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.

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)*
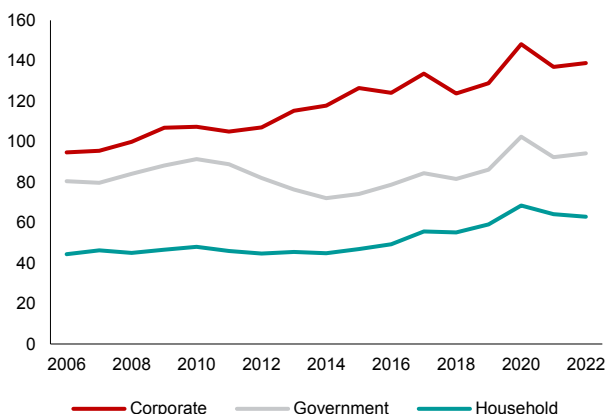
Source: Bank for International Settlements (BIS); AMRO staff calculation.
Note: Data covers all economies reporting nonfinancial debt data to the BIS. Selected ASEAN+3 includes China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, and Thailand. Government debt data include all the above economies 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)*
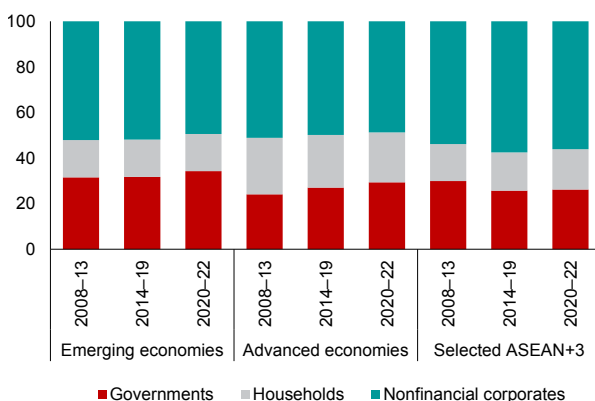
Source: Bank for International Settlements; AMRO staff calculation.
Note: Emerging markets (EMs) data exclude those in ASEAN+3. Advanced economies data excludes Japan. Selected ASEAN+3 includes China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, and Thailand.

Figure 2.3 Selected Regions: Annual Growth in Corporate Debt
(Percent, year-on-year)
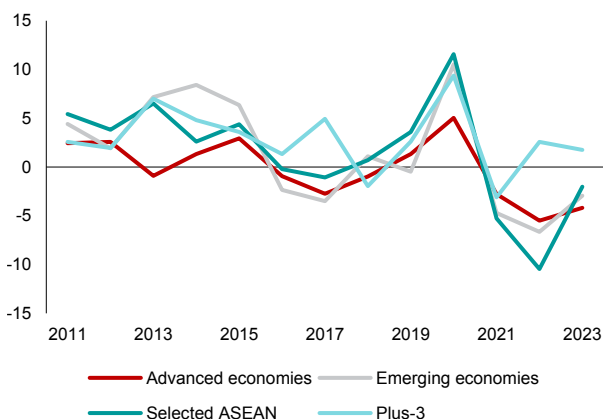
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, Singapore, and Thailand. Plus-3 includes China, Japan, and Korea. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

Figure 2.4. Selected Regions: Corporate Debt
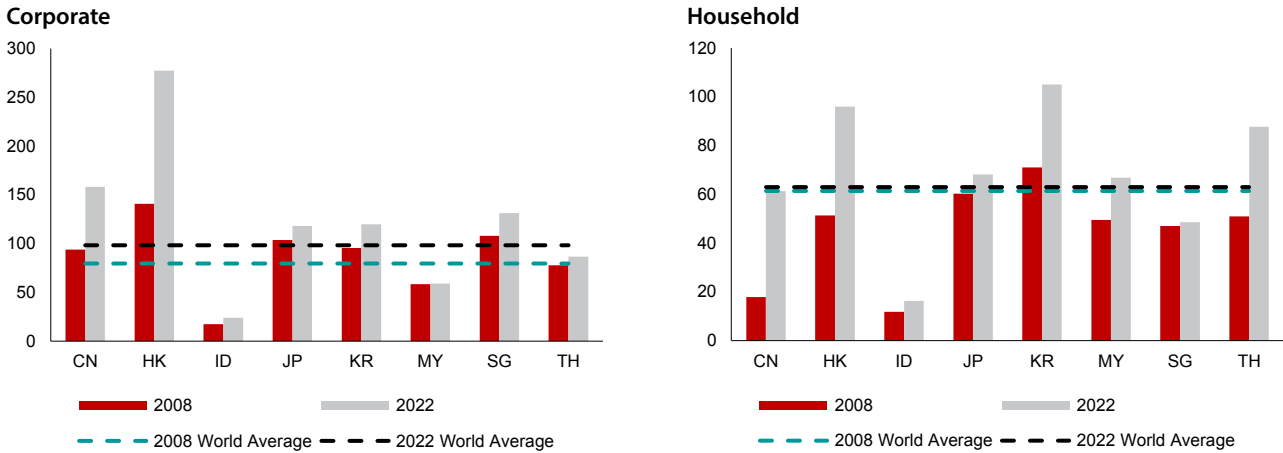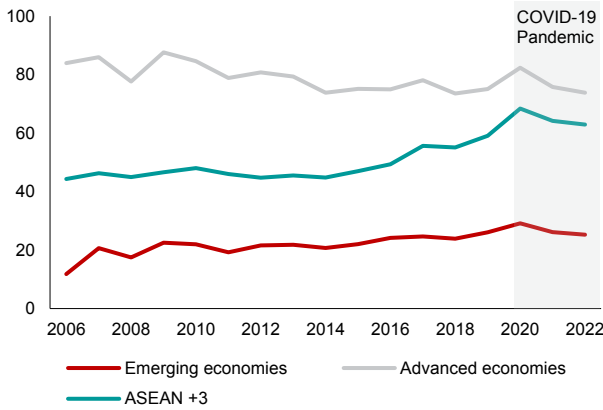*(Percent of GDP)*
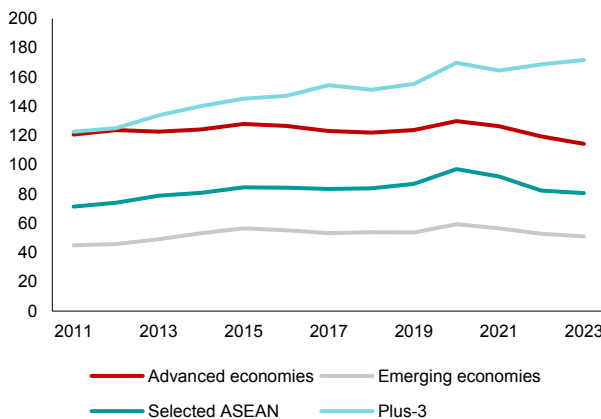
Source: Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, Singapore, and Thailand. Plus-3 includes China, Japan, and Korea. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

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

Corporate

Household

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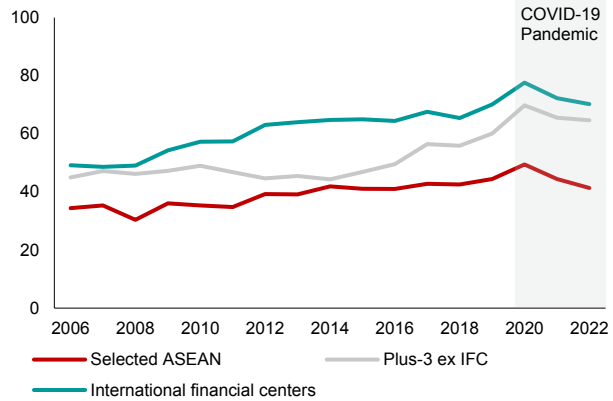
Source: Bank for International Settlements; AMRO staff calculations.
Note: IFC = International financial centers. Selected ASEAN includes Indonesia, Malaysia, and Thailand. Plus-3 ex IFC includes China, Japan, and Korea. IFCs consist of Hong Kong and Singapore.

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).
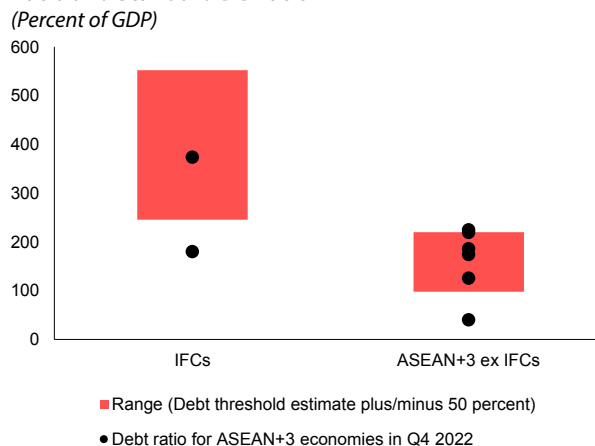
Threshold estimates for each ASEAN+3 economy need to account for economy-specific factors that can increase debt-carrying capacity. Each economy's threshold will reflect the strength of its institutions and macroeconomic fundamentals. Figure 2.8 can help guide this analysis by indicating a range for 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)

■ Range (Debt threshold estimate plus/minus 50 percent)
● Debt ratio for ASEAN+3 economies in Q4 2022

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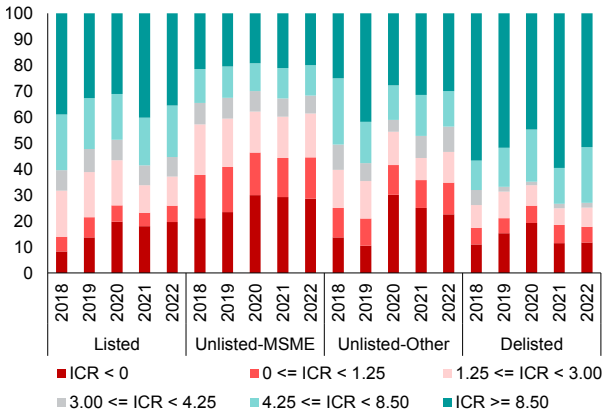*(Percent)*
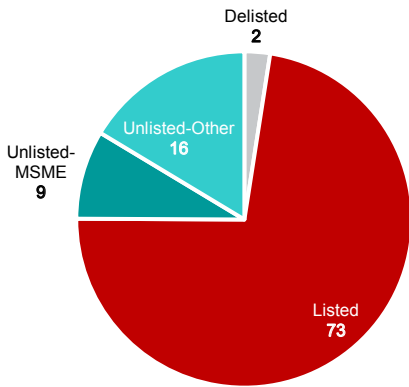
Source: Orbis; AMRO staff calculations.
Note: MSME = micro, small, and medium enterprise. ASEAN+3 economies covered are China, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. Due to data availability, Brunei, Cambodia, Lao PDR, and Myanmar are excluded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

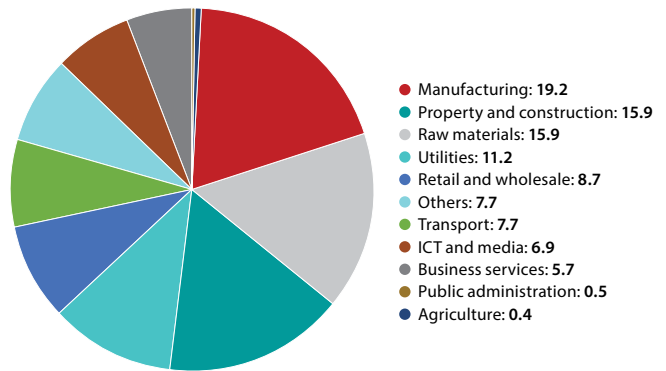**Figure 2.10. Selected ASEAN: Interest Coverage Ratio**
(Percent of debt)
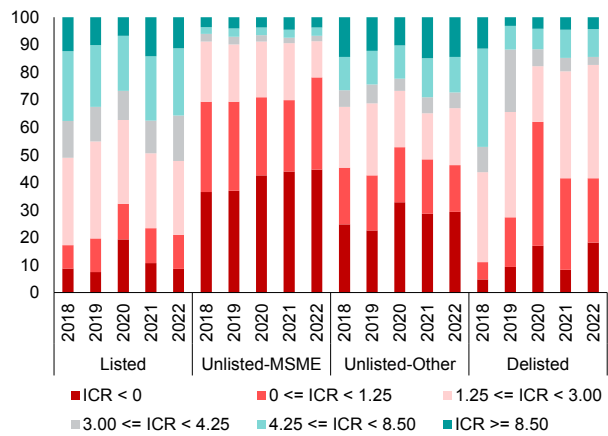
Source: Orbis; AMRO staff calculations.
Note: MSME = micro, small, and medium enterprise; ICR = interest coverage ratio. Due to data availability, Brunei, Lao PDR, and Myanmar are not included in the analysis.

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)

- Manufacturing: **19.2**
- Property and construction: **15.9**
- Raw materials: **15.9**
- Utilities: **11.2**
- Retail and wholesale: **8.7**
- Others: **7.7**
- Transport: **7.7**
- ICT and media: **6.9**
- Business services: **5.7**
- Public administration: **0.5**
- Agriculture: **0.4**

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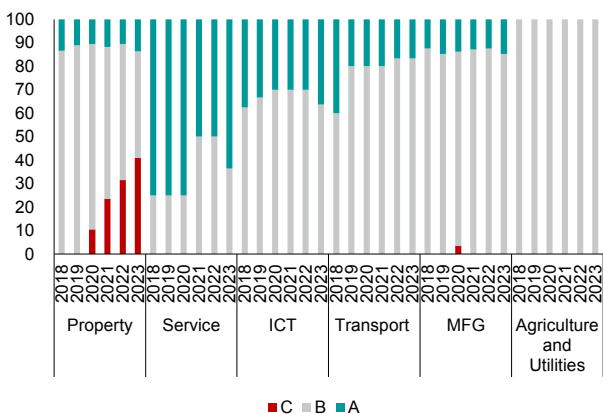
Source: Moody's Analytics; AMRO staff calculations.
Note: ICT = information and communication technology; MFG = manufacturing. Due to data availability, firms from Brunei, Cambodia, Lao PDR, and Myanmar are not included in the analysis.

Figure 2.14. Plus-3: Corporate Credit Ratings
(Percent)
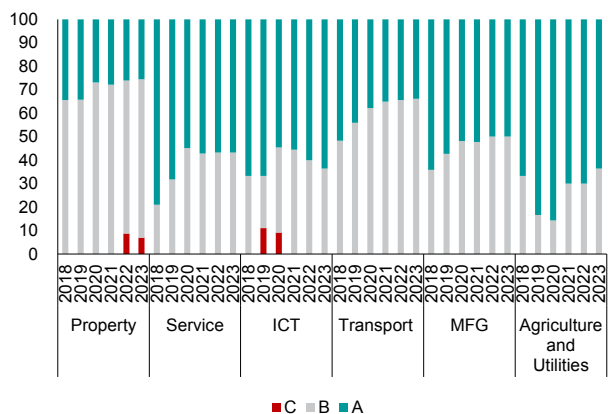
Source: Moody's Analytics; AMRO staff calculations.
Note: ICT = information and communication technology; MFG = manufacturing.

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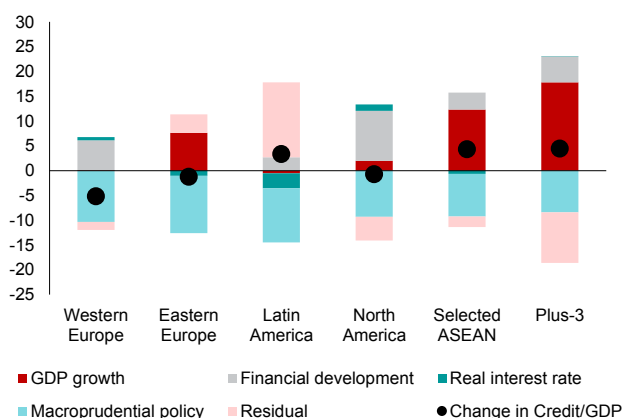
Source: AMRO staff estimates. Refer to Annex 2.3 for more details.
Note: Selected ASEAN includes Indonesia, Malaysia, the Philippines, and Thailand. Pre-COVID period is from 2011 to 2019.

Figure 2.16. Selected Regions: Decomposition Analysis of Change in Credit-to-GDP, COVID
(Percent)
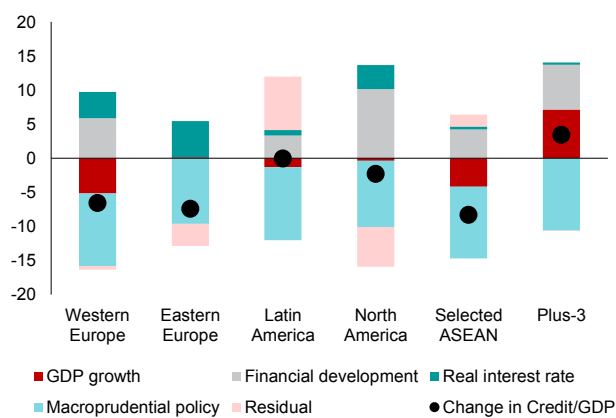
Source: AMRO staff estimates. Refer to Annex 2.3 for more details.
Note: Selected ASEAN includes Indonesia, Malaysia, the Philippines, and Thailand. COVID period is from 2020 to 2022.

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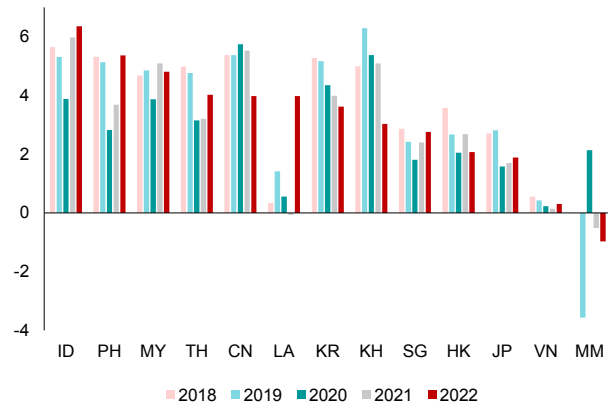
Source: Orbis; AMRO staff calculations.
Note: CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = the Philippines; SG = Singapore; TH = Thailand; VN = Vietnam. Due to data availability, information on Brunei is not included.

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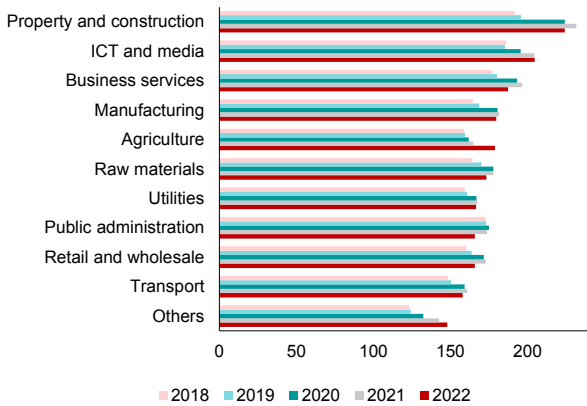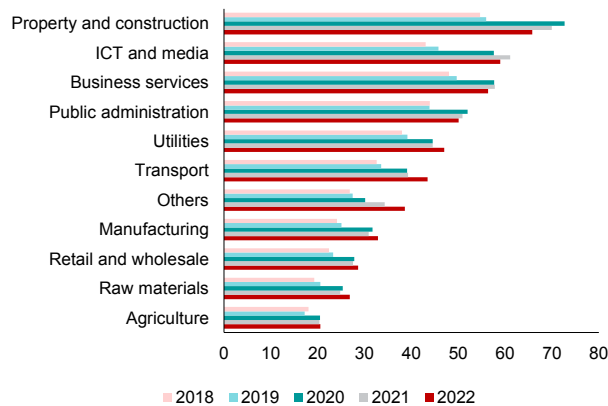
Figure 2.20. ASEAN+3: Median Cash Cover by Sector
(Percent)

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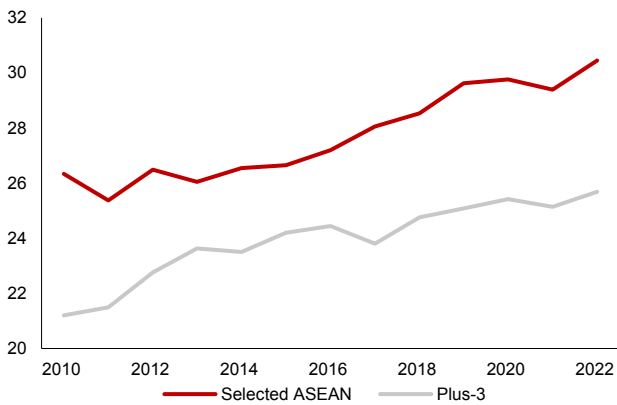
Source: AsianBondsOnline; IMF International Financial Statistics (IFS) and Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

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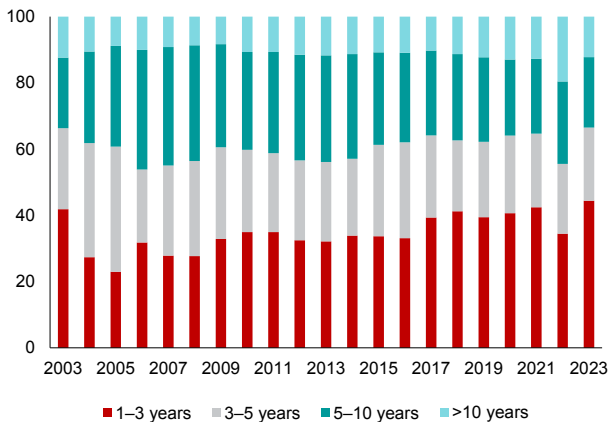
Source: AsianBondsOnline; AMRO staff calculations.
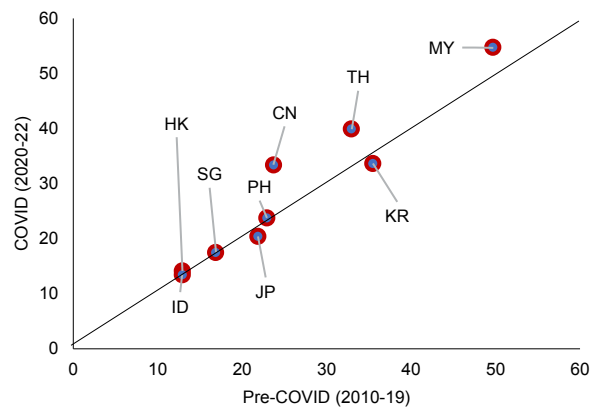Note: Due to data availability, information on Brunei, Cambodia, Lao PDR, and Myanmar are not included. Data for 2023 is using 2023Q1 data.

Figure 2.24. Selected ASEAN+3: Drivers of Corporate Bonds, 2012–22
(Percent)
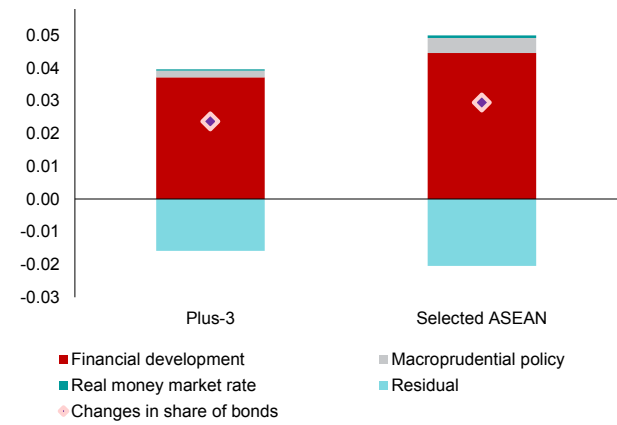
Source: AsianBondsOnline; IMF International Financial Statistics and Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

Figure 2.25. Selected ASEAN+3: Share of Corporate Bond by Currency
(Percent)
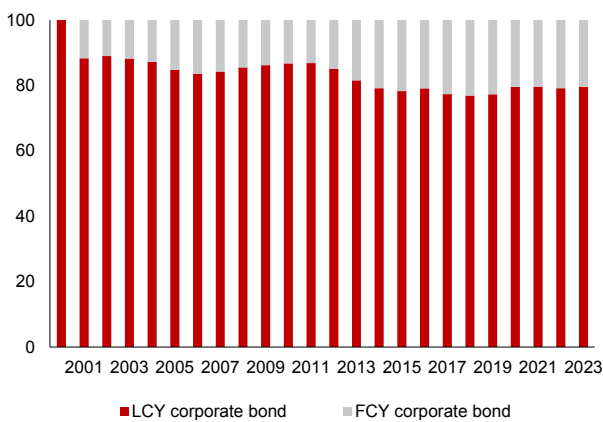
Source: AsianBondsOnline; AMRO staff calculations.
Note: LCY and FCY represent local currency and foreign currency, respectively. Brunei, Cambodia, Lao PDR, and Myanmar are not included. Data as of 2023Q1.

Figure 2.26. Selected ASEAN+3: Share of Corporate Bond by Currency, Q1 2023
(Percent)
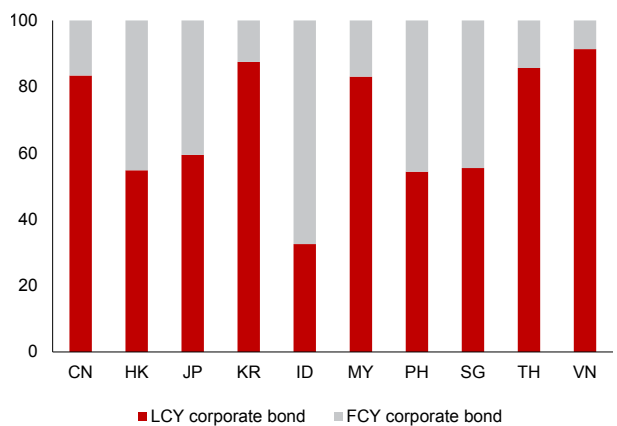
Source: AsianBondsOnline; AMRO staff calculations.
Note: LCY and FCY represent local currency and foreign currency, respectively. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = the Philippines; SG = Singapore; TH = Thailand; VN = Vietnam. Due to data availability, 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)
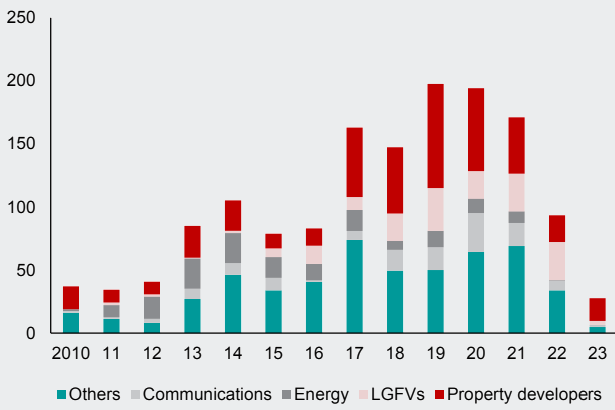
Others | Communications | Energy | LGFVs | Property developers

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)
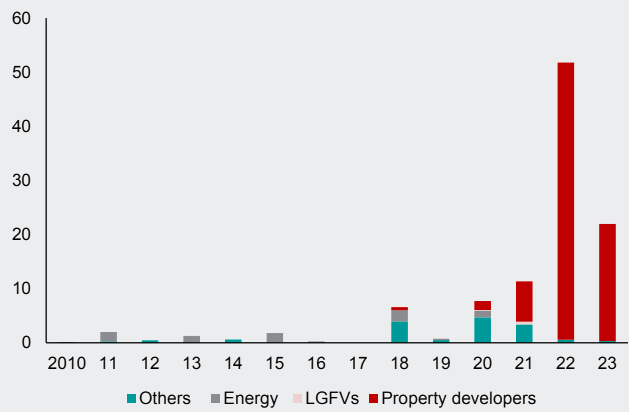
Others | Energy | LGFVs | Property developers

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)
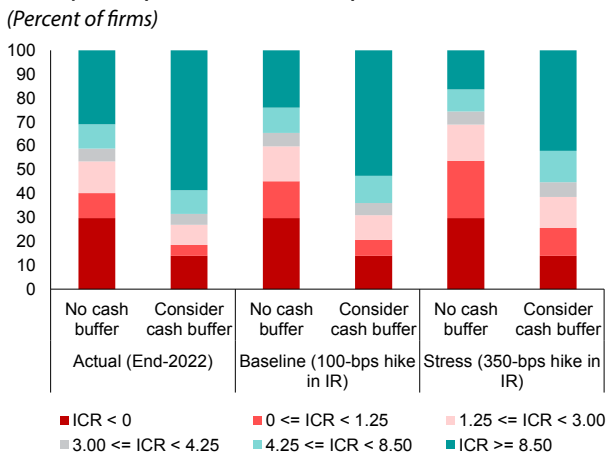
Source: AMRO staff calculations.
Notes: ICR= Interest coverage ratio (equivalent to EBIT/interest expense); IR = corporate borrowing rate. The scenarios with hikes in IR are assumed to affect interest expense but not EBIT. The scenarios indicating "no cash buffer" takes only account EBIT in servicing 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)
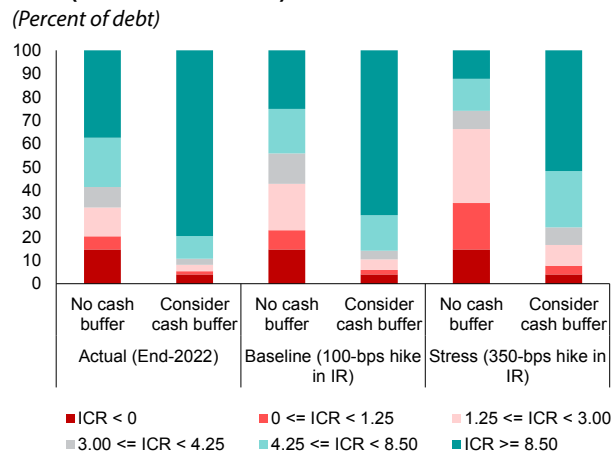
Source: AMRO staff calculations.
Notes: ICR= Interest coverage ratio (equivalent to EBIT/interest expense); IR = corporate borrowing rate. The scenarios with hikes in IR are assumed to affect interest expense but not EBIT. The scenarios indicating "no cash buffer" takes only account EBIT in servicing 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)
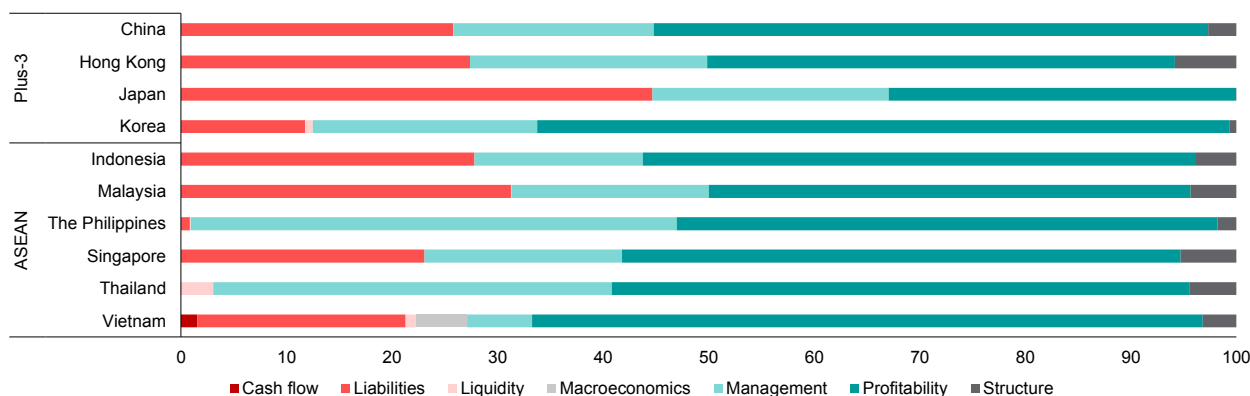
Source: AMRO staff estimates.

Figure 2.30. Selected ASEAN+3: Importance of Indicators to Predict ICR<1.25X by Sector
(Percent)
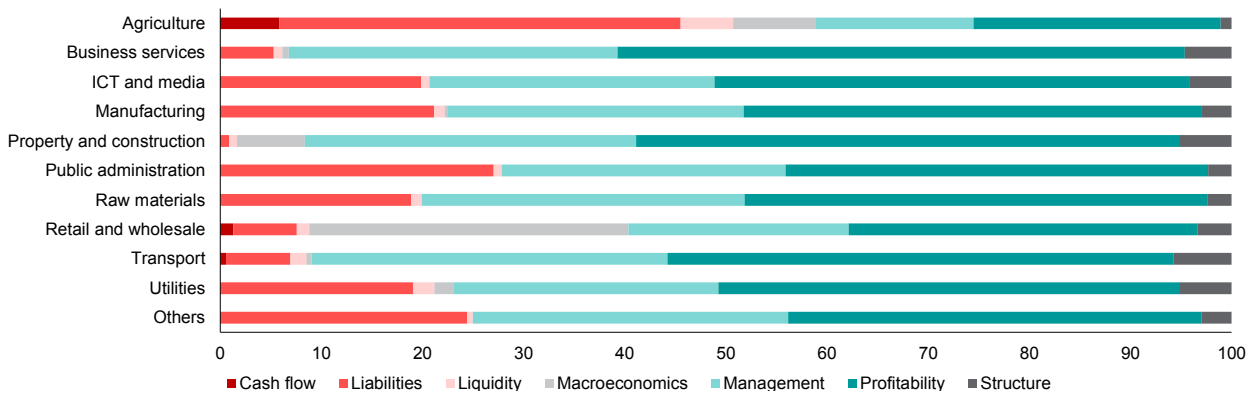
Source: AMRO staff estimates.
Note: ICT = information and communication technology. Due to data availability issue, the estimation does not include Brunei, Cambodia, Lao PDR, and Myanmar.

Figure 2.31. Selected ASEAN: Change in Share of Distressed Firms
(Percentage points, year-on-year)
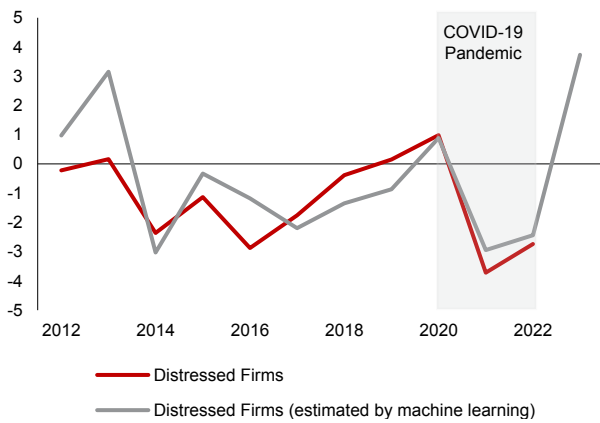
Source: AMRO staff calculations.
Note: Due to data availability, Brunei, Cambodia, Lao PDR, and Myanmar are excluded from the analysis.

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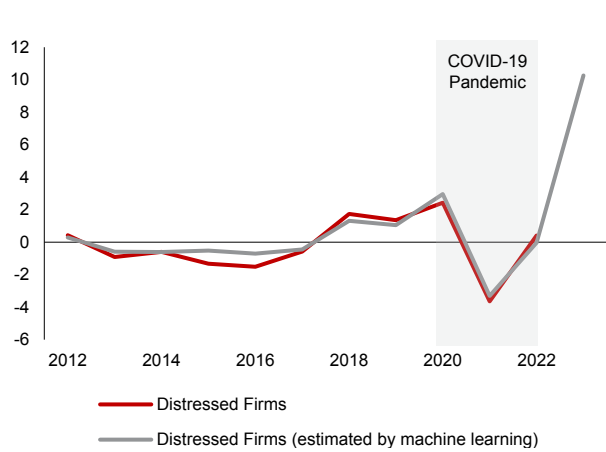
Source: AMRO staff calculations.

Figure 2.33. Selected Regions: Average Tightening of Macroprudential Policies
(Percent)
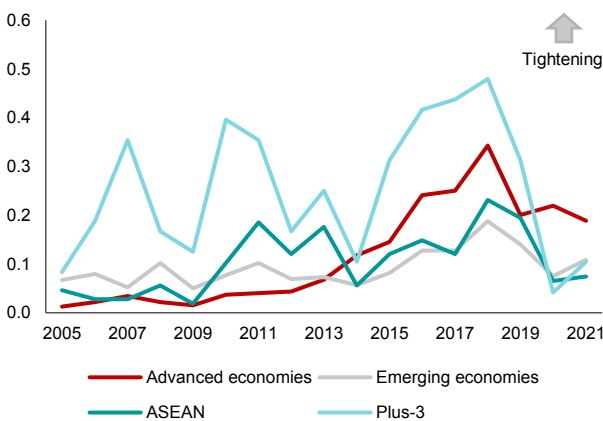
Source: IMF; AMRO staff calculations.
Note: The number of tightening in macroprudential policies is divided by the number of economies within the same regional group. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin America and Eastern Europe.

Figure 2.34. Selected Regions: Average Loosening of Macroprudential Policies
(Percent)
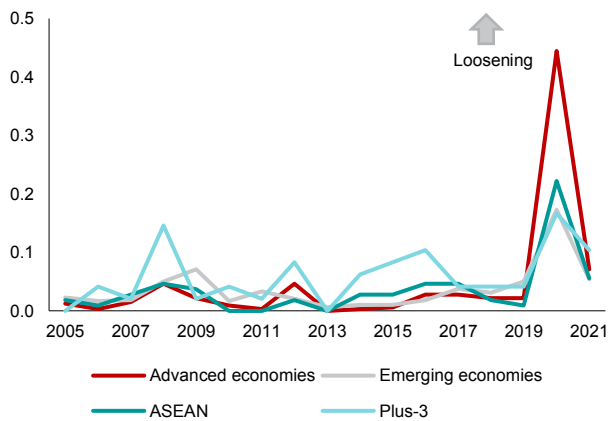
Source: IMF; AMRO staff calculations.
Note: The number of loosening in macroprudential policies is divided by the number of economies within the same regional group. Advanced economies refer to selected economies in North America and Western Europe. Emerging economies refer to selected economies in Latin 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)
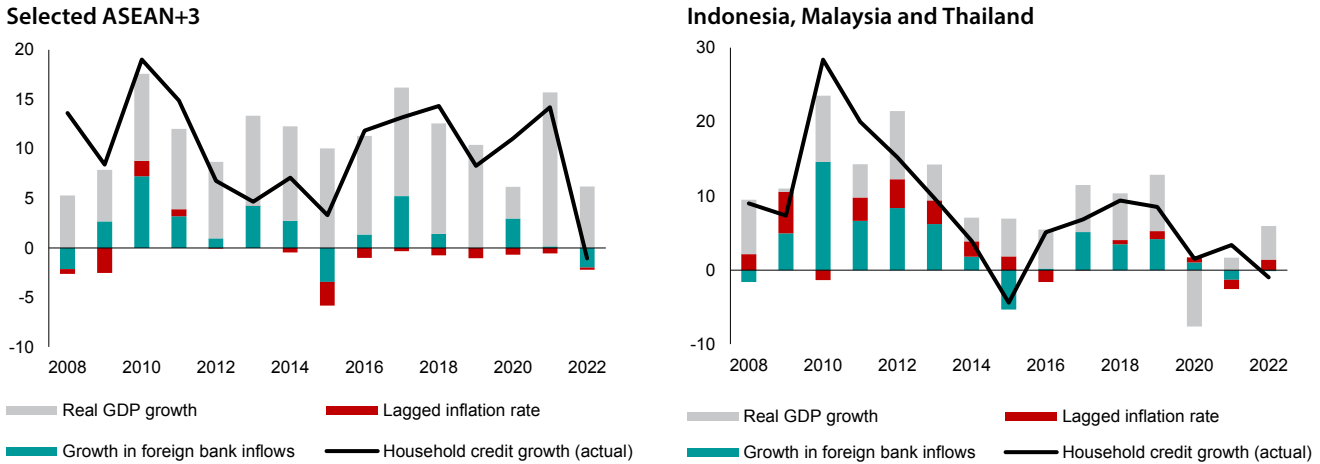
Selected ASEAN+3

Real GDP growth
Growth in foreign bank inflows
Lagged inflation rate
Household credit growth (actual)

Indonesia, Malaysia and Thailand

Real GDP growth
Growth in foreign bank inflows
Lagged inflation rate
Household credit growth (actual)

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)
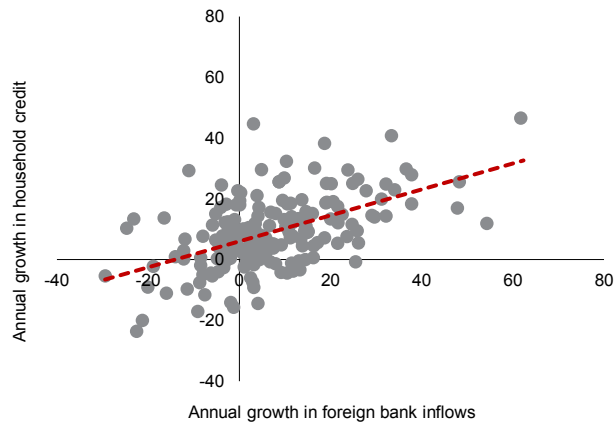
Source: Bank for International Settlements; AMRO staff calculation.
Note: Selected ASEAN+3 = China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, Thailand. Data includes all annual pairs of data points of the eight ASEAN+3 economies, spanning from 2006 to 2022. Foreign bank inflows refer total 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)

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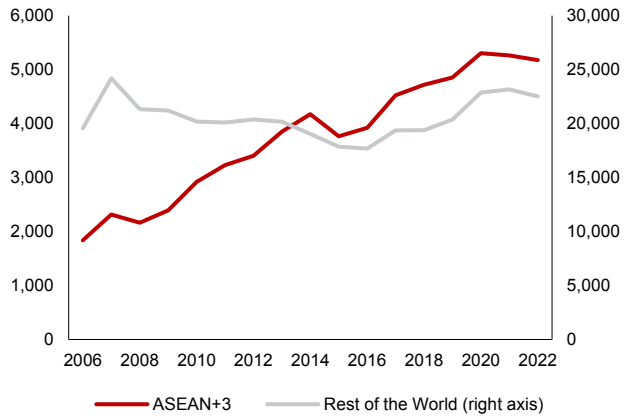
Source: Bank for International Settlements.
Note: Data for the rest of the world is calculated based on the 65 economies, excluding ASEAN+3 economies, surveyed by the BIS.

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)
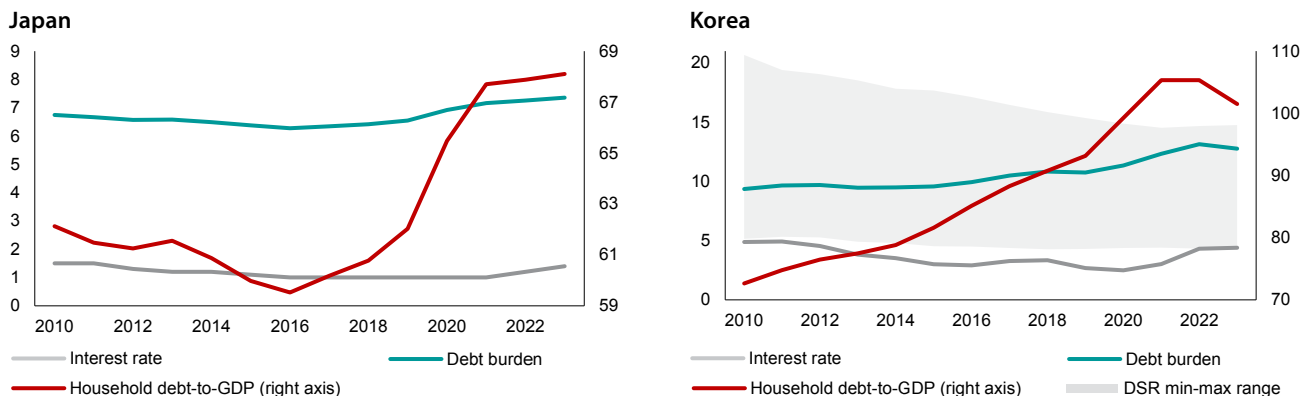
Japan

Korea

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)
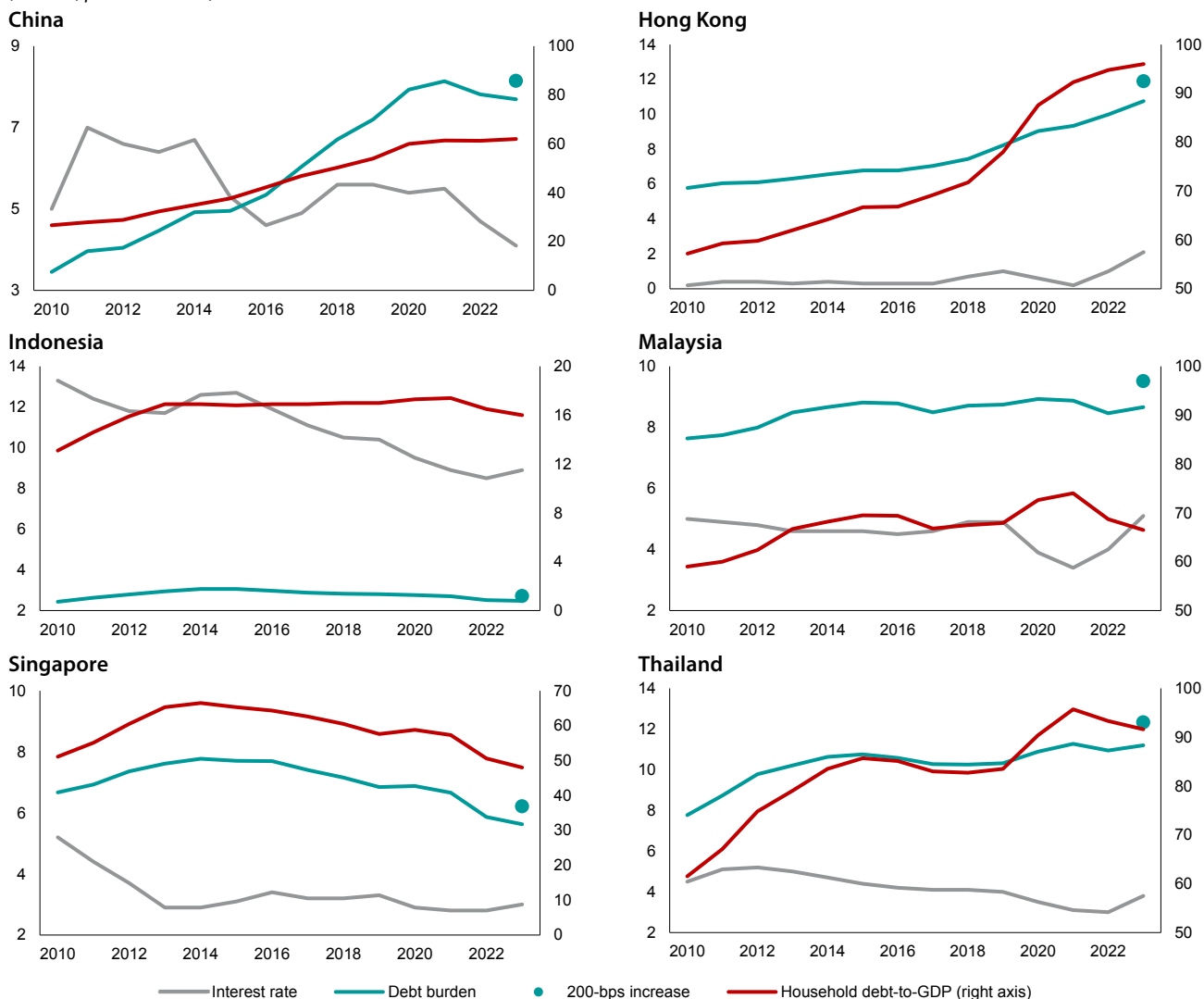
China

Hong Kong

Indonesia

Malaysia

Singapore

Thailand

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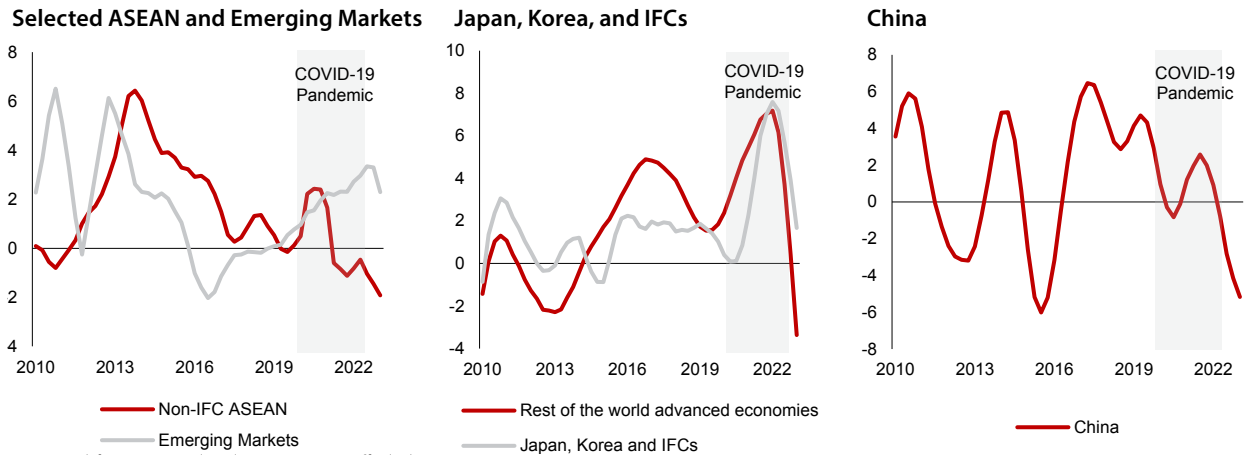
Source: Bank for International Settlements; AMRO staff calculations.
Note: Selected ASEAN includes Indonesia, Malaysia, Philippines, and Thailand. Emerging markets data exclude those in ASEAN+3. IFCs include Hong Kong, and Singapore. Rest of the world advanced economies excludes Japan.

Figure 2.41. Selected ASEAN+3: Real House Price versus Predicted Value from a Model of Fundamental House Prices
(Index, 2015 = 100)
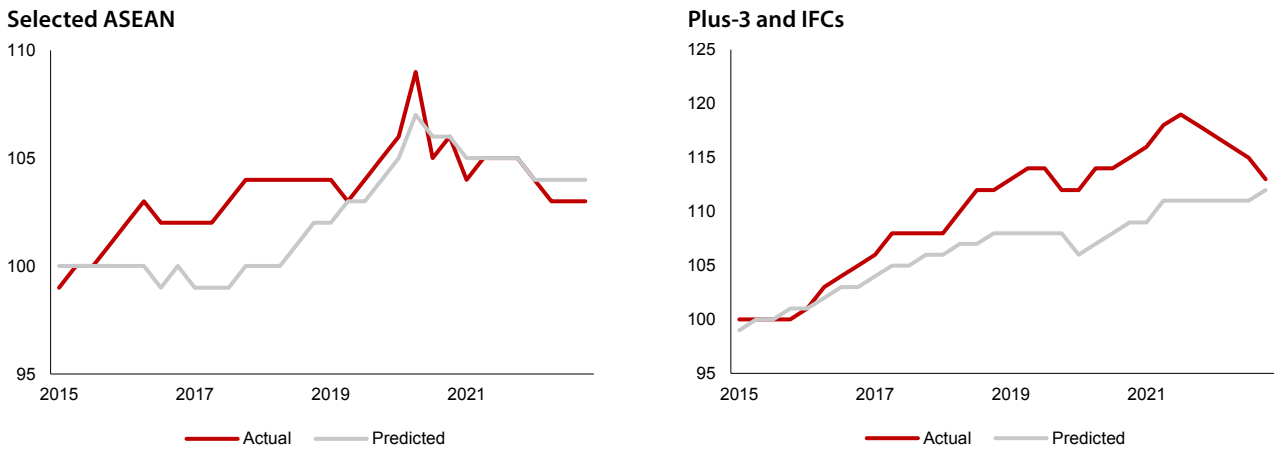
Source: National authorities; International Monetary Fund; Bank for International Settlements; AMRO staff estimates. Selected ASEAN economies included are Indonesia, Malaysia, Philippines, and Thailand. Plus-3 and IFCs include China, Japan, Korea, Hong Kong, and Singapore.

Figure 2.42. Selected ASEAN+3: Drivers of House Price Growth
(Percent share of contribution)
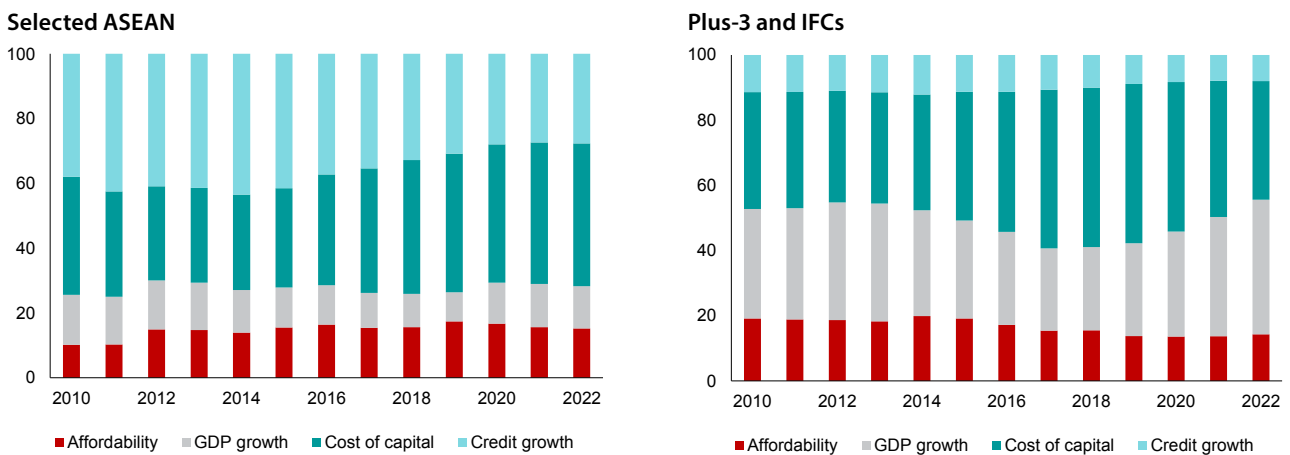
Source: AMRO staff estimates.
Note: The cost of capital bar combines the effects of the interest rate and the equity price variables in the model. Only Japan and Korean publish a housing affordability index, thus, a proxy for affordability is used as the error correction term in the model, which is the 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)

Housing price deviation from long-term trend

Monthly change of housing price (right axis)
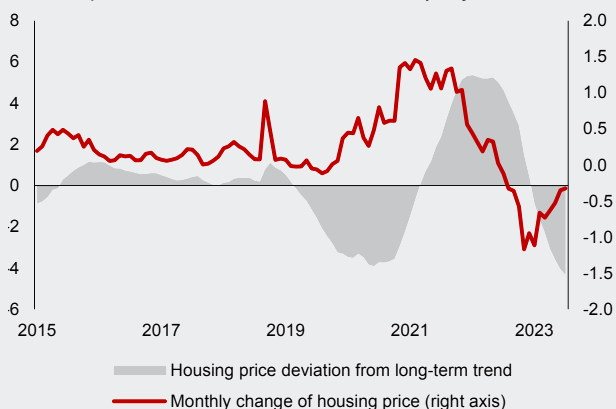
Source: Kookmin Bank; AMRO staff calculations.
Note: The long-term housing price trend is estimated using the Hodrick-Prescott filter.

Figure 2.2.2. Housing Affordability Index (HAI)

■ 2019 ■ 2020 ■ 2021

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)

Monthly change in M2 (right axis)
Policy rate
Sales price in Seoul
Sale price in non-metropolitan area
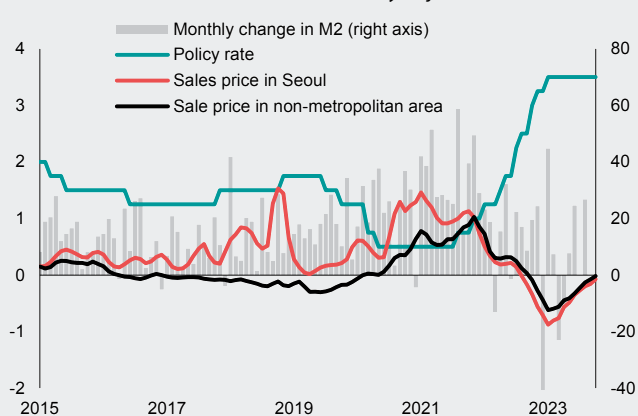
Source: Kookmin Bank; BOK; AMRO staff calculations
Note: Units for sales prices are month-on-month, seasonally adjusted percentage change at the three-month moving average.

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

↑ Jeonse demand > Jeonse supply
↓ Jeonse demand < Jeonse supply

Nationwide jeonse deposit-to-price ratio

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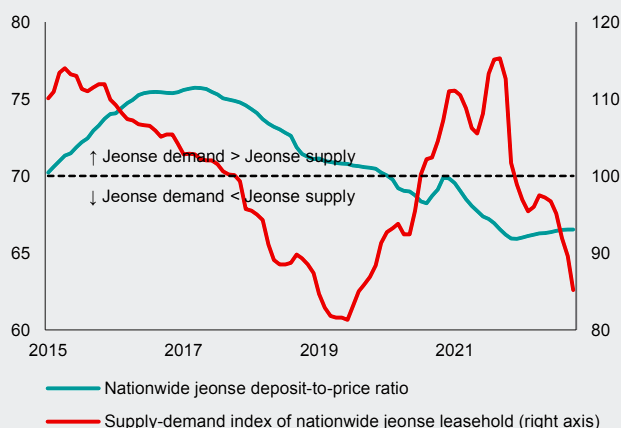
Source: Korea Real Estate Board; Bank of Korea; AMRO staff calculations
Note: Supply-demand index of jeonse leaseholds ranges from from 0 to 200, which 100 indicates the balance between demand and supply of jeonse units; index < 100 indicates excess supply; and >100 indicates excess demand.

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

Completed housing construction (right axis)
Absorption rate: Nationwide
Absorption rate: Seoul
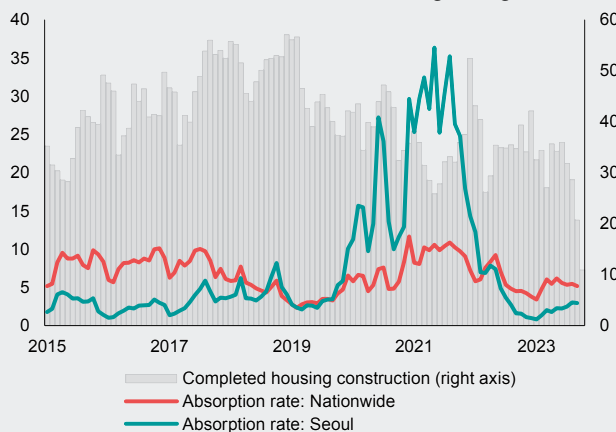
Source: Ministry of Land, Infrastructure and Transport; AMRO staff calculations
Note: Housing absorption rate is the ratio of the average number of sales per month to the total number of unsold housing units.

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)
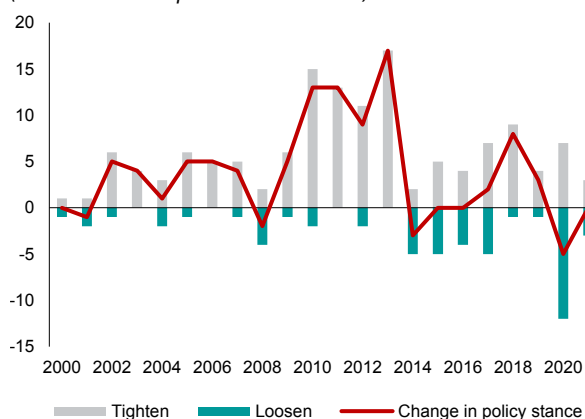
Source: IMF iMaPP database; AMRO staff calculations.

Figure 2.44. Selected ASEAN+3: Loan-to-Value Ratio
(Percent)
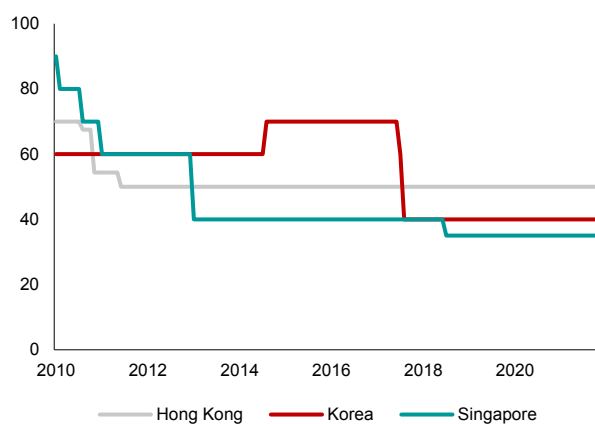
Source: IMF iMaPP database; AMRO staff calculations. In Singapore, the LTV is tiered, with LTVs for the first, second and third housing loans set at 75, 45 and 35 percent, respectively.

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	-0.024
	(0.016)	(0.012)
Beta 2	-0.032*	-0.041***
	(0.013)	(0.011)
GDP per capita	0.473	2.935
	(0.529)	(1.884)
Asian financial crisis	-3.253**	-2.041
	(1.006)	(1.796)
Global financial crisis	-1.392	-2.314
	(0.713)	(1.425)
COVID-19 pandemic	-2.365**	0.013
	(0.753)	(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
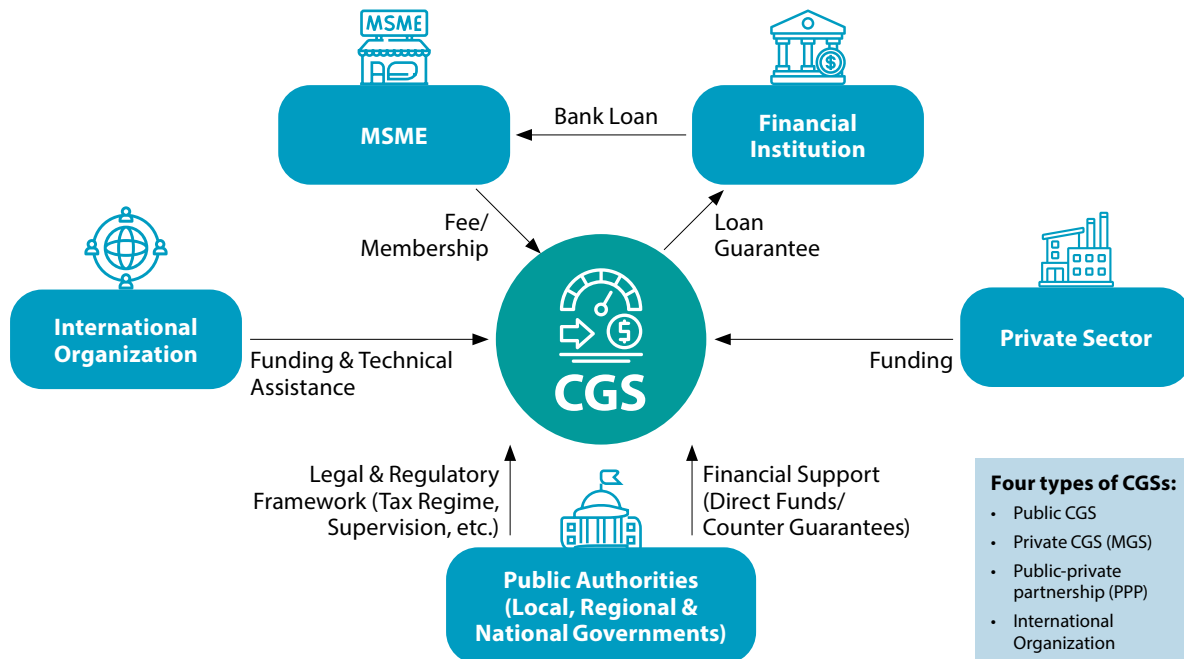
Four types of CGSs:
• Public CGS
• Private CGS (MGS)
• Public-private partnership (PPP)
• International Organization

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**	-0.1159	-0.1078*
	(-2.0369)	(-1.6252)	(-1.7328)
Financial Development	37.630***	21.409**	2.0947**
	(2.6002)	(2.1592)	(2.1897)
Macroprudential Policy	-0.1895	0.5427	0.7099
	(-0.3109)	(0.9461)	(1.1150)
GDP Growth	0.4374***	0.5691***	0.4847***
	(3.7847)	(7.0103)	(7.6023)
Constant	-18.866***	-11.010**	-1.1178*
	(-2.6428)	(-2.2287)	(-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.

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.
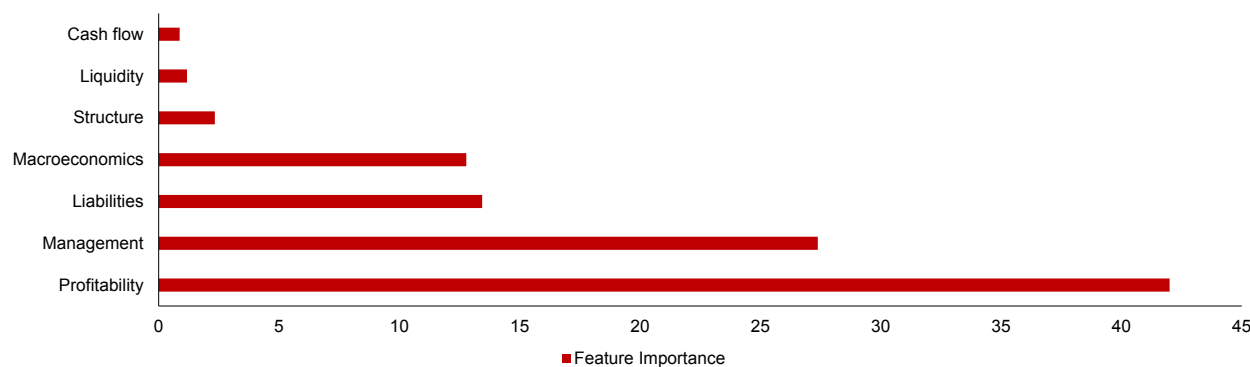
Annex 2.6. Empirical Study on The Drivers of Household Credit

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	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.

References

Alam, Zohair, Adrian Alter, Jesse Eiseman, Gaston Gelos, Heedon Kang, Machiko Narita, Erlend Nier, and Naixi Wang 2019. "Digging Deeper—Evidence on the Effects of Macroprudential Policies from a New Database." IMF Working Paper 19/66, International Monetary Fund, Washington, DC, March. *https://www.imf.org/-/media/Files/Publications/WP/2019/WPIEA2019066.ashx*

ASEAN+3 Macroeconomic Research Office. 2021. "AMRO Annual Consultation Report Korea—2021." *AMRO Country Report* ACR/21-05, ASEAN+3 Macroeconomic Research Office, Singapore, August. *https://www.amro-asia.org/wp-content/uploads/2021/08/Korea-ACR_2021.pdf*

Bank of Korea. 2022. *Financial Stability Report (December 2022)*. Korea, December. *https://www.bok.or.kr/portal/bbs/P0000593/view.do?nttId=10074512&menuNo=200769&pageIndex=1*

Biljanovska, Nina, Chenxu Fu, and Igan Deniz. 2023. Housing Affordability: A New Dataset. [Manuscript in preparation]. International Monetary Fund, Washington, DC.

Bruno, Valentina, and Hyun Song Shin. 2017. "Global Dollar Credit and Carry Trades: A Firm-Level Analysis." *The Review of Financial Studies* 30(3): 703–49. Oxford Academic, 6 February. *https://doi.org/10.1093/rfs/hhw099*

Bolibok, Piotr. 2018. "The Macroeconomic Drivers of Household Debt-to-Income Ratio: An Evidence Frome The OECD Countries." *Corpernican Journal of Finance & Accounting* 7(2): 29-41. *http://dx.doi.org/10.12775/CJFA.2018.007*

Chen, Chih-Shun, Chun-Da Chen, and Donald Lien. 2020. "Financial Distress Prediction Model: The Effects of Corporate Governance Indicators." *Journal of Forecasting* 39(8): 1238–52. 25 March. *https://doi.org/10.1002/for.2684*

Cheng, Evelyn. 2023. "China's Housing Ministry is Getting 'Bolder' about Real Estate Support." CNBC Economy, 28 July. *https://www.cnbc.com/2023/07/28/chinas-housing-ministry-announces-new-details-for-real-estate-support.html*

Ding, Ding, Huang Yi, and Zhou Yue. 2019. "Chapter 16 China's Offshore Corporate Dollar Bonds." *In The Future of China's Bond Market*. International Monetary Fund, Washington, DC, 13 March. *https://doi.org/10.5089/9781484372142.071*

Damodaran, Aswath. 2016. "Estimating a Synthetic Rating and Cost of Debt." NYU Stern, New York. *https://pages.stern.nyu.edu/~adamodar/New_Home_Page/valquestions/syntrating.htm*

Drehmann, Mathias, Anamaria Illes, Mikael Juselius, and Marjorie Santos. 2015. "How Much Income is Used for Debt Payments? A New Database for Debt Service Ratios." BIS Quarterly Review, September 2015. Bank for International Settlements, Basel, September. *https://www.bis.org/publ/qtrpdf/r_qt1509h.pdf*

Dumitrescu, Bogdan Andrei, Adrian Enciu, Catalina Adriana Handoreanu, Carmen Obreja, and Florin Blaga. 2022. "Macroeconomic Determinants of Household Debt in OECD Countries." *Sustainability* 2022 14(7), 3977. *https://doi.org/10.3390/su14073977*

Dudley, William C. 2011. "Financial Stability and Economic Growth." BIS Central Bankers' Speeches. Bank for International Settlements, Basel, 23 September. *https://www.bis.org/review/r110927c.pdf*

Goldin, David. 2014. "Top 10 Reasons Banks Won't Loan Money to Your Business." The Business Journals. 5 November. *https://www.bizjournals.com/bizjournals/how-to/funding/2014/11/top-10-reasons-banks-wont-loan-to-your-business.html*

Goyal, Vidhan, and Frank Packer. 2017. "Corporate Leverage in Emerging Asia." BIS Papers 91, Bank for International Settlements, Basel, March. *https://www.bis.org/publ/bppdf/bispap91e_rh.pdf*

He, Laura. 2022. "China Slashes Key Interest Rate as Housing Sales Collapse." CNN Business, China, 20 May. *https://edition.cnn.com/2022/05/20/economy/china-record-lpr-cut-property-market-intl-hnk*

Hosaka, Tadaaki. 2019. "Bankruptcy Prediction Using Imaged Financial Ratios and Convolutional Neural Networks." *Expert System with Applications* 117: 287–99. 1 March. *https://doi.org/10.1016/j.eswa.2018.09.039*

Ho, Tuan, Tuan Huu Nguyen, Trang Thi Ngoc Nguyen, and Tho Ngoc Tran. 2022. "Rising Risks from Cross-ownership between Real Estate Developers and Banks in Vietnam." ISEAS Perspective, Yusof Ishak Institute (ISEAS), Singapore, 17 February. *https://www.iseas.edu.sg/articles-commentaries/iseas-perspective/2022-14-rising-risks-from-cross-ownership-between-real-estate-developers-and-banks-in-vietnam-by-tuan-ho-tuan-huu-nguyen-trang-thi-ngoc-nguyen-and-tho-ngoc-tran/*

Igan, Deniz, and Prakash Loungani. 2012. "Global Housing Cycles." IMF Working Paper 12/217, International Monetary Fund, Washington, DC, 1 August. *https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Global-Housing-Cycles-26229*

Katharangsiporn, Kanana. 2023. "REIC Revises Up Property Market Outlook for this Year." Bangkok Post, Thailand, 17 February. *https://www.bangkokpost.com/property/2508499/reic-revises-up-property-market-outlook-for-this-year*

Kho, Catharine, and Megan Chong. 2023. "ASEAN+3 Regional Economic Outlook 2023 in Five Charts." AMRO Blog. ASEAN+3 Macroeconomic Research Office, Singapore, 19 April. *https://amro-asia.org/asean3-regional-economic-outlook-2023-in-five-charts/*

Liew, Ming En. 2022. "How Malaysia is Helping SMEs Thrive Post-Covid with Digital Transformation." GovInsider. Singapore, 8 September. *https://govinsider.asia/intl-en/article/how-malaysia-is-helping-smes-thrive-post-covid-with-digital-transformation-sme-corp-rizal-bin-nainy*

Lin, Diaan-Yi, Sruthi Namratha Rayavarapu, Karim Tadjeddine, and Rebecca Yeoh. 2022. "Beyond Financials: Helping Small and Medium-Size Enterprises Thrive." McKinsey and Company, 26 January. *https://www.mckinsey.com/industries/public-sector/our-insights/beyond-financials-helping-small-and-medium-size-enterprises-thrive*

Liu, Juliana. 2023. "China extends some policies to support its troubled property market." CNN. 11 July. *https://edition.cnn.com/2023/07/11/economy/china-property-support-measures-hnk-intl/index.html*

Organisation for Economic Co-operation and Development (OECD). 2021. "Strengthening Macroprudential Policies in Emerging Asia: Adapting to Green Goals and Fintech." The Development Dimension, Paris, 29 June. *https://doi.org/10.1787/19901372*

Organisation for Economic Co-operation and Development (OECD). 2013. "SME and Entrepreneurship Financing: The Role of Credit Guarantee Schemes and Mutual Guarantee Societies in Supporting Finance for Small and Medium-sized Enterprises." CFE/SME(2012)1/FINAL, Paris, 30 January. *https://one.oecd.org/document/CFE/SME(2012)1/FINAL/en/pdf*

Panyanukul, Sakkapop, Warut Promboon, and Wanwisa May Vorranikulkij. 2014. "Role of Government in Improving SME Access to Financing: Credit Guarantee Schemes and the Way Forward. Paper Presented at BOT Symposium 2014. Bank of Thailand, Thailand. *https://www.bot.or.th/Thai/MonetaryPolicy?ArticleAndResearch/SymposiumDocument?Paper3*

Sen, Rajib, and Monika Mangla. 2023. "From Struggling to Thriving: How Credit Guarantees Can Bridge the Credit Gap Faced by MSMEs." The Economist, 24 February. *https://economictimes.indiatimes.com/small-biz/money/from-struggling-to-thriving-how-credit-guarantees-can-bridge-the-credit-gap-faced-by-msmes/articleshow/98204362.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst*

Singapore Business Review. 2021. "Government Reveals Initiatives to Aid Firms in Digitalisation." 3 March. *https://sbr.com.sg/economy/news/government-reveals-initiatives-aid-firms-in-digitalisation*

The Business Times. 2023. "Down Payment, Mortgage Rate to be Lowered for China's First-and Second-time Home Buyers." 31 August. *https://www.businesstimes.com.sg/international/global/down-payment-mortgage-rate-be-lowered-chinas-first-and-second-time-home-buyers*

The Economist. 2023. "China's Cities Are on the Verge of a Debt Crisis." 27 February. *https://www.economist.com/finance-and-economics/2023/02/27/chinas-cities-are-on-the-verge-of-a-debt-crisis*

Vietnam News Agency. 2023. "Property Developers Ask for Bank Loans to Repay Maturing Bonds." 5 April. *https://e.vnexpress.net/news/business/property/property-developers-ask-for-bank-loans-to-repay-maturing-bonds-4589741.html*

Vietnam Investment Review. 2022. "Developers Seeking Further Support in Approaching Loans." 30 December. *https://vir.com.vn/developers-seeking-further-support-in-approaching-loans-98916.html*

World Bank. 2016. "Principles for Public Credit Guarantee Schemes (CGSs) for SMEs." Working Paper. Washington, DC. 11 March. *https://www.worldbank.org/en/topic/financialsector/publication/principles-for-public-credit-guarantee-schemes-cgss-for-smes#:~:text=A%20credit%20guarantee%20scheme%20provides,in%20return%20for%20a%20fee*

World Bank. 2023. "Small and Medium Enterprises (SMEs) Finance." World Bank, Washington, DC. *https://www.worldbank.org/en/topic/smefinance*

World Bank. 2023. "Financial Development." *Global Financial Development Report*, Background. World Bank, Washington, DC. *https://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/financial-development*

Yao, Kevin, and Yawen Chen. 2019. "China's 2018 Growth Slows to 28-year Low, More Stimulus Seen." Reuters, 21 January. *https://www.reuters.com/article/us-china-economy-gdp-idUSKCN1PF04A*

Yoshino, Naoyuki, and Farhad Taghizadeh-Hesary. 2018. "The Role of SMEs in Asia and Their Difficulties in Accessing Finance. ADBI Working Paper 911, Asian Development Bank Institute, Tokyo, December. *https://www.adb.org/publications/role-smes-asia-and-theirdifficulties-accessing-finance*

Yutharo, Kim. 2023. "Finance Ministry Pushes Back Tax Payments for Boreys to Boost Sector." The Phnom Penh Post, Cambodia, 17 April. *https://phnompenhpost.com/post-property/finance-ministry-pushes-back-tax-payments-boreys-boost-sector*

Xinhua. 2022. "Chinese Lenders Step Up Credit Support for Property Market." Global Times, 26 November. *https://www.globaltimes.cn/page/202211/1280478.shtml*