on existing debt. Fixed rates can be beneficial in rising interest rate environments but may incur opportunity costs when rates fall because they have locked in the higher interest costs.

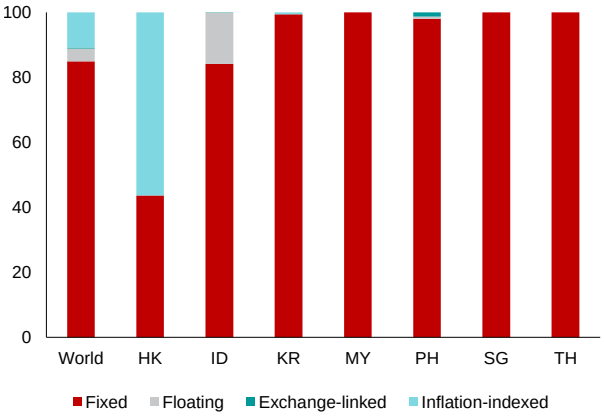
- For new debt, a rise in market interest rates increases coupon rates set during primary market auctions. This change can lead to fluctuations in bond prices and market volatility, which in turn affects investor sentiment and demand for government bonds. The dynamics of the secondary market indirectly influence a government's capacity to either finance new debt or refinance existing debt at more favorable rates.

In 2022, interest rate risks in the ASEAN+3 region rose. The increase was triggered by US monetary tightening, which pushed global rates up and global government bond prices down until the third quarter, followed by some recovery in the fourth quarter. Government bond prices in the region, like other regions, fell sharply in response to interest rate hikes but recovered much faster (Figure 3.9). Throughout 2023, the government bond market in ASEAN+3 has remained more resilient than in Europe and the US.

A stress test assessing the **effect of changes in bond yields** on bank resilience shows **banks would maintain sufficient capital** under adverse conditions. Our findings indicate that even with a 100-basis point increase in bond yields, the Capital Adequacy Ratios (CARs) of ASEAN+3 banks would still exceed Basel III minimum levels. Specifically, such an increase would lower CARs by an average of 3.3 percentage points in Plus-3 countries and 1.8 percentage points in ASEAN-4 countries. These changes would not push CARs below the Basel III minimum as most ASEAN+3 banks maintain high CAR ratios (Figure 3.10). However, in the event of a serious financial crisis, such as a 300-basis point increase in bond yields, the average CAR of Plus-3 countries could fall below the Basel III minimum.

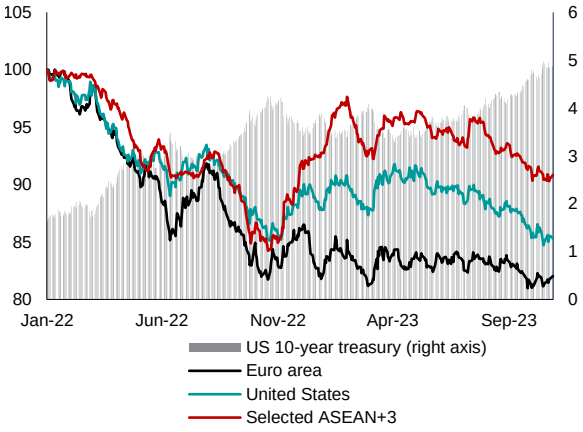
The impact of these yield changes could vary between banks depending on their bond portfolio, including the maturities and amount of bonds held. Meanwhile, a fall in marked-to-market asset values is typically an unrealized loss if the bank retains the bonds until maturity. However, if a large marked-to-market decline in the value of banks' government securities holdings raises depositor anxiety and triggers a rapid massive withdrawal, banks may be forced into a fire sale of securities, in which case losses on these securities would be realized.

Figure 3.8. Selected ASEAN+3: Central Government Debt Securities by Instrument
(Percent, as of end-2022)



Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: World data is calculated based on the 30 countries surveyed by the Bank for International Settlements.

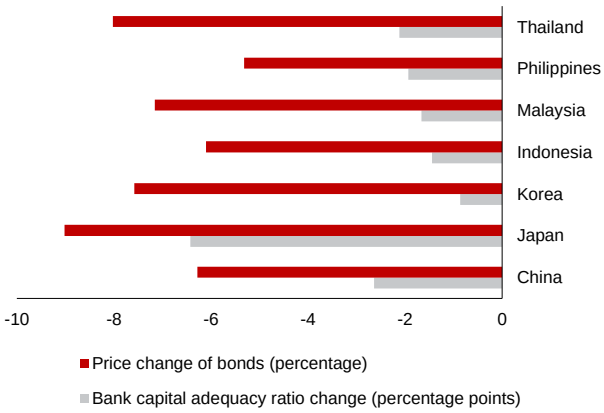
Figure 3.9. Euro area, US and Selected ASEAN+3: US 10-Year Treasury Bond Yield and Bond Price Indices Movement
(Index unit; percent)



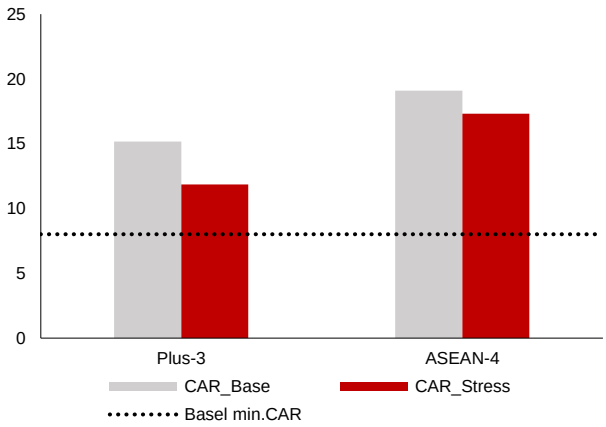
Source: S&P Dow Jones Indices; CEIC; Haver Analytics.
Note: For bond indices, the total return indices of S&P iBoxx USD Treasuries, iBoxx EUR sovereign/sub-sovereign, iBoxx ABF Pan-Asia (including sovereign/sub-sovereign bonds of selected ASEAN+3 - China, Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore, Thailand) are used. Bond price indices were recalibrated to a baseline of 100 on 3 January 2022, to facilitate comparisons.

Figure 3.10. Selected ASEAN+3: Example of Interest Rate Risk for Banks Holding Government Debt
(Under a hypothetical scenario of a 100bps upward shift in the parallel bond yield curve)

Bond Price and CAR Changes by Country



CARs under a Stressed Scenario by Country Group
(Percent)



Source: IMF Financial Soundness Indicators via CEIC and Haver Analytics; IMF Sovereign Debt Investor Base; S&P Dow Jones Indices; AMRO staff calculations.
Note: Modified duration provides an approximate estimation of the percentage change in the price of a bond for a 1 percentage point change in yield. Banks are assumed to have a bond portfolio with a modified duration equal to the average modified duration of each country's government bonds. Modified durations are estimated using S&P iBoxx ABF indices as proxies. The sovereign debt investor base data is as of 2022. The bank capital adequacy and asset figures are up-to-date data available but vary from country to country (Korea: Q2 2022, China, Japan, Philippines: Q3 2022, Malaysia, Thailand: Q4 2022, Indonesia: Q1 2023). Capital adequacy ratio (CAR) is calculated by 'Total regulatory capital/Risk-weighted assets'. Government debts are assigned a zero risk weight in the calculation of the CAR. It was assumed that all government bonds held by the banks were adjusted by marked-to-market valuation without distinguishing whether they were actually in the banking book or in the trading book.

Exchange rate risk

Exchange rate risks for public debt in ASEAN+3 are generally low, but may pose risks for those reliant on foreign currency debt. Such risks affect both interest and foreign exchange costs. For selected ASEAN+3 economies in 2022, a stronger US dollar[7] led to a 0.4 percent year-on-year decrease in outstanding foreign currency debt in US dollar terms, but an 8.5 percent increase when converted to local currencies. The average interest burden on this debt in 2022 rose by only 4.1 percent in US dollars, but by 14.3 percent in local currency terms. Countries with a high reliance on foreign currency debt and weaker fundamentals were more significantly affected.

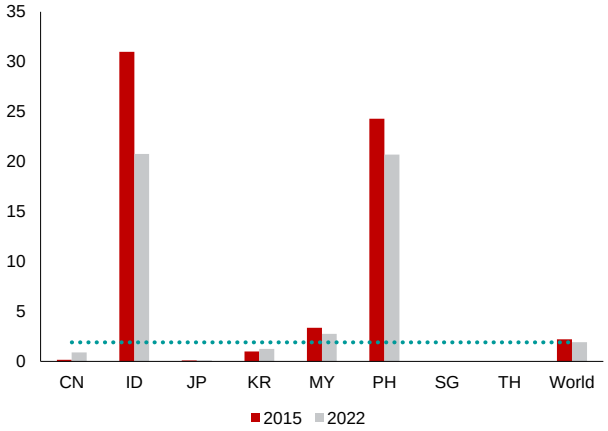
Meanwhile, most ASEAN+3 economies primarily issue domestic currency debts, although Indonesia and the Philippines, along with Lao PDR have higher foreign currency debt ratios than the global average (Figure 3.11).

ASEAN+3 governments have a high capacity to respond to exchange rate risks, as demonstrated by their low ratios of government foreign currency debt to foreign currency reserves (Figure 3.12). Most countries maintain sufficient foreign currency reserves in comparison to the foreign currency debt on their balance sheets, although the foreign currency debt-to-reserves ratios have increased in some countries over the years. Even countries with

[7] In this calculation, selected ASEAN+3 include China, Hong Kong, Indonesia, Korea, Lao PDR, Malaysia, Philippines, Thailand, and Vietnam, and the change in exchange rates against the US dollar in 2022 compared with 2021 varies from 0 percent to above 50 percent by economy, with a simple average increase of 10.7 percent (CEIC, year-end).

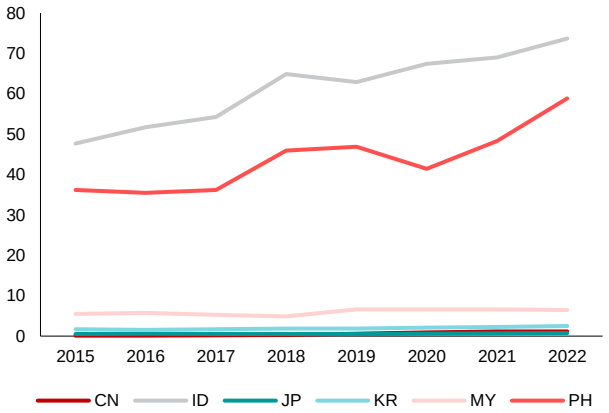
a high ratio of foreign currency debt, such as Indonesia and the Philippines, **demonstrate the capacity to deal with exchange rate risks,** with the ratio of short-term external debt-to-reserves at 36.9 percent in Indonesia and 17.3 percent in the Philippines at the end of 2022 (Database of Fiscal Space, World Bank). Both have also continuously reduced their foreign currency debt ratios (Figure 3.11).

Figure 3.11. World and Selected ASEAN+3: Foreign Currency Debt Securities Ratio in General Government Debt Securities
(Percent)



Source: Bank for International Settlements, World Bank/IMF via Haver Analytics; AMRO staff calculations.
Note: The ratio of foreign currency securities to general government securities for long-term securities with original maturity above one year. China's data is based on the central government securities using WB/IMF data. The dotted line represents the global average of 1.9 percent, calculated based on the 55 countries surveyed by Bank for International Settlements . CN = China; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand.

Figure 3.12. Selected ASEAN+3: General Government Foreign Currency Debt Securities-to-Foreign Currency Reserves Ratio
(End of year, percent)



Source: Bank for International Settlements, IMF, World Bank, national authorities via Haver Analytics; AMRO staff calculations.
Note: General government foreign currency securities are long-term securities with original maturity above one year. China's data is based on the central government securities using World Bank/IMF data. Foreign currency reserves include securities, currency, deposits, and other financial instruments denominated in foreign currencies held by national authorities. CN = China; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines.

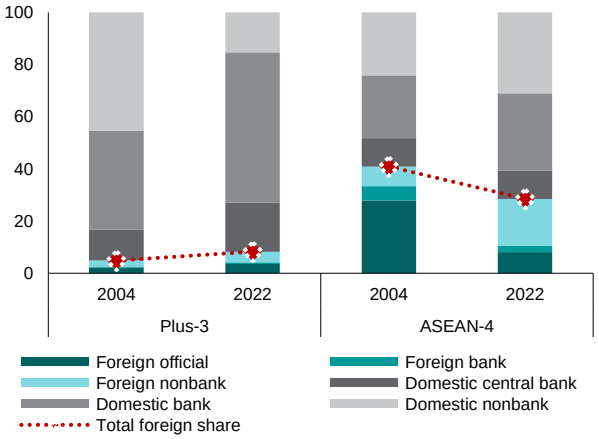
2. Investor Base of Debt

The composition of government debt investors plays a crucial role in financial stability. While foreign creditors may lower government borrowing costs by broadening the investor base, foreign debt holders may also introduce volatility as they may quickly sell off riskier assets during stressed periods. Meanwhile, domestic banks have been accumulating government debt, a trend that intensified during the COVID-19 pandemic (IMF 2022; Hardy and Zhu 2023). This enhanced "government-bank nexus" poses risks to the banking system if a government defaults, as demonstrated by the 2010–12 European debt crisis.

Overall, domestic sectors dominate the ASEAN+3 government debt market, with a relatively low presence of foreign investors (Figure 3.13). Over the years, the role of domestic banks in absorbing government debt as primary market makers has increased, notably for China, Malaysia, the Philippines, and Thailand, where central banks or banks are among major holders of government debt (see Figure A3.2.1 in Annex 3.2 for economy-level charts). The share of government debt held by foreign investors is lower than in other regions and although on a modest upward trend, it has declined slightly to below 10 percent since the pandemic (Figure 3.14). Considering individual countries, Indonesia, the Philippines, and Malaysia have foreign holding ratios exceeding 20 percent, followed by Korea. In Indonesia and Malaysia, the holdings of foreign nonbanks are high while foreign official sectors are high in Korea and the Philippines.

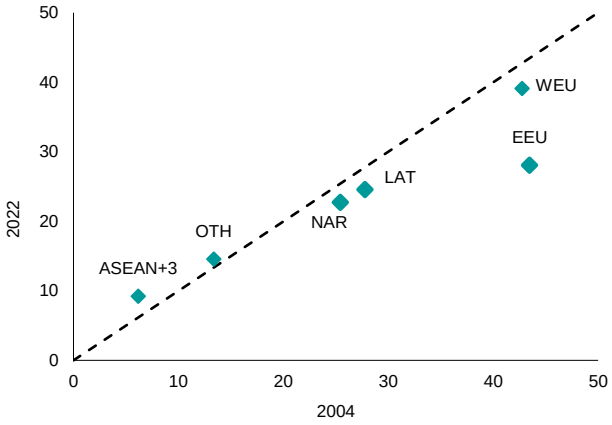
To gauge the effect of foreign participation on sovereign default risk, the contributions of investor shares to changes in credit default swap (CDS) spreads are estimated. The analysis finds that **an increase in the share of foreign entities can elevate credit default risk of the region.** According to panel regression analysis, an increase in the share of foreign entities tends to raise five-year CDS spreads. On average, a 1 percentage point rise in the foreign entity shares raises CDS spreads by 1.32 basis points for the selected ASEAN+3 group, and 1.82 basis points for ASEAN-4 (Annex 3.2). Indeed, the share of foreign entities among the explanatory variables was behind the change in the selected ASEAN+3 group CDS spreads (Figure 3.15). However, the effects were relatively muted for the ASEAN-4 relative to other variables (Figure 3.16).

Figure 3.13. Selected ASEAN+3: Investor Composition of General Government Gross Debt
(Percent)



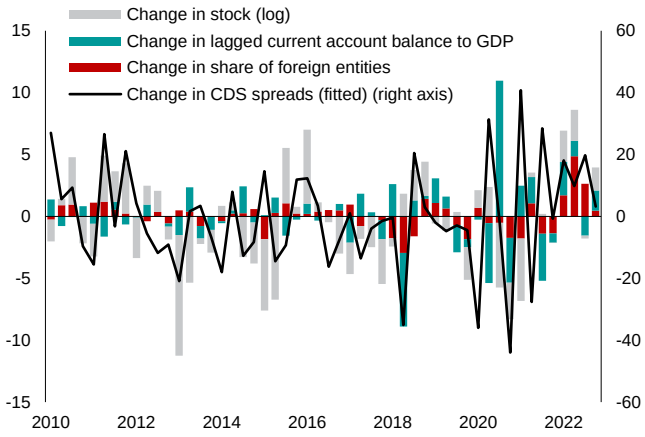
Source: IMF; AMRO staff calculations.

Figure 3.14. Selected Regions: Share of General Government Gross Debt Held by Foreign Investors
(Percent)



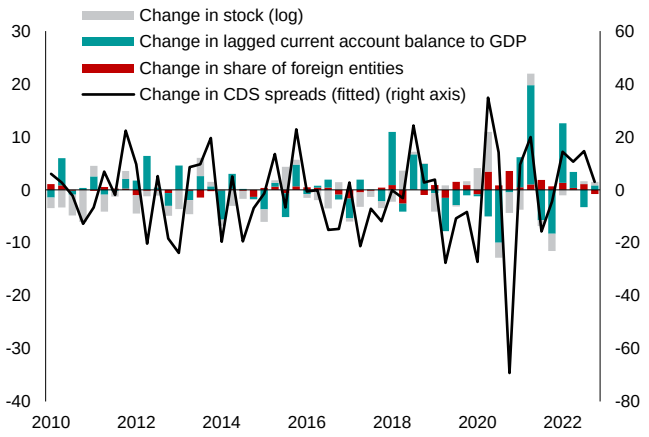
Source: IMF Sovereign Debt Investor Base; AMRO staff calculations.
Note: Calculated based on 48 countries' data in the IMF's data. WEU = Western Europe; EEU = Eastern Europe; NAR = North America; LAT = Latin America; OTH = others; Selected ASEAN+3 = China, Indonesia, Japan, Korea, Malaysia, Philippines, and Thailand.

Figure 3.15. Selected ASEAN+3: Contributions to Change in CDS Spreads
(Percentage points, year-on-year; percent, year-on-year)



Source: IMF Sovereign Debt Investor, International Financial Statistics; CMA Datavision; national authorities; AMRO staff calculations.
Note: Regression results can be found in Annex 3.2. Only significant variables are included. Selected ASEAN+3 = China, Indonesia, Japan, Korea, Malaysia, Philippines, and Thailand.

Figure 3.16. ASEAN-4: Contributions to Change in CDS Spreads
(Percentage points, year-on-year; percent, year-on-year)



Source: IMF Sovereign Debt Investor, International Financial Statistics; CMA Datavision; national authorities; AMRO staff calculations.
Note: Regression results can be found in Annex 3.2. Only significant variables are included. ASEAN-4 = Indonesia, Malaysia, Philippines, and Thailand.

3. Liquidity of Government Debt

Liquidity in the ASEAN+3 government debt market tightened in 2022. Government trading volumes decreased in countries besides China and Singapore. Turnover ratios of government bonds decreased (Figure 3.17) and bid-ask spreads widened in most countries in 2022 (Figure 3.18). According to a survey of bond market participants in the ASEAN+3 region,[8] the main factors affecting bond market liquidity were monetary tightening, domestically and in the US. In China, despite being the only country in the region with easing monetary policy, liquidity tightened as yields became less attractive amid broader macroeconomic uncertainties. Korea, where a corporate debt liquidity crunch spread to the government bond market, was noticeably affected in 2022.

Even if **liquidity challenges** are global, they **could hit the region's relatively shallow markets harder** than advanced economies. In 2022, the US, Euro area, and UK also saw liquidity in government debt markets deteriorate, largely due to interest rate increases and economic volatility. By 2023, although still high, liquidity stress started to ease along with concerns over the US monetary policy (Figure 3.19). ASEAN+3 had a wider bid-ask spread than advanced economies like the US and UK in 2022,[9] indicating lower liquidity and higher transaction costs. Therefore, creating a deep, liquid market is crucial for dealing with liquidity shortfalls.

[8] AsianBondsOnline, Local Currency Bond Market Liquidity Survey.
[9] Bid-ask spreads for on-the-run issues of US and UK Treasuries typically do not exceed 1 basis point.

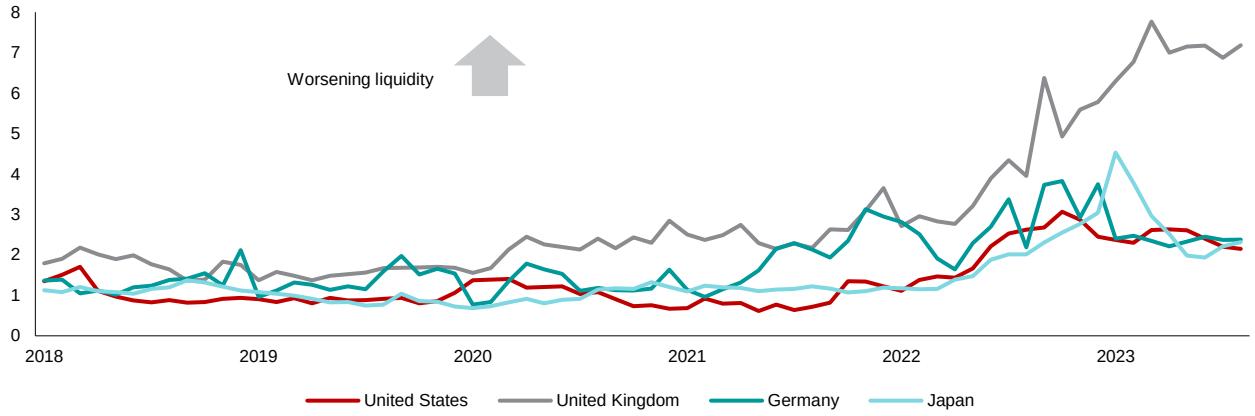
Figure 3.17. Selected ASEAN+3 and US: Turnover Ratio of Government Bonds
(Ratio)

Source: AsianBondsOnline; The Securities Industry and Financial Markets Association (SIFMA), AMRO staff calculations.
Note: Turnover ratio is calculated by the sum of the value of bonds traded divided by the bonds outstanding amount at year-end. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States; VN = Vietnam.

Figure 3.18. Selected ASEAN+3: Average Bid-Ask Spreads for On-The-Run Government Bonds
(Basis points)

Source: AsianBondsOnline; Bloomberg L.P; AMRO staff calculations.
Note: Bid-ask spread represents the difference between the lowest price a seller is willing to sell (ask) and the highest price that a buyer is willing to pay (bid). 'Bid yield - Ask yield' in terms of basis points is used here. Countries excluding the US are the results of AsianBondOnline's liquidity survey, and the US bid-ask spread was calculated based on ten 10-year maturity Treasury bonds issued after 2020. CN = China; HK = Hong Kong; ID = Indonesia; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States.

Figure 3.19. Selected Advanced Economies: Liquidity Indices of Treasury Bond Market
(Index)



Source: Bloomberg L.P.
Note: The Index is a measure of prevailing liquidity in the treasury bond market. It displays the average yield deviation relative to a fitted yield curve across treasury bonds, with maturity beyond 1 year. The index is low when the liquidity is favorable and high when stressful.

III. Policy Implications

Establish a sound debt structure

Having sound debt structure with an appropriate maturity profile and proper currency distribution is important. When determining a debt structure, it is essential to consider trade-offs between cost and risk, and between different kinds of risks while accounting for country-specific circumstances, including the macro-economic framework and domestic financial market.

- In terms of maturity, short-term debt can lower borrowing costs[10] but increase refinancing or rollover risk. On the other hand, long-term debt can lower rollover risk, but the borrowing cost is relatively higher for the government and the longer duration may raise interest rate risks for debt holders.

- In considering currency denomination, governments should strike a balance between the lower cost of foreign currency-denominated debts and greater vulnerability to external shocks such as capital flow volatility and exchange rate risks. Excessive foreign currency borrowing can have spillover effects to the broader financial sector. To mitigate these risks, ASEAN+3 governments could use tools such as currency swaps and forward contracts or match foreign debts with foreign receipts. For instance, the Philippines tends to issue global bonds in currencies from stable trading partners like the US, Japan, China, and the EU.

Diversify the investor base

The ASEAN+3 authorities should broaden the investor base. Given that different groups of investors have different risk appetites, investment objectives, and time horizons, diversification of the investor base will help mitigate the damage from adverse shocks. To broaden the base of investors, governments can diversify the stock of debt across the yield curve or through a range of market instruments (IMF and World Bank 2001). In particular, it is beneficial to have more domestic saving institutions, insurance companies and pension funds in the government debt market as these institutions are usually stable and long-term investors. Also, the presence of more investment funds will help boost market liquidity given their expertise in trading and investment.

Governments should pay special attention to debt holding by foreign investors. Countries with a high concentration of foreign investors in their public debt are more susceptible to financial crises as such investors are less committed to these assets (Das and others 2010). Therefore, it is necessary for the ASEAN+3 governments to keep an eye on foreign capital, analyze the trends in foreign ownership, and identify potential risks of heightened market volatility due to volatile capital flows to ensure timely response (Korean Ministry of Economy and Finance 2022).

Enhance market liquidity

It is necessary to create a liquid and deep bond market to facilitate government borrowing and reduce financial market volatility. In particular, the ASEAN+3 governments should continue to boost market liquidity on three fronts—supply, demand, and supporting mechanisms to facilitate transactions.

- On the supply side, governments should ensure a consistent and stable supply of government bonds, especially benchmark issues in the primary market. As in many of the region's economies, ASEAN+3 governments should continue to use reopening, buybacks, and conversion offers[11] to improve the supply-demand balance and boost liquidity.

- On the demand side, governments should maintain a solid fiscal situation and sound sovereign credit ratings to maintain investor interest in their debt markets. The inclusion of domestic bonds into the global bond index can promote visibility and attract more investors. For example, government bonds of China, Indonesia, Malaysia, and Thailand have been included in a notable global bond index. Also, the development of bond-related markets such as for repurchasing agreements and derivatives will provide investors with risk management tools and increase their interest in bonds. Furthermore, simplifying trading procedures and removing regulatory impediments to trade will boost investor demand.

- On supporting mechanisms, it is necessary to follow common practices and put in place some well-proven mechanisms to facilitate price discovery and transactions. This includes the auction system, primary dealers, and market makers system, and benchmark yield curve for financial product pricing.

Take preemptive and prompt action against market stress

To ensure the smooth operation of the bond market during stress periods, emergency liquidity facilities are crucial. These measures can prevent extreme price fluctuations, bolster investor confidence, and mitigate spillover effects to the entire

[10] This refers to a positively sloped yield curve environment, which is usually the case.

[11] Reopening refers to the issuance of additional amounts of an existing bond. Buyback involves government repurchase of existing bonds before their maturity date. A conversion offer allows bondholders to exchange current bonds for new ones with different terms. In practice, China, Japan, Malaysia, and Singapore use liquidity enhancement auctions to expand past issues. Japan, Korea, Singapore, and Thailand employ buybacks or conversion offers to retire illiquid benchmark bonds, supporting new issuances. Korea utilizes a fungible issuance system, treating new bonds issued within a specific period as the same as existing ones.

financial sector and economy. For example, in response to the pandemic, the Korean government initiated emergency bond buybacks to stabilize markets, while Indonesia, Korea, Malaysia, and Thailand central banks purchased government bonds to inject liquidity into their markets. Furthermore, governments can use specialized bond financing programs to stabilize the bond market. Malaysia, for instance, established the National Financial Guarantee Institution during the global financial crisis to assist corporations in raising bond funds. Similarly, Thailand set up the Corporate Bond Stabilization Fund in 2020, and Korea created the Bond Market Stabilization Fund in 2008, which was reactivated in 2022 to tackle a credit crunch. Meanwhile, it is essential to establish a well-defined communication strategy and ensure clear and transparent communication with the public, market participants, and relevant agencies while implementing emergency measures.

Maintain a sustainable debt level and growth rate

Finally, to minimize the financial stability risks of public debt, some economies should implement fiscal consolidation to stabilize or manage the ongoing rise in public debt, which was exacerbated by the pandemic fiscal stimulus programs. A wealth of research shows that elevated government debt not only can slow economic growth but also can heighten the risk of fiscal crises. As such, determining the optimum size of public debt is a critical decision that considers the needs for more fiscal spending on infrastructure investment and other important social needs and the long-term negative impacts of excessive borrowing. Possible solutions include boosting revenue, optimizing expenditures, and adopting fiscal rules.

Annex 3.1. How Does the Government Debt–to–GDP Ratio Affect Fiscal Crisis Likelihood?

It is crucial to examine how the increase in government debt-to-GDP ratio affects the likelihood of a fiscal crisis, amid the rise in government debt. High levels of government debt can trigger fiscal crises that pose significant threats to financial stability. The primary objective of this analysis is to quantify the extent to which the government debt-to-GDP ratio influences the probability of a fiscal crisis. The study also aims to show how economic development affects the likelihood of one occurring. Based on the result, the probability of a fiscal crisis for each country in the ASEAN+3 region can be estimated (Figure 3.5).

Data and methodology

The panel logit regression model[1] is adopted for empirical analysis. As a dependent variable, the binary outcome variable of fiscal crisis is used. Fiscal crisis data from 1980 to 2015 of 185 countries sourced from Medas and others (2017)[2] was used. Y_{it} takes the value of 1 when the country is in a fiscal crisis in a given year, otherwise takes the value of 0. The independent variable X_{it} is a government debt-to-GDP ratio in a given year of a country. Lagged GDP growth, current account balance, and CPI inflation are used as control variables. To assess the significance of whether a country is an advanced economy on the likelihood of a fiscal crisis, the advanced economy dummy is introduced.

The equation is as follows:

$$Logit(Y_{it}) = \beta_0 + \beta_1 X_{it} + \gamma Z_{it-1} + \delta A_i$$

where

Y_{it} = Dependent variable (Fiscal crisis year, 1=crisis, 0=non-crisis)
X_{it} = Independent variable (Government debt-to-GDP ratio)
Z_{it-1} = Control variables (Lagged GDP growth, Current account balance, CPI inflation)
A_i = Dummy variable (1=advanced economy, 0=non-advanced economy)
β_0 = Constant term
β_1 = Coefficient of independent variable
γ = Coefficients of control variables
δ = Coefficient of dummy variable

Main findings

The government debt-to-GDP ratio plays a crucial role in determining the likelihood of fiscal crisis. As the debt-to-GDP ratio rises, the probability of a crisis also increases. This result is consistent whether the current or the lagged debt-to-GDP ratio is used in the analysis. Even just for ASEAN-4 countries, the relationship remains consistent: higher debt-to-GDP ratios are associated with a higher likelihood of fiscal crisis. On the other hand, an increase in lagged GDP growth and current account balance corresponds to a lower probability of fiscal crisis, while an increase in lagged CPI inflation corresponds to a higher probability. Meanwhile, if a country is an advanced economy, the likelihood of fiscal crisis is greatly reduced (Table A3.1.1).

An increase in the government debt-to-GDP ratio of 1 percentage point, ceteris paribus, is associated with a 0.2 percentage point increase in the probability of a fiscal crisis. Meanwhile, a 1 percentage point increase in lagged GDP growth corresponds to a 0.8 percentage point decrease in probability of fiscal crisis. A 1 percentage point increase in the lagged current account balance leads to a 0.3 percentage point decrease in the probability of fiscal crisis, while an increase in lagged CPI inflation of 1 percentage point is associated with a 0.1 percentage point increase. On average, the likelihood of fiscal crisis in advanced economies is 31 percentage points lower than in non-advanced economies (Table A3.1.2).

The author of this annex is Eunmi Park.

[1] For the panel logit regression, the random effect model is used. In this analysis, the fixed effect model has limitations of observation omission. When using the fixed effect model, a considerable number of observations are dropped because of all the same outcomes within a country. The advanced economy dummy is also omitted because there is no within-group variance. Nevertheless, even when the fixed-effects model is used for a robust check, the coefficient sign and significance come out the same.

[2] The original data covers 188 countries from 1970 to 2015. Considering data availability, only data of 185 countries from 1980 to 2015 were used in this analysis.

Table A3.1.1. Panel Logit Regression Results on Fiscal Crisis (Random Effects Model)

Variable	Global (Model 1)	ASEAN-4 (Model 1)	Global (Model 2)	ASEAN-4 (Model 2)
Gov debt/GDP	0.0172*** (0.0020)	0.0787** (0.0311)		
Lagged Gov debt/GDP			0.0170*** (0.0020)	0.0584** (0.0262)
Lagged GDP growth	-0.0726*** (0.0140)	-0.4425*** (0.1486)	-0.0711*** (0.0144)	-0.4825*** (0.1549)
Lagged current account balance	-0.0231*** (0.0074)	-0.1697* (0.9401)	-0.0240*** (0.0081)	-0.2028** (0.1002)
Lagged CPI inflation	0.0090** (0.0041)	0.3276*** (0.1480)	0.0052 (0.0042)	0.3033** (0.1245)
Advance economy dummy	-3.6656*** (0.4683)	-	-3.6010*** (0.4854)	-
Constant	-1.7502*** (0.2147)	-4.8639** (1.908)	-1.8021*** (0.2219)	-3.5310** (1.5802)
Observations	3,156	85	3,042	81

Source: Fiscal crises database (Medas and others, 2017); IMF *World Economic Outlook* April 2023; AMRO staff calculations.
Note: ASEAN-4 includes Indonesia, Malaysia, the Philippines, and Thailand. Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent respectively. Standard errors are in parentheses.

Table A3.1.2. Average Marginal Effects of Variables on the Probability of a Fiscal Crisis (Global, Model 1)

Variable	Marginal Effect	[95 Percent Confidence Interval]
Gov debt/GDP	0.0020*** (0.0002)	[0.0016, 0.0024]
Lagged GDP growth	-0.0083*** (0.0016)	[-0.0116, -0.0051]
Lagged current account balance	-0.0027*** (0.0008)	[-0.0043, -0.0010]
Lagged CPI inflation	0.0010** (0.0005)	[0.0001, 0.0020]
Advance economy dummy	-0.3076*** (0.0260)	[-0.3587, -0.2566]

Source: Fiscal crises database (Medas and others, 2017); IMF *World Economic Outlook* April 2023; AMRO staff calculations.
Note: Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent, and 1 percent respectively. Standard errors are in parentheses.

Annex 3.2. How Does the Composition of Government Debt Holders Impact Sovereign Default Risk in ASEAN+3?

Analysing the effect of the changes in government debt ownership on sovereign default risk is crucial. The composition of debt holders and its changes have often been highlighted as having a bearing on credit default risks, especially in emerging market economies. Moreover, some types of investors' herd behavior could bring about spillover effects across the region, while the nexus between sovereign and financial institutions could raise sovereign default risks to the level of whole financial system risks. Examining the effect of each investor type could help countries devise policies regarding investor composition that would make financial markets more stable.

Data and methodology

Panel fixed effects[1] regressions for country groups and OLS regressions for each of the seven selected ASEAN+3 economies were run. As a dependent variable, the credit default swap (CDS) spread is used. A CDS is a credit derivative used to hedge against the credit risk of a bond issuer – in this case a sovereign nation. For this exercise, sovereign CDS spread is used to proxy the market expectations of a particular sovereign's ability to repay its obligations. A spike in CDS spread indicates a sharp increase in perceived risk or uncertainty regarding the creditworthiness of a government or its ability to meet its debt obligations. Independent variables are the shares of general government debt held by each type of investors. Data are sourced from IMF Sovereign Debt Investor Base which is extended from Arslanalp and Tsuda (2012, 2014). Control variables shortlisted included real GDP growth, current account balance, and foreign reserves as a percent of GDP, exchange rate against US dollar, stock index, and dummies for global financial crisis and COVID-19 pandemic. Quarterly balanced data spans from 2005 to 2022. The sample includes seven ASEAN+3 economies: China, Indonesia, Japan, Korea, Malaysia, the Philippines, and Thailand.

The equation is as follows:

$$Y_{it} = \beta_0 + \beta_1 Y_{it-1} + \beta_2 Y_{it-2} + \beta_3 X_{it} + \alpha_i + \varepsilon_{it}$$

where,

Y_{it} = dependent variable (CDS spreads)
Y_{it-1}, Y_{it-2} = lagged dependent variables
X_{it} = independent and control variables
β_0 = common intercept
β_1, β_2 = coefficients of lagged dependent variables
β_3 = coefficient of independent and control variables
α_i = fixed effect for economy *i,* capturing time-invariant characteristics
ε_{it} = error term

Main findings

An increase in the share of foreign entities raises five-year CDS spreads of all country groups. Five-year CDS spreads of the economies increase by 1.32 bps, and 1.82 bps on average for selected ASEAN+3 and ASEAN-4, respectively [2] when the share of bond ownership by foreign entities increases by 1 percentage point. The results are significant at the significance level of 1 percent (Table A3.2.1).

Breaking down by type of investor groups, the coefficients of share of foreign officials and foreign nonbanks holdings are significant in the ASEAN-4 group. This time the results for ASEAN+3 as a whole are not significant for all investor-share variables. The increase in share of foreign officials' holdings raises the sovereign's default risks in ASEAN-4 economies collectively. The increase in share of foreign nonbank holdings also contributes to increasing default risks. On the other hand, the coefficients of the rest of the investor share variables were not significant largely due to heterogeneity in idiosyncratic responses to the changes in government bond holdings.

The author of this annex is Chiang Yong (Edmond) Choo.

[1] For panel regression, the Hausman test was implemented to choose between the fixed effect model and the random effect model. In this exercise, the cross section fixed effect model is used. Time fixed effects are not implemented as we want to observe the effects during the crises.

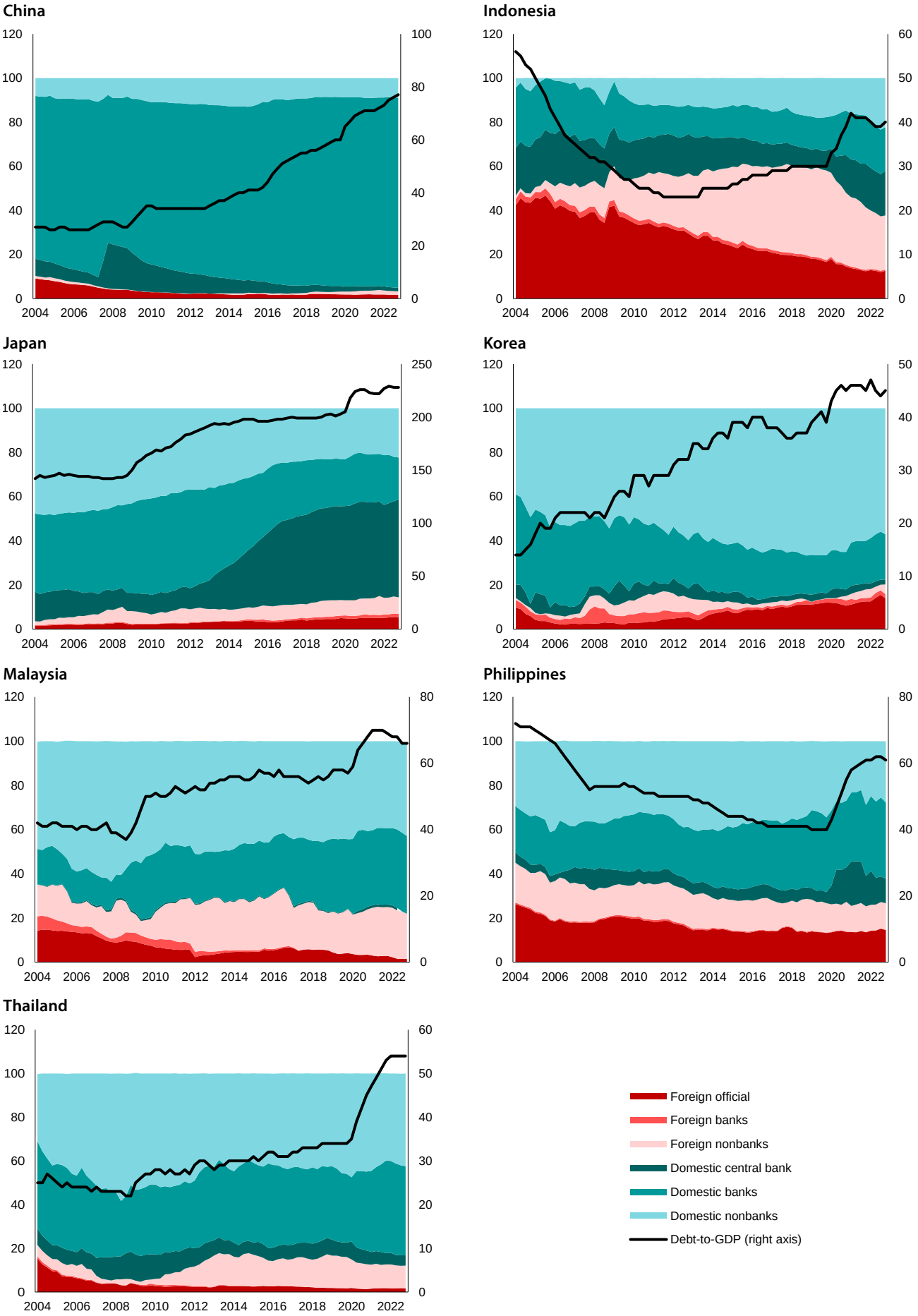
[2] The results for Plus-3 are not significant hence the region is not discussed here.

Table A3.2.1. Panel Regression Results on 5-year CDS Spreads (Cross Section Fixed Effects Model)

Group / Variable	Selected ASEAN+3 (Model 1)	ASEAN-4 (Model 1)	Selected ASEAN+3 (Model 2)	ASEAN-4 (Model 2)
Intercept	215.51***	237.73***	233.10***	240.21**
CDS (-1)	0.85***	0.78***	0.85***	0.77***
CDS (-2)	-0.21***	-0.20***	-0.21***	-0.19***
Share of government bond holdings by:				
All foreign entities	1.32***	1.82***	–	–
Foreign officials	–	–	0.90	1.64*
Foreign banks	–	–	3.39	5.54
Foreign nonbanks	–	–	0.87	2.33**
All domestic entities	–	–	–	–
Domestic central banks	–	–	-0.36	0.54
Domestic banks	–	–	-0.48	0.40
Debt-to-GDP	0.19	0.09	0.26*	0.01
GDP growth	-0.56	-0.13	-0.57	-0.04
Current account balance to GDP (-1)	-2.01***	-2.06***	-2.36***	-2.15***
Stock index (log)	-27.92***	-31.69***	-27.09***	-34.68***
GFC dummy	32.05***	44.44***	30.84***	45.87***
COVID-19 dummy	-13.57*	7.48	-13.10	-7.02
R^2	0.82	0.80	0.82	0.80
Adjusted R^2	0.82	0.79	0.82	0.79

Source: AMRO staff estimation.
Note: Asterisks (*, **, ***) denote significance levels at 10 percent, 5 percent and 1 percent respectively. Selected ASEAN+3 includes China, Indonesia, Japan, Korea, Malaysia, the Philippines and Thailand. ASEAN-4 includes Indonesia, Malaysia, the Philippines and Thailand.

Figure A3.2.1. Selected ASEAN+3: Composition of Government Bonds by Holders and Debt-to-GDP
(Percent share of total general government debt; percent of GDP)



Source: IMF Sovereign Debt Investor Base data base.

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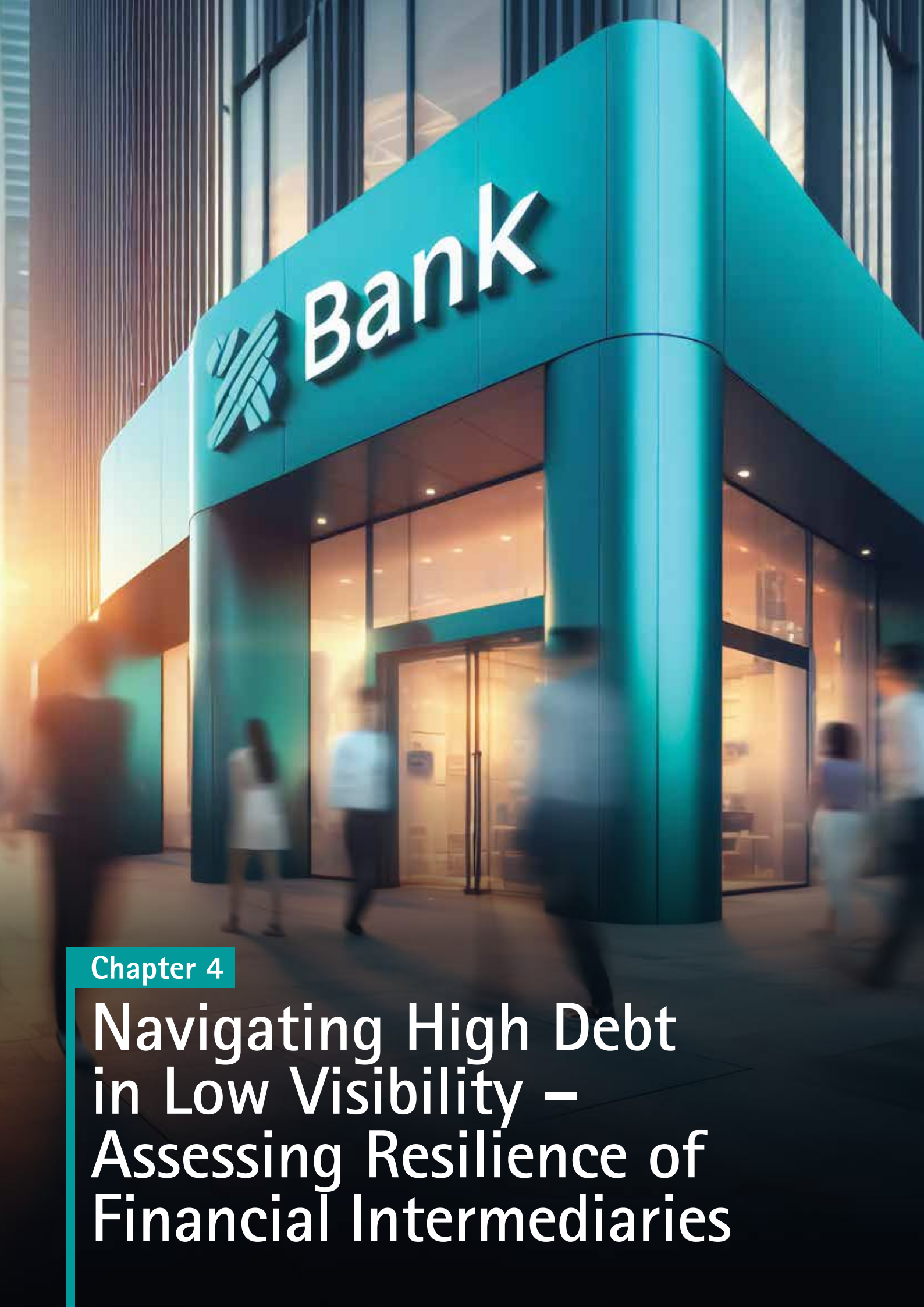


Chapter 4

Navigating High Debt in Low Visibility – Assessing Resilience of Financial Intermediaries

Highlights

- ASEAN+3 banks are the dominant source of credit in the region, holding a substantial share of financial assets, and their growth has consistently exceeded economic growth over the past decade. Assessing leverage risks is essential, since a widening credit-to-GDP gap relative to its long-term trend can be an indicator of the risk of banking crises.

- ASEAN+3 banks have bolstered resilience by building capital buffers and upholding high credit quality standards, as reflected in their good compliance with Basel III regulations. This prudent regulatory approach has served the region well.

- Improving liquidity buffers can help banks better withstand external shocks, particularly given their vulnerability to market funding risks, with the rise in funding costs associated with global monetary tightening. Meanwhile, some liquidity indicators have worsened, as banks are more vulnerable when interest rates are elevated. However, growing reliance on intraregional financing and regulatory tightening can mitigate the risks. Strengthened deposit insurance schemes and bilateral swap lines can also boost confidence in the banking sector.

- Several risks remain. First, the end of pandemic relief measures left borrowers' leverage at relatively high levels. Second, the concentration of property and construction loans makes banks vulnerable to real estate market cycles, as seen in some economies. Third, rising interest rates may undermine loan portfolio quality due to heightened refinancing and default risks.

- Nonbank Financial Intermediaries (NBFIs) constitute a smaller sector than banking but have grown rapidly and remain systemically important given their key role in financial intermediation in ASEAN+3. Assessing risks posed by NBFIs is complex due to the diverse types of institutions and limited data.

- Systemic risk from NBFIs come primarily through those that provide maturity or currency transformation. NBFIs have expanded rapidly in the region, with their role varying significantly across economies. In Japan, Korea, Hong Kong, and Singapore, growth is concentrated in Financial Market Intermediaries (FMIs), which are key liquidity providers, especially in foreign currency. In China, the main type of NBFIs are Collective Investment Vehicles (CIVs), such as fixed income funds.

- Given the diverse roles of NBFIs, prudential oversight needs to be tailored to the specific risks posed by each type. In light of their growing systemic importance in ASEAN+3, regulation and supervision, data disclosure, and risk management of NBFIs need to be substantially strengthened. Should these lines of defence fail to prevent a systemic crisis, central banks need to be ready to provide temporary liquidity support to solvent NBFIs to ensure the continued functioning of financial markets.

This chapter is authored by Richard Sean Craig and Siang Leng Wong under the guidance of Kevin C. Cheng, with contributions from Prashant Pande, Yoki Okawa, Leilei Lu (project manager), Laura Grace Gabriella, Chiang Yong (Edmond) Choo, Benyaporn Chantana, Chenxu Fu, Kit Yee Lim, Huisheng Wang, Jingwei Zhou and Yang Jiao.

I. Introduction

High debt levels can undermine the resilience of financial intermediaries in multiple ways. For one, high indebtedness makes default more likely, potentially impairing the quality of intermediaries' asset portfolios. Moreover, higher interest rates raise debt-servicing burdens for borrowers and can reduce the quality of assets. The confluence of these factors could shake investor confidence in ASEAN+3 financial intermediaries (Box 4.1), making rapid fund withdrawals more likely and putting liquidity at risk. If excessive debt contributes to asset bubbles that eventually burst, the drop in collateral values could heighten loan-to-value ratios, which would introduce an added layer of financial risk. Furthermore, where multiple intermediaries share a common exposure to certain high-risk borrowers, a single default event could ripple through the financial system.

Against this background, this chapter assesses the resilience of financial intermediaries amid higher debt. Specifically:

- Section II starts with an assessment of ASEAN+3 banks' financial stability through key metrics such as capital adequacy, credit quality, and liquidity coverage. It also analyzes risks to bank balance sheets from cross-border financial exposures. A simulation evaluates banks' resilience to rising interest rates. The section concludes by recommending strategies to enhance regional banking resilience amid market volatility.

- Section III examines Nonbank Financial Intermediaries (NBFIs) in the ASEAN+3 region. It highlights their rapid expansion and growing systemic importance, and considers how data limitations prevent the risks to financial stability from being adequately assessed. The section identifies the key sources of systemic risk posed by various types of NBFIs. It concludes with policy recommendations to strengthen the resilience of NBFIs and ensure they can continue to perform their critical market intermediation role when financial systems come under stress.

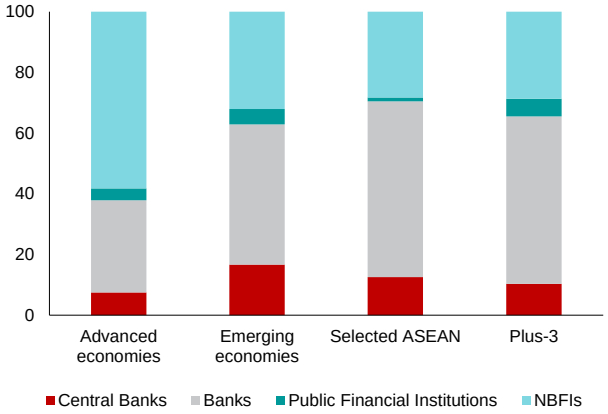
II. Banks

Banks are major providers of credit in the region

ASEAN+3 banks are key players in directing credit to households, businesses, and governments. A significant share of the region's financial assets resides with banks and they have a more dominant role in lending compared to global averages for the financial service industry (Figure 4.1). The region's credit-to-GDP ratios have been rising steadily for decades, mirroring global trends (Figure 4.2). Plus-3 economies (including Hong Kong) have had the highest credit-to-GDP ratios within ASEAN+3 since 2014 (Figure 4.3). These trends may indicate that some borrowers are taking on excessive leverage, which raises financial system vulnerabilities, especially when interest rate are elevated (Drehmann and Tsatsaronis 2014).

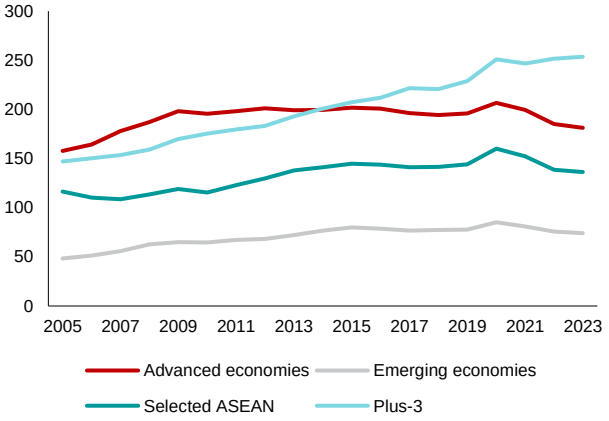
Credit in the region is allocated for various purposes, with notable focus on the property sector. While ASEAN banks extend more loans for financial services, business, and trade, Plus-3 economies granted more to tourism and the services sector (Figures 4.4 and 4.5). Across the region, loans to construction firms and mortgage borrowers comprise a significant share (24 percent to 27 percent). This raises concerns about the vulnerability of banks to fluctuations in the property market, especially when loans are backed by property as collateral.

Figure 4.1. Selected Regions: Share of Financial Assets by Type of Financial Institution, 2021
(Percent)



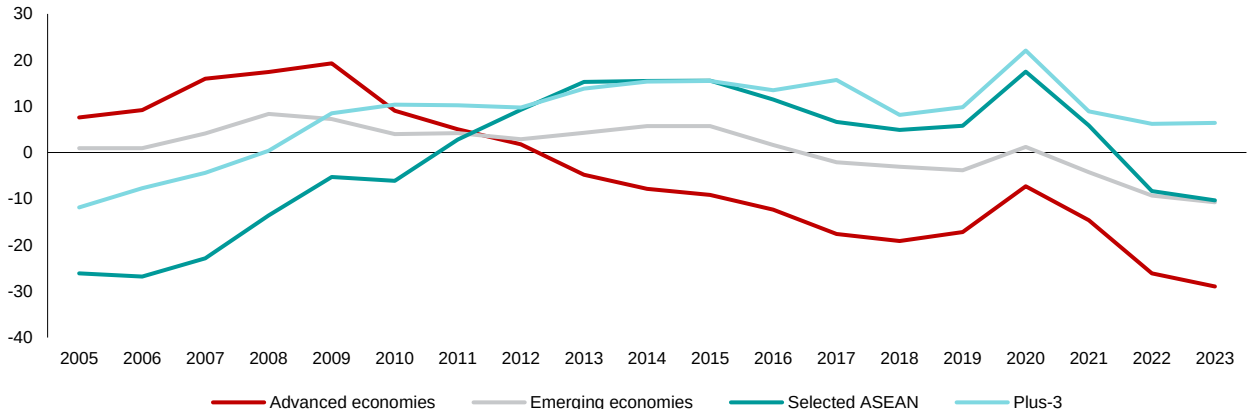
Source: Financial Stability Board via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia and Singapore. Plus-3 economies covered are China, Hong Kong, Japan, and Korea. Due to data availability for public financial institutions, it may be underestimated. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

Figure 4.2. Selected Regions: Credit-to-GDP Ratio
(Percent)



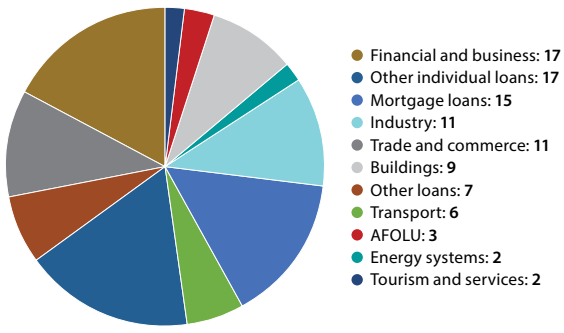
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: The credit-to-GDP ratios are computed based on simple averages amongst economies in the specific region. The estimates are constrained by data availability. Selected ASEAN includes Indonesia, Malaysia, Singapore, and Thailand. Plus-3 economies covered are China, Hong Kong, Japan, and Korea. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe. Data for 2023 as of Q1 2023.

Figure 4.3. Selected Regions: Credit-to-GDP Gap
(Percent)



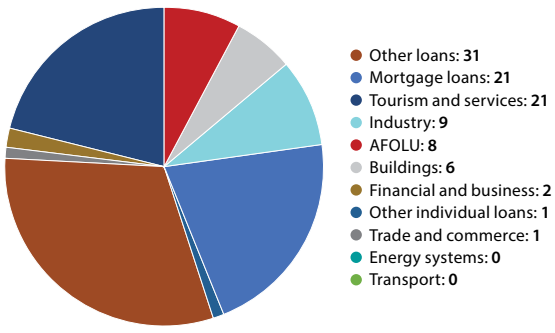
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: The credit-to-GDP gaps are computed based on simple averages amongst economies in the specific region. The estimates are constrained by data availability. Selected ASEAN includes Indonesia, Malaysia, Singapore, and Thailand. Plus-3 economies covered are China, Hong Kong, Japan, and Korea. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe. Data for 2023 as of Q1 2023.

Figure 4.4. ASEAN: Sectoral Credit, 2022
(Percent)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: The shares of sectoral credit are weighted by the size of banking loans.
AFOLU=Agriculture, Forestry and Other Land Use.

Figure 4.5. Plus-3: Sectoral Credit, 2022
(Percent)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: The shares of sectoral credit are weighted by the size of banking loans.
AFOLU=Agriculture, Forestry and Other Land Use.

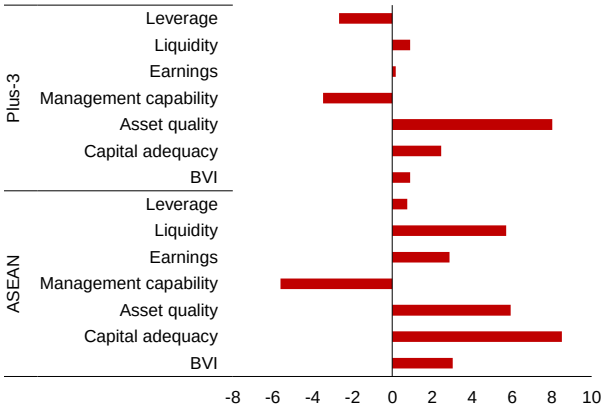
Broadly, ASEAN+3 banking sectors are relatively sound

ASEAN+3 banks have remained resilient through the COVID-19 pandemic, bolstered by regulatory improvements since the Asian financial crisis (Khor and Jiang 2023). Utilizing AMRO's Bank Vulnerability Index (BVI),[1] which assesses criteria such as capital adequacy, asset quality, management capability, earnings, liquidity, and leverage, the region's banks have performed more strongly than their peers.

ASEAN+3 banks are well-capitalized, providing a cushion against credit risks. As reflected in the region's higher BVI scores, capital adequacy is better than it was a decade ago (Figure 4.6). Notably, ASEAN banks boast higher total and Tier 1 capital adequacy ratios (CARs) than regional peers (Figures 4.7 and 4.8). While Plus-3 banks have lower CARs, their nonperforming loan (NPL) ratios are among the world's lowest (Figure 4.9). Most economies in the region comply with Basel III regulations and meet elevated capital adequacy standards (Table 4.1). This fortifies capital buffers against credit and liquidity risks while offering continued credit support to households, businesses, and governments. That said, despite stable bank credit quality, weak corporate solvency ratios are reflected in low interest coverage ratios (Chapter 2), which indicates a possibility of sudden and significant increase in NPLs.

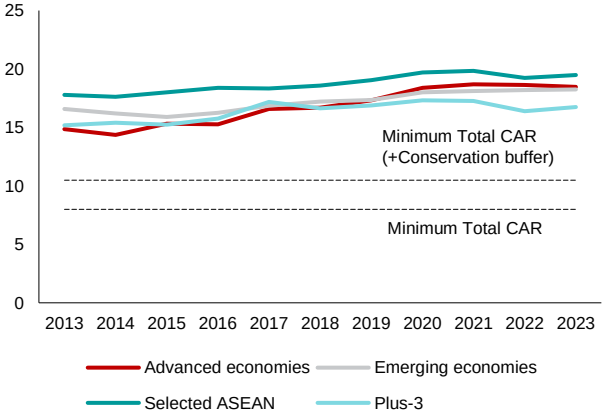
Several factors contribute to the higher CARs of ASEAN+3 banks. First, the region's NPL ratios are low and stable, reflecting generally prudent lending standards that help contain erosion in the capital base and adequate provisioning for losses. Second, regulatory measures such as dividend caps, introduced at the onset of the pandemic (The Nation 2023; Monetary Authority of Singapore 2020; Trang 2022), aided capital retention. Third, even though regional banks' return-on-asset might not be best performing, the decline in profitability during the initial stage of the pandemic was less severe than in other regions (Figure 4.10), and so supported ongoing capital growth. Lastly, ASEAN+3 banks' primary income is from net interest margins (Figure 4.11). These are tied to lending and a more stable source of profit than investments in markets.

Figure 4.6. ASEAN+3: Improvement in Bank Vulnerability Index (BVI) Factors, 2013–22
(Percent)



Source: AMRO staff calculations.
Note: BVI = Bank vulnerability index; BVI comprises of six factors, namely capital adequacy, asset quality, management capabability, earnings, liquiidty, and leverage. A positive BVI/ BVI factor refers to an improvement in banking sector resilience. The banks are benchmarked against their indvidual historical domestic banking sector. For more details on the benchmarking group, refer to Wong and Wei (2023).

Figure 4.7. Selected Regions: Total Capital Adequacy Ratio (CAR)
(Percent)



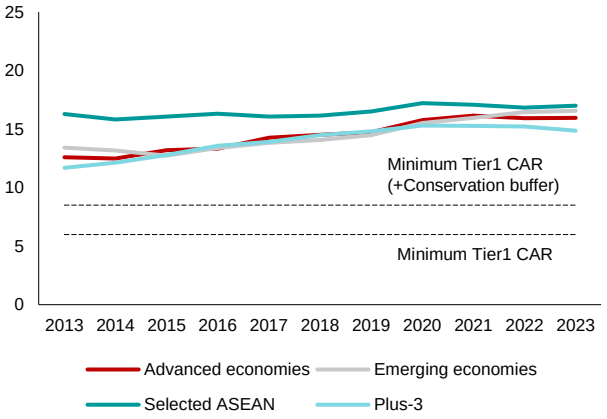
Source: National authorities; International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: The CARs are computed based on simple averages amongst economies in the specific region. Due to data availability, ASEAN economies not covered are Lao PDR, Myanmar, and Vietnam. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

Pandemic relief measures have been key to sustaining ASEAN+3 banking resilience. Regulators started a variety of initiatives benefitting both banks and borrowers (Table 4.2). For banks, easing regulatory requirements helped maintain credit flows. Borrowers received support through measures such as loan deferrals, restructuring, moratoriums, debt consolidation, credit guarantees, and reduced interest rates to ease cash flow issues. While these supportive policies have ended, NPL ratios have generally remained low. In 2023, Korea, Lao PDR, Thailand, and Vietnam are still phasing out forbearance measures with an emphasis on sound restructuring practices and timely financial disclosure, as the true financial soundness may not yet be fully known.

Forbearance policies present long-term risks. First, they can keep borrowers' leverage high, raising the risk of future debt delinquency. This could create insolvent 'zombie firms,' which would be more destabilizing than prompt liquidation (Gee and Lucas 2023). Second, banks, especially with lower capital, may accumulate 'evergreen loans' by deferring payments and prolonging debt restructuring to avoid loan loss recognition (Özlem Dursun-de Neef and Schandlbauer 2021). Proactive surveillance of household and corporate balance sheets can help authorities better assess these long-term vulnerabilities.

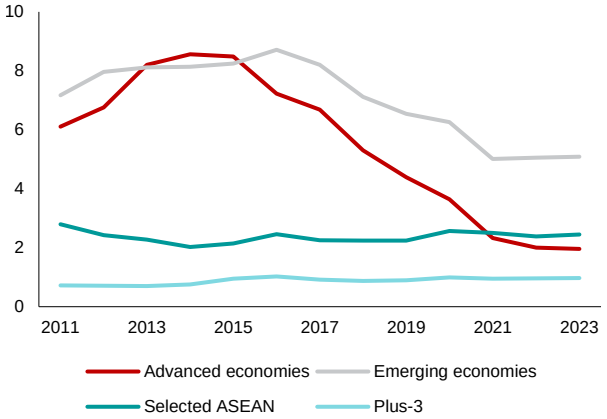
[1] The BVI, as described in Wong and Wei (2023), is a modified approach to the widely recognized CAMELS rating system.

Figure 4.8. Selected Regions: Tier 1 Capital Adequacy Ratios (CAR)
(Percent)



Source: National authorities; International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: The Tier 1 CARs are computed based on simple averages amongst economies in the specific region. Due to data availability, ASEAN economies not covered are Indonesia, 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.

Figure 4.9. Selected Regions: Nonperforming Loan (NPL) Ratio
(Percent)



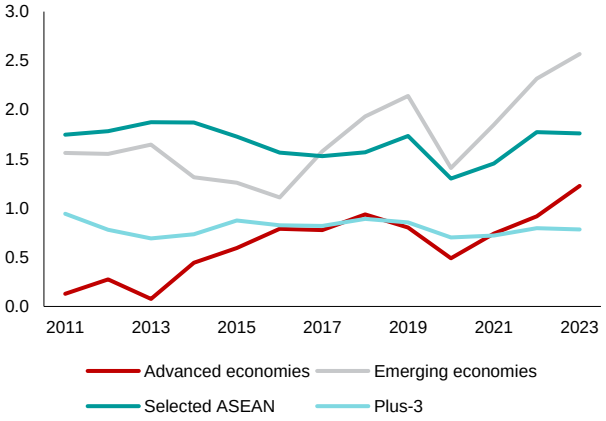
Source: National authorities; International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: The NPL ratios are computed based on simple averages amongst economies in the specific region. Due to data availability, Lao PDR, Myanmar, and Vietnam are excluded from the analysis for ASEAN, while China is excluded from the analysis for Plus-3. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe. Data for 2023 as of Q1 2023. Data are extrapolated for the economies that do not have latest data.

Table 4.1. ASEAN+3: Year of Basel III Implementation

Economy	Capital requirements			Liquidity requirements		Domestic systemically important requirements	Global systemically important requirements	Large exposure framework
	Regulatory capital	Conservation capital	Countercyclical capital buffer	Liquidity coverage ratio	Net stable funding ratio			
Brunei	2019			Brunei has developed guidelines and is in the midst of engaging with industry.	2020			
Cambodia	2016	2019	2019	2020				
China	2013	2016	2016	2017	2018	2016	2016	2018
Hong Kong	2013	2015	2015	2015	2018	2015	2015	2020
Indonesia	2014	2016	2016	2015	2017	2016		2020
Japan	2013	2016	2016	2016	2021	2016	2016	2020
Korea	2013	2016	2016	2015	2018	2016		2019
Lao PDR	2018 (Basel II)	Lao PDR is implementing Basel II.						
Malaysia	2013	2016	2020	2015	2016	2020		2020
Myanmar	2017			2017				2017
Philippines	2014	2014	2018	2018	2019	2014		2024
Singapore	2013	2016	2016	2017	2018	2015	2014	2020
Thailand	2013	2016	2013	2016	2018	2017		
Vietnam	The State Bank of Vietnam is implementing Basel II.							

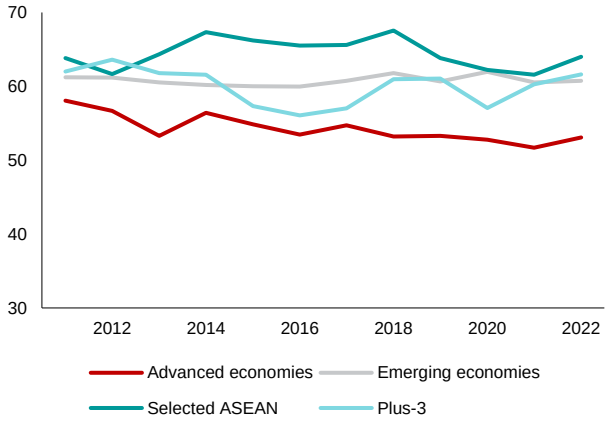
Sources: Bank for International Settlements; Moody's; national authorities; AMRO staff compilation.
Note: Figures refer to the year of implementation for each measure.

Figure 4.10. Selected Regions: Return on Asset
(Percent)



Source: National authorities; International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: The ROAs 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, while China is excluded from the analysis for Plus-3. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe. Data for 2023 as of Q1 2023.

Figure 4.11. Selected Regions: Interest Margin to Gross Income
(Percent)



Source: National authorities; International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: The net interest margins 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, while China is excluded from the analysis for Plus-3. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe. Data extrapolated where necessary. Data for 2023 as of Q1 2023. Data are extrapolated for the economies that do not have latest data.

Table 4.2. Selected ASEAN+3: Summary of Regulatory Forbearance Policies

Measure	Economy	Target segments
Relaxing regulatory requirements for banks		
• Reducing capital conservation buffer or liquidity requirements	MY, PH	Broad-based
• Reducing required regulatory reserves	HK, ID, KH, MY, PH	Broad-based
• Relaxation of debt classification and/or provisioning criteria	KH, LA, PH, TH, VN	Broad-based
• Delaying Basel III implementation	ID, JP, HK, KH, SG	Broad-based
• Lowering banks' operation costs	PH	Broad-based
Relief of debt repayment burden for borrowers		
• Moratoriums or deferment of debt repayment	BN, CN, HK, KR, LA, MY, PH, SG, TH	Households, SMEs
• Easing macroprudential regulations	ID, PH, TH	Corporates, property sector
• Debt restructuring and/or consolidation programs	BN, ID, KH, LA, MY, PH, SG, TH, VN	Households, corporates, SMEs
• Interest rate subsidies/ reductions	PH, VN	Corporates, SMEs

Source: National authorities; AMRO staff compilation.
Note: BN = Brunei; KH = Cambodia; CN = China; HK = Hong Kong; ID = Indonesia; KR = Korea; LA = Lao PDR; MY = Malaysia; PH = Philippines; TH = Thailand; SME = small and medium enterprise; and VN = Vietnam. The policies were introduced to support the banking sectors and borrowers during the pandemic, but might have since been phased out.

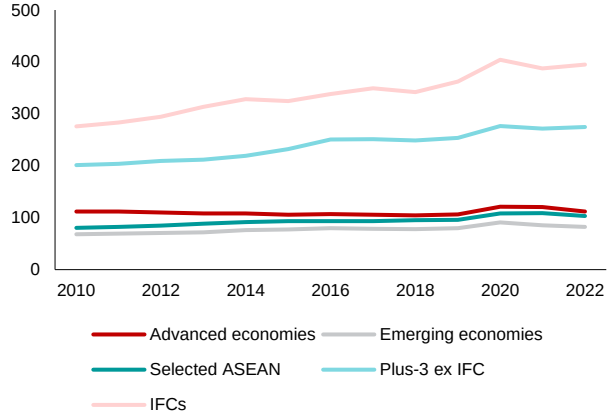
Some shifts in financing sources are occurring for ASEAN+3 banks

Liabilities have grown, especially from market financing. Reliance on market-based financing has grown more quickly in international financial centers (IFCs) and Plus-3 economies compared with global averages (Figure 4.12). Even as deposits still constitute most banking liabilities, a growing portion comes from more market-based financing sources such as bonds and repurchase operations, especially in economies where the stock of bank liabilities is large (Figure 4.13). This trend exposes banks to greater risks. For example, the March 2023 turmoil in the United States (US) and European banking sectors hurt sentiment in Plus-3 economies, resulting in higher credit default swap (CDS) spreads and lower bank equity prices, which in turn increased the cost of raising funds in the market.

While the US and the rest of the world has traditionally been the main sources of cross-border funding for ASEAN+3 banks, particularly in the Plus-3 region (Figures 4.14, 4.15, 4.16), reliance on intraregional financing, notably from Japan, is growing. This shift, observed since the global financial crisis (Remolona and Shim 2015), could mean economies in the region rely more on their neighbours and so are less exposed to volatility from outside the region than to volatility from within. Moreover, as this cross-border finance in the region is dominated by the US dollar, it will continue to be affected by unexpected changes in global monetary policies. ASEAN+3 economies should remain vigilant about foreign exchange risks, given that US dollars are significant on the balance sheets of the main intraregional financiers. For instance, the three largest Japanese megabanks, which are key sources of dollar funding for ASEAN, rely on US repurchase operations, cross-currency swaps, and rolling forward FX contracts for funding, although they have increased deposits to stabilize their funding base.

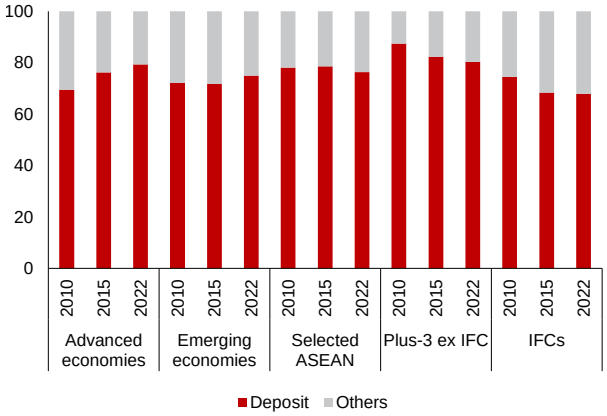
Mitigating cross-border liquidity risk is a priority for ASEAN+3 banks since their regional financial ties are substantial (Figures 4.17 and 4.18), including those with the Hong Kong and Singapore as financial centers. This reliance on cross-border financing can make banks more vulnerable to market volatility (Figure 4.19) given that most claims and liabilities are in US dollars (Figures 4.20 and 4.21), which adds to liquidity risks due to foreign exchange fluctuations.

Figure 4.12. Selected Regions: Bank Liabilities
(Percent of GDP)



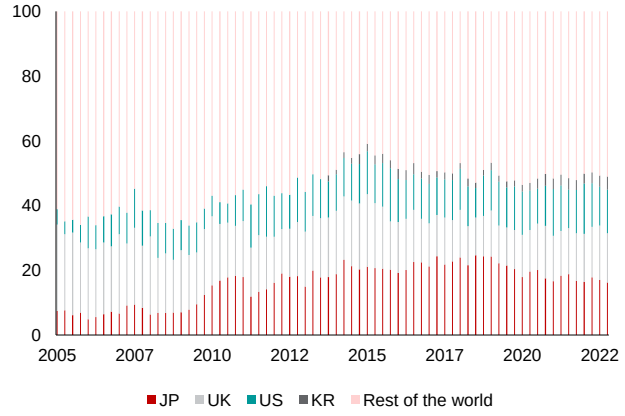
Source: International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: IFCs = international financial centers; IFCs covers Hong Kong and Singapore. Advanced economies constitute countries in the Western Europe and North American regions. Emerging economies constitutes countries in the Eastern Europe and Latin American regions. Selected ASEAN includes Brunei, Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, and Thailand, but excludes Lao PDR due to data availability issue. The figures are computed based on weighted averages amongst economies in the specific region. Data are extrapolated for the economies that do not have latest data. Latest information on Singapore is from 2020.

Figure 4.13. Selected Regions: Share of Bank Liabilities
(Percent)



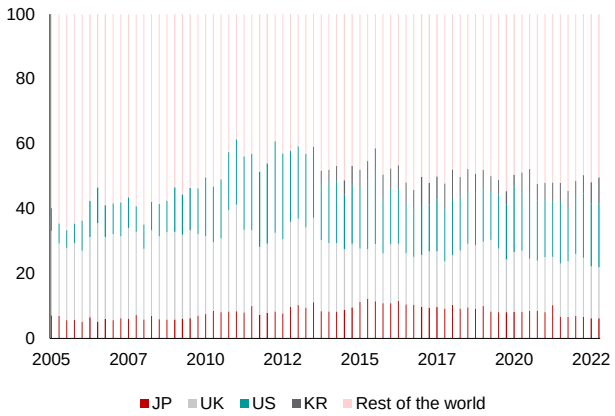
Sources: International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: IFCs = international financial centers, covering Hong Kong and Singapore. Advanced economies constitute countries in the Western Europe and North American regions. Emerging economies constitutes countries in the Eastern Europe and Latin American regions. Selected ASEAN includes Brunei, Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, and Thailand, but excludes Lao PDR due to data availability issue. The share of liabilities is computed based on simple averages amongst economies in the specific region. Data are extrapolated for the economies that do not have latest data. Latest information on Singapore is from 2020.

Figure 4.14. ASEAN: Share of Foreign Claims on Banks by Counterparty Economy
(Percent)



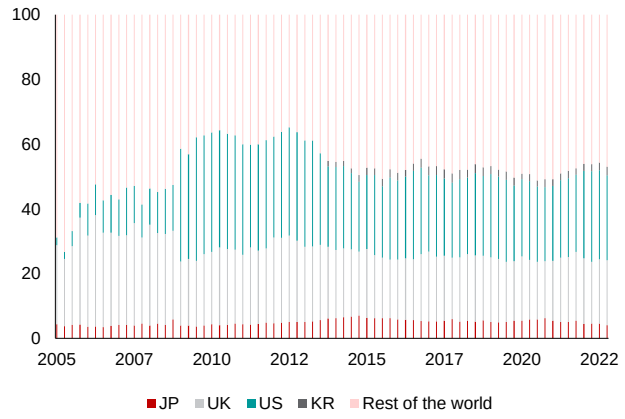
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: JP = Japan; KR = Korea; UK = United Kingdom; US = United States.

Figure 4.15. Hong Kong and Singapore: Share of Foreign Claims on Banks by Counterparty Economy
(Percent)



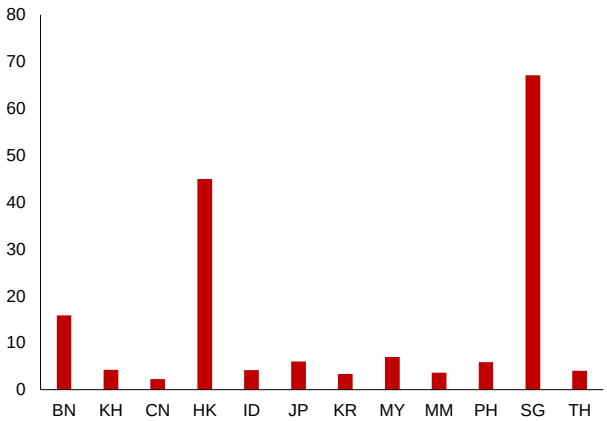
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: JP = Japan; KR = Korea; UK = United Kingdom; US = United States.

Figure 4.16. Plus-3 Excluding IFC: Share of Foreign Claims on Banks by Counterparty Economy
(Percent)



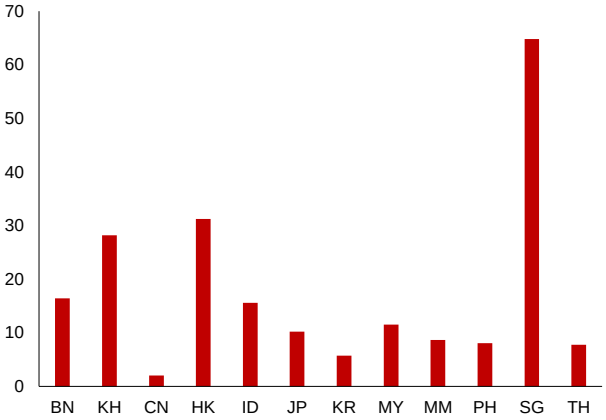
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Plus-3 excluding IFC covers China, Japan, and Korea. JP = Japan; KR = Korea; UK = United Kingdom; US = United States.

Figure 4.17. Selected ASEAN+3: Cross Border Bank Loans, Q4 2022
(Percent of own banking sector assets)



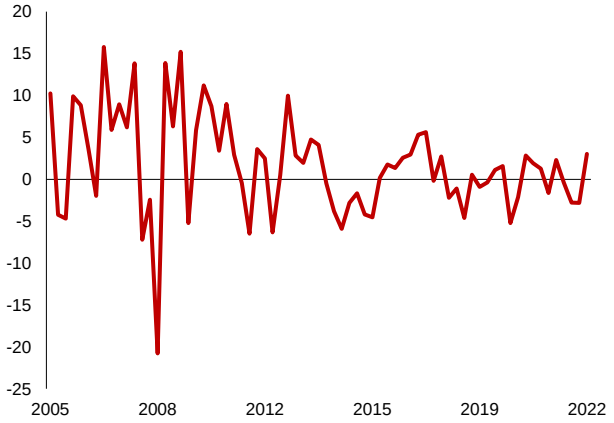
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Refers to ASEAN+3 banks' lending to external banking counterparts. BN = Brunei; KH = Cambodia; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; LA = Lao PDR; MY = Malaysia; MM = Myanmar; PH = Philippines; SG = Singapore; TH = Thailand; Calculations for Singapore and Myanmar are based on Q4 2019 and Q4 2020 information, and those for China, Japan, and Malaysia on Q3 2022.

Figure 4.18. Selected ASEAN+3: Cross Border Bank Borrowings, Q4 2022
(Percent of own banking sector assets)



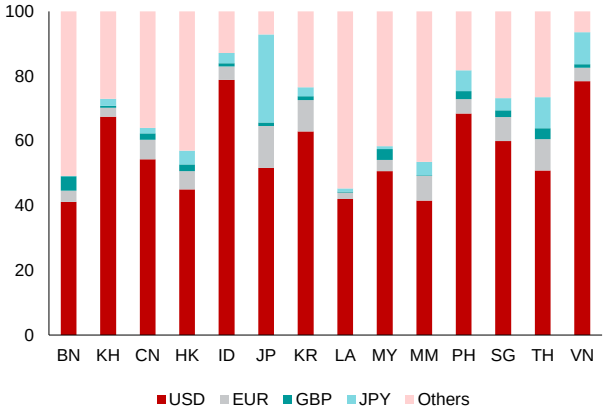
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Refers to ASEAN+3 banks' lending to external banking counterparts. BN = Brunei; KH = Cambodia; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; LA = Lao PDR; MY = Malaysia; MM = Myanmar; PH = Philippines; SG = Singapore; TH = Thailand; Calculations for Singapore are based on Q4 2019 information and for Myanmar on Q4 2020. Calculations for China, Japan, and Malaysia are based on Q3 2022.

Figure 4.19. ASEAN+3: Quarterly Growth Rate of Cross Border Bank Borrowings
(Percent, quarter-on-quarter)



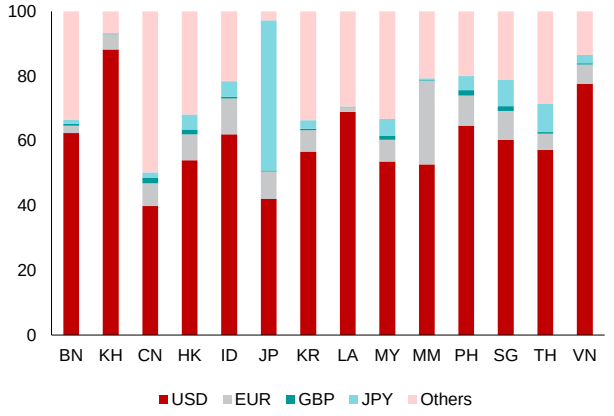
Source: International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: Refers to the change in ASEAN+3 banks borrowing from external banking counterparts.

Figure 4.20. ASEAN+3: Cross Border Bank Loans by Foreign Currencies, 2022
(Percent)



Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
BN = Brunei; KH = Cambodia; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; LA = Lao PDR; MY = Malaysia; MM = Myanmar; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam; USD = US dollar; GBP = Pound sterling; JPY = Japanese yen.

Figure 4.21. ASEAN+3: Cross Border Bank Borrowings by Foreign Currencies, 2022
(Percent)



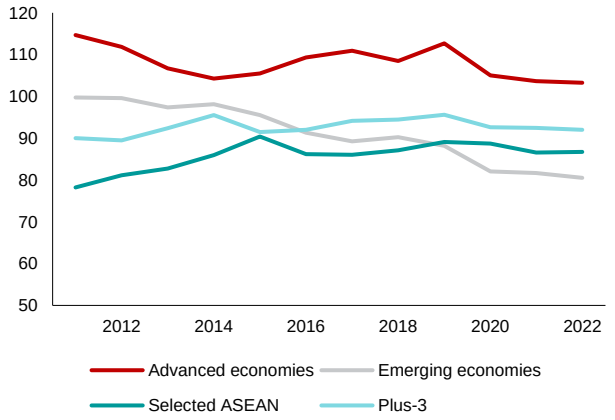
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
BN = Brunei; KH = Cambodia; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; LA = Lao PDR; MY = Malaysia; MM = Myanmar; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam; USD = US dollar; GBP = Pound sterling; JPY = Japanese yen.

Banks should strengthen liquidity buffers to better insulate from external shocks

During the pandemic, ASEAN+3 banks maintained stable liquidity, supported by central bank actions such as government bond purchases and reductions in reserve requirements. The region's loan-to-deposit ratios are better than a decade ago and are in between that of advanced and emerging market economies (Figure 4.22). Liquidity measures, such as the ratio of liquid assets to short-term liabilities, have remained steady, although improved in some other regions (Figure 4.23).

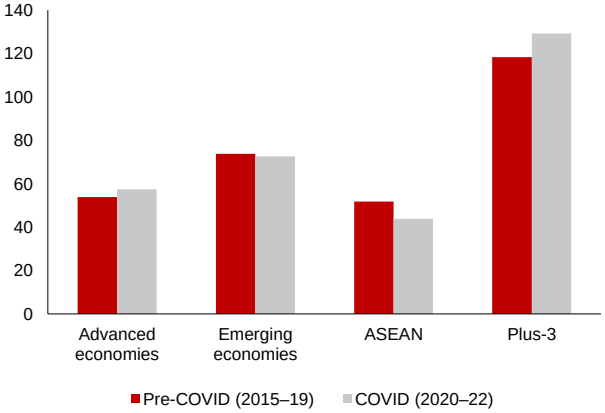
However, potential vulnerabilities do exist. Banks in Plus-3 economies have seen their liquid asset ratios fall, as highlighted in Figure 4.24. Research by Wong and Wei in 2023 indicates that both Domestic Systemically Important Banks (D-SIBs) and large banks in ASEAN+3 emerging markets have experienced some decline in their liquid-asset ratio. Given the increasing reliance on market financing, these banks may need to review their liquid asset ratio and carefully monitor risks from fluctuating interest rates that can influence market funding liquidity, as demonstrated for Malaysia in Box 4.2.

Figure 4.22. Selected Regions: Loan-to-Deposit Ratio
(Percent)



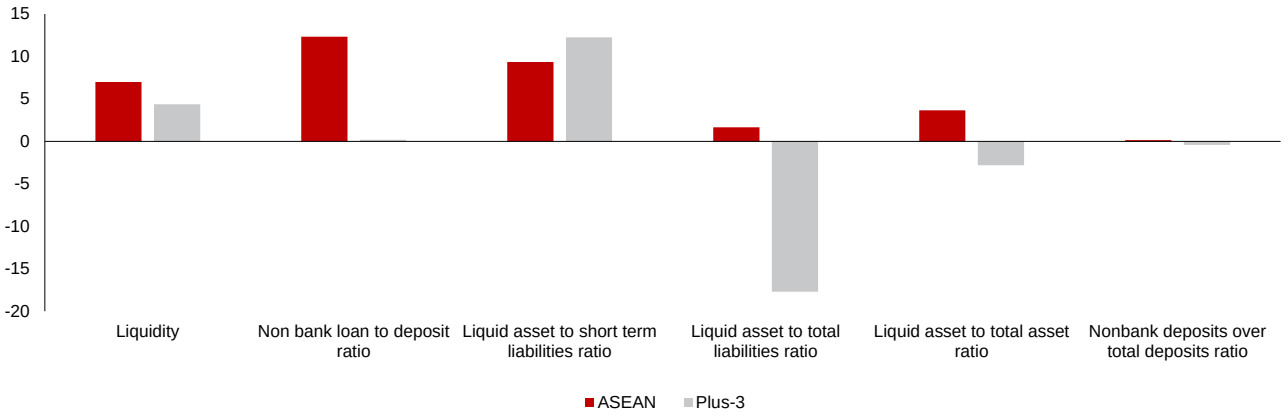
Source: International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: The loan-to-deposit ratios are computed based on simple averages amongst economies in the specific region. Due to data availability, Lao PDR and Myanmar were excluded from the analysis of ASEAN while China and Japan for Plus-3. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe. Data are extrapolated for the economies that do not have latest data.

Figure 4.23. Selected Regions: Average Liquid Asset-to-Short-Term Liabilities, Pre-COVID and COVID
(Percent)



Source: International Monetary Fund via Haver Analytics; AMRO staff calculations.
Note: Due to data availability, Lao PDR, Myanmar, and Vietnam were excluded from the analysis. The liquid asset-to-short term liability ratios are computed based on simple averages amongst economies in the specific region. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

Figure 4.24. ASEAN+3: Improvement in Average Bank Vulnerability Index (BVI) Liquidity Factor, Pre-COVID and COVID
(Percent)



Source: AMRO staff estimates.
Note: Higher score represents an improvement in banking resilience. The factor "Liquidity" comprises of five dimensions, including nonbank loan-to- deposit ratio and liquid asset to short term liabilities ratio. The ASEAN+3 banks are benchmarked against banks in the same domestic economy. For more details on the benchmarking group, refer to Wong and Wei (2023).

Box 4.1:

Beta Analysis of Banks and NBFIs

To evaluate how the market perceives risks of financial intermediaries, a study is conducted on the market betas of banks and other financial service providers, which broadly cover Nonbanks Financial Intermediaries (NBFIs). For each economy, two market capitalization-weighted indices are created, one for a consolidated banking sector as well as another one for a consolidated financial services sector. The indices include all listed companies classified as "banks" and "financial services" (which is a proxy for NBFIs) according to Bloomberg Industry Classification Standard (BICS).[1] The market beta is the coefficient of regression of the daily changes of each of these indices to the daily changes in the benchmark index of that economy. The coefficient is calculated on a rolling basis for a period of six months.

The indicator provides a measure of markets perception of risk associated with the respective sectors as compared with the broader economy. A beta greater than 1 is typically associated with a market perception that the sector is riskier than the "market" (more specifically firms included in the benchmark index, typically representative of the dominant sectors and firms in the economy). The risks perceived by the markets could be due to multiple factors such as balance sheet issues (e.g., leverage), business models (e.g., target customers), negative news (operational risks, legal risks, regulatory actions, or adverse corporate governance) and, in some cases, the impact of macroeconomic backdrop on the firms.

The analysis shows that market's perception of risks associated with the banking sector have been reducing since the pandemic (Figure 4.1.1). The severe slowdown in economic activity during the pandemic led to concerns of widespread defaults and there was an uptick in the market betas (a measure of market's perception of risk associated with the sector) in most of the ASEAN+3 economies. However, the governments in the region acted swiftly to provide forbearances and support to the vulnerable sectors of the economies, thus helping ease the risks of a systemic crisis. More recently, banks in most ASEAN+3 economies have reported better net interest margins (NIMs) due to rising interest rates, which has helped boost the market confidence in the sector. A similar trend was seen in the market betas for the NBFI sector during the pandemic where the beta rose after initially before easing. However, the average beta for ASEAN+3 NBFIs has largely remained stable over the past couple of years (Figure 4.1.2).

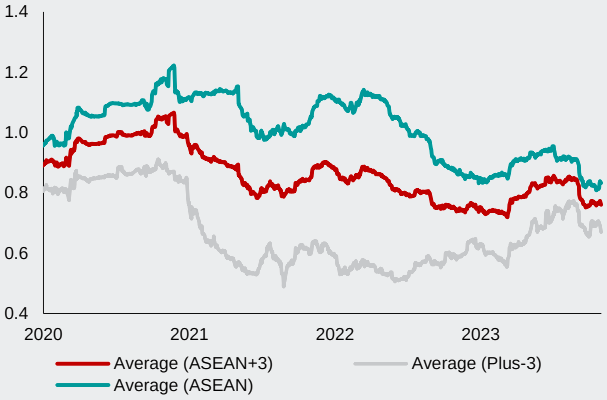
There is a significant difference between the beta magnitudes in Plus-3 and ASEAN markets. Based on the past 6 months of data (Figure 4.1.3), the NBFI betas have been higher than those of banks in China, Hong Kong, Japan, and Thailand while it is much lower for Indonesia, Malaysia, and Philippines. The relatively higher beta NBFIs in Plus-3 could be an outcome of the more evolved and complex nature of NBFIs which has helped offload the riskier segments of the business from the banks. On the other hand, ASEAN financial system remains dominated by banks and these banks operate across the risk spectrum, which justifies their higher betas. The NBFI sectors of China and Thailand, and banking sectors of Singapore[2] are perceived to be riskier than the broader economy (beta > 1) based on the past six months of data.

The author of this box is Prashant Pande.

[1] We use level 2 categorization of the Bloomberg Industry Classification Standard (BICS) for Banks and Financial Services. The BICS definitions of Banks is: "This industry group includes companies that provide banking services. These companies accept deposits and use these deposits as their primary funding source for their lending activities" and the definition of Financial Services is "This industry group includes companies that provide services which focuses on the growth or transaction of money and assets." The sub-categories included under Banking are Diversified Banks and Banks. The sub-categories for Financial Services are Asset Management, Speciality Finance, and Institutional Finance Services.

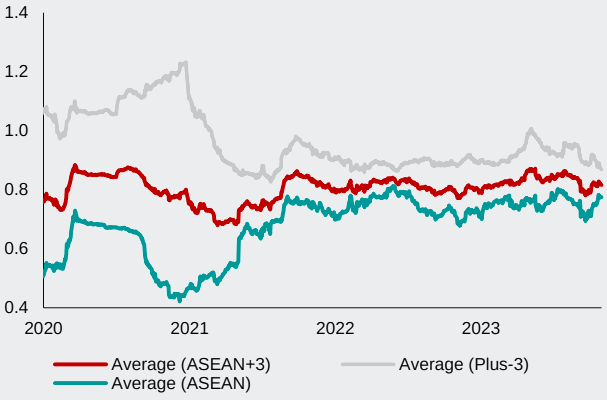
[2] About 37 percent of the benchmark index for Singapore is made of major banking stocks and over the past six months, have accounted for about 25 percent of the trading volume of the Singapore Stock Exchange. Singapore banks may not be as risky as the market beta suggests but the higher beta could be an outcome of trading behaviour in the stock exchange. With most trading activity concentrated in banking stocks, they would tend to be more volatile than other stocks which are traded less.

Figure 4.1.1. ASEAN+3: Market Betas for Banks
(Index)



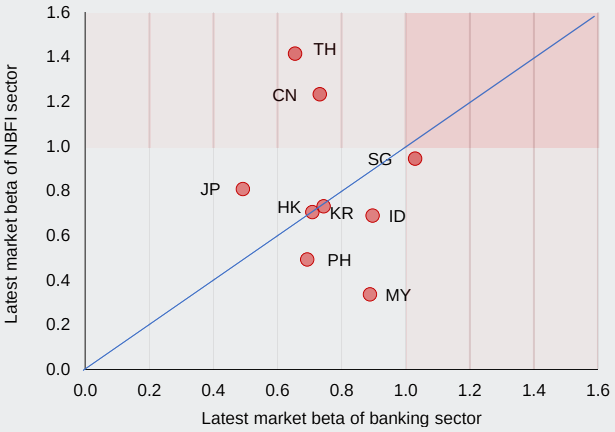
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: A simple average across of betas across economies is used.

Figure 4.1.2. ASEAN+3: Market Betas for NBFIs
(Index)



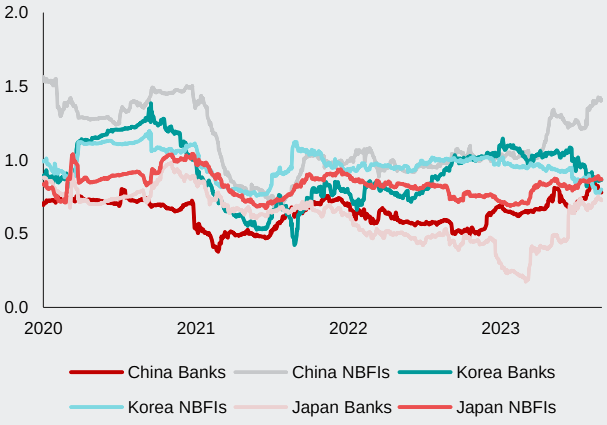
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: A simple average across of betas across economies is used.

Figure 4.1.3. Selected ASEAN+3: Market Betas of Banking and NBFI Sectors
(Index)



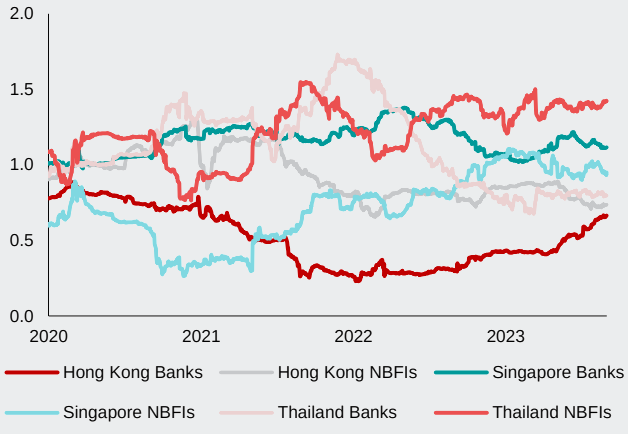
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: Data as of 30 October 2023.

Figure 4.1.4. Selected Plus-3: Market Betas for Banks and NBFIs
(Index)



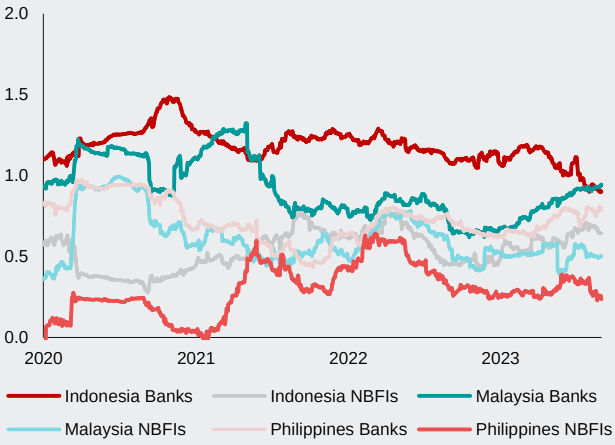
Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: A simple average across of betas across economies is used. NBFI = nonbank financial institution

Figure 4.1.5. IFCs and Thailand: Market Betas for Banks and NBFIs
(Index)



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: International financial centers (IFCs) include Hong Kong and Singapore.
NBFI = nonbank financial institution.

Figure 4.1.6. Selected ASEAN: Market Betas for Banks and NBFIs
(Index)



Source: Bloomberg Finance L.P.; AMRO staff calculations.
Note: NBFI = nonbank financial institution.

Box 4.2:

Impact of Rising Interest Rates on Malaysian Banks' Liquidity

The rising interest rate cycle in Malaysia that started in 2022 may have contributed to changes in banks' liquidity position. This box sheds light on this development, based on AMRO's analysis and engagements with market participants in Malaysia.

Symptoms of liquidity tightness

In the second half of 2022, Malaysian banks faced tighter funding conditions due to rising interest rates. Bank Negara Malaysia (BNM) initiated monetary policy normalization in May 2022, raising the Overnight Policy Rate (OPR) from 1.75 percent to 3.0 percent by May 2023. This led to noticeable tightness in the interbank market, especially in the second half of 2022 following the cumulative increase in OPR by 100 bps for the year. During this period, the Kuala Lumpur Interbank Offered Rates (KLIBOR) for three and six months surged by more than 150 bps. The spread between the three-month KLIBOR and OPR widened to 100 bps by year's end, a notable increase from its 45 bps average for 2015–2019 (Figure 4.2.1). This change was attributed both to market expectations of further OPR hikes and shifts in bank balance sheets as economic conditions improved.

Shifts in bank assets and liabilities

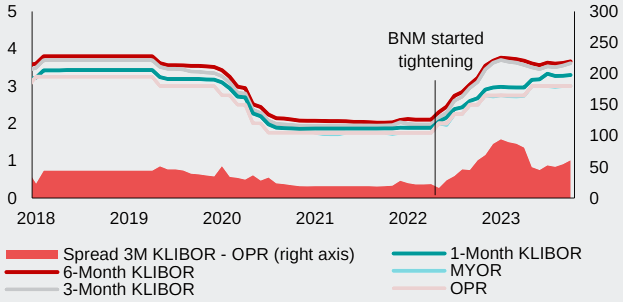
Loan growth outpaced deposit growth once economic activities picked up, increasing bank funding needs. After pandemic-related restrictions were relaxed and economic activities expanded in 2022, loan growth—which had fallen short of deposit growth throughout 2021—outpaced deposit growth (Figure 4.2.2). Consequently, the banking system's loans-to-funds ratio rose from under 81 percent in the fourth quarter of 2021 to 82.4 percent at the end of 2022 (Figure 4.2.3). Moreover, bank-level data show that liquid-asset-to-total-asset ratio fell in six of the eight largest Malaysian banks (Figure 4.2.4). The tighter liquidity position, which resulted from faster loan expansion, contributed to higher borrowing costs in the interbank market.

The shift in deposit duration gave rise to lower Liquidity Coverage Ratio (LCR). Anticipating higher interest rates, some interest-sensitive institutional depositors shortened their term deposit placements tenors, especially one to two months (Figure 4.2.5), resulting in a deterioration in LCR for banks.[1] The shift had the biggest effect on banks that relied less on individual deposits and more on rate-sensitive wholesale deposits, such as Islamic banks (Figure 4.2.6). Thus, the average LCR for Islamic banks fell from 144 percent to 127 percent between end-2021 and the third quarter of 2022, the period low. Meanwhile, the average LCR of commercial banks also dropped 12 percent (Figure 4.2.7). Although the ratios remained well above the regulatory threshold of 100 percent, banks pre-emptively restored LCR to avoid market panic by borrowing term liquidity, pushing up money market rates.

Authorities and banks' responses

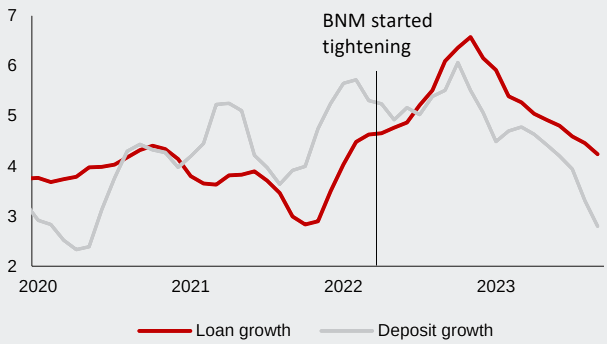
BNM and banks responded promptly to strengthen the liquidity position. BNM addressed the tightened liquidity conditions by easing funding in the interbank market. It injected liquidity into the market through a mix of open market operations, mainly the buy/sell US dollar swaps and term repo. As for banks, besides borrowing term liquidity in the market and from BNM, they attracted term deposits by increasing the rates paid on these deposits. Between April and December 2022, the 3-month and 12-month fixed deposit rates rose close to 100 bps (Figure 4.2.8). Discussions with market participants suggested that competition for term deposits intensified during the second half of 2022. Thanks to such efforts, liquidity conditions improved, as shown by the KLIBOR-OPR spread that narrowed in the first quarter of 2023.

Figure 4.2.1. Overnight Policy Rate (OPR) and Short-Term Market Rates
(Percent)



Source: Bank Negara Malaysia (BNM); CEIC; AMRO staff calculations.
Note: OPR = Overnight Policy Rate; KLIBOR = Kuala Lumpur Interbank Offered Rates; MYOR = Malaysia Overnight Rate.

Figure 4.2.2. Loan and Deposit Growth
(Percent, year-on-year)

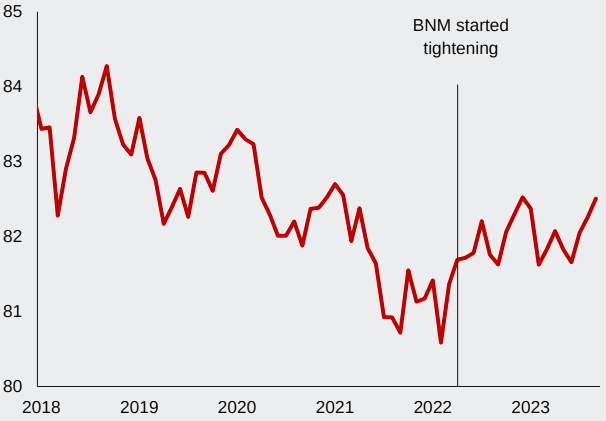


Source: Bank Negara Malaysia; CEIC; AMRO staff calculations.

The author of this box is Pim-orn Wacharaprapapong.

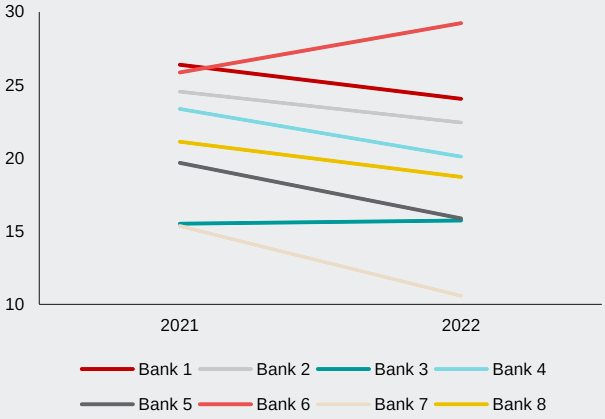
[1] The LCR is calculated by dividing high-quality liquid assets (HQLA) by total net cash outflows over a 30-day stress period. The shortening of funding duration could lead to an increase in the net cash outflows, and hence, lower LCR.

Figure 4.2.3. Loans-to-Fund Ratio of Malaysia's Banking System
(Percent)



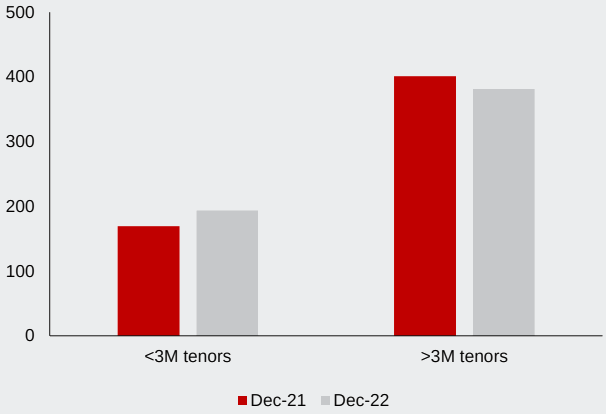
Source: Bank Negara Malaysia.

Figure 4.2.4 Liquid Assets-to-Total Asset Ratios of the Eight Largest Banks in Malaysia
(Percent)



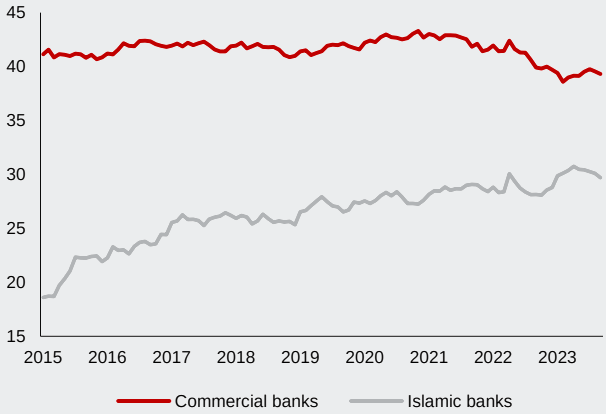
Source: Bank Focus.

Figure 4.2.5. Fixed Deposits by Tenor
(Billions of Malaysian ringgit)



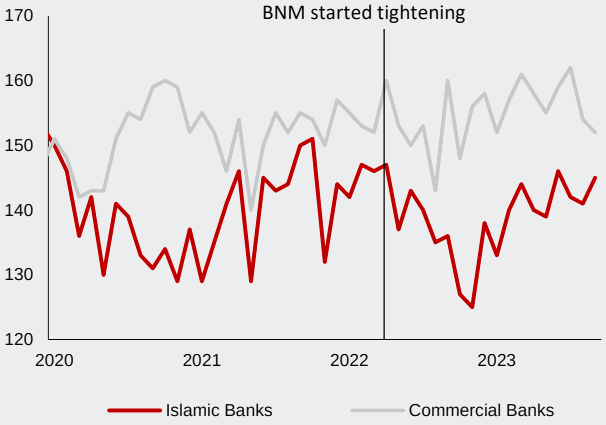
Source: Bank Negara Malaysia; CEIC; AMRO staff calculations.

Figure 4.2.6. Share of Individual Deposits
(Percent of total deposits)



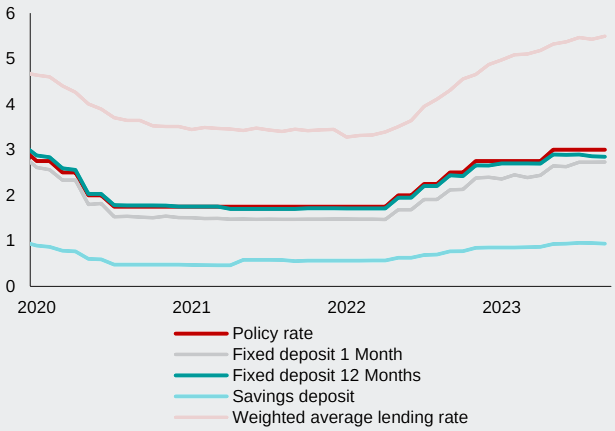
Source: Bank Negara Malaysia; CEIC; AMRO staff calculations.

Figure 4.2.7. Liquidity Coverage Ratio
(Percent)



Source: Bank Negara Malaysia; AMRO staff calculations.

Figure 4.2.8. Deposit and Lending Rates
(Percent)



Source: Bank Negara Malaysia; CEIC.

Elevated interest rates are a double-edged sword for banks

Rising interest rates could weaken ASEAN+3 bank loan quality. A panel regression model finds that a 100-basis-point interest rate hike could increase NPL ratios by up to 1.5 percentage points on average (Figure 4.25). This reflects the risk that current borrowers, especially when refinancing at higher rates, could face financial stress, which raises the risk of default. The effect on NPL ratios would vary, with banks with poorer initial asset quality likely to see greater deterioration. The rate at which NPL ratios increase also depends on whether loans have fixed or floating interest rates.

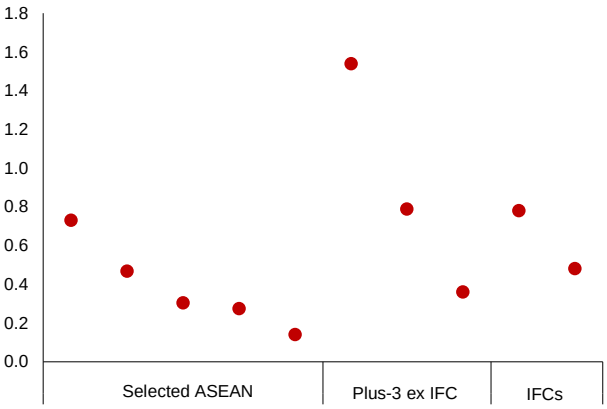
Higher interest rates could also boost the profitability of ASEAN+3 banks. Our estimation indicates that a 100-basis-point rate hike in lending rates (as a result of a higher policy rate) will push up net interest income (Figure 4.26). This suggests banks could pass some higher rates on to borrowers, elevating net interest margins while keeping deposit rates relatively stable. This is in line with market perspectives. For example, an investment bank estimates that if Malaysia's overnight policy rate rises by a 25 basis points then the net interest margin increases by 5 to 6 basis points (New Straits Times 2023). Similarly, some Cambodian banks have increased lending rates as funding costs rise (Molika, Thul, and Amarthalingam 2023). These higher profits could help banks to accumulate capital.

That said, while higher interest rates could boost profitability, the outlook remains uncertain. First, the challenging macroeconomic landscape may mean that NIMs have peaked due to rising credit risks (Tan 2023). Second, competitive pressures may hinder banks' ability to pass higher funding rates to borrowers. For instance, Hong Kong banks are using cash rebates to attract mortgage customers (Wee 2023). Moreover, some economies are keeping lending rates low to support businesses and households (Nguyen 2023; Reuters News Agency 2023). This helps support the fragile post-pandemic economic recovery, although risks could be underpriced.

Most banks hold adequate capital as a buffer against interest rate shocks. However, a simulation study shows that some may need to bolster their CARs. As sustained and possibly elevated interest rates appear to be on the horizon, this chapter carried out scenario analyses assuming interest rate hikes, ranging from 200 to 400 basis points (Annex 4.1). In such a scenario, banks should increase provisioning or improve their capital reserves to counter the associated risks. The study reveals that individual banks may have limited exposure, yet systemic spillover risks could affect the broader banking sector. These risks could manifest through direct interbank loans, loans extended to a shared pool of nonbank borrowers, and second-order confidence effects.

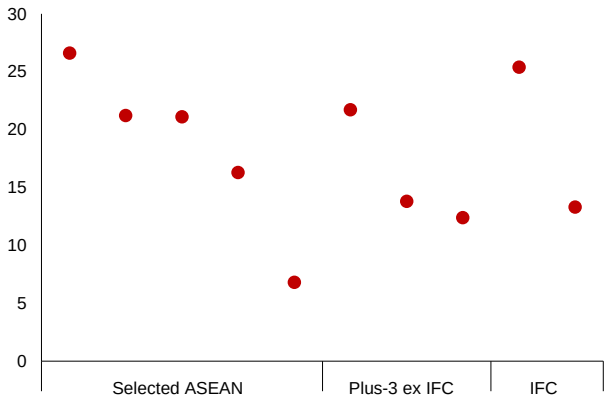
Bank credit has grown at a faster pace than nominal GDP growth and increased banking system risks. Empirical literature shows that a higher credit-to-GDP gap is an early warning of banking crises (Annex 4.2). An empirical analysis shows that for every 1 percentage point increase in this gap, the likelihood of a crisis occurring in the following year rises by 0.20 percentage point, and over the next five years, jumps to 0.75 percent. The heightened risk can be attributed to higher credit intensity in sectors such as real estate, where overheating could lead to adverse consequences such as an increase in NPLs. Banking crises typically involve large losses (Laeven and Valencia 2018). Accordingly, our estimates indicate that ASEAN+3 banks have strengthened their resilience following the COVID-19 pandemic (Figure 4.27). This is largely due to their low credit-to-GDP ratios. Despite these improvements, financial risks in the region are slightly higher than the global average (Figure 4.28).

Figure 4.25. Selected ASEAN+3: Effect of 100bps Increase in Interest Rate on NPL Ratios
(Percentage points)



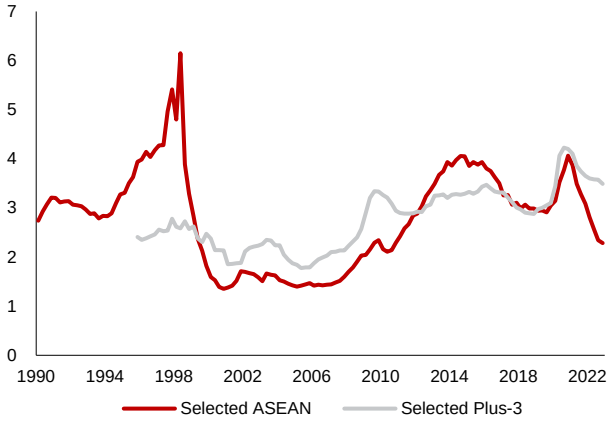
Source: AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, Philippines, Thailand, and Vietnam. IFCs = international financial centers, covering Hong Kong and Singapore.

Figure 4.26. Selected ASEAN+3: Effect of 100bps Increase in Interest Rate on Growth in Net Interest Income
(Percent)



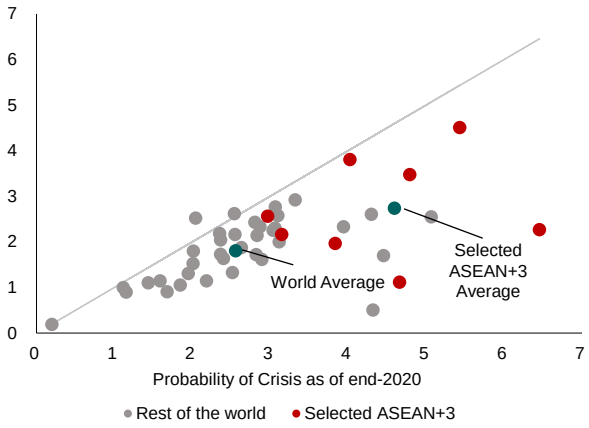
Source: AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, Philippines, Thailand, and Vietnam. IFCs = international financial centers, covering Hong Kong and Singapore.

Figure 4.27. Selected ASEAN+3: Estimated Probability of Crisis
(Percent)



Source: AMRO staff estimates.
Note: Estimated probability of a banking crisis occurring within three years. Refer to Annex 4.2 for more details. Selected Plus-3 includes China, Japan and Korea. Selected ASEAN includes Indonesia, Malaysia, SIngapore and Thailand.

Figure 4.28. World and Selected ASEAN+3: Estimated Probability of Crisis, 2020 versus 2022
(Percent)



Source: AMRO staff estimates.
Note: Estimated probability of a banking crisis occurring within three years. Refer to Annex 4.2 for more details. The red dots denote ASEAN+3 economies which include China, Hong Kong, Indonesia, Japan, Korea, Malaysia, SIngapore and Thailand. The gray dots refer to the rest of the world. World Average excludes the estimations for ASEAN+3 economies.

Policies can safeguard financial stability in ASEAN+3 banking

ASEAN+3 banks need to manage leverage effectively to minimize vulnerabilities. They should continue to use macroprudential policies as the primary tool to contain risks to financial stability. ASEAN+3 economies were already using macroprudential policies to safeguard financial stability before the pandemic (Figure 4.29). The set of macroprudential policies is listed in Table 4.1. A stocktake shows the effect of macroprudential measures used to address risks, as well as areas for improvement:

- **Capital, provisioning, and liquidity:** These measures strengthen bank capacity to absorb losses and maintain operations. ASEAN+3 banks have generally improved capital buffers and credit risk management, partly to meet Basel requirements. Liquidity needs to be monitored carefully as the region's banks have higher loan-to-deposit ratios than banks in most other regions, while in the Plus-3 economies liquid-asset-to-total-asset ratios have declined. Regular stress tests can strengthen banks' resilience against shocks.

- **Credit measures and reserve requirements:** These tools regulate money supply and include credit growth limits and loan restrictions to maintain prudent leverage. They help manage credit growth and curb excessive lending, especially since nonfinancial sector debt in some of the region's economies is close to levels that could constrain economic growth (Chapter 2).

Improvements to deposit insurance schemes should be considered. Currently, 90 percent of bank accounts in Asia have balances below the deposit insurance limit (Chang 2023), which would provide depositors some confidence in fund recovery, even in adverse scenarios. As the amount of the guarantee is key in instilling confidence under stress, some ASEAN+3 authorities plan to increase insured deposit amounts after the collapse of Silicon Valley Bank. However, those plans mainly cover domestic currency deposits, though a few economies (e.g., Hong Kong) also extended the coverage to foreign currencies (Table 4.3). Given that regional economies have significant foreign currency or cross-border exposure (e.g., the IFCs), room could exist to extend insurance to foreign currency deposits. However, the scheme's effectiveness hinges on the availability of foreign exchange reserves to underpin a credible deposit insurance system.

Third, mitigating US dollar exchange rate risks on bank balance sheets is crucial. While reducing US dollar dependency is a long-term objective, liquidity facilities like central bank backstops and bilateral swap agreements can help provide emergency foreign currency liquidity in the short-to-medium term. The number of these bilateral agreements in the ASEAN+3 region has already increased fourfold in the past decade (Figure 4.30). Expansion of that network in the region, though mostly meant for meeting balance of payments financing needs, could serve as a second line of defense in times of stress. Direct access to US dollars from the US Federal Reserve (Fed) is always welcomed. In the region, the Bank of Japan can access US dollars through a network of swap lines among six major central banks, including the Fed itself (Federal Reserve 2023). Central banks (e.g., the Bank of Korea and the Monetary Authority of Singapore) have also accessed US dollar liquidity by establishing temporary swap lines with the Fed (Federal Reserve 2020), or tapping into repo facilities that foreign and international monetary authorities established during the pandemic (Federal Reserve 2022).

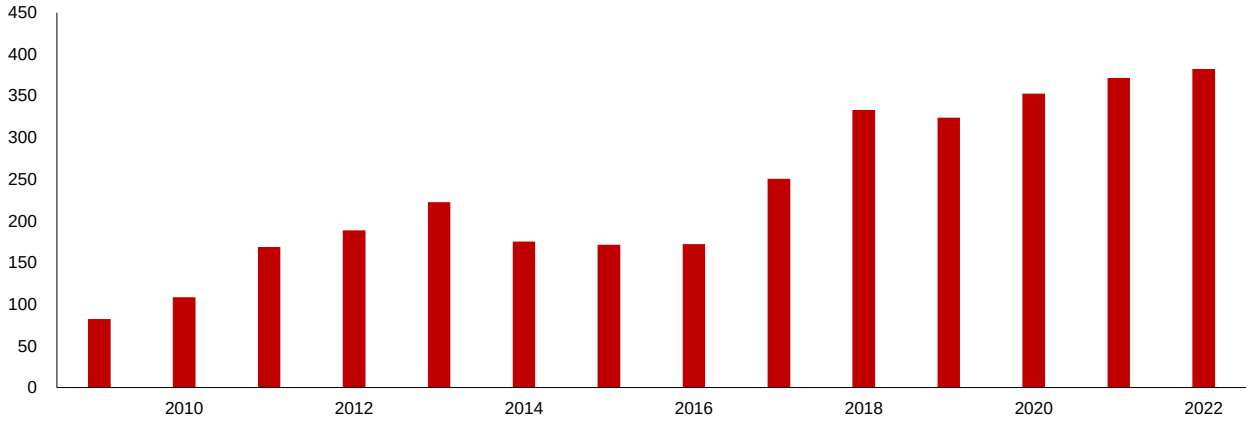
Clear communication and heightened readiness for worst-case scenarios is essential. In reaction to recent US bank failures and Credit Suisse's collapse, several ASEAN+3 central banks, including Japan, Singapore, the Philippines, and Thailand, quickly issued statements clarifying that their local banks had limited exposure to the failed banks and underscoring the resilience of the banking sector as a whole.

Proactive communication is key to easing concerns and ensuring stability. It is also vital that banks have well-defined resolution plans, given the potential for contagion effects (as indicated by earlier simulations). This should be in accordance with Financial Stability Board (FSB) guidance to banks on establishing living wills.

Figure 4.29. World and ASEAN+3: Number of Macroprudential Policy Use, 2010–21

Source: International Monetary Fund; AMRO staff calculations.
Note: CCB = countercyclical capital buffer; LVR = limit on leverage of banks; LLP = loan loss provision; SIFI = measures to mitigate risks from global and domestic systemically important financial institutions; LTV = loan-to-value; DSTI = debt-service-to-income ratio. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

Figure 4.30. ASEAN+3: Bilateral Currency Swap Agreements
(Billions of US dollars)



Source: National authorities; AMRO staff calculation.

Table 4.3. ASEAN+3: Summary of Deposit Insurance

Economy	Institution	Current amount guaranteed	Last adjustment date	Amount prior to adjustment	Upcoming plan
Brunei	Brunei Darussalam Deposit Protection Corporation (BDPC)	BND50,000 (USD37,037)	1st Jan 2011	Never adjusted	-
China	The People's Bank of China (PBC)	RMB500,000 (USD68,871)	1st May 2015	Never adjusted	-
Hong Kong	Hong Kong Deposit Protection Board	HKD500,000 (USD63,776)	1st Jan 2011	HKD100,000 (USD12,755)	Public consultation issued
Indonesia	Indonesia Deposit Insurance Corporation (IDIC)	IDR2 billion (USD133,103)	13th Oct 2008	IDR100 million (USD66,551)	-
Japan	Deposit Insurance Corporation of Japan (DICJ)	JPY10 million (USD69,023)	Jul 1986	JPY3 million (USD20,707)	-
Lao PDR	Deposit Protection Office (DPO)	LAK50 million, and USD5,550	25th Oct 2017	LAK28,000,000, THB36,000, and USD1,200	-
Malaysia	Perbadanan Insurans Deposit Malaysia (PIDM)	RM250,000 (USD53,419)	31st Dec 2010	RM60,000 (USD12,821)	-
Philippines	Philippine Deposit Insurance Corporation (PDIC)	PHP500,000 (USD9,032)	1st Jun 2009	PHP250,000 (USD4,516)	-
Singapore	Singapore Deposit Insurance Corporation (SDIC)	SGD75,000 (USD55,147)	1st Apr 2019	SGD50,000 (USD36,765)	Public consultation issued
Korea	Korea Deposit Insurance Corporation (KDIC)	KRW50 million (USD38,087)	1st Jan 2001	KRW20 million per depositor and KRW50 million won for insurance policyholders (USD 15,235 or USD 38,087)	Discussion of plan
Thailand	Deposit Protection Agency (DPA)	THB1 million (USD28,090)	11th Aug 2021	THB5 million (USD140,449)	-
Vietnam	Deposit Insurance of VietNam (DIV)	VND125 million (USD5,271)	12th Dec 2021	VND75 million (USD3,163)	-

Source: National authorities; AMRO staff compilation.

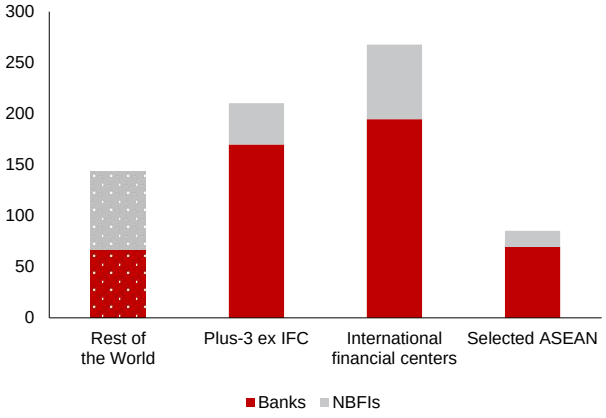
III. Nonbank Financial Intermediaries

While NBFIs constitute a smaller sector than banks in ASEAN+3, they provide essential financial products and market intermediation functions that if disrupted could threaten financial stability. The sector encompasses a wide range of diverse institutions, including mutual funds, unit trusts, specialized policy banks and specialized financial institutions. The role of NBFIs varies significantly across economies. In Japan, Korea, Singapore, and Hong Kong, China, they are key providers of liquidity, particularly in US dollars needed to support cross-border finance and the international activities of corporates in the region. In China, the main type of NBFIs is the Collective Investment Vehicle. These channel customer funds into investment products.

NBFIs are crucial for cross-border finance, particularly in US dollars. They are vital to dollar funding and the hedging of currency risk, which impacts capital flows and financial market stability in ASEAN+3 . Given that the sector is diverse, the focus here is on NBFIs that contribute to systemic risk. These institutions provide substantial maturity and currency transformation that generates liquidity and credit risk. NBFIs create novel policy challenges for ASEAN+3 authorities. Their regulation, supervision, and risk management is weaker than banks and need to be strengthened by building up the lines of defense against risks. This will help avoid the need for central banks to provide emergency liquidity support to ensure the continued functioning of financial markets. Given that NBFI act as key suppliers of dollar liquidity, this will also help avoid situations where central banks may need to provide liquidity in dollars.

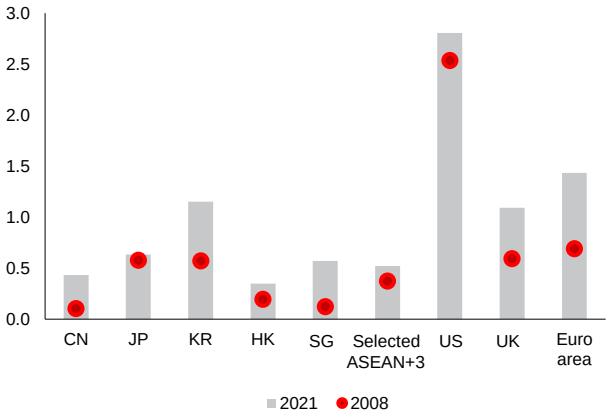
This section outlines the structure of the NBFI sector in ASEAN+3 for economies with available data. It focuses on NBFIs that pose systemic risk and differentiates this risk from that posed by banks. Also highlighted are risks from the expanding role of NBFIs as providers of dollar liquidity that they raise in global markets and distribute within ASEAN+3. Lastly, it discusses the challenges facing policymakers in strengthening the frameworks for regulation, supervision, and liquidity provision for NBFIs to limit systemic risk, including from dollar liquidity shocks.

Figure 4.31. World and Selected ASEAN+3: Financing of Nonfinancial Private Sector by Banks and NBFIs
(Percent of GNP)



Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: International financial centers (IFCs) consist of Hong Kong and Singapore. Selected ASEAN consist of Indonesia, Malaysia and Thailand.

Figure 4.32. Selected Economies: Financial Assets of Banks Relative to NBFIs
(Ratio of NBFI assets to bank assets)



Source: Financial Stability Board; AMRO staff calculations.
Note: Selected ASEAN+3 includes China, Hong Kong, Indonesia, Japan, Korea and Singapore. CN = China; JP = Japan; KR = Korea; HK = Hong Kong; SG = Singapore; US = United States; UK = United Kingdom.

The development of NBFIs varies across ASEAN+3

In ASEAN+3, banks are the principal financiers of the private sector, while NBFIs function to a greater extent as market intermediaries. Figures 4.31 and 4.32 show that in ASEAN+3 the role of NBFIs in financing the private sector compared with banks is smaller than in the rest of the world. And within the region, the ratio of NBFI to bank financing is much lower for the selected ASEAN economies of Indonesia, Malaysia, and Thailand, relative to the Plus-3 economies and IFCs (Figure 4.31). This ratio increased in some economies between 2012 to 2020 (Figure 4.32), and the expansion in NBFI financing was largest in in the IFCs, where it rose from 35 percent to 90 percent of GDP (Figure 4.33). This financing remained stable as a percent of GDP in the rest of ASEAN+3 on average, although the role of NBFIs is evolving as illustrated by the example of Thailand (Box 4.3). During the same period, traditional bank financing as a percent of GDP grew moderately in the Plus-3 economies and IFCs and was largely unchanged in the selected ASEAN economies. This expansion in NBFIs' role in IFCs may partly reflect the low global interest rates over the last decade as NBFIs rely more on market sources of financing than banks. However, the rise in global interest rates could reduce the relative funding advantage of NBFIs and raise financing risks.

The FSB provides comprehensive data on NBFI balance sheets. Data are only available in the Plus-3 and IFCs with no comparable data covering on NBFIs activities in most ASEAN economies (with the exception of Indonesia and Singapore). Accordingly, this section focuses on the Plus-3 economies and IFCs which, as Figure 4.31 shows, account for most NBFI financing of the private sector in ASEAN+3. This reflects that their financial systems are much larger and more complex with NBFIs playing a greater role.

Table 4.4 describes the structure of the NBFI sector, highlighting significant differences across economies. Broadly speaking, the NBFI sector is roughly half the size of the banking sectors in reporting economies. In the table, the sector is divided into two groups, those engaging in credit intermediation and other NBFIs, using the classification provided by the FSB. Credit intermediation, the focus of the following analysis, involves maturity and currency transformation that can give rise to systemic risk. Pension funds and life insurance companies are not the focus of this analysis as they typically match long-term liabilities to long-term assets and do not engage in maturity transformation.

There are significant differences in the size and structure of NBFIs across economies.

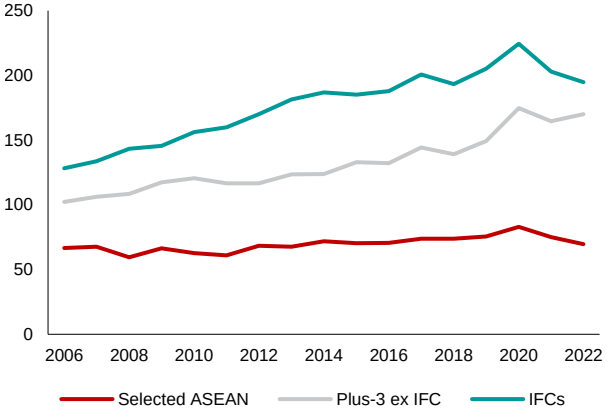
- In China, the main type of NBFIs is the **Collective Investment Vehicles (CIVs),** while in the other Plus-3 economies and IFCs **Financial Market Intermediaries (FMIs)** are relatively important (Figure 4.34). This cross-country variation in the role of NBFIs reflects differences in financial structure and regulation. In China, CIVs are major providers of saving products, while the financial system is less reliant on NBFIs for market making activities. Capital account restrictions may also help explain the smaller size of FMIs in China. This encourages large mainland China firms that operate internationally to rely more on FMIs or major global banks in financial centers such as Hong Kong to obtain the US dollar finance they need to conduct international business.

- The IFCs of Hong Kong and Singapore have the advantage that they host large international corporations and investors with dollar balance sheets. As a result, the major global banks located in IFCs typically have excess dollar deposits and are a source of dollar liquidity for the region.

- In Japan and Korea, domestic corporates and smaller banks typically need to raise dollar funding to operate internationally. They can obtain these from FMIs and global banks in their economies with access to dollar funding in international markets. The structure and function of the NBFI sector also depend on the regulatory framework. In Japan, NBFIs can be part of a financial conglomerate with banks, while in Korea regulation limits this.

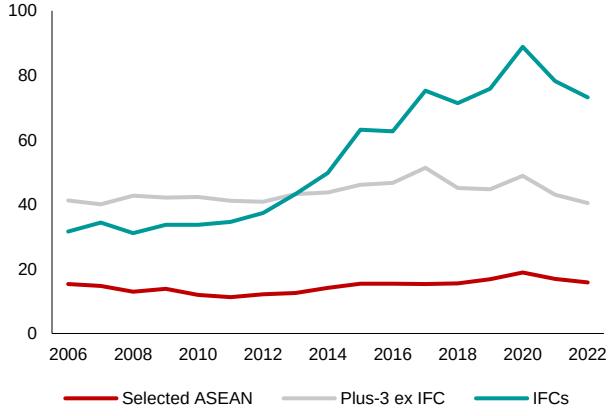
Figure 4.33. Selected ASEAN+3: Banks and NBFIs Financing of Nonfinancial Private Sector
(Percent of GDP)

Banks



Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN consists of Indonesia, Malaysia, and Thailand. International financial centers (IFCs) consist of Hong Kong and Singapore.

NBFIs



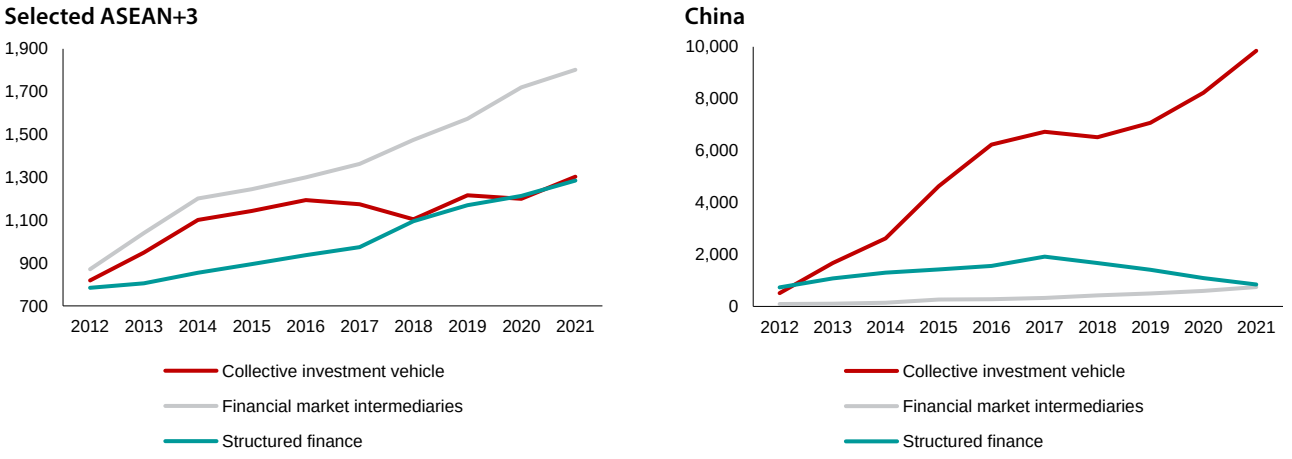
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN consists of Indonesia, Malaysia, and Thailand. International financial centers (IFCs) consist of Hong Kong and Singapore.

Table 4.4. Plus-3 and IFCs: Total Financial Asset Breakdown of NBFIs

(Percent of GDP, 2021)	China	Japan	Korea	Hong Kong	Singapore	Average of Plus-3 and IFCs
Credit Intermediation:	63	65	63	38	16	63
Collective Investment Vehicle (i.e., fixed income, money market and hedge funds)	55	18	20	16	10	44
Financial market intermediaries (i.e., broker-dealers)	4	29	20	17	4	10
Other: (finance companies, structured finance vehicles, financial guarantors)	5	18	23	6	2	9
Non-Credit Intermediation	49	199	194	283	324	94
NBFI Total	**112**	**264**	**257**	**321**	**340**	**157**
Of Which:						
Pension Funds	1	31	16	54	99	10
Insurance Company	22	98	73	168	73	43
Memo items:						
Banks	258	417	224	921	598	300

Source: Financial Stability Board; AMRO staff calculations.
Note: Credit intermediation refers to activities that could give rise to vulnerabilities because they involve liquidity/maturity transformation or use of leverage, also known as Financial Stability Board's narrow measure of NBFI. Institutional categorization based on credit intermediation was not feasible due to data limitations.

Figure 4.34. Selected ASEAN+3: Credit Intermediation of NBFIs
(Billions of US dollars)



Source: Financial Stability Board; AMRO staff calculations.
Note: Selected ASEAN+3 includes Japan, Korea, Hong Kong, and Singapore.

Box 4.3:

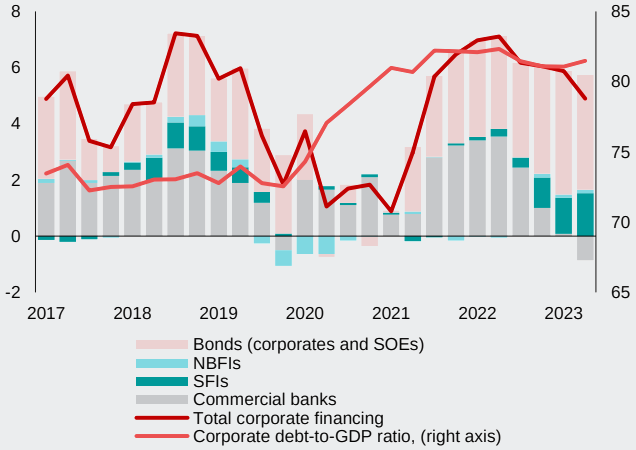
NBFI Financing in Thailand

Thailand has long been characterized as a 'bank-based economy', but recent developments underscore a changing dynamic, with NBFIs emerging as key players in financing both corporates and households. In Thailand, NBFIs encompass insurance companies, pension and provident funds, cooperatives and mutual funds, and also personal loan and credit card companies which provide loans to households.

For corporate financing, there is a shift in preference as more corporates opt to raise funding through the bond market, which enables them to lock in lower financing costs amid a rising interest rate environment. Since the latter half of 2022, corporate bond issuances have shown a steady upward trend, while commercial bank lending has experienced more sluggish growth, eventually nearing zero-growth by the second quarter of 2023 (Figure 4.3.1). Notably, although retail investors continue to be the largest holders of corporate bonds; however, the share of NBFI corporate bond holders has exhibited significant growth over the past decade (Figures 4.3.3 and 4.3.4). For households, growth of lending by NBFIs have also outpaced commercial bank lending (Figure 4.3.2), partly due to more accessible loan application processes, which can attract a broader range of borrowers who may have difficulty meeting the more stringent requirements of traditional banks.

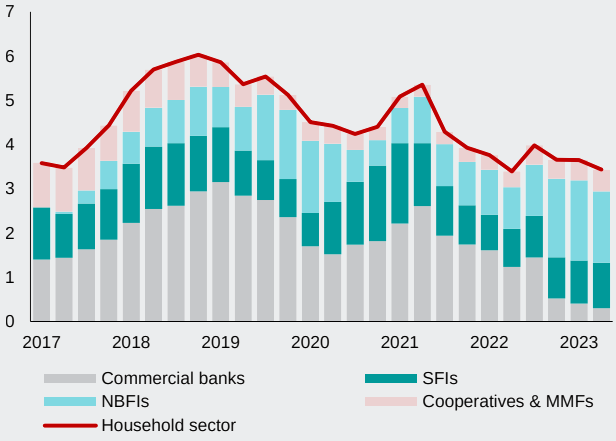
This transition brings regulatory challenges of risk transfer from banks to NBFIs. Commercial banks and Specialized Financial Institutions (SFIs) operate under stringent regulatory oversight, aimed at ensuring financial stability and safeguarding deposits. In contrast, NBFIs often operate with fewer regulatory constraints, rendering them more susceptible to risks arising from leverage, liquidity, and risk management practices. Efforts should be made to harmonize regulations governing NBFIs, especially those on risk management practices, to reduce incentives to risk transfers.

Figure 4.3.1 Financing to Corporates by Type of Financial Institution
(Percent, year-on-year)



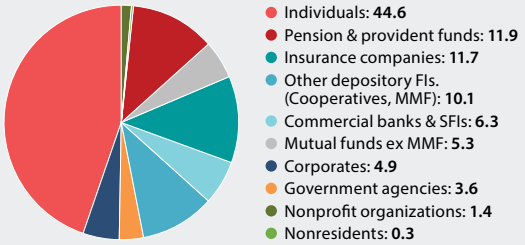
Source: Bank of Thailand; CEIC
Note: NBFI = nonbank financial institution; SFI = specialized financial institution; SOE = state-owned enterprise.

Figure 4.3.2 Lending to Households by Type of Financial Institution
(Percent, year-on-year)



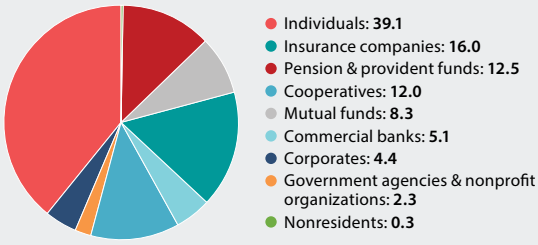
Source: Bank of Thailand; CEIC
Note: NBFI = nonbank financial institution; SFI = specialized financial institution; MMF = money market fund.

Figure 4.3.3 Share of Bond Holdings by Corporate Bondholders, 2013
(Percent of total corporate bond holdings)



Source: ThaiBMA.
Note: MMF = Money market fund; SFI = specialized financial institution; FI = Financial institution.

Figure 4.3.4 Share of Bond Holdings by Corporate Bondholders, Q2 2023
(Percent of total corporate bond holdings)



Source: ThaiBMA.
Note: SSO = Social Security Office. The categorizations in 2013 and 2023 differ due to changes in groupings implemented by the ThaiBMA since 2020.

The author of this box is Benyaporn Chantana.

NBFIs give rise to risks to financial stability

Table 4.5 identifies three types of NBFIs conducting credit intermediation. These entities often engage in activities requiring significant maturity and currency transformation that can contribute to broader systemic risk. Their diverse roles generate different forms of systemic risk in the financial system.

- **Collective Investment Vehicles** (CIVs) are fixed-income funds, money market funds and hedge funds. They are a source of demand for liquidity in the sense that they receive funds from investors which they channel into assets involving credit, interest rate and currency risks. This role gives rise to a maturity mismatch since liabilities – mostly investor funds – are short term (i.e., redeemable on demand or after a notice period) while assets are longer-term and less liquid (i.e., can only be sold with a delay and/or a price discount). This contributes to the risk of a NBFI "run", involving the following mechanism:

  i. Losses on CIV assets are matched by a decline in the value of liabilities, imposing losses on investors.

  ii. This creates an incentive for investors to withdraw their funds as fast and early as possible to avoid losses.

  iii. These withdrawals force a fire sale of CIV assets at a discount as they are illiquid and hard to sell. This triggers further price declines and more sales in a negative feedback loop.

  iv. Systemic risk results from the contagion effect of fire sales, which contribute to a widespread decline in asset prices that prompts investors to withdraw from other, healthy CIVs in a broad "flight to safety." This represents a key channel of contagion to the banking system and broader economy.

- **Financial Market Intermediaries** (FMIs) are NBFIs such as "Broker-Dealers" that receive funding from counterparties and provide a variety of financial products (e.g., derivatives). They are essential providers of liquidity to the financial system, including through their market-making activities (Box 4.4). This role is critical in Asia where dollar dominance means cross-border finance is largely conducted in dollars. They raise dollar funding from US banks and markets with surplus dollar liquidity and channel it to Asian corporates and financial institutions that need dollar liquidity. For example, derivatives such as cross-currency swaps enable ASEAN+3 banks and corporates to convert local currency assets into dollar financing. These activities involve risks from maturity and currency transformation. And when the soundness of FMIs is threatened, they may scale back provision of dollar liquidity, which could severely disrupt dollar finance in Asia with potentially large consequences for real economic activity as corporates' capacity to operate internationally is compromised.

- **Structured Finance Vehicles** (SFVs) and **investment companies** (ICs) raise market funding to finance investment. SFVs are typically created to fund specific projects or investments. Like investment companies, they engage in maturity transformation as they rely on short-term funding (e.g., commercial paper) to finance long-term investments that involve credit risk and are illiquid (e.g., construction projects). The structure typically involves refinancing risk, and when maturing short term debt funding cannot be rolled over, the financing of the investment project comes to halt. By their nature, SFVs are prone to runs, which creates systemic risk. Specifically, a default affecting one SFV can trigger refinancing difficulties at "healthy" ones as lenders have imperfect information on the credit quality and may view the default as indicative of widespread credit problems.

These features are summarized in Table 4.5, which contrasts the risks faced by each type of NBFIs and how this translates into different systemic risks.

The blurred dividing line between banks and NBFIs, which can provide many of the same financial functions, affects NBFI risks. This dividing line is fluid and can shift over time with an increase in NBFIs risk associated with a risk transfer from banks to NBFIs (e.g., driven by regulatory arbitrage). This can affect risks associated with dollar finance in the region. As both NBFIs and large global banks can access dollar funding, either can assume the primary role as supplier of dollar liquidity. It depends on factors such as (i) global financial market conditions, (ii) banks' own dollar funding needs related to their global activities, and (iii) the regulation and ongoing structural transformation of finance.

Global financial conditions influence the role of NBFIs as providers of dollar liquidity. NBFIs typically rely on market funding while major banks have a variety of funding sources, including dollar deposits. NBFIs benefited from an extended period of very low global interest rates, which reduced funding costs and made them more competitive as providers of dollar liquidity. The recent rise in global interest rates may have reduced this advantage. Another contribution to NBFIs' expanding role in dollar finance are innovations in payments and financial markets. An example is the digitalization of secured finance (e.g., in US repo markets) over the last few years.

Table 4.5. Summary of Role and Risks of NBFIs Engaged in Maturity Transformation

Type of NBFIs and Role	CIVs (fixed-income and hedge funds)	Financial market intermediaries (FMIs, e.g., broker-dealers)	Structured finance vehicles (SFVs)/Investment companies (ICs)
Maturity transformation	Short maturity liabilities from investors fund long term and/or illiquid assets	Provides liquidity and financial product (e.g., derivatives) involves maturity/FX mismatches	Funding raised in short-term debt markets used to finance illiquid and/or risky assets
Risks faced by NBFIs	A fall in liabilities forces asset sales and mark-to-market losses, reducing the value of liabilities	Moves in interest/ exchange rates cause loss on mismatched positions. Or loss of liquidity in funding market forces asset liquidation	Refinancing risk as funding instrument (e.g., commercial paper not rolled over), triggering forced sale of asset and mark-to-market losses
Source of systemic risk	A "run" on NBFIs as investors withdraw funding, triggering a fire sale and more losses. Run spreads to more NBFIs and asset prices fall sharply	Provision of financial products cut (derivative canceled) cutting funding or imposing losses for users of product, forcing them reduce economic activity	Contagion as defaults of one SFV leads to failure to rollover funding of other, forcing further asset liquidations and a sharp fall in asset prices. Funding dries up

Source: Financial Stability Board; AMRO staff analysis

Policies to contain the risk to financial stability from NBFIs

NBFIs have rapidly expanded their financial market intermediation role in the region, particularly as suppliers of dollar finance, which represents a novel source of systemic risk. The risks are complex owing to the variety of roles NBFIs play in ASEAN+3 finance. Their growing importance as market intermediaries supplying liquidity to the financial system, particularly of US dollars, means policies governing the role of NBFIs need strengthening. This requires close cooperation among the region's regulatory and macroprudential authorities, and central banks, owing to the cross-border nature of this finance.

A key prerequisite for strengthening policies is to close data gaps and improve data quality and relevance. This is much more challenging for NBFIs than for banks owing to the diversity of NBFIs and the wide range or functions they perform. Data on the size of different types of NBFIs by function from the FSB and reported by the Plus-3 economies and financial centers should be produced by ASEAN economies (except Indonesia and Singapore, which already publish these data). Data on the liability structure of NBFIs are also essential to assess funding liquidity risk. The lack of these data hampers the ability of market participants to make timely risk assessments needed for market discipline of NBFIs. It also impedes cooperation among ASEAN+3 authorities to address risks from reliance on the US dollar by the region.

The variety of NBFIs means a one-size-fits-all regulatory approach may not work and oversight will need to be tailored to the type of NBFI. Analysis of the systemic risk posed by different types of NBFIs should guide the prioritization of supervisory resources. The focus needs to be on bolstering regulatory and supervisory frameworks to provide the first line of defense, building on FSB recommendations. This should be complemented by a strengthening of the second line of defense by enhancing incentives for risk management. Given NBFIs' critical role as market intermediaries, weaknesses in risk management pose a systemic threat to the functioning of financial markets across the region. Finally, should these lines of defense fail, a third line of defense comes from central banks who can provide a temporary liquidity backstop for NBFIs. This may have to be activated in a crisis to ensure the continued operation of core financial markets and to limit contagion to the banking system and broader economy. This liquidity facility should strike a balance between preventing a financial crisis and limiting moral hazard and involve safeguards to avoid providing liquidity support to insolvent NBFIs. With NBFIs' critical role in intermediating dollar finance in the region, such liquidity support could involve coordination among ASEAN+3 central banks to ensure continued functioning of dollar funding and hedging markets when they come under stress. As this can involve providing liquidity in foreign exchanges, cooperation may be needed to draw on central bank swap lines or rapid financing faculties from international financial institutions.

Box 4.4:

Dollar Finance in ASEAN+3

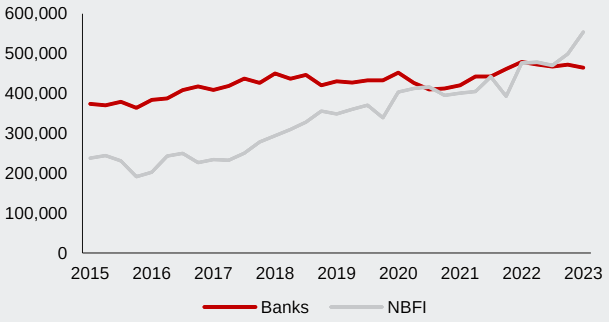
NBFI financial market intermediaries supply FX liquidity, mostly in US dollars, in ASEAN+3 using dollar funding sourced from global banks and dollar financial markets. Dollar funding is provided by large global financial institutions that have surplus dollar liquidity. Some ASEAN+3 NBFIs can also obtain funding by accessing secured financial markets in the US (e.g., repo markets). Within the region, this funding is raised primarily by banks and NBFIs in the two IFCs (i.e., Hong Kong and Singapore), and in Japan and Korea (Figure 4.4.1).

The dollar volume of funding raised by NBFIs has increased rapidly. Financing obtained from international banks has more than doubled since 2015 to above USD500 billion (Figure 4.4.1) and now exceeds the dollar funding raised by ASEAN+3 banks. NBFIs rely more on short-term market funding markets such as repo markets. They make less use of international dollar bond markets than banks, which tap them to raise longer term funding. Nevertheless, NBFI issuance of bonds has also increased substantially to around USD400 billion for ASEAN+3 (Figure 4.4.1). NBFIs' access to secured funding markets (e.g., repo markets) with global bank counterparties enables them to provide financial products that are a key vehicle through which they supply dollar liquidity to the region. This also entails maturity transformation that boosts returns. In sum, the large relative increase in dollar funding raised by ASEAN+3 NBFIs suggests they are playing a rapidly expanding role as suppliers of dollar liquidity in the region.

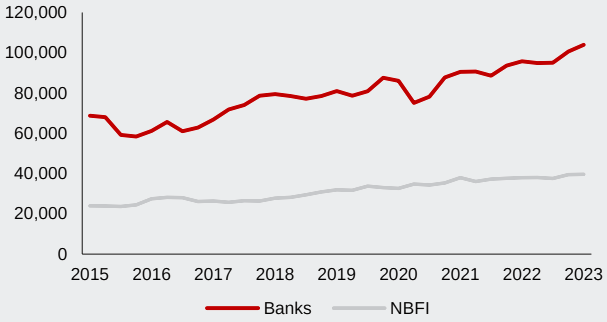
In contrast, dollar funding going to NBFIs in ASEAN emerging market economies is much smaller and has not increased relative to banks. A feature of the dollar funding received by these NBFIs is that a large share comes from within ASEAN+3. Most of the supply of dollars comes from Japan and Korea and from the rest of the world while the total from the US is very low. The share of intra-ASEAN+3 finance is probably much higher than that reported by the BIS (Figure 4.4.1, lower left panel) as the financial centers of Hong Kong and Singapore are also important providers of intra-ASEAN+3 finance but their contribution is shown in the rest-of-the-world total since they do not report this lending separately (unlike Japan and Korea).

Figure 4.4.1. ASEAN+3: Dollar Financing of Banks and NBFIs

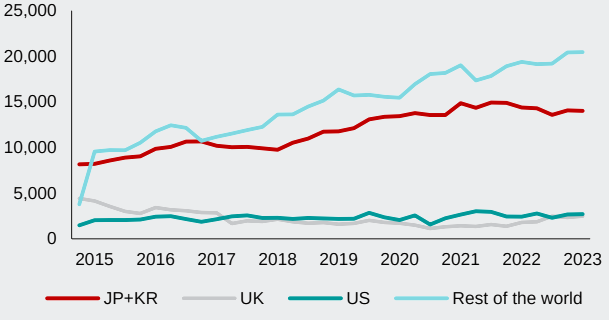
ASEAN+3
(Millions of US dollars)



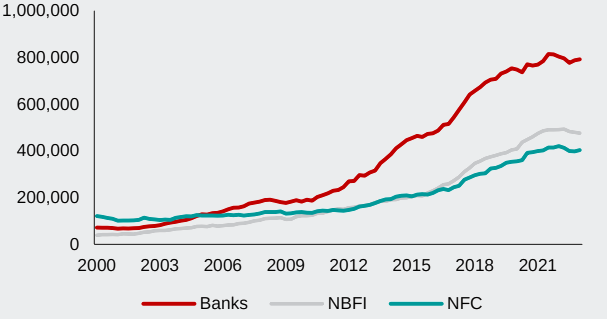
ASEAN+3 Other than Plus-3 Economies and IFCs
(Millions of US dollars)



ASEAN+3 Other than Plus-3 Economies and IFCs: Dollar Funding of NBFIs
(Millions of US dollars)



ASEAN+3: International Dollar Debt Issuance
(Millions of US dollars)



Source: Bank for International Settlements via Haver Analytics; AMRO staff calculation.
Note: Data for the year 2013 only includes information from the first quarter. JP = Japan; KR = Korea; UK = United Kingdom; US = United States. NBFI = nonbank financial institution; NFC = nonfinancial corporate.

The author of this box is Sean R. Craig.

Annex 4.1. Bank Simulation Exercise – Implications of Higher Interest Rate Environment

This is a box to describe the simulation exercise for banks in the region (Figure A4.1.1). A total of 145 ASEAN+3 banks are covered, which cover most of the banking balance sheets.

- Plus-3 excluding IFC: 68 banks, accounting for 82 percent of total assets and 83.2 percent of total loans in the banking sector;
- IFCs (Hong Kong and Singapore): 24 banks, accounting for 77 percent of total assets and 93.7 percent of total loans in the banking sector; and
- ASEAN-4 and Vietnam: 53 banks, accounting for 79.3 percent of total assets and 78.5 percent of total loans in the banking sector.

First, a satellite model is used to estimate the relationship between interest rates and NPL ratios in ASEAN+3 from 2010 to 2022. The specification of the model is as follows:

$$NPL_{it} = \alpha + \beta_1 IR_{it} + \beta_2 GDP_{it-1} + \beta_3 VIX_t + x_i + \epsilon_{it}$$

where NPL_{it} refers to the NPL ratio for economy i in year t, IR_{it} is the interest rate, GDP_{it-1} is the lagged real GDP growth, and VIX_t is the change in VIX index. GDP and VIX are control variables that capture business cycle and international volatility, respectively. Data on NPL ratios, GDP growth, and interest rates are obtained from the International Monetary Fund and/or national authorities. Information on VIX data is sourced from the Chicago Board Options Exchange.

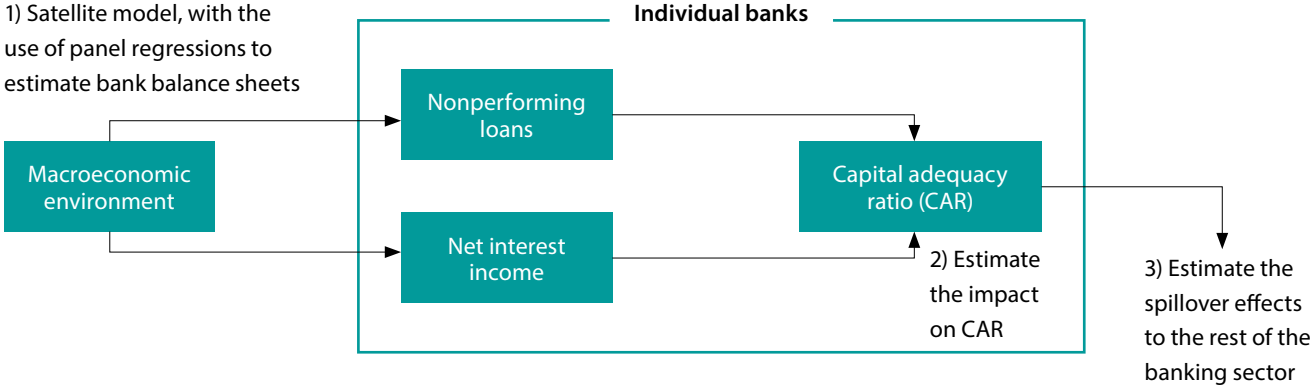
The regression estimations of the correlations between IR, GDP, and VIX and NPL ratio are reported in Figure A4.1.2. The NPL ratio is positively correlated with IR and VIX, but negatively correlated with GDP growth.

Two interest rate shock scenarios are then prescribed in the macroeconomic environment (on IR), which eventually translate into higher NPL ratios. In the mild scenario (termed "***Mild scenario – 200bps***"), an interest rate increase of 200 bps from the end of 2022, equivalent to two standard deviation shocks on average, is assumed. In the stress scenario (termed "***Stress scenario – 400bps***"), interest rate is assumed to increase another 200 bps, for a cumulative 400 bps shock that is equivalent to another Asian financial crisis. The higher interest rates translate into higher NPL ratios, based on the earlier equation. To summarize, Figure A4.1.3 shows that the NPL ratio in some economies could increase 2–3 percentage points when subject to a 400 bps shock.

Second, the higher NPL ratios would lead to a drawdown of banks' capital buffers from balance sheets. Banks with higher initial NPLs ratios are expected to see larger increase in it. Individual banks' capital holdings and risk-weighted asset are then estimated, based on initial balance sheet data obtained from Moody's BankFocus database. The exercise has adopted a more conservative approach, assuming that net interest income remains stable, though net interest income could also increase on the back of higher interest rates. While the average total and Tier 1 CARs of banks in ASEAN+3 in both mild and stress scenarios should remain above Basel prescribed thresholds (Figure A4.1.4 and A4.1.5), some individual banks do come under pressure (Table A4.1.1).

Third, using AMRO's Systemic Network of World Expected-Losses of Institutions (SuNWEI) model that relies on co-movements of probabilities of default to measure financial interconnectedness (Sun 2020), shocks to any bank identified are estimated to result in direct credit losses of USD 26.8 million to USD 289.8 billion. Contagion credit losses beyond the direct damage to individual banks' asset quality in the banking sector are about USD 28.2 million for small, less connected banks and USD 119.2 billion for large, connected banks.

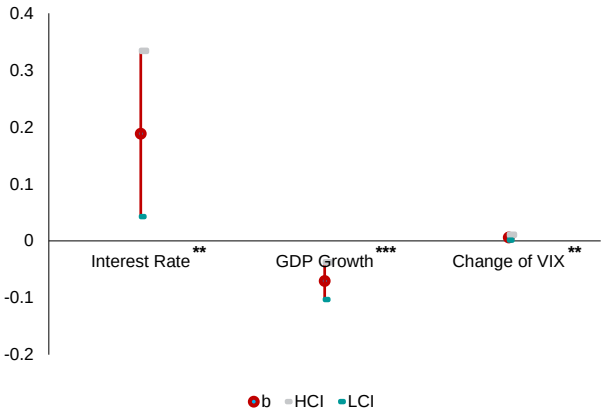
Figure A4.1.1. Overview: Steps to Conduct the Simulation Exercise



Source: AMRO staff visualization.

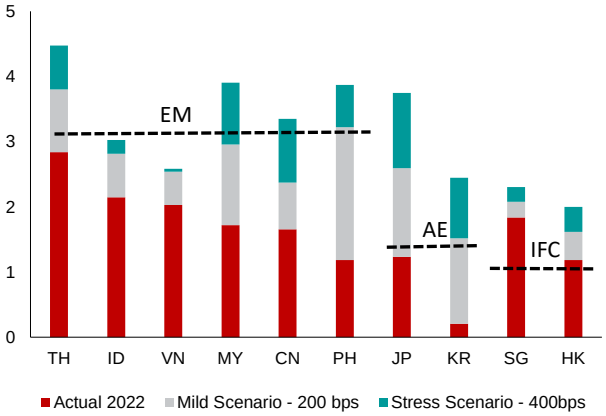
The author of this annex is Chenxu Fu, with technical advice from Yoki Okawa, and under the guidance of Leilei Lu and Siang Leng Wong.

Figure A4.1.2. Coefficient Estimates



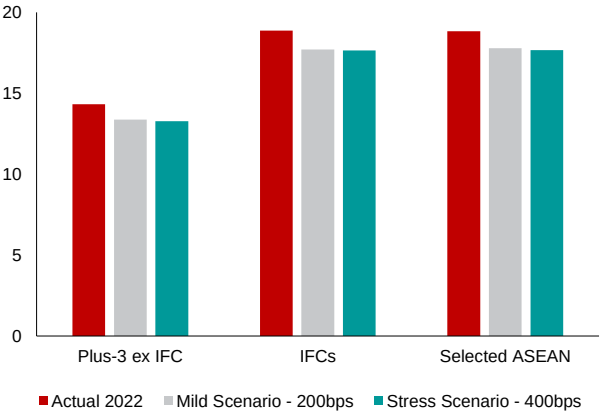
Source: Bank for International Settlements; International Monetary Fund; Moody's Analytics; national authorities; World Bank; AMRO staff estimates.
Notes: VIX refers to the Chicago Board Options Exchange's Volatility Index. b refers to the coefficient estimate of the specific variable. The red line shows the 95 percent confidence interval. HCI refers to the higher bound of the 95 percent confidence interval and LCI refers to the lower bound. Asterisks (**, ***) denote significance levels at 5 percent and 1 percent levels, respectively.

Figure A4.1.3. Selected ASEAN+3: Nonperforming Loan Ratios
(Percent)



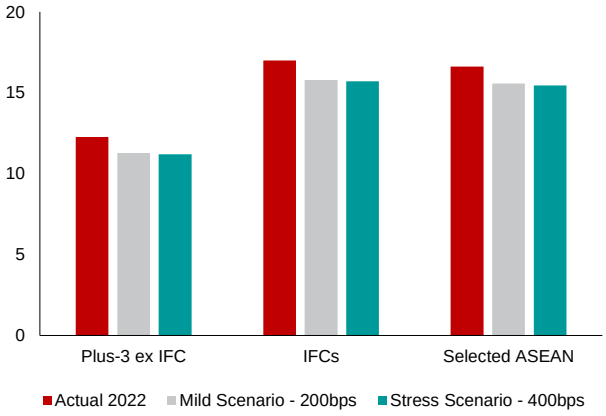
Source: Bank for International Settlements; International Monetary Fund; Moody's Analytics; national authorities; World Bank; AMRO staff estimates.
Note: The lines represent the average nonperforming loan ratios of emerging market economies (EM), advanced economies (AE) and international financial centers (IFCs) in 2022 respectively.

Figure A4.1.4. Selected ASEAN+3: Total Capital Adequacy Ratios
(Percent)



Source: Bank for International Settlements; International Monetary Fund; Moody's Analytics; national authorities; World Bank; AMRO staff estimates.
Note: Selected ASEAN includes Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. International financial centers (IFCs) include Hong Kong and Singapore. bps = basis points

Figure A4.1.5. Selected ASEAN+3: Tier 1 Capital Adequacy Ratios
(Percent)



Source: Bank for International Settlements; International Monetary Fund; Moody's Analytics; national authorities; World Bank; AMRO staff estimates.
Note: Selected ASEAN includes Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. International financial centers (IFCs) include Hong Kong and Singapore. bps = basis points

Table A4.1.1. Selected ASEAN+3: Bank Solvency Test Results

Scenario	Region	Basel Capital Adequacy Ratio Threshold[1]	Number of Banks[2]	Amount of Capital Required	
				Amount (USD Billion)	Percent of Banking Sector Assets
Mild Scenario – 200 bps	Plus-3 ex IFC	Total	9	6.57	0.01
		Tier 1	3	0.59	<0.01
	IFCs	Total	0	0	0
		Tier 1	0	0	0
	Selected ASEAN	Total	6	5.02	0.20
		Tier 1	7	4.19	0.17
Stress Scenario – 400bps	Plus-3 ex IFC	Total	11	7.17	0.01
		Tier 1	5	1.04	<0.01
	IFCs	Total	0	0	0
		Tier 1	0	0	0
	Selected ASEAN	Total	6	5.02	0.20
		Tier 1	7	4.23	0.17

Source: AMRO staff estimates.
Note: Subscript (1) The Basel CAR Threshold refers to the total and Tier 1 capital requirements that incorporates conservation buffer. Hence, the total and Tier 1 CARs thresholds here are 10.5 percent and 8.5 percent, respectively. (2) Refers to the number of banks with total and Tier 1 CAR falling below Basel requirements, respectively. Selected ASEAN includes Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. International financial centers (IFCs) include Hong Kong and Singapore. bps = basis points.

Annex 4.2. Methodology: Early Identification of Banking Crisis

This box begins by (i) evaluating the predictive power of changes in credit-to-GDP for future banking crises. Subsequently, (ii) it conducts an estimation of the probability of a banking crisis.

For the first part (i), the analysis explores various indicators related to credit-to-GDP. Logit model on an unbalanced panel of 43 economies spanning from 1990 to 2018 for the s periods ahead forecast is conducted as follows:

$$\text{Prob}(\text{crisis within s years}_{i,t}) = \frac{\exp\left(\beta_0 + \sum_j \beta_j X_{i,t}^j + \varepsilon_{i,t}\right)}{1 + \exp\left(\beta_0 + \sum_j \beta_j X_{i,t}^j + \varepsilon_{i,t}\right)}$$

The indicator variable showing banking crisis is obtained from the database compiled by Laeven and Valencia (2020), which includes systemic banking crises, such as sovereign debt, currency, and banking crises. The Bank of International Settlements (BIS) has identified the credit-to-GDP ratio and gap as indicators that offer clear signals for the policy formulation on the countercyclical capital buffer (BIS Quarterly Review 2014). Hence, data on credit-to-GDP ratio/gap is sourced from the BIS and used to assess its effectiveness as a leading indicator of banking crises.

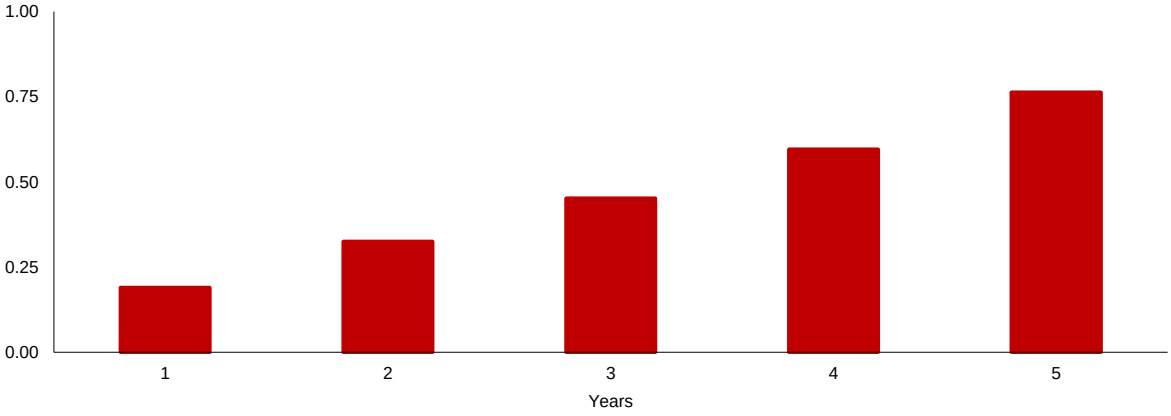
The findings show that the increase in credit-to-GDP gap does indeed predict banking crises (Figure A4.2.1). One percentage point increase in credit-to-GDP gap is associated with 0.45 percentage point increase in the probability of crisis in next 3 years. These results are statistically significant at the 5 percent level even when considering a lag of 5 years.

Finally, for part (ii), the estimates show the probability of banking crisis for selected ASEAN economies indeed peaked during the Asian financial crisis (AFC) and were at elevated levels during the pandemic but were relatively moderate during the Global financial crisis (GFC) (Figure A4.2.2). Such findings were rather intuitive, corresponding to the higher corporate cessations and unemployment rates during the AFC and the numerous unprecedented measures rolled out during the COVID-19. Using the outstanding credit-to-GDP ratio/gap as of July 2023, the current probability of a banking crisis in the region has already declined following COVID-19.

The outstanding credit-to-GDP ratio/gap is just one of several potentially useful indicators for assessing banking sector resilience. While the indicator is known to perform well for a panel of countries, the application to a single economy without considering idiosyncratic factors could lead to misleading interpretations (Drehmann and Tsatsaronis 2014). A more precise and comprehensive assessment must consider structural changes in the economy, which can be challenging to discern using historical credit and crisis data alone. For example, some economies may have shifted to a lower interest rate environment, which could encourage higher leverage while maintaining credit quality. Also, extreme scenarios such as the COVID-19 pandemic could be an one-off event that significantly dampens GDP growth, resulting in widened credit-to-GDP gap temporarily. Additionally, the type of credit institutions offering these loans matters, as state-affiliated institutions can rely on government support during times of stress, potentially preventing a banking crisis altogether.

Figure A4.2.1. Probability of Banking Crisis over the Next Five Years under a 1-Percentage Point Increase in Credit-to-GDP Gap Scenario

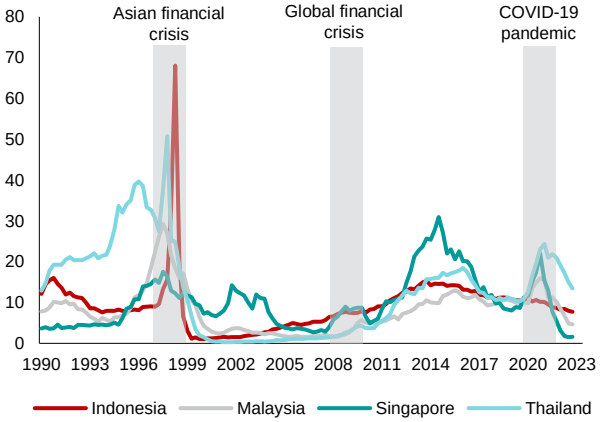
(Percentage point)



Source: AMRO staff estimates.

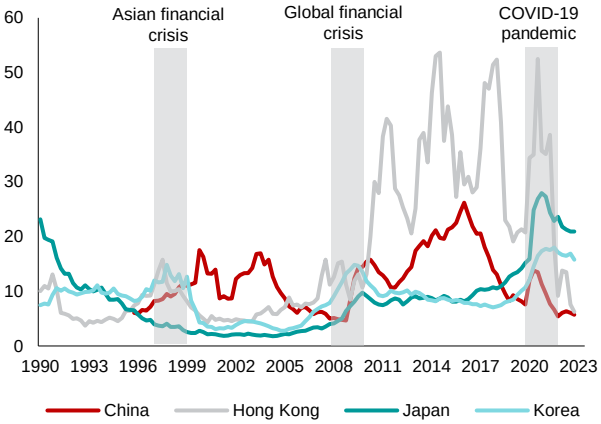
The author of this annex is Yoki Okawa, under the guidance of Siang Leng Wong.

Figure A4.2.2. Selected ASEAN: Estimated Probability of Banking Crisis Within Three Years
(Percent)



Source: AMRO staff estimates.
Note: Economies are selected solely based on data availability. The estimation of probability depends only on the credit-to-GDP gap, excluding idiosyncratic economy-specific factors and differentials in safeguards in place.

Figure A4.2.3. Plus-3: Estimated Probability of Banking Crisis Within Three Years
(Percent)



Source: AMRO staff estimates.
Note: Economies are selected solely based on data availability. The estimation of probability depends only on the credit-to-GDP gap, excluding idiosyncratic economy-specific factors and differentials in safeguards in place.

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