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.

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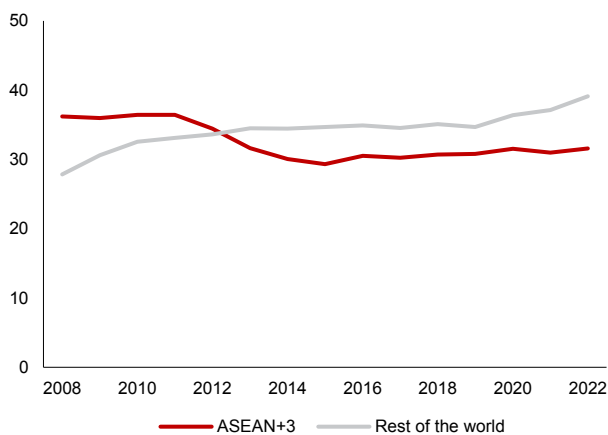
Source: Bank for International Settlements, AMRO staff calculations.
Note: Selected ASEAN+3 = China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, and Thailand. Rest of the world data is calculated based on the 34 countries, excluding 8 selected ASEAN+3 economies out of 42 economies surveyed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

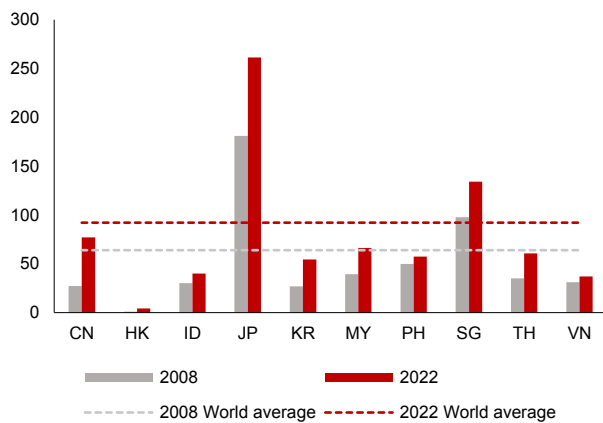**Figure 3.2. World and ASEAN+3: Trend of Public Debt-to-GDP Ratios**
(Percent)
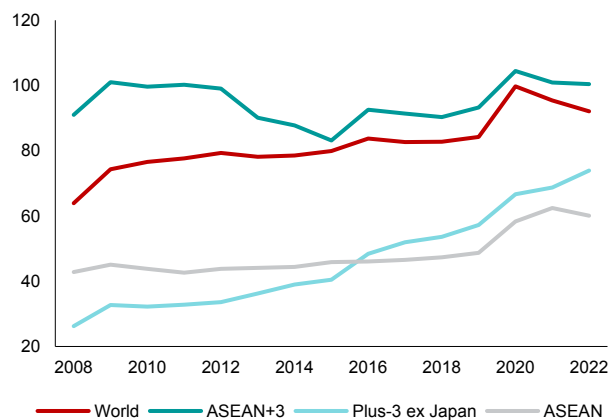
Source: IMF *World Economic Outlook* April 2023; IMF *Fiscal Monitor* April 2023; IMF *Global Debt Monitor* 2022; AMRO staff calculations.
Note: A country group's average is calculated as a GDP-weighted average of individual economies' debt-to-GDP ratios. Plus-3 ex Japan = China, Hong Kong, and Korea.

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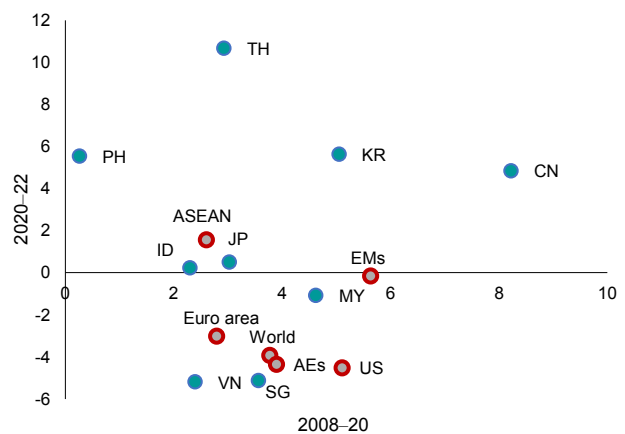
Source; IMF *World Economic Outlook* April 2023; IMF *Fiscal Monitor* April 2023; IMF *Global Debt Monitor* 2022; AMRO staff calculations.
Note: AEs = Advanced economies, EMs = Emerging market economies, CN = China; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore;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

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[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
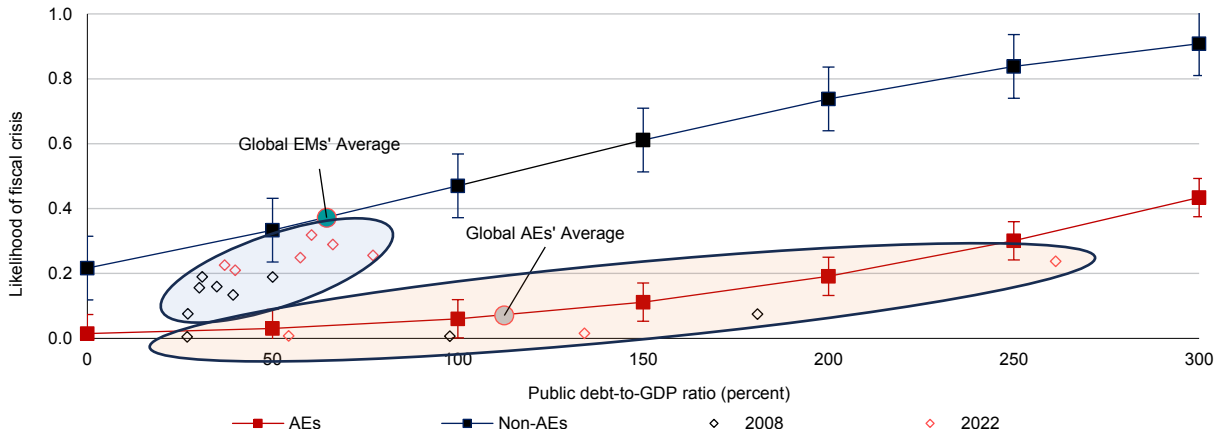
Source: Fiscal crises database (Medas and others, 2017); IMF *World Economic Outlook* April 2023; AMRO staff calculations.
Note: Vertical lines refer to 90 percent confidence intervals. Black dots and magenta dots represent the predictive fiscal crisis probabilities of selected ASEAN+3 countries as of 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).

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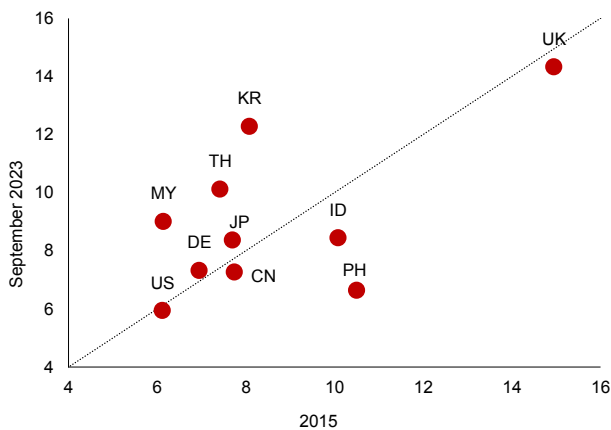
Source: Bloomberg L.P.
Note: The weighted average remaining maturities are calculated based on the outstanding treasury/ sovereign bonds, excluding loans, and bonds issued by government-related agencies. CN = China; DE = Germany; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines;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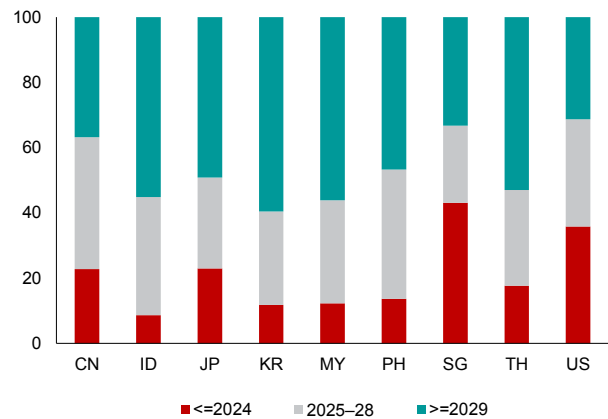
Interest rate risk

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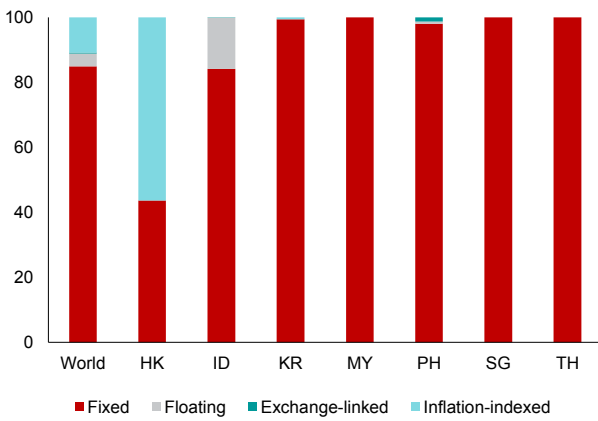
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: World data is calculated based on the 30 countries surveyed by the Bank for International Settlements.

Figure 3.9. Euro area, US and Selected ASEAN+3: US 10-Year Treasury Bond Yield and Bond Price Indices Movement
*(Index unit; percent)*
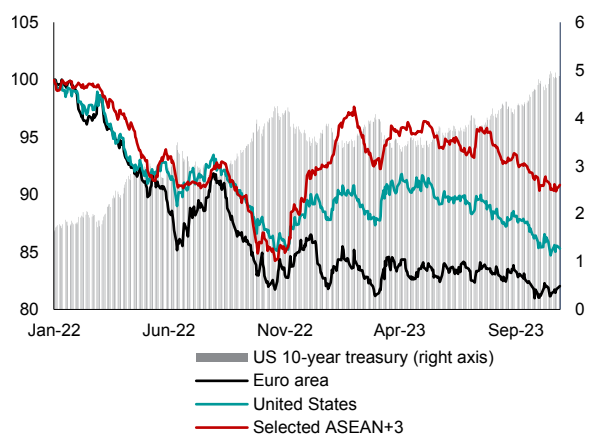
Source: S&P Dow Jones Indices; CEIC; Haver Analytics.
Note: For bond indices, the total return indices of S&P iBoxx USD Treasuries, iBoxx EUR sovereign/sub-sovereign, iBoxx ABF Pan-Asia (including sovereign/sub-sovereign bonds of selected ASEAN+3 - China, Hong Kong, Indonesia, Korea, Malaysia, the Philippines, 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
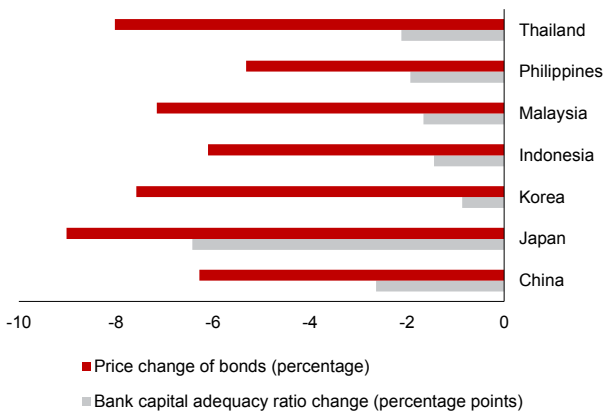
CARs under a Stressed Scenario by Country Group
(Percent)
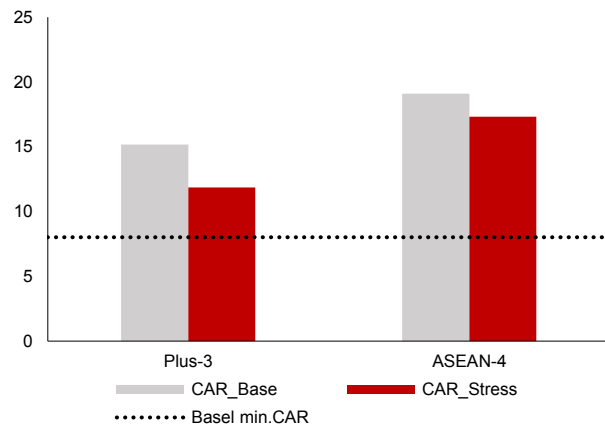
Source: IMF Financial Soundness Indicators via CEIC and Haver Analytics; IMF Sovereign Debt Investor Base; S&P Dow Jones Indices; AMRO staff calculations.
Note: Modified duration provides an approximate estimation of the percentage change in the price of a bond for a 1 percentage point change in yield. 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

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[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)
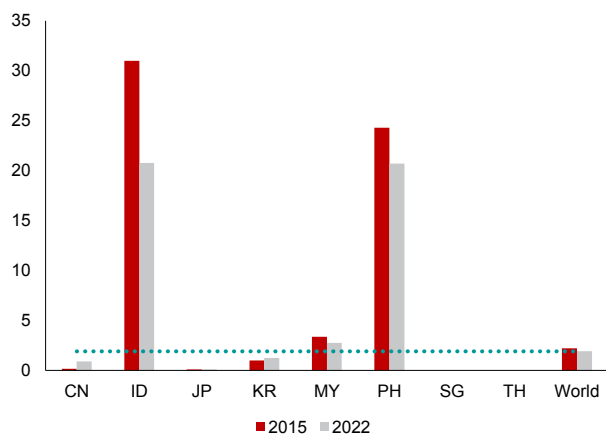
Source: Bank for International Settlements, World Bank/IMF via Haver Analytics; AMRO staff calculations.
Note: The ratio of foreign currency securities to general government securities for long-term securities with original maturity above one year. China's data is based on the central government securities 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.
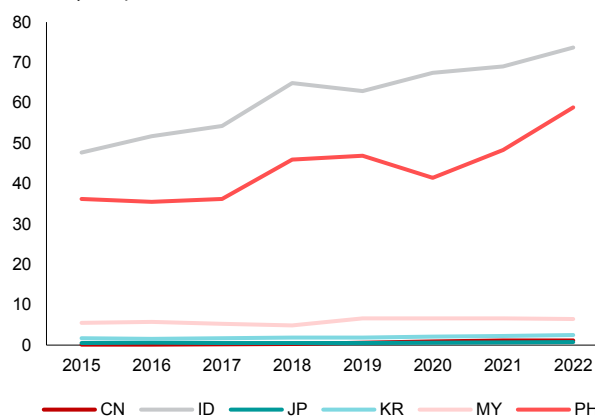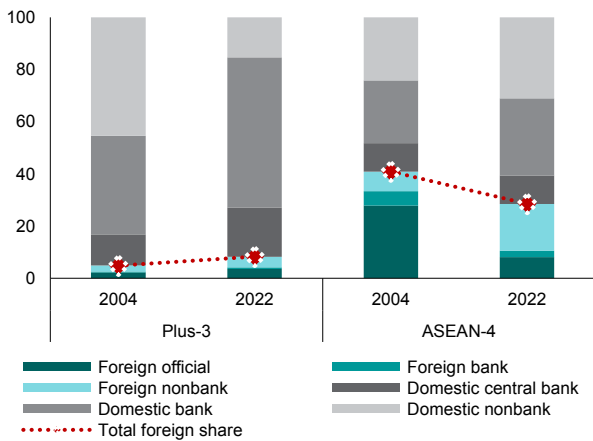
2. Investor Base of Debt

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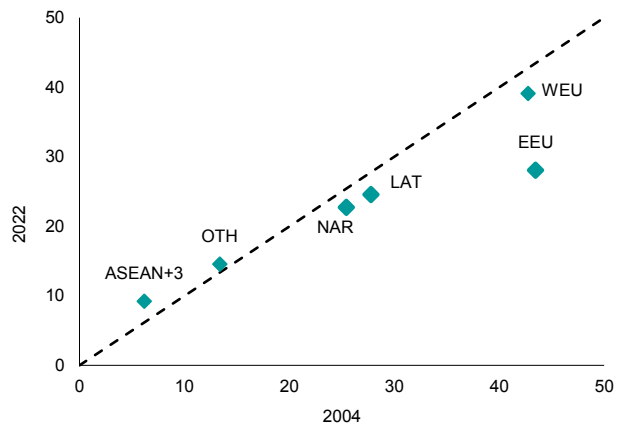
Source: IMF Sovereign Debt Investor Base; AMRO staff calculations.
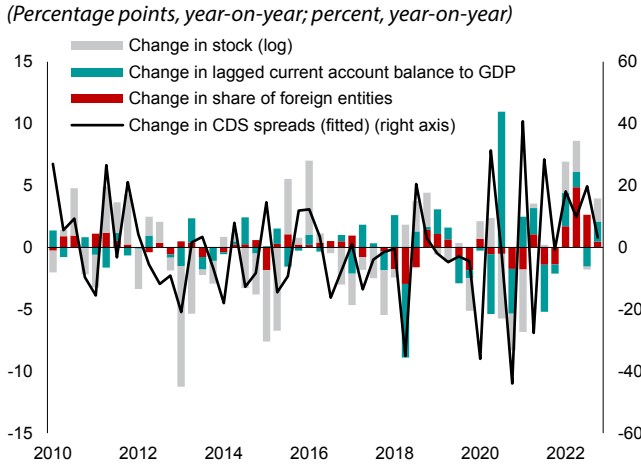Note: Calculated based on 48 countries' data in the IMF's data. WEU = Western Europe; EEU = Eastern Europe; NAR = North America; LAT = Latin America; OTH = others; Selected ASEAN+3 = China, Indonesia, Japan, Korea, Malaysia, Philippines, and Thailand.

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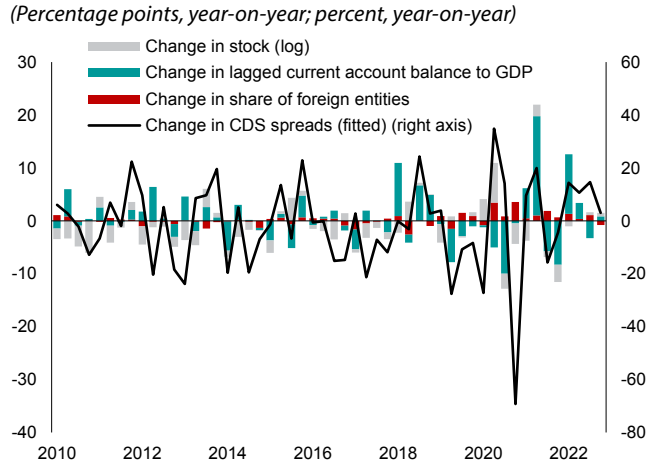
Source: IMF Sovereign Debt Investor, International Financial Statistics; CMA Datavision; national authorities; AMRO staff calculations.
Note: Regression results can be found in Annex 3.2. Only significant variables are included. ASEAN-4 = Indonesia, Malaysia, Philippines, and Thailand.

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.

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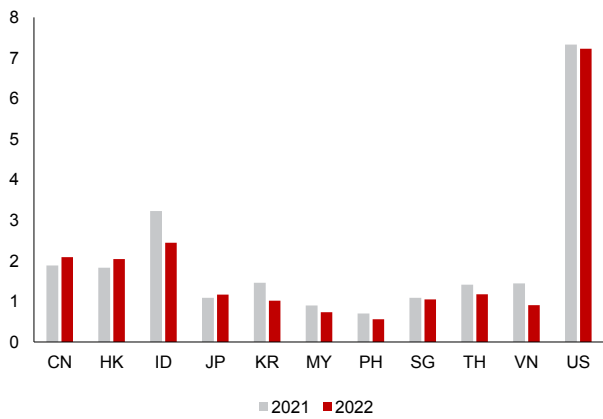
Source: AsianBondsOnline; The Securities Industry and Financial Markets Association (SIFMA), AMRO staff calculations.
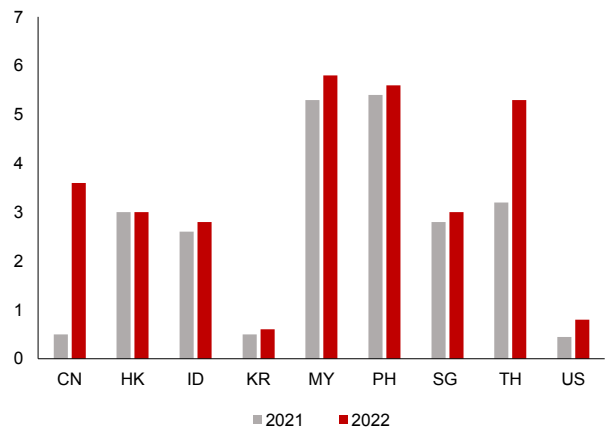Note: Turnover ratio is calculated by the sum of the value of bonds traded divided by the bonds outstanding amount at year-end. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States; VN = Vietnam.

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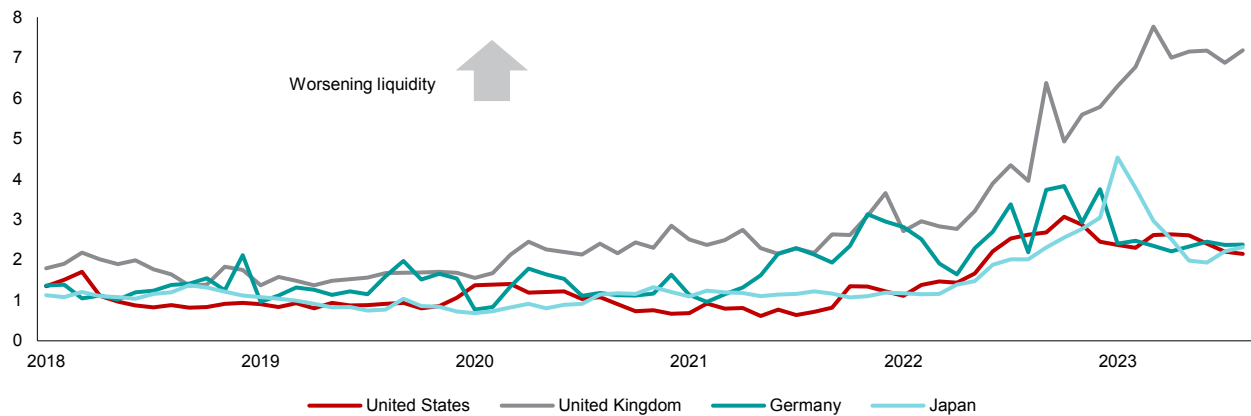
Source: Bloomberg L.P.
Note: The Index is a measure of prevailing liquidity in the treasury bond market. It displays the average yield deviation relative to a fitted yield curve across treasury bonds, with maturity beyond 1 year. The index is low when the liquidity is favorable and high when stressful.

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

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[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:

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

where,

Y_{it} = dependent variable (CDS spreads)
$Y_{it\text{-}1}$, $Y_{it\text{-}2}$ = 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.

[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)
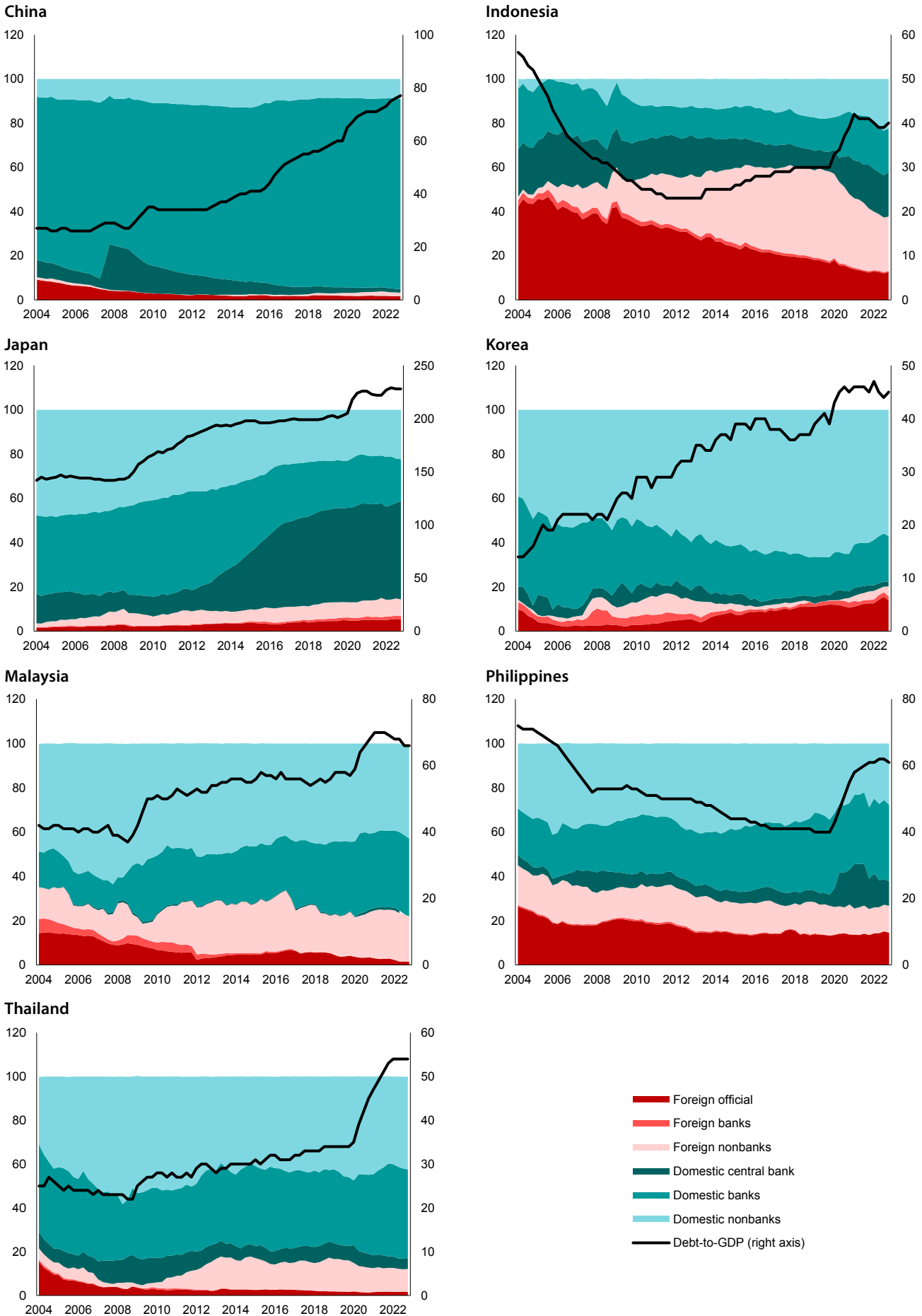
Source: IMF Sovereign Debt Investor Base data base.

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