Background Paper (PPP/24–02)

ASEAN+3 Corporate and MSME Debt-at-Risk in a High Interest Rate Environment: Empirical Analysis

February 2024

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ASEAN+3 Corporate and MSME Debt-at-Risk: Empirical Analysis

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February 2024

Abstract

Credit risks posed by non-financial corporates (NFC) in the ASEAN+3 region remain elevated in the wake of the COVID-19 pandemic. Concerted interest rate hikes by central banks, enacted to contain post-pandemic inflationary pressures, have increased the borrowing costs of firms, especially those that had taken on more debt during the pandemic. At the same time, downside risks to the economic outlook amid global geopolitical crises and tighter financial conditions could cause a sharp jump in risk aversion, potentially leading to retrenchment by lenders. The debt-at-risk analyses in this study extend the scope of previous AMRO staff research to include private firms—in particular, MSMEs that had borne the brunt of the pandemic—as well as across industries. The results highlight the NFC vulnerabilities in ASEAN+3 economies, including among MSMEs and in specific industries. Scenario analyses, applying separate interest rate and earning shocks, further underscore the sensitivities of already-vulnerable NFC sectors. The empirical findings, as well as revelations on data gaps relating to firm financials, inform the preparation of AMRO staff’s related policy position paper on improving the resilience and surveillance of the region’s NFCs to safeguard financial stability and promote economic growth.

JEL classification: E52, F34, G28, G32, P52

Keywords: corporate debt, COVID-19 pandemic, debt-at-risk, debt service ratio, financial stability, interest coverage ratio, listed firms, unlisted firms, micro, small and medium-sized enterprises (MSMEs)

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\(^1\) With contributions from Laura Grace Gabriella (Financial Surveillance) and research support from Yin Fai Ho and Michael Wynn (both Macro-Financial Research Group).
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## Abbreviations

<table>
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ASEAN</td>
<td>Association of South-East Asian Nations (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam)</td>
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<tr>
<td>ASEAN-5</td>
<td>Indonesia, Malaysia, Philippines, Singapore, Thailand</td>
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<tr>
<td>ASEAN+3</td>
<td>ASEAN plus China (including Hong Kong), Japan, Korea</td>
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<tr>
<td>BIS</td>
<td>Bank for International Settlements</td>
</tr>
<tr>
<td>BN</td>
<td>Brunei Darussalam (“Brunei”)</td>
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<tr>
<td>CN</td>
<td>China</td>
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<tr>
<td>COVID-19</td>
<td>coronavirus disease 2019</td>
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<td>D</td>
<td>total debt</td>
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<td>DAR</td>
<td>debt-at-risk</td>
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<tr>
<td>DSR</td>
<td>debt service ratio</td>
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<tr>
<td>EBIT</td>
<td>earnings before interest and taxes</td>
</tr>
<tr>
<td>EBITDA</td>
<td>earnings before interest, taxes, depreciation, and amortization</td>
</tr>
<tr>
<td>HK</td>
<td>Hong Kong, China</td>
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<tr>
<td>ICR</td>
<td>interest coverage ratio</td>
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<tr>
<td>IE</td>
<td>interest expense</td>
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<tr>
<td>KH</td>
<td>Cambodia</td>
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<td>LA</td>
<td>Lao PDR</td>
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<tr>
<td>LSTD</td>
<td>loans and short-term debt</td>
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<tr>
<td>MM</td>
<td>Myanmar</td>
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<tr>
<td>MSME</td>
<td>micro, small, and medium enterprises</td>
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<tr>
<td>MY</td>
<td>Malaysia</td>
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<tr>
<td>NACE</td>
<td>Nomenclature of Economic Activities</td>
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<td>NAIC</td>
<td>North American Industry Classification System</td>
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<tr>
<td>NFC</td>
<td>non-financial corporate</td>
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<tr>
<td>Plus-3</td>
<td>China (including Hong Kong), Japan, Korea</td>
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<tr>
<td>PH</td>
<td>Philippines</td>
</tr>
<tr>
<td>QA</td>
<td>quick assets</td>
</tr>
<tr>
<td>SG</td>
<td>Singapore</td>
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<tr>
<td>SIC</td>
<td>US Standard Industrial Classification</td>
</tr>
<tr>
<td>TH</td>
<td>Thailand</td>
</tr>
<tr>
<td>VN</td>
<td>Vietnam</td>
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I. Introduction

1. Corporate credit risks have risen over the past two years, in an environment of rising interest rates amid downside risks to the growth outlook. In this context, the aim of this study is to assess the risks to and vulnerabilities of non-financial corporates (NFCs) in ASEAN+3 economies, to determine appropriate policy responses to safeguard financial stability and promote economic growth. In support, this background paper undertakes extensive empirical analysis to inform the preparation of policy position paper AMRO (2024) by estimating firm debt-at-risk (DAR) across regional economies. As a by-product, this project also assesses the adequacy of firm financial reporting and the ready availability and accessibility of such information to conduct macro-financial surveillance, and consequent areas for improvement.

2. Where available, the richness of the reported information allows the analysis to be undertaken from various perspectives. Specifically, the ability of the NFC sector to service its debt is considered by economy, type of firm, and industry, from before the COVID-19 pandemic up to the latest full-year period, 2022. Firm debt is also decomposed into short- and long-term tenors to assess their vulnerability to rollover risks. In addition to determining the sufficiency of annual earnings to cover firms’ debt obligations (interest expense and loan repayment), the adequacy of their highly liquid asset buffers to cover these liabilities is also taken into account in instances where earnings alone are insufficient.

3. However, the coverage of the corporate database used in this exercise is not exhaustive. It does not capture the entire universe of NFCs in the ASEAN+3 region. Further, the sample used in this study is a subset of the reported NFCs in that it only includes firms—either listed, delisted, or unlisted—that report the requisite financial indicators for estimating DAR. Hence the results may not fully reflect the risks to the NFC sector, which are likely to be on the downside given the data gap in the micro, small, and medium enterprise (MSME) category, many of which were severely hit by the pandemic (Choo and Oeking 2021).

4. The findings highlight that both the region’s NFC debt and their vulnerabilities have risen in the intervening period since before the COVID-19 pandemic. At the aggregate level, firm risks vary widely across ASEAN+3 economies, firm types, and industries:

- Firm DAR as a percentage of GDP is up from pre-pandemic levels in many economies—largely driven by those in both the listed and unlisted categories and quite widely dispersed across industries.

- When liquidity buffers on firm balance sheets are applied, remaining DAR as a percentage of GDP declines noticeably across economies but repayment vulnerabilities remain high in some.

- Scenario analyses applying shocks to interest rates and earnings underscore the sensitivities of already-vulnerable NFC sectors among Plus-3 and ASEAN.

Importantly, wide data gaps across economies, firm types and/or industries might be obscuring other NFC vulnerabilities. In this regard, the findings in this report should be viewed as broader trends rather than any definitive conclusion about the risks that NFCs pose to financial stability in the region.
The rest of the paper is organized as follows. Section II describes the methodology and data employed in the exercise. Section III presents and analyzes the results, followed by a simple stress testing exercise in Section IV. Section V summarizes the findings.

II. Method and Data

A. Debt-at-Risk Metrics

Solvency risk metrics and thresholds are applied to estimate DAR for individual firms across the ASEAN+3 region, for which requisite financial information is available. Consistent with the methodology adopted in Ho and Ong (2022), the following indicators are estimated for individual firms:

- **Interest coverage ratio (ICR)**, which is the ratio of earnings before interest and taxes of firm $i$ at time $t$ ($EBIT_{it}$) relative to interest expense during the same period ($IE_{it}$). This indicator measures the ability of a firm to pay its interest expense on outstanding debt with its earnings during a given period. A lower ICR typically indicates a higher risk of insolvency:

  \[
  ICR_{it} \equiv \frac{EBIT_{it}}{IE_{it}}. 
  \]

- **Debt service ratio (DSR)**, which is the ratio of earnings before interest, taxes, depreciation and amortization of firm $i$ at time $t$ ($EBITDA_{it}$) relative to interest expense ($IE_{it}$) and principal on loans and short-term debt at time $t-1$, due at time $t$ ($LSTD_{t-1}$). It measures the ability of a firm to use its operating income to repay all its debt obligations. A lower DSR typically indicates a higher risk of insolvency:

  \[
  DSR_{it} \equiv \frac{EBITDA_{it}}{LSTD_{it-1} + IE_{it}}. 
  \]

The firms in the sample are then placed in various buckets based on their respective ICRs and DSRs. They comprise the following:

- **ICR buckets**,
  - $ICR < 0$
  - $0 \leq ICR < 1.25$
  - $1.25 \leq ICR < 3.00$
  - $3.00 \leq ICR < 4.25$
  - $4.25 \leq ICR < 8.50$
  - $8.50 \leq ICR$

- **DSR buckets**,  
  - $DSR < 0$
  - $0 \leq DSR < 1.0$
  - $1.0 \leq DSR < 2.0$
  - $2.0 < DSR$
where the ICR buckets broadly follow Damodaran’s (2016) classifications, which assign synthetic ratings based on each firm’s ICRs. Firms with ICRs lower than 1.25 are the equivalent of Standard & Poor's ratings of “CCC” and below. Separately, firms with DSRs lower than 1.0 are generally considered to be facing high solvency risks because they are not generating sufficient earnings to meet their debt service and repayment obligations; a DSR score of 2.0 or higher is considered healthy as a general rule of thumb.

8. **DAR is defined as the debt of financially stressed borrowers.** It does not necessarily correspond directly to nonperforming loans; rather, it is the debt that could come under strain or could potentially become nonperforming, and is defined as follows:

\[
DAR_{it} \equiv \frac{\sum_i S_i D_{it}}{\sum_i D_{it}},
\]

where, \(D_i\) is the total debt of firm \(i\) at time \(t\); and \(S_i = 1\) if ICR < 1.25 or DSR < 1.0, and 0 otherwise.

9. **Where firm earnings alone may be insufficient to repay their short-term obligations (interest and maturing debt), their quick assets (cash or cash equivalents) are included as additional resources.** Per equations (1) and (2), the augmented resources at time \(t\) would be respectively defined as follows:

\[
(1) \quad ICR_{it} \equiv \frac{EBIT_{it} + QA_{it}}{IE_{it}}
\]

\[
(2) \quad DSR_{it} \equiv \frac{EBITDA_{it} + QA_{it}}{LSTD_{it-1} + IE_{it}}
\]

where, \(QA_{it}\) is the quick assets of firm \(i\) at time \(t\).

**B. Firm Financial Information and Economic Statistics**

10. **The data used in this report comprise selected items from the reported financial statements of active NFCs in the ASEAN+3 region and corresponding macroeconomic data.** Requisite indicators for estimating ICR and DSR are sourced from the Orbis database by Moody’s Analytics, while economic data are available from national authorities via Haver Analytics. On average, the data used in this paper represent about 80 percent of NFC debt in economies where the aggregates are reported by the Bank for International Settlements (BIS). The data cut-off date for this study is October 31, 2023.

11. **In this study, the firms in the sample are classified in two ways.** Specifically, they are grouped by:

- **Firm type.** Consistent with Orbis, firms are categorized as either “listed,” “delisted,” or “unlisted”:
  - Listed firms are selected based on country of domicile, that is, firms that are incorporated in a specific country irrespective of which domestic or overseas stock exchange it is listed on.
  - Delisting of firms from a stock exchange could be voluntary or mandatory. Firms could opt to go private or fail to meet the exchange’s requirements. Delisting
could be perceived as a sign of financial trouble within a firm, with adverse implications for its future performance.

- Given the interest in the performance of MSMEs during the COVID-19 pandemic and the subsequent recovery period, we further separate the firms in the “unlisted” category into “MSME” and “other” sub-groups. The characteristics that typically define MSMEs include the number of employees, revenue amounts and/or asset size, but for the purpose of this project, any unlisted firm that fulfills at least one out of three aforementioned conditions is defined as an MSME (Appendix I).

### Industry

Firms are grouped according to their business functions, mapping the Orbis industry classifications to international codes such as Nomenclature of Economic Activities (NACE) 1.1, US Standard Industrial Classification (SIC), North American Industry Classification System (NAIC) *(Bureau van Dijk)*. The outcome is that the sample firms are consolidated into the following 11 sectors (Appendix II):

- Agriculture
- Business services
- Manufacturing, industrial, and machinery
- Property and construction
- Public administration, education, and health social services
- Raw materials (such as chemicals, glass, metal, rubber etc.)
- Retail, wholesale, and others
- Technology, computer, communications, and media
- Transport
- Utilities and waste management
- Others

12. **However, there are significant data gaps in the NFC sectors across economies, notably in relation to unlisted firms.** This situation is not surprising given that there is no regulatory requirement that these firms publish their financial information. Consequently, the sample size of unlisted firms may be significantly smaller relative to their actual numbers, because the requisite information for estimating DAR is not published by many of them. To maximize usable data points, the requisite series in the Orbis database are “cleaned” for consistency, outliers, and missing observations (Appendix III). Even so, the extent of any debt problem across reporting firms may be obscured—for instance, any debt restructuring that allows interest and/or principal payments to be postponed would not be immediately obvious from the published data.

13. **The usable dataset reflects the “imbalances” inherent in any cross-country analysis when assessing the health of the region’s NFC sector.** Specifically:

- Not all firms report the requisite indicators for estimating ICR and DSR (equations 1 and 2). For example, there are only a handful or fewer firms in Brunei, Cambodia, and Lao PDR that publish the requisite indicators, while only the listed firms in Indonesia and Myanmar report sufficient information for this exercise (Figure 1).

- The lack of financial information on unlisted firms in some economies could bias aggregate comparisons in favor of those where only listed company data are made public, given the relative weakness of MSMEs within the former group of firms. For example, large numbers of unlisted firms in Japan, Korea, Thailand, and Vietnam
publish their financials, while only a few in the other economies report theirs or not at all. Even in the reporting group of economies, the relative proportions of unlisted firms (and consequently MSMEs) for which information is available may only be a fraction of the actual numbers within the respective economies.

- There is some difficulty in differentiating MSMEs within the group of unlisted firms. For example, unlisted firms clearly represent a very high proportion of business enterprises in the Thai economy but few in Thailand based on official definitions. The variation in industry coverage appears to capture the key industries across economies but here again, the sample sizes vary widely.

**Figure 1. ASEAN+3: Share of Firms in Sample by Economy, 2022**

(Percent)

**By Type**

**By Industry**

Sources: Orbis; and AMRO staff calculations.

Note: The count includes firms with sufficient financial information to calculate ICR or DSR. BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.

### III. Results and Analysis

14. An overview of firm DAR from 2018 to 2022 reveals clear patterns across economies, firm types, and industries. The COVID-19 pandemic introduced distortions in 2020, largely because of the sharp contractions in GDP across the board, but also because
of the increased indebtedness of firms, as some were forced to borrow to supplement working capital while others took advantage of ultra-low interest rates to borrow longer term (AMRO 2024). More specific and differentiated observations may be teased out of the DAR analyses, notably:

- **The share of reporting firms posting losses and/or reduced profits appears to have risen in many economies, across firm types, and industries** (Figure 2). The share of DAR firms, as measured by the ICR, has generally increased over time. In the majority of the ASEAN+3 economies, shares peaked during the pandemic and then moderated. Meanwhile, the share of DSR DAR firms has risen more in the Plus-3 than ASEAN-5 economies. From another perspective, the share of ICR DAR firms have generally trended upward across firm types and industries (Figures 3 and 4); the share of DSR DAR firms appear to have ticked up in 2022 among listed firms but stabilized across the other firm types; DSR DAR has generally trended up across industries post-pandemic.

- **Firm DAR as a percentage of GDP is up from 2018 in many ASEAN+3 economies albeit down from pandemic peaks** (Figure 5). In particular, firm debt has risen sharply from 240 to 280 percent of GDP in Hong Kong, and to more than 100 percent of GDP in Korea and Thailand in 2022. However, it appears to be lower in 2022 in Indonesia, Malaysia, and Singapore compared to the pre-pandemic period. Correspondingly, ICR DAR and DSR DAR have risen sharply in the former group of economies but have fallen quite steeply in the latter group since the pandemic.

- **Firm DAR estimated as percentages of total sample assets and debt reveals similar yet somewhat differentiated perspectives** (Figure 5). Given existing data gaps and potential biasness when comparing across economies, firm DAR is also separately standardized by own assets and debt:
  - When standardized by total assets, the latest ICR DAR is highest for Vietnam, Thailand, and Korea, and lowest for China, while DSR DAR is highest for Korea and China (depending on whether EBIT or EBITDA is used). To address any concern about bias, liquid asset buffers of individual firms are added to earnings to assess DAR.
  - When measured against total debt, the latest ICR DAR is highest for Vietnam, followed by Korea and Thailand. However, DSR DAR is similarly high across several ASEAN and Plus-3 economies. To address any concern about bias, firm DAR in each economy is also grouped and assessed by firm type for transparency.

- **Firm DAR is underpinned by those in both the listed and unlisted categories** (Figure 6; Appendix IV, Appendix Figure 2; and Appendix V, Appendix Figure 3).

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2 Consistent with the plethora literature on the relationships between credit, GDP, and financial stability (Borio and Drehmann 2009; Drehmann and others 2010; Drehmann, Borio, and Tsatsaronis 2012; Drehmann and Tsatsaronis 2014; Drehmann and Yetman 2021; and IMF Global Financial Stability Reports), as well as financial depth, access, and stability (for example, Sahay and others 2015), we use GDP as the key denominator and scaling factor for economy size and ability to absorb shocks (Barajas and others 2021).

3 There is only one firm in the Brunei sample (Appendix III, Appendix Table 3).
Notably, ICR DAR is largest as a proportion of GDP among listed firms and MSMEs, while DSR DAR is highest among listed and other unlisted (non-MSME) firms. These trends are unsurprising, given that listed firms are by far the most comprehensively covered in the sample and the largest in terms of size in the majority of economies (Appendix III, Appendix Tables 3 and 4), while unlisted firms are well-represented in the sample by large economies (e.g., Japan and Korea among the Plus-3, and by Thailand, the Philippines and Vietnam among ASEAN).

- **Firm DAR is more dispersed across industries** (Figure 7). In 2022, ICR DAR is highest as a percentage of GDP in business services (e.g., Hong Kong, Thailand, Vietnam); manufacturing (e.g., Korea, Thailand, Vietnam); property and construction (e.g., Korea, Thailand, Vietnam); raw materials (e.g., Hong Kong); transport (e.g., Hong Kong, Korea, Thailand); and utilities (Korea) (Appendix VI, Appendix Figure 4; and Appendix VII, Appendix Figure 5). DSR DAR is largest as a percentage of GDP for manufacturing (e.g., Japan, Korea); property and construction (e.g., Hong Kong, Korea, Singapore, Thailand, Vietnam); raw materials (e.g., Hong Kong, Korea); and others (e.g., China, Hong Kong).
Figure 2. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Economies, 2018–22 (Percent)

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 3. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Firm Types, 2018–22 (Percent)

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 4. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Industries, 2018–22 (Percent)

ICR

Sources: Orbis; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 5. ASEAN+3: Firm Debt-at-Risk across Economies, 2018–22

**Percent of GDP**

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: The large discrepancy in China’s total firm debt to GDP between ICR and DSR estimates is attributable to the much larger number of firms with short-term debt that are not reporting interest expense—particularly so among unlisted firms—and are hence captured in the latter but not the former. BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 5. ASEAN+3: Firm Debt-at-Risk across Economies, 2018–22
(Continued)

Percent of Total Sample Assets

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: The large discrepancy in China’s total firm debt to GDP between ICR and DSR estimates is attributable to the much larger number of firms with short-term debt that are not reporting interest expense—particularly so among unlisted firms—and are hence captured in the latter but not the former. BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 5. ASEAN+3: Firm Debt-at-Risk across Economies, 2018–22
(Continued)

Percent of Total Sample Debt

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: The large discrepancy in China’s total firm debt to GDP between ICR and DSR estimates is attributable to the much larger number of firms with short-term debt that are not reporting interest expense—particularly so among unlisted firms—and are hence captured in the latter but not the former. BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 6. ASEAN+3: Firm Debt-at-Risk across Firm Types, 2018–22 (Percent of GDP)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 7. ASEAN+3: Firm Debt-at-Risk across Industries, 2018–22
(Percent of GDP)

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
15. **Creditor confidence in the economy is critical in ensuring that they continue to provide financing to the NFC sector.** Unsurprisingly, DSR DAR levels are much higher across the region compared to ICR DAR, when measured as a percentage of GDP. These differences suggest that more firms would have difficulty repaying their short-term loans out of earnings compared to simply servicing their interest expenses. In other words, firms would have to draw down their assets to repay debt if they are unable to roll over the latter. Consequently, when firms’ cash and cash equivalents—assets that can be quickly realized in the event of urgent need—are taken into account:

- **The share of remaining DAR firms falls significantly but that of still at-risk firms makes up a not insignificant portion** (Figure 8). The share of ICR DAR firms drops significantly, from between 40–60 percent to between 10–20 percent, albeit still particularly elevated in Lao PDR, Myanmar, and Thailand, at between 25-50 percent in 2022; the share of DSR DAR firms remains very high across most economies. The share of remaining DAR firms is highest among the delisted and other unlisted groups, and smallest among the listed one (Figure 9). Separately, the share of remaining DSR DAR firms is highest among the “agriculture,” “manufacturing,” “raw materials,” “technology” and miscellaneous “others” industries, but firms in the “business services” and “public administration” industries appear to be able to put more liquidity toward covering their principal repayments than others (Figure 10).

- **Remaining DAR as a percentage of GDP also declines noticeably across economies but repayment vulnerabilities remain** (Figure 11). There appears to be sufficient liquidity on firm balance sheets to cover their interest obligations in most economies, as evidenced by their ICRs; the obvious exceptions are Korea, Thailand, and Vietnam. However, firms in some economies are vulnerable if they are required to repay their short-term debt, as evidenced by the DSRs, particularly in Hong Kong, Japan, Korea, Singapore, Thailand, and Vietnam.

- **The debt of both listed and unlisted firms are still at-risk after liquidity buffers are considered—although the aggregate amounts are small relative to total ASEAN+3 GDP, they vary by economy** (Figure 12). Remaining ICR DAR is relatively small across firm types and DSR DAR is slightly larger, but below 5 percent of GDP. Aggregate DSR DAR of firms in the unlisted “other” category fell sharply between 2021 and 2022, likely driven by developments in China (Appendix VIII, Appendix Figure 6; and Appendix IX, Appendix Figure 7). Vulnerabilities across firm types vary by economy—DSR DAR is highest for listed firms in Hong Kong, Japan, Korea, Singapore, and Thailand; for delisted firms in Malaysia and Singapore, and MSMEs in Korea and Vietnam; and for unlisted “other” firms in Hong Kong and Thailand.

- **Firms in several industries are largely able to service their debt and repay their short-term obligations and remaining aggregate DAR is relatively small in GDP terms, except for the miscellaneous group, “others”** (Figure 13). Firms in the “others” category had remaining DSR DAR of between 10–15 percent of GDP before 2022, likely driven by China’s corresponding DSR DAR of about 20 percent of GDP (Appendix X, Appendix Figure 8; and Appendix XI, Appendix Figure 9). At the economy level, remaining DSR DAR is about 10–20 percent in the “manufacturing, industrial, and machinery” industry in Korea, Thailand, and Vietnam, and the “retail, wholesale and others” industry in Thailand; and Korea’s “property and construction”
industry. The “transportation” industry appears most vulnerable, with almost all economies having remaining ICR DAR even after liquidity buffers are applied, and DSR DAR of up to about 5 percent of GDP.

Figure 8. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Economies, Taking into Account Highly Liquid Assets, 2018–22 (Percent)

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 9. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Firm Types, Taking into Account Highly Liquid Assets, 2018–22 (Percent)

Sources: Orbis; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 10. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Industries, Taking into Account Highly Liquid Assets, 2018–22 (Percent)

ICR

<table>
<thead>
<tr>
<th>Industry</th>
<th>ICR &lt; 0</th>
<th>0 &lt;= ICR &lt; 1.25</th>
<th>1.25 &lt;= ICR &lt; 3.00</th>
<th>3.00 &lt;= ICR &lt; 4.25</th>
<th>4.25 &lt;= ICR &lt; 8.50</th>
<th>ICR &gt;= 8.50</th>
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<tr>
<td>2018</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DSR (EBIT)

<table>
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<tr>
<th>Industry</th>
<th>DSR &lt; 0</th>
<th>0 &lt;= DSR &lt; 1.0</th>
<th>1.0 &lt;= DSR &lt; 2.0</th>
<th>DSR &gt;= 2.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DSR (EBITDA)

<table>
<thead>
<tr>
<th>Industry</th>
<th>DSR &lt; 0</th>
<th>0 &lt;= DSR &lt; 1.0</th>
<th>1.0 &lt;= DSR &lt; 2.0</th>
<th>DSR &gt;= 2.00</th>
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<tr>
<td>2021</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2022</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: Orbis; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 11. ASEAN+3: Firm Debt-at-Risk across Economies, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 12. ASEAN+3: Firm Debt-at-Risk across Firm Types, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP)

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 13. ASEAN+3: Firm Debt-at-Risk across Industries, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
IV. Extension: Scenario Analysis of Interest Rate and Earning Shocks

16. Importantly, the amount of debt with ICR and DSR ratios in the buckets just above the DAR thresholds is not insignificant, even after liquidity buffers are included. Hence, it is important to be able to identify risks to NFC soundness to facilitate the formulation of mitigation strategies. Moreover, the most recent available firm data are as of end-2022 and adverse developments in the form of interest rate hikes and slower than initially forecast growth (AMRO 2023a and 2023b) have already come to pass to some extent. In this regard, simple shocks are applied to key items on firms’ financial statements as of end-2022 to assess their resilience (Table 1), specifically:

- **Increases in firm borrowing costs.** Given high and rising interest rates globally, including in the ASEAN+3 region (Figure 14), the cost of financing for firms has been increasing and manifesting in the form of higher interest expense in their Profit & Loss. For the purpose of this exercise, interest rate shocks of 2, 4, and 6 percentage points are applied to all firms’ average interest rates.

- **Reductions in the availability of liquid assets.** As interest rates rise, the mark-to-market value of firms' bond holdings concurrently falls, reducing the liquidity buffers in the event that they need to be realized to repay maturing debt. In this regard, “haircuts” of 5.2, 9.5, and 13.0 percent are imposed on the cash and cash equivalents item on the balance sheets of listed and delisted, corresponding respectively to the interest rate shocks described above. It is assumed that only listed and delisted firms hold bonds in their portfolios, amounting to one-third of the cash or cash equivalent total—it is unlikely that smaller (unlisted) firms, and especially MSMEs, would invest in bonds given the difficulties they regularly face in obtaining financing. Haircuts are based on more liquid 10-year bonds paying coupons at the end of each year over the tenor of the bonds.

- **Reductions in firm earnings.** Any slowdown in economic growth is likely to feed through to firm revenues and consequently, earnings (ECB 2007; Konchitchki and Patatoukas 2014; NASDAQ 2015), reducing their ability to service interest payments and make debt repayments. With risks to regional growth tilted on the downside (Figure 15), the EBIT and EBITDA across firms are each shocked by –10, –30, and –50 percent.

---

4 Foley (2023) describes how Silicon Valley Bank was forced to realize losses on its bond portfolio as interest rates rose when it had to sell those bonds to cover depositor withdrawals.
### Table 1. ASEAN+3 Corporate Debt-at-Risk: Scenario Analysis Shocks

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Separate Shocks</th>
<th>Concurrent Shocks</th>
<th>Individual Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interest Rate (Percentage points)</td>
<td>Value of Cash and Cash Equivalents for Listed Firms Only (Percent)</td>
<td>EBIT and/or EBITDA (Percent)</td>
</tr>
<tr>
<td>1</td>
<td>+2.0</td>
<td></td>
<td>−5.2</td>
</tr>
<tr>
<td>2</td>
<td>+4.0</td>
<td></td>
<td>−9.5</td>
</tr>
<tr>
<td>3</td>
<td>+6.0</td>
<td></td>
<td>−13.0</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>−10.0</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>−30.0</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>−50.0</td>
</tr>
</tbody>
</table>

Source: AMRO staff assumptions.

Note: For interest rate shocks, it is assumed that one third of liquid assets of listed firms comprise bonds; the baseline assumes that all bond tenors are 10 years, with annual coupon payments and face value at maturity equivalent to the current year’s interest expense and total outstanding debt, respectively.

### Figure 14. Selected ASEAN+3, United States and Euro Area: Policy Interest Rates (Percent)

![Figure 14](image1.png)

Source: National authorities via Haver Analytics.

Note: Data are up to October 31, 2023.

### Figure 15. Selected ASEAN+3: Contribution to Real GDP Growth (Percent, year-over-year; percentage points)

![Figure 15](image2.png)

Sources: Orbis; and AMRO staff calculations.

17. The scenario analysis results suggest that shocks to interest rates and earnings could have markedly affected the soundness of firm balance sheets since the end of 2022. Using end of 2022 data as baseline, findings are that:

- **The more vulnerable NFC sectors are the most exposed to interest rate shocks.** Specifically, firms in Hong Kong, Japan, Korea, and Thailand would be most susceptible (Figure 16). ICR DAR grows by up to almost 20 percent of GDP (Thailand) when interest rates rise by an additional 2 percentage points; by up to about 35 percent of GDP (Hong Kong, Thailand) when rates are 4 percentage points higher; and by up to 50 percent of GDP (Hong Kong) when rates are up by 6 percentage points. DAR could increase substantially even in NFC sectors where it has been declining (Malaysia, Philippines, Singapore). Trends in changes to firm DSR DAR relative to GDP are similar to those of ICR DAR for Hong Kong and Thailand but are relatively larger for Malaysia when EBIT is used; they are larger for Hong Kong, Japan, and Korea when EBITDA is applied.
Haircuts to bonds under the “cash and cash equivalents” item could have substantial implications for listed firms. Based on the assumptions described above, the liquidity buffers among Hong Kong firms could be reduced by about 6–16 percent of GDP, by almost 4 percent of GDP among Japanese firms, and by about 2–2.5 percent of GDP among Korean and selected ASEAN firms (Figure 17). The effect would be to further expose listed firms in those economies to the threat of retrenchment by creditors. In contrast, any impact on delisted firms would be minimal, at less than 0.2 percent of GDP.

The NFC sectors that are most exposed to interest rate shocks would also be most negatively affected by separate and unrelated shocks to earnings, albeit in different order of importance. Earning declines of 30 and 50 percent would hit the ICR DAR of Thailand, Korea, and Malaysia hardest, by between 15–30 percent of GDP; declines of 10 percent would impact Korea, Thailand, and Vietnam most, by between 2–3 percent of GDP (Figure 18). A 50 percent shock to earnings would increase the DSR DAR of Hong Kong, Korea, Japan, and Singapore by the largest amounts, of between 11–52 percent of GDP, depending on the earnings metric used; earning reductions of 10 and 30 percent would affect Hong Kong and Thailand most, by up to 28 percent of GDP.

V. Summary and Caveats

There are clear trends in firm DAR across economies, firm types, and industries. Firstly, the share of reporting firms posting losses and/or lower profits has risen since 2018, in many economies and across firm types and industries. Correspondingly, firm debt as a percentage of GDP is generally higher, albeit down from the pandemic peak, as is their DAR. In contrast, debt is lower in 2022 than during the pre-pandemic period in several ASEAN economies, notably, in Indonesia, Malaysia, and Singapore, and their DAR has fallen as well. Firm DAR is largely driven by those in both the listed and unlisted categories and is distributed across industries, with “manufacturing,” “property and construction,” and “raw materials” posting the weakest ICRs and DSRs.

When firms’ liquidity buffers are taken into account, the resulting estimates underscore the importance of maintaining creditor confidence so that they continue to finance the NFCs. Even if firms’ liquid assets are fully applied to the repayment of short-term loans, the number of at-risk firms—largely among the unlisted ones—would still represent a not insignificant portion of the NFC sector. In most economies, firms have sufficient liquidity to cover their interest payments but some would struggle to repay their short-term debt if lenders were to pull out. The debt service requirements of the different firm types vary by economy, with listed firms most vulnerable to rollover risk in the advanced economies, while the unlisted ones in some emerging market economies appear most exposed. Firms across industries are generally able to cover most of their short-term debt, except for the “transportation” industry whose debt is at-risk across most economies even after liquidity buffers are applied.

Scenario analyses of firm profit and loss statements and balance sheets reveal the pressure points in the NFC sectors across economies. Shocks to interest rates would increase firm DAR in both selected Plus-3 (Hong Kong, Japan, Korea) and ASEAN economies (Malaysia, Philippines, Singapore, Thailand), as a percentage of GDP; corresponding haircuts to the liquidity buffers of listed firms in these economies would
reduce their capacity to cover debt repayments in the event that creditors were to refuse to renew maturing loans. Separately, firms in Hong Kong, Japan, Korea, and Thailand would be most vulnerable to any drop in earnings from an economic slowdown.

21. **Finally, the findings should take into account caveats to the data.** Not all firms are captured in the database, notably, the unlisted ones that are not required to publish their financial statements or that do not disclose detailed financial information. Even among reporting firms, any debt restructuring that allows interest and/or principal payments to be pushed back would not be immediately obvious from the published data. Hence, the extent of any debt problem in the NFC sector would not be fully captured; the results should be viewed as broad trends that provide a sense of the sector’s overall health, rather than definitive and complete findings on the soundness of the region’s large firms and MSMEs.
Figure 16. ASEAN+3: Change in Firm Debt-at-Risk across Economies Following Shocks to End-2022 Estimated Interest Rates (Percent of 2022 GDP)

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: ppts = percentage points. BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 17. ASEAN+3: Change in Cash and Cash Equivalents of Listed Firms Following Shocks to End-2022 Interest Rates (Percent of 2022 GDP)

Listed

Delisted

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: ppts = percentage points. BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Figure 18. ASEAN+3: Change in Firm Debt-at-Risk across Economies Following Shocks to End-2022 Earnings
(Percent of 2022 GDP)

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: Estimated debt-at-risk as of the end of 2022 for each economy is shown in parentheses along the X-axis. BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
## Appendix I. Identifying ASEAN+3 MSMEs

### Appendix Table 1. ASEAN+3 and International Organizations: MSME Definitions

<table>
<thead>
<tr>
<th>Institution / Member</th>
<th>Maximum Number of Employees</th>
<th>Maximum Revenues (Thousands of US dollars)</th>
<th>Maximum Assets (Thousands of US dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>African Development Bank</td>
<td>50</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Multilateral Investment Fund (MIF) – Inter-American Development Bank (IADB)</td>
<td>100</td>
<td>3,000</td>
<td>–</td>
</tr>
<tr>
<td>United Nations Development Programme</td>
<td>200</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>World Bank</td>
<td>250</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td>Brunei</td>
<td>100</td>
<td>3,698</td>
<td>2,219</td>
</tr>
<tr>
<td>Cambodia</td>
<td>100</td>
<td>–</td>
<td>1,000</td>
</tr>
<tr>
<td>China</td>
<td>3,000</td>
<td>42,943</td>
<td>57,257</td>
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<tr>
<td>Hong Kong</td>
<td>100</td>
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<td>12,807</td>
</tr>
<tr>
<td>Indonesia</td>
<td>100</td>
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<tr>
<td>Japan</td>
<td>300</td>
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<td>Myanmar</td>
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<td>Vietnam</td>
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<td>ASEAN+3 (Median)</td>
<td>200</td>
<td>12,018</td>
<td>2,219</td>
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</table>

Sources: Association of Southeast Asian Nations; Ecovis; van der Vaart and Gibson (2008); Government of Hong Kong; International Finance Corporation (2009); Korea Ministry of SMEs and Startups; Page (2016); Monetary Authority of Singapore; Philippines Senate Economic Planning Office; SME Corp Malaysia; SME Support Japan; The Office of SMEs Promotion Thailand; The Supreme People’s Court of the Socialist Republic of Vietnam; and AMRO staff compilations and calculations.

Note: Exchange rates for calculating US dollar amounts are as of end-Q4 2022.
Appendix II. Summary of Industry Classifications

Appendix Table 2. Mapping Orbis to International Industry Classifications

<table>
<thead>
<tr>
<th>Orbis Industry Classification</th>
<th>Reclassification Based on International Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, Horticulture &amp; Livestock</td>
<td>Agriculture</td>
</tr>
<tr>
<td>Banking, Insurance &amp; Financial Services</td>
<td>Business Services</td>
</tr>
<tr>
<td>Biotechnology and Life Sciences</td>
<td>Technology, Computer, Communications, and Media</td>
</tr>
<tr>
<td>Business Services</td>
<td>Business Services</td>
</tr>
<tr>
<td>Chemicals, Petroleum, Rubber &amp; Plastic</td>
<td>Raw Materials</td>
</tr>
<tr>
<td>Communications</td>
<td>Technology, Computer, Communications, and Media</td>
</tr>
<tr>
<td>Computer Hardware</td>
<td>Technology, Computer, Communications, and Media</td>
</tr>
<tr>
<td>Computer Software</td>
<td>Technology, Computer, Communications, and Media</td>
</tr>
<tr>
<td>Construction</td>
<td>Property and Construction</td>
</tr>
<tr>
<td>Food &amp; Tobacco Manufacturing</td>
<td>Manufacturing, Industrial, and Machinery</td>
</tr>
<tr>
<td>Industrial, Electric &amp; Electronic Machinery</td>
<td>Manufacturing, Industrial, and Machinery</td>
</tr>
<tr>
<td>Information Services</td>
<td>Technology, Computer, Communications, and Media</td>
</tr>
<tr>
<td>Leather, Stone, Clay &amp; Glass products</td>
<td>Raw Materials</td>
</tr>
<tr>
<td>Media &amp; Broadcasting</td>
<td>Technology, Computer, Communications, and Media</td>
</tr>
<tr>
<td>Metals &amp; Metal Products</td>
<td>Raw Materials</td>
</tr>
<tr>
<td>Mining &amp; Extraction</td>
<td>Raw Materials</td>
</tr>
<tr>
<td>Miscellaneous Manufacturing</td>
<td>Manufacturing, Industrial, and Machinery</td>
</tr>
<tr>
<td>Other</td>
<td>Others</td>
</tr>
<tr>
<td>Printing &amp; Publishing</td>
<td>Manufacturing, Industrial, and Machinery</td>
</tr>
<tr>
<td>Property Services</td>
<td>Property and Construction</td>
</tr>
<tr>
<td>Public Administration, Education, Health Social Services</td>
<td>Public Administration, Education, Health Social Services</td>
</tr>
<tr>
<td>Retail</td>
<td>Retail, Wholesale, and Others</td>
</tr>
<tr>
<td>Textiles &amp; Clothing Manufacturing</td>
<td>Manufacturing, Industrial, and Machinery</td>
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<tr>
<td>Transport Manufacturing</td>
<td>Manufacturing, Industrial, and Machinery</td>
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<tr>
<td>Transport, Freight &amp; Storage</td>
<td>Transport</td>
</tr>
<tr>
<td>Travel, Personal &amp; Leisure</td>
<td>Others</td>
</tr>
<tr>
<td>Utilities</td>
<td>Utilities and Waste Management</td>
</tr>
<tr>
<td>Waste Management &amp; Treatment</td>
<td>Utilities and Waste Management</td>
</tr>
<tr>
<td>Wholesale</td>
<td>Retail, Wholesale, and Others</td>
</tr>
<tr>
<td>Wood, Furniture &amp; Paper Manufacturing</td>
<td>Manufacturing, Industrial, and Machinery</td>
</tr>
<tr>
<td>NULL</td>
<td>Others</td>
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Source: AMRO staff compilations and classifications.
Appendix III. “Cleaning” the Data

Several steps are taken to “clean” the Orbis database by Moody’s Analytics used in this study so that they are fit for purpose. The corporate database in Orbis covers some 117 million firms in Asia, but not all firms publish sufficient information for debt-at-risk analysis. The cleaning process takes into account factors such as industries, reporting years, reporting format, reporting period, requisite financial items and associated missing values and outliers.

As a first step, firm coverage is determined. Specifically, data for the following are filtered and extracted:

- firms that operate in the NFC sector;
- firms that are available from 2018–22, to capture developments before, during, and right after the COVID-19 pandemic;
- financial statement items reported on a consolidated (as opposed to unconsolidated) basis.

Next, the timing of the reporting periods is standardized. Firms’ reporting periods across—or even within—countries typically vary and the information is converted to calendar years. In the Orbis database, a reporting year that runs until March of a particular year is assumed to belong to the previous calendar year, while a reporting year that runs from April of that year is assumed to represent that calendar year itself. The data are processed by calendar year for the purpose of this project as follows (Appendix Figure 3.1):

- The Q1 2022 data of firms whose reporting year ends in Q1 2022 are first removed from the reporting year;
- Then data for Q2–Q4 2021 (i.e., the first three quarters of the current reporting year) are stitched to the firms’ data for Q1 2021 (i.e., the last quarter of the previous reporting year) to derive the 2021 calendar year information.

For firms whose reporting year is the same as the calendar year (i.e., January to December), no action is required.

Appendix Figure 1. Adjusting Reporting Year Data to Calendar Year

Source: AMRO staff visualization.
Lastly, adjustments are also made to address missing values and outliers in the data. Specifically:

- **Missing data points.** Missing data points are treated differently depending on when they occur. Single time-series data points are replaced with the average values between previous and following years; missing single data points at the end of a time series are replaced with the values of the immediate previous year to capture information on firms that are reporting biennially.

- **Earnings.** Not all firms report EBITDA; EBIT tends to be more widely reported. Where the former is not published, EBIT is used to calculate the DSR for a separate set of results, with the caveat that the latter results would be more conservative given that depreciation and amortization amounts have been deducted from the earnings outturn.

- **Interest expense.** Some firms may report interest expense in their Profit & Loss statements but loans and debt may be missing from their balance sheets. Conversely, others may report loans and debt but not interest expense. In the case of the former, ICR would be calculated but not DSR, and vice-versa.

The resultant number of firms in the usable sample is substantially reduced from that in the database. Importantly, the cleaned dataset also reveals obvious gaps across economies, firm types, and industries (Appendix Tables 3 and 4).
## Appendix Table 3. ASEAN+3: Number of Sample Firms by Type and Metric

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Sources: Orbis and AMRO staff calculations.
Note: Blank cell means there is no firm in that particular category; "0" means there are firms in that category but there is insufficient information for estimating debt-at-risk. Firms are included in the number if they have sufficient information to estimate either their interest coverage ratios or debt service ratios.
### Appendix Table 4. ASEAN+3: Number of Sample Firms by Industry

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Sources: Orbis; and AMRO staff calculations.
Note: Blank cell means there is no firm in that particular category; “0” means there are firms in that category but there is insufficient information for estimating debt-at-risk. Firms are included in the number if they have sufficient information to estimate either their interest coverage ratios or debt service ratios.
Appendix IV. Firm Debt-at-Risk across ASEAN+3 Economies by Firm Type

Appendix Figure 2. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, 2018–22 (Percent of GDP)

Listed

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 2. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, 2018–22
(Percent of GDP)
(Continued)

Delisted

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 2. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, 2018–22
(Percent of GDP)
(Continued)

Unlisted: MSME

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 2. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, 2018–22 (Percent of GDP) (Continued)

Unlisted: Other

ICR

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</tr>
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DSR (EBIT)

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DSR (EBITDA)

<table>
<thead>
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<th>1.0 &lt;= DSR &lt; 2.0</th>
<th>DSR &gt;= 2.00</th>
</tr>
</thead>
</table>

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix V. Firm Debt-at-Risk across Firm Types for Individual ASEAN+3 Economies

Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)

Brunei

ICR

![ICR Graph]

DSR (EBIT)

![DSR (EBIT) Graph]

DSR (EBITDA)

![DSR (EBITDA) Graph]

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22 (Percent of GDP) (Continued)

Cambodia

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

China

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22 (Percent of GDP) (Continued)

Hong Kong

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Indonesia

ICR


0 2 4 6 8 10 12
2018 2019 2020 2021 2022

Listed
Delisted
Unlisted-MSME
Unlisted-Other

ICR < 0
0 <= ICR < 1.25
1.25 <= ICR < 3.00
3.00 <= ICR < 4.25
4.25 <= ICR < 8.50
ICR >= 8.50

DSR (EBIT)

0 2 4 6 8 10 12
2018 2019 2020 2021 2022

Listed
Delisted
Unlisted-MSME
Unlisted-Other

DSR < 0
0 <= DSR < 1.0
1.0 <= DSR < 2.0
DSR >= 2.0

DSR (EBITDA)

0 2 4 6 8 10 12
2018 2019 2020 2021 2022

Listed
Delisted
Unlisted-MSME
Unlisted-Other

DSR < 0
0 <= DSR < 1.0
1.0 <= DSR < 2.0
DSR >= 2.0

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22 (Percent of GDP)
(Continued)

Japan

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22 (Percent of GDP) (Continued)

Korea

ICR

![ICR chart]

DSR (EBIT)

![DSR (EBIT) chart]

DSR (EBITDA)

![DSR (EBITDA) chart]

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Lao PDR

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Malaysia

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22 (Percent of GDP) (Continued)

Myanmar

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Philippines

ICR

0  10  20  30  40  50
2018 2019 2020 2021 2022
Listed Delisted Unlisted-MSME Unlisted-Other

DSR (EBIT)

0  10  20  30  40  50
2018 2019 2020 2021 2022
Listed Delisted Unlisted-MSME Unlisted-Other

DSR (EBITDA)

0  10  20  30  40  50
2018 2019 2020 2021 2022
Listed Delisted Unlisted-MSME Unlisted-Other

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Singapore

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22 (Percent of GDP) (Continued)

Thailand

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22 (Percent of GDP) (Continued)

Vietnam

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix VI. Firm Debt-at-Risk across ASEAN+3 Economies by Industry

Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22

Agriculture

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Business Services

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Manufacturing, Industrial, and Machinery

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Property and Construction

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Public Administration, Education, and Health Social Services

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Raw Materials

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Retail, Wholesale, and Others

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Technology, Media, Computer, and Communications

ICR

Source: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Transport

ICR

![ICR Chart](chart1)

DSR (EBIT)

![DSR (EBIT) Chart](chart2)

DSR (EBITDA)

![DSR (EBITDA) Chart](chart3)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Utilities and Waste Management

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Others

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix VII. Firm Debt-at-Risk across Industries for Individual ASEAN+3 Economies

Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)

Brunei

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Cambodia

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

China

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Hong Kong

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Indonesia

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Japan

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Korea

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Lao PDR

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)
Malaysia

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Myanmar

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Philippines

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Singapore

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Thailand

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Vietnam

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix VIII. Firm Debt-at-Risk across ASEAN+3 Economies by Firm Type, with Liquidity Buffers

Appendix Figure 6. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)

Listed

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 6. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

**Delisted**

**ICR**

**DSR (EBIT)**

**DSR (EBITDA)**

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 6. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Unlisted: MSME

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 6. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Unlisted: Other

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix IX. Firm Debt-at-Risk across Firm Types for Individual ASEAN+3 Economies, with Liquidity Buffers

Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)

Brunei

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP)

(Continued)

Cambodia

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

China

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Hong Kong

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Indonesia

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Japan

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Korea

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Lao PDR

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Malaysia

**ICR**

**DSR (EBIT)**

**DSR (EBITDA)**

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Myanmar

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Philippines

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Singapore

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Thailand

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

**Vietnam**

**ICR**

**DSR (EBIT)**

**DSR (EBITDA)**

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix X. Firm Debt-at-Risk across ASEAN+3 Economies by Industry, with Liquidity Buffers

Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP)

Agriculture

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Business Services

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Manufacturing, Industrial, and Machinery

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Property and Construction

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Public Administration, Education, and Health Social Services

ICR

![ICR Chart]

DSR (EBIT)

![DSR (EBIT) Chart]

DSR (EBITDA)

![DSR (EBITDA) Chart]

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Raw Materials

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Retail, Wholesale, and Others

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Technology, Media, Computer, and Communications

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Transport

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP)
(Continued)

Utilities and Waste Management

**ICR**

**DSR (EBIT)**

**DSR (EBITDA)**

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Others

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.
Appendix XI. Firm Debt-at-Risk across Industries for Individual ASEAN+3 Economies, with Liquidity Buffers

Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)

Brunei

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Cambodia

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

China

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Hong Kong

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Indonesia

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Japan

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Korea

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Lao PDR

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Malaysia

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP)
(Continued)

Myanmar

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP)
(Continued)

Philippines

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Singapore

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Thailand

ICR

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22 (Percent of GDP) (Continued)

Vietnam

ICR

DSR (EBIT)

DSR (EBITDA)

Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.
References


