



Background Paper (PPP/24–02)

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

February 2024

Disclaimer: The findings, interpretations, and conclusions expressed in this material represent the views of the author(s) and are not necessarily those of the ASEAN+3 Macroeconomic Research Office (AMRO) or its member authorities. Neither AMRO nor its member authorities shall be held responsible for any consequence arising from the use of the information contained therein.

[This page is intentionally left blank]

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

Prepared by an AMRO team led by Li Lian Ong, and comprising Min Wei (both Macro-Financial Research Group) and Siang Leng Wong (Financial Surveillance)¹

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)

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

Contents

Abstract	i
Abbreviations	iv
I. Introduction.....	1
II. Method and Data.....	2
A. Debt-at-Risk Metrics.....	2
B. Firm Financial Information and Economic Statistics	3
III. Results and Analysis	5
IV. Extension: Scenario Analysis of Interest Rate and Earning Shocks	23
V. Summary and Caveats	25
Appendix I. Identifying ASEAN+3 MSMEs.....	29
Appendix II. Summary of Industry Classifications	30
Appendix III. “Cleaning” the Data.....	31
Appendix IV. Firm Debt-at-Risk across ASEAN+3 Economies by Firm Type.....	37
Appendix V. Firm Debt-at-Risk across Firm Types for Individual ASEAN+3 Economies.....	41
Appendix VI. Firm Debt-at-Risk across ASEAN+3 Economies by Industry.....	55
Appendix VII. Firm Debt-at-Risk across Industries for Individual ASEAN+3 Economies	66
Appendix VIII. Firm Debt-at-Risk across ASEAN+3 Economies by Firm Type, with Liquidity Buffers	80
Appendix IX. Firm Debt-at-Risk across Firm Types for Individual ASEAN+3 Economies, with Liquidity Buffers	84
Appendix X. Firm Debt-at-Risk across ASEAN+3 Economies by Industry, with Liquidity Buffers	98
Appendix XI. Firm Debt-at-Risk across Industries for Individual ASEAN+3 Economies, with Liquidity Buffers	109
References	123

Figures

Figure 1. ASEAN+3: Share of Firms in Sample by Economy, 2022.....	5
Figure 2. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Economies, 2018–22 ...	8
Figure 3. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Firm Types, 2018–22 ...	9
Figure 4. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Industries, 2018–22 ...	10
Figure 5. ASEAN+3: Firm Debt-at-Risk across Economies, 2018–22.....	11
Figure 6. ASEAN+3: Firm Debt-at-Risk across Firm Types, 2018–22	14
Figure 7. ASEAN+3: Firm Debt-at-Risk across Industries, 2018–22.....	15
Figure 8. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Economies, Taking into Account Highly Liquid Assets, 2018–22.....	17
Figure 9. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Firm Types, Taking into Account Highly Liquid Assets, 2018–22.....	18
Figure 10. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Industries, Taking into Account Highly Liquid Assets, 2018–22.....	19

Figure 11. ASEAN+3: Firm Debt-at-Risk across Economies, Taking into Account Highly Liquid Assets, 2018–22	20
Figure 12. ASEAN+3: Firm Debt-at-Risk across Firm Types, Taking into Account Highly Liquid Assets, 2018–22	21
Figure 13. ASEAN+3: Firm Debt-at-Risk across Industries, Taking into Account Highly Liquid Assets, 2018–22.....	22
Figure 14. Selected ASEAN+3, United States and Euro Area: Policy Interest Rates.....	24
Figure 15. Selected ASEAN+3: Contribution to Real GDP Growth.....	24
Figure 16. ASEAN+3: Change in Firm Debt-at-Risk across Economies Following Shocks to End-2022 Estimated Interest Rates	26
Figure 17. ASEAN+3: Change in Cash and Cash Equivalents of Listed Firms Following Shocks to End-2022 Interest Rates	27
Figure 18. ASEAN+3: Change in Firm Debt-at-Risk across Economies Following Shocks to End-2022 Earnings.....	28
Appendix Figure 1. Adjusting Reporting Year Data to Calendar Year.....	31
Appendix Figure 2. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, 2018–22	37
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22	41
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22	55
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22	66
Appendix Figure 6. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, Taking into Account Highly Liquid Assets, 2018–22	80
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22	84
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22.....	98
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22.....	109

Tables

Table 1. ASEAN+3 Corporate Debt-at-Risk: Scenario Analysis Shocks.....	23
Appendix Table 1. ASEAN+3 and International Organizations: MSME Definitions	29
Appendix Table 2. Mapping Orbis to International Industry Classifications.....	30
Appendix Table 3. ASEAN+3: Number of Sample Firms by Type and Metric.....	33
Appendix Table 4. ASEAN+3: Number of Sample Firms by Industry.....	35

Abbreviations

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

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.

5. **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

6. **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:

$$(1) \quad ICR_{it} \equiv \frac{EBIT_{it}}{IE_{it}}.$$

- **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:

$$(2) \quad DSR_{it} \equiv \frac{EBITDA_{it}}{LSTD_{it-1} + IE_{it}}.$$

7. **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 fulfils 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.

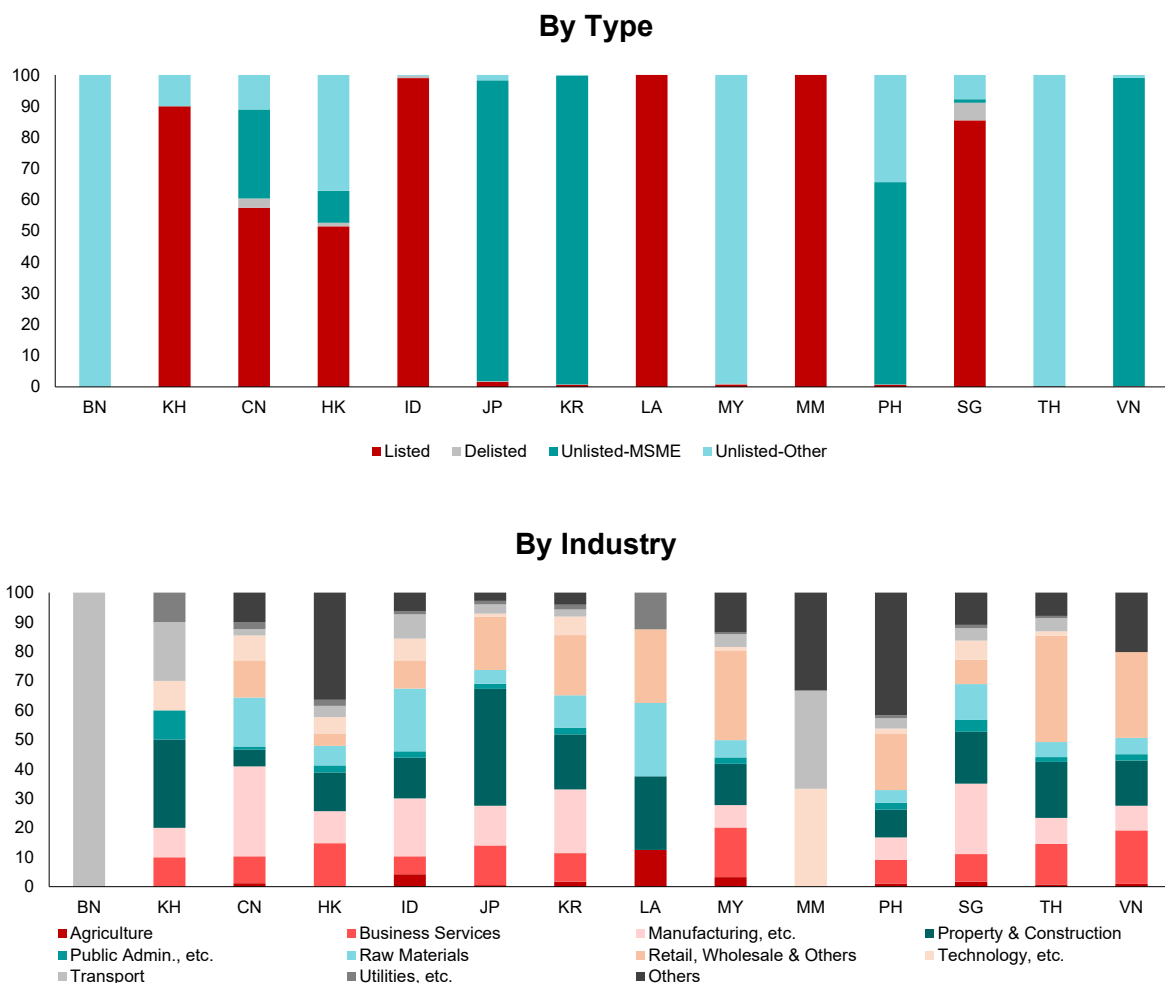
13. **The usable dataset reflects the “imbalances” inherent in any cross-country analysis when assessing the health of the region’s NFC sector.** Specifically:

- 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)



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).² 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).³ 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).

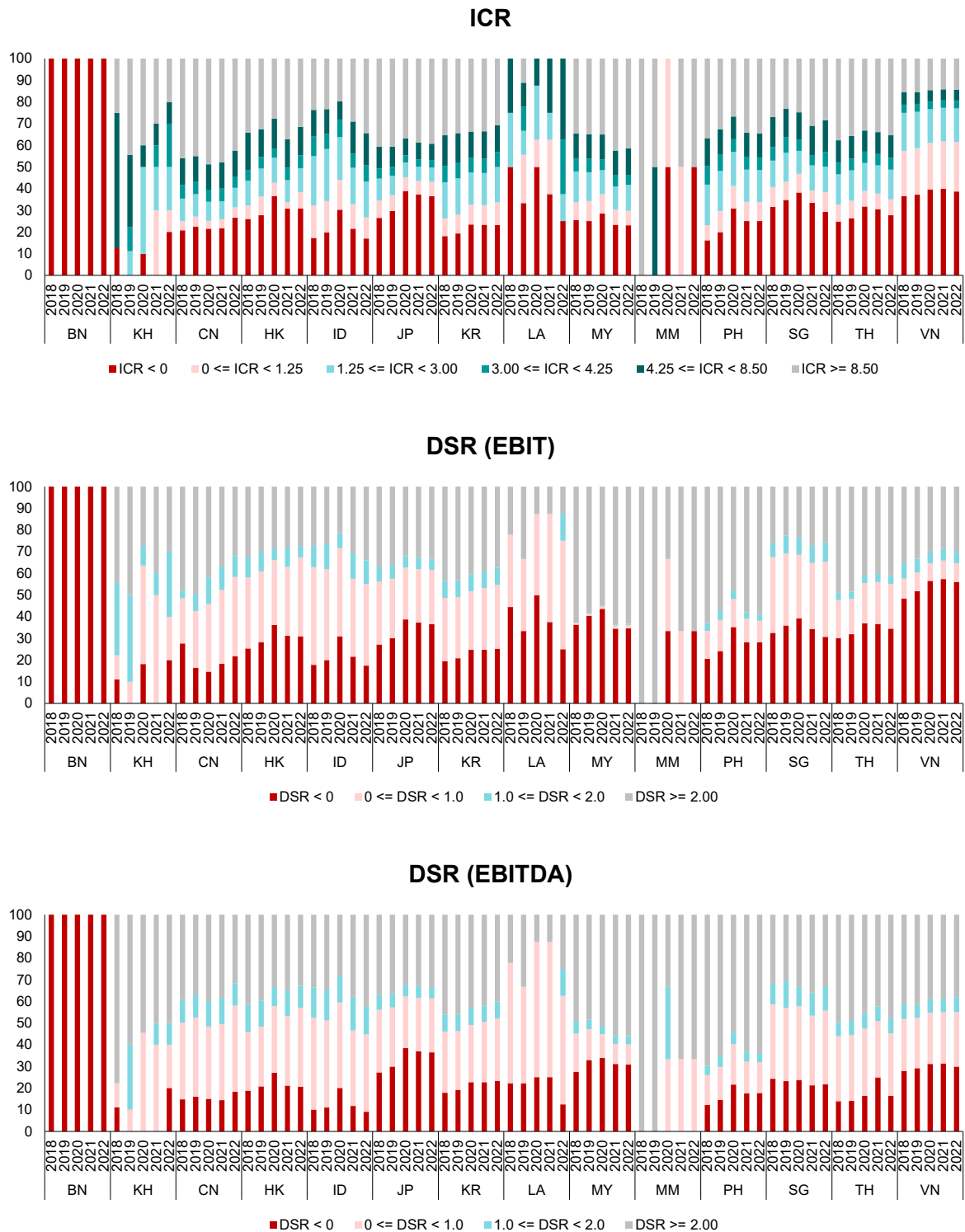
² Consistent with the plethora literature on the relationships between credit, GDP, and financial stability ([Borio and Drehmann 2009](#); [Drehmann and others 2010](#); [Drehmann, Borio, and Tsatsaronis 2012](#); [Drehmann and Tsatsaronis 2014](#); [Drehmann and Yetman 2021](#); and [IMF Global Financial 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).

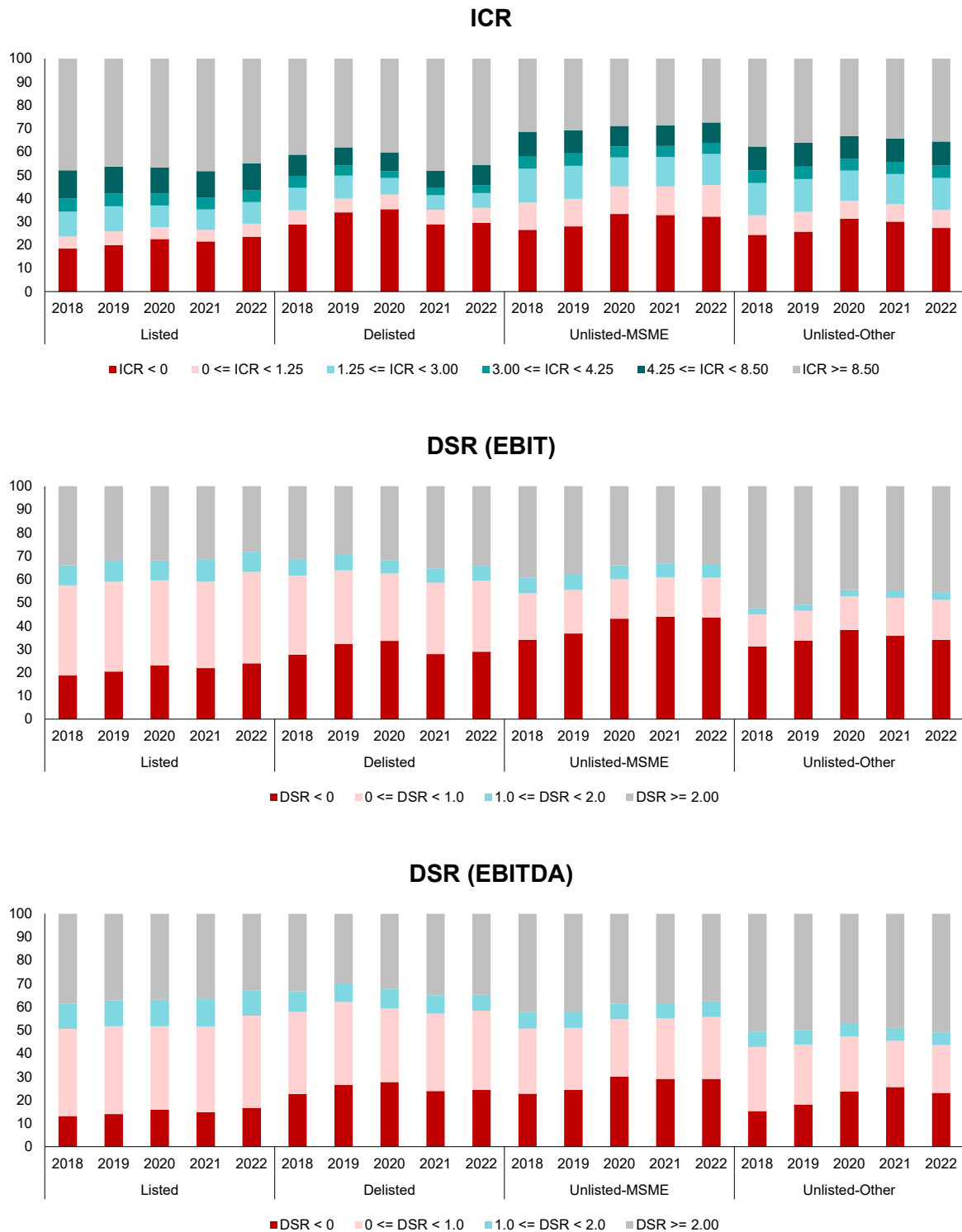
Figure 2. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Economies, 2018–22
(Percent)



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.

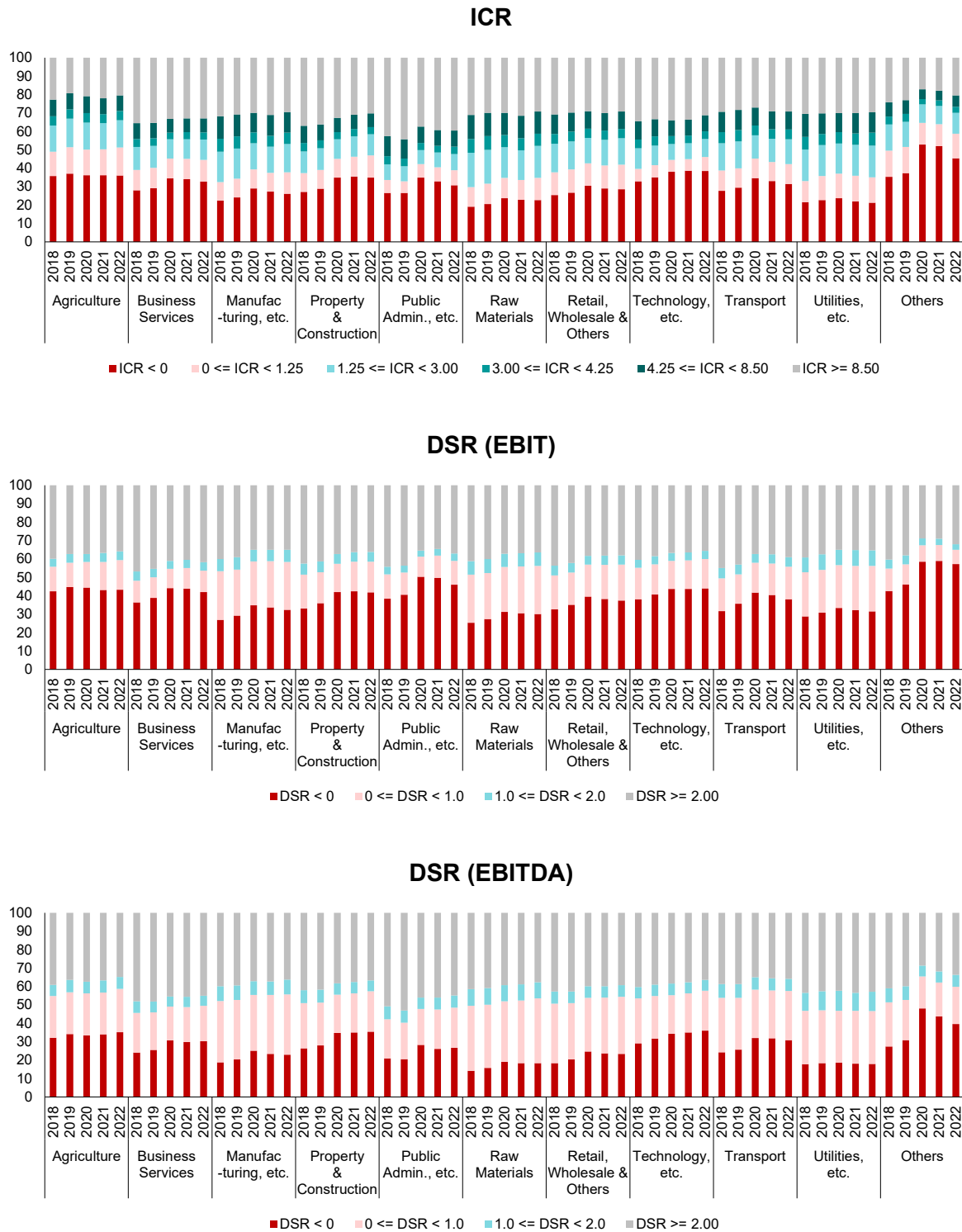
Figure 3. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Firm Types, 2018–22
(Percent)



Sources: Orbis; and AMRO staff estimates.

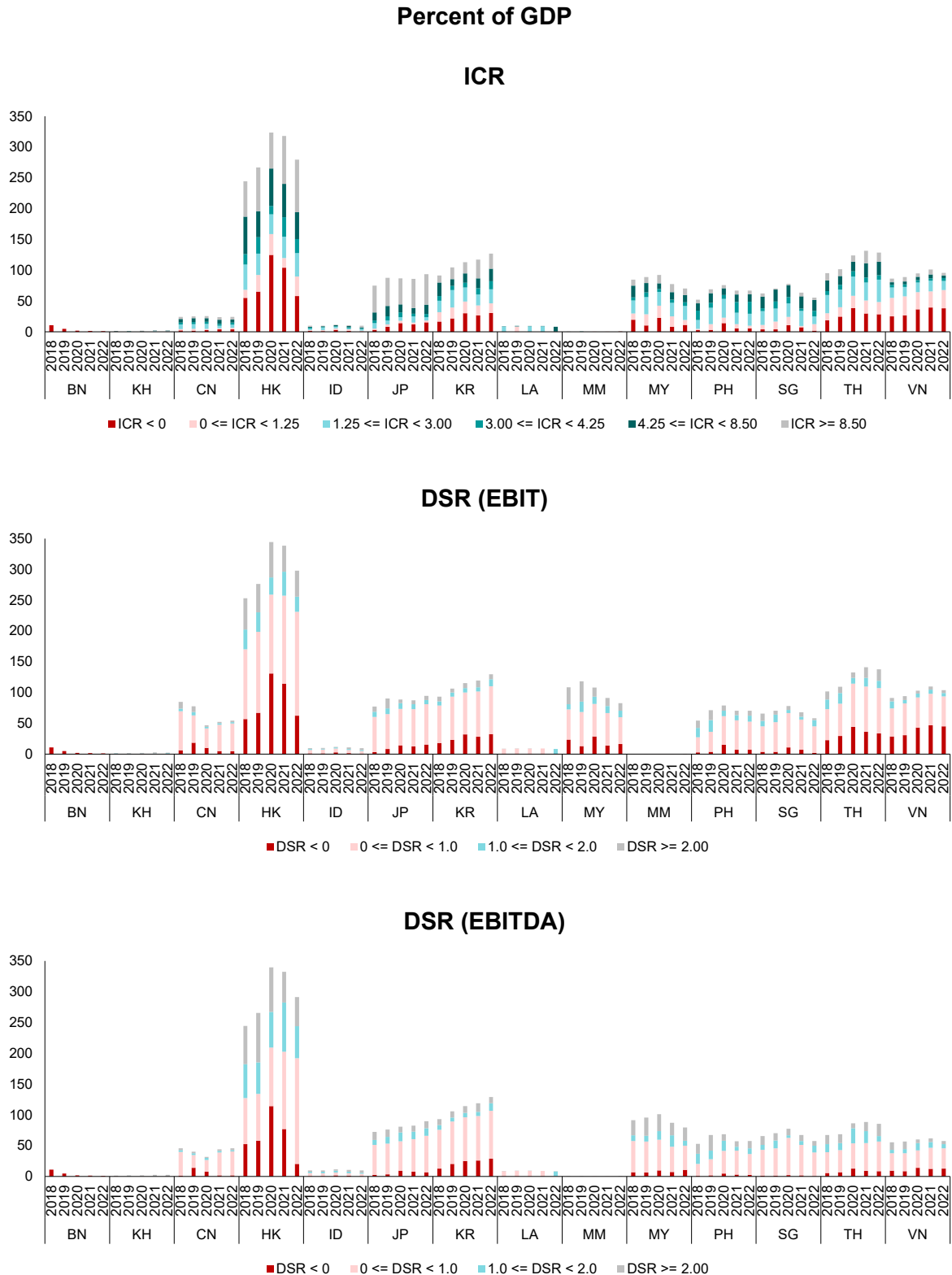
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.

Figure 4. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Industries, 2018–22
(Percent)



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.

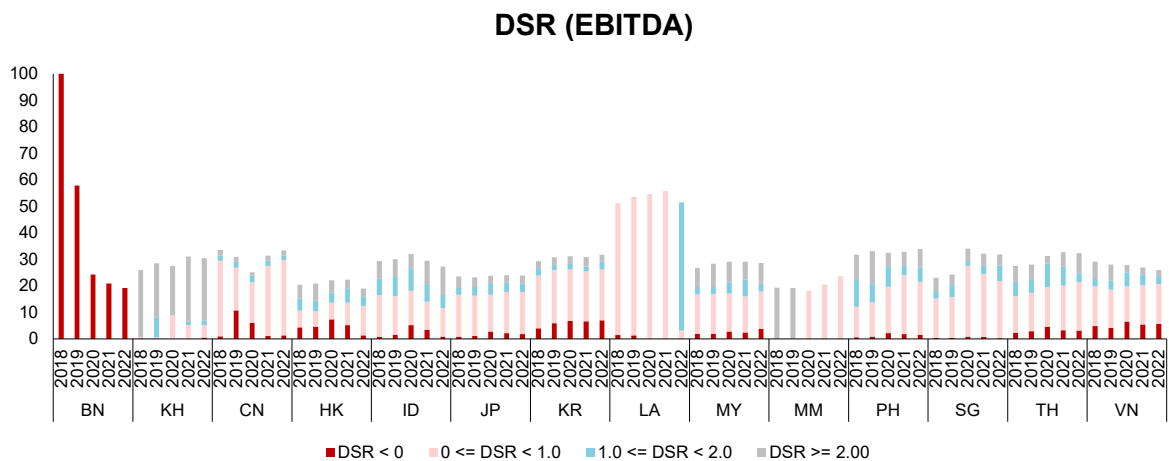
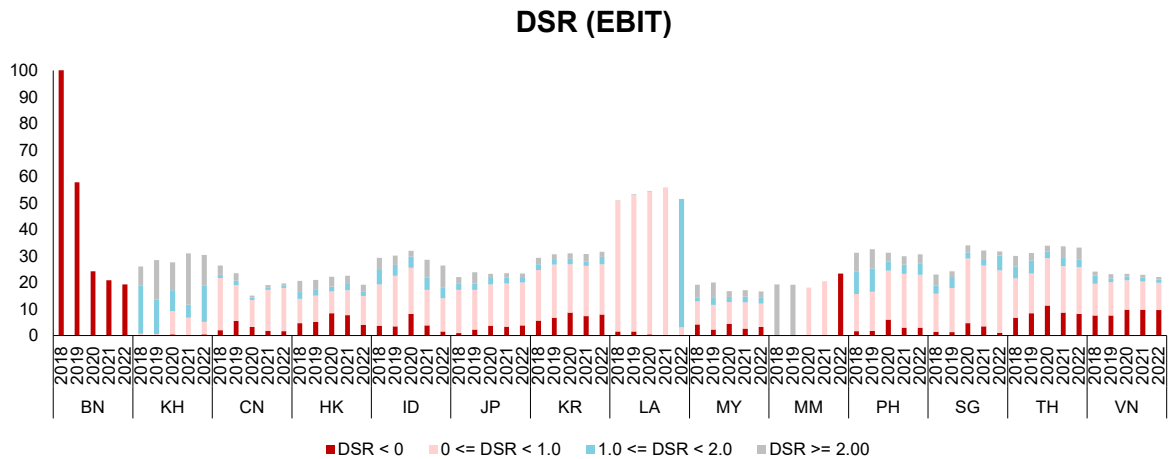
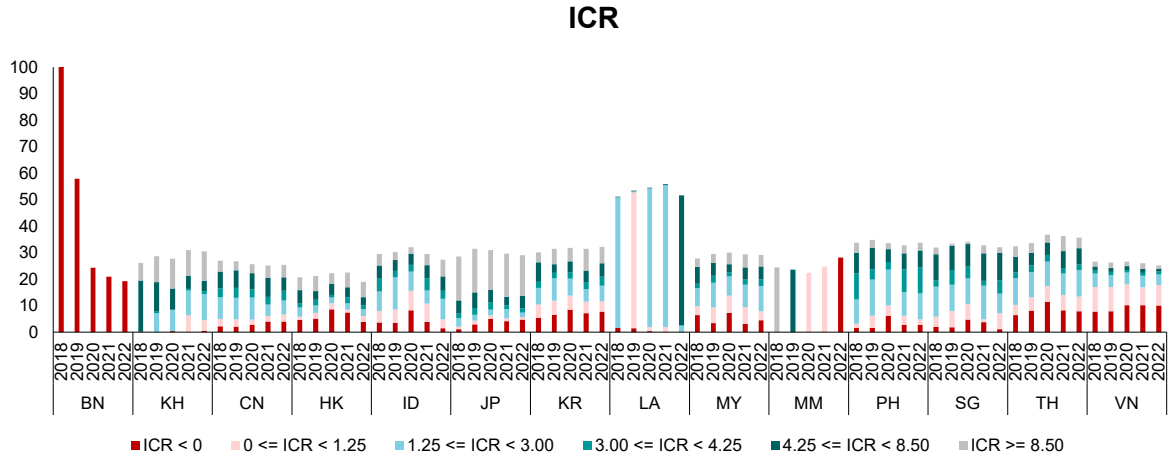
Figure 5. ASEAN+3: Firm Debt-at-Risk across Economies, 2018–22

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)

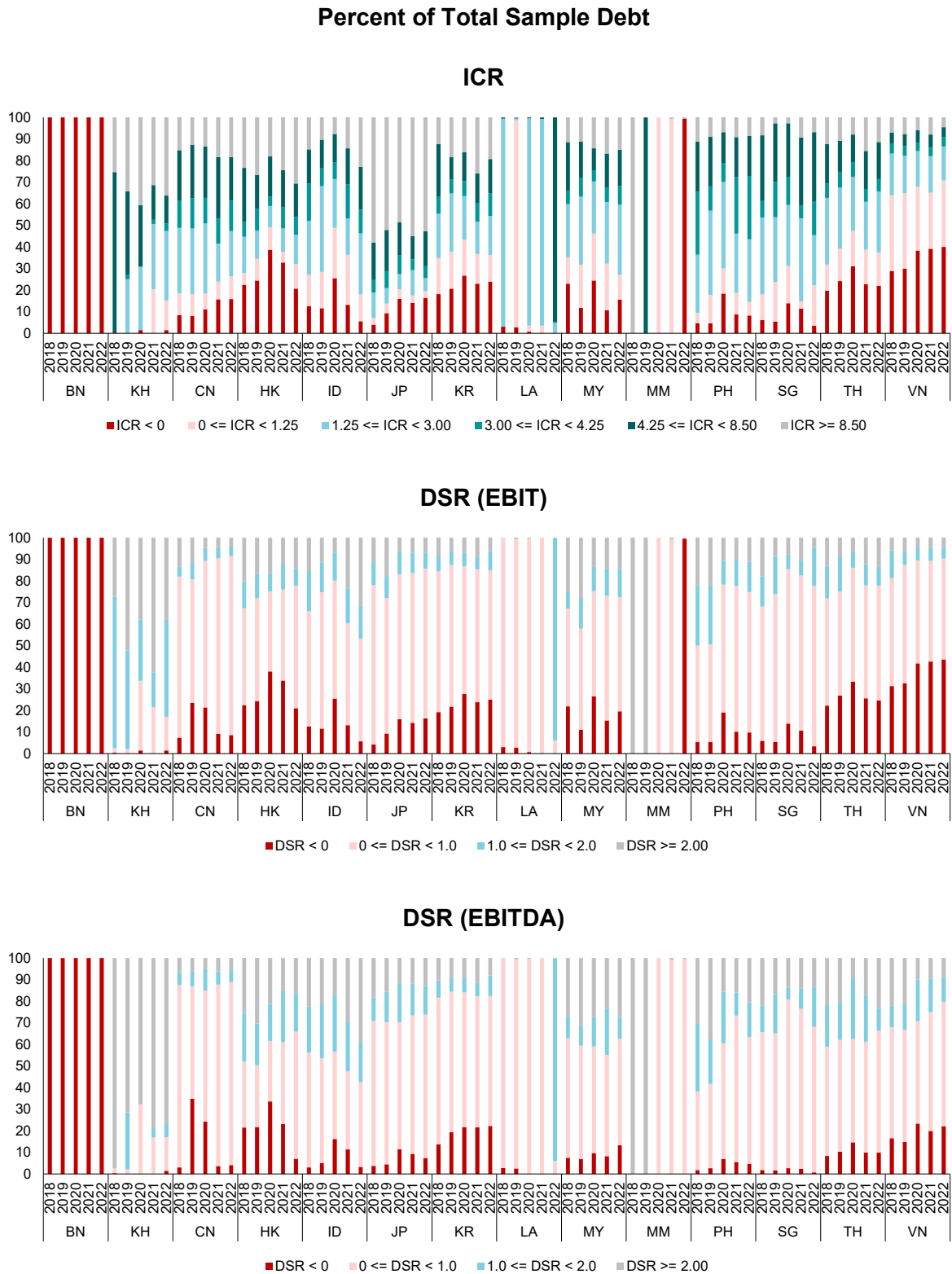
Percent of Total Sample Assets



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)



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.

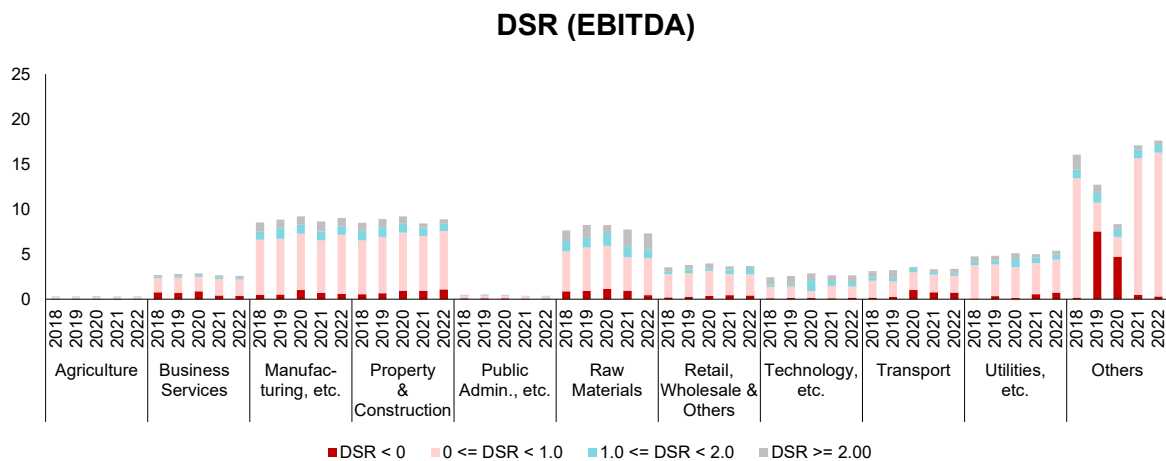
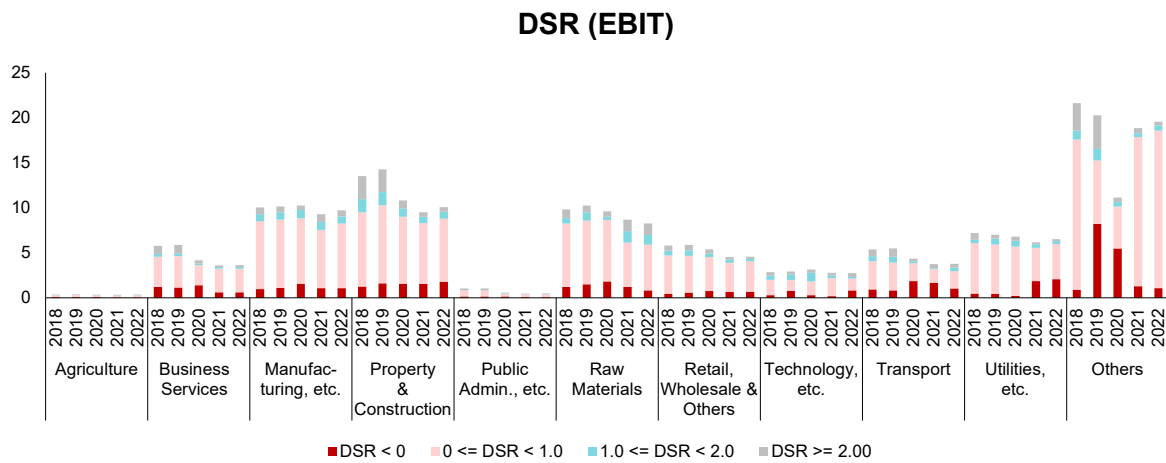
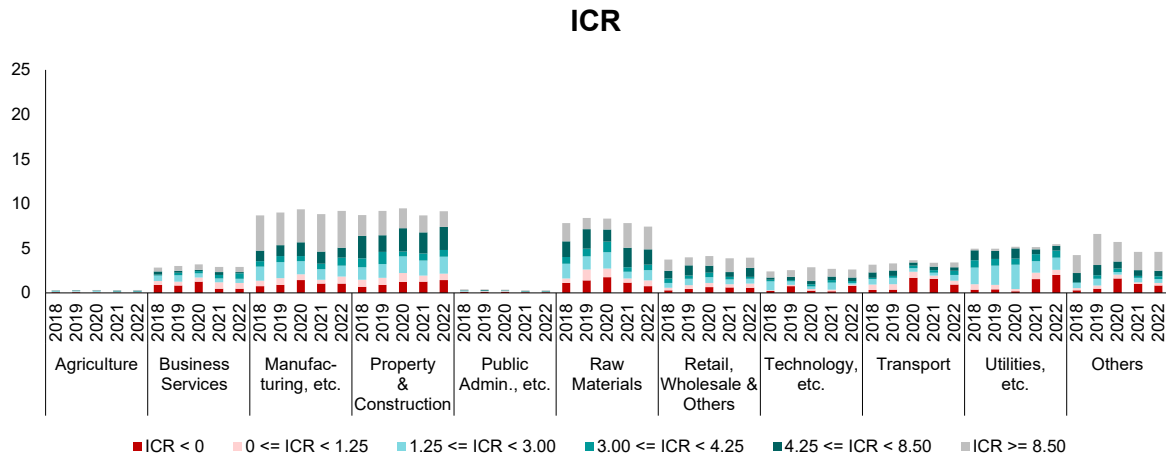
Figure 6. ASEAN+3: Firm Debt-at-Risk across Firm Types, 2018–22
(Percent of GDP)



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)



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

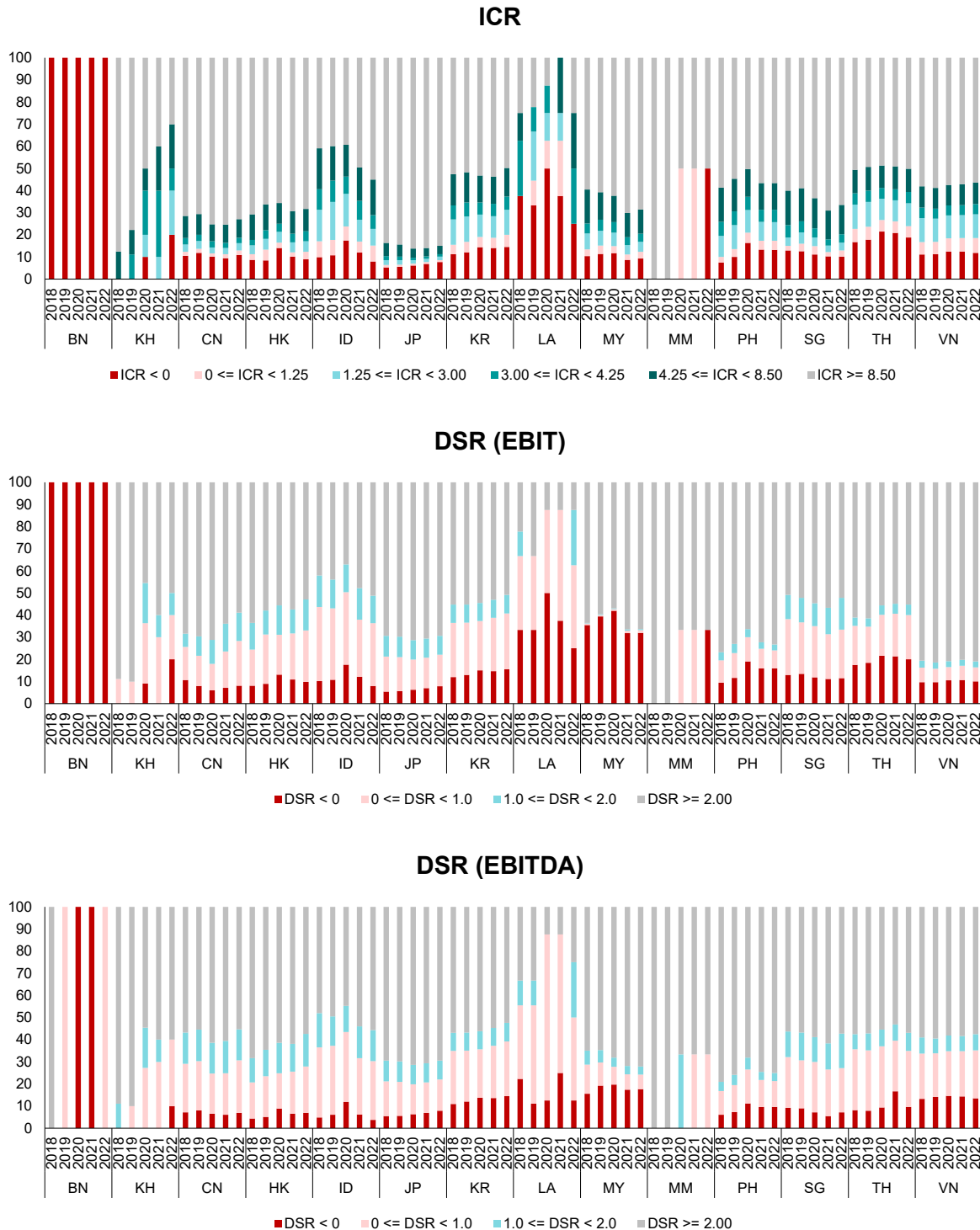
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.

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.

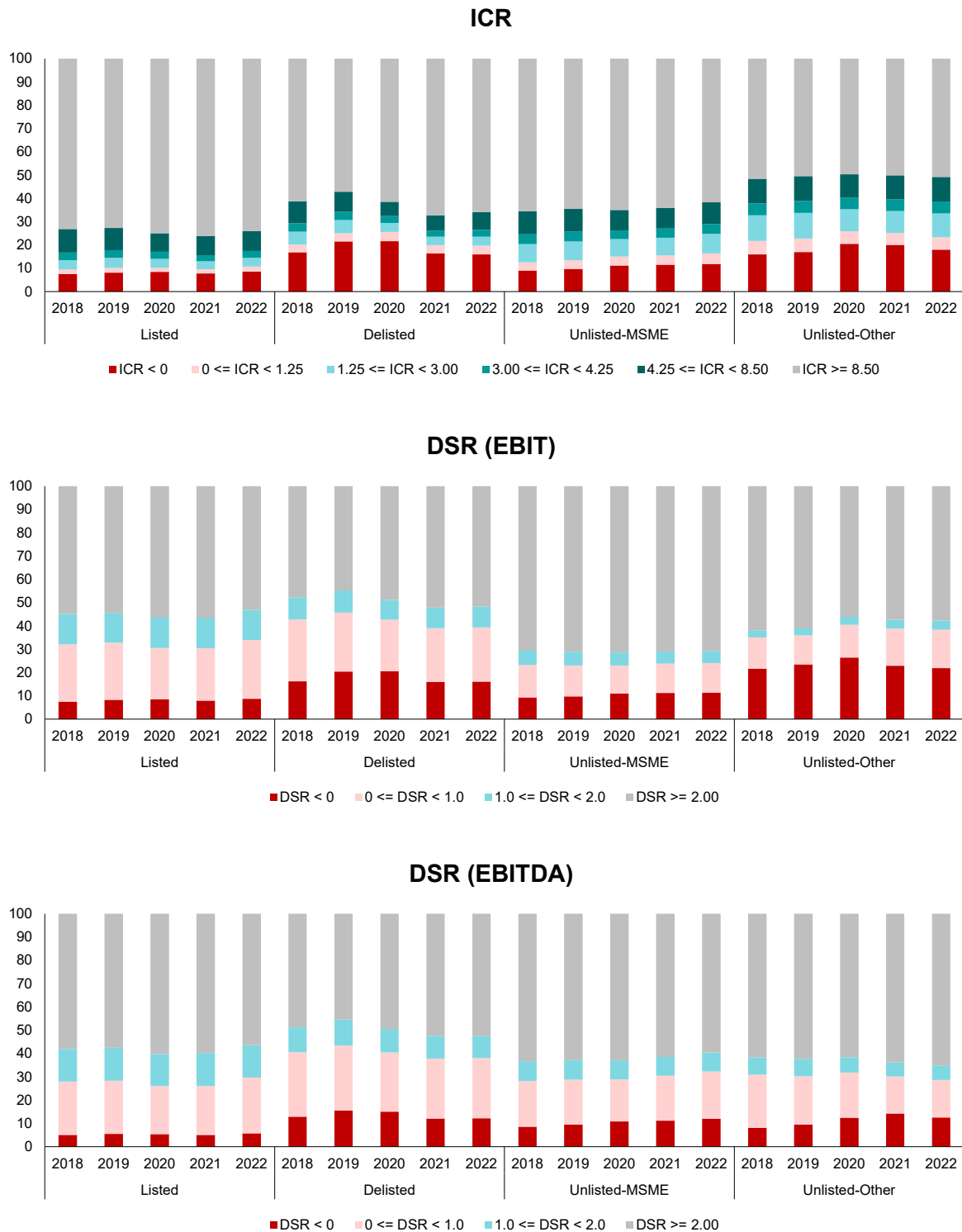
Figure 8. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Economies, Taking into Account Highly Liquid Assets, 2018–22
(Percent)



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.

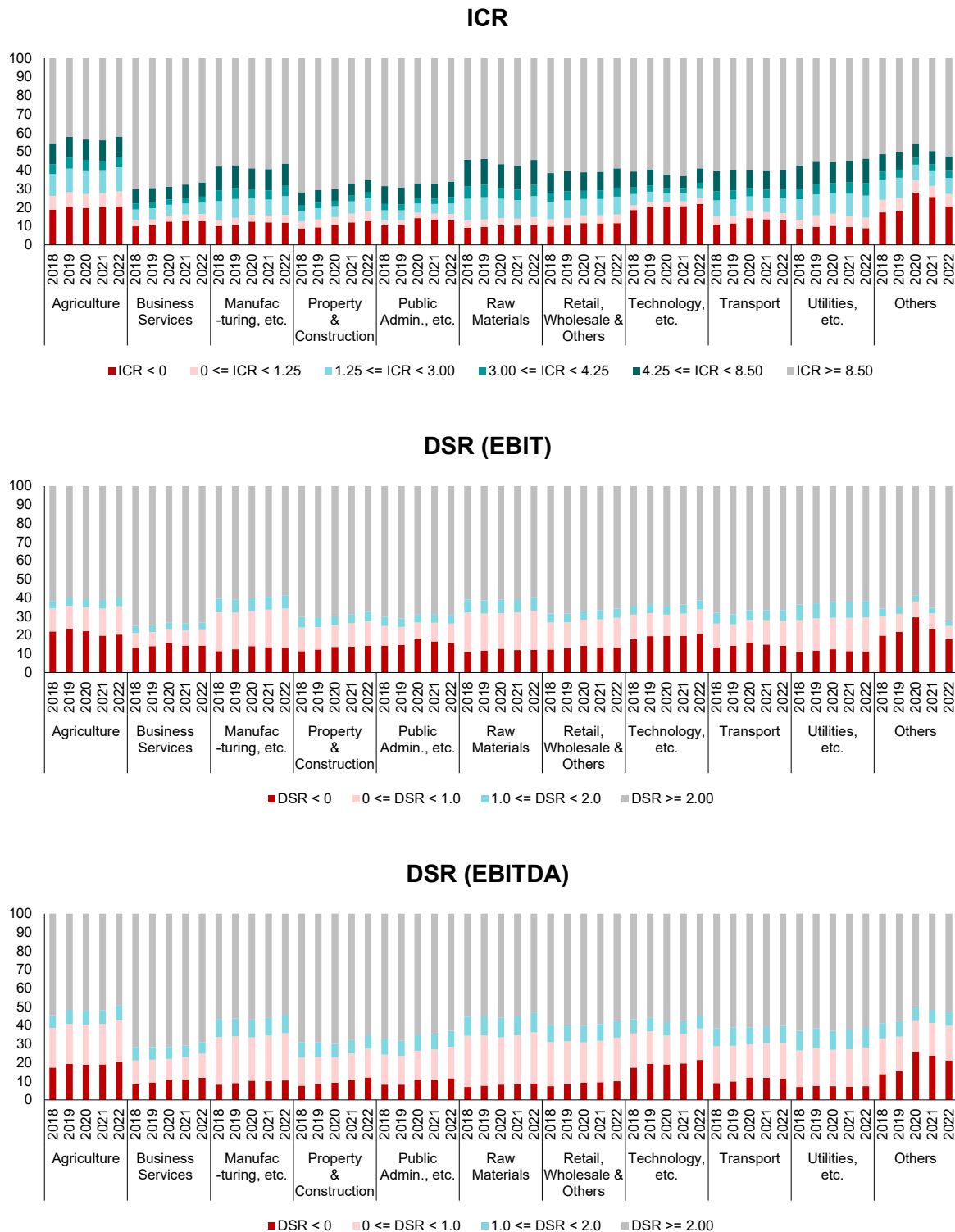
Figure 9. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Firm Types, Taking into Account Highly Liquid Assets, 2018–22
(Percent)



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.

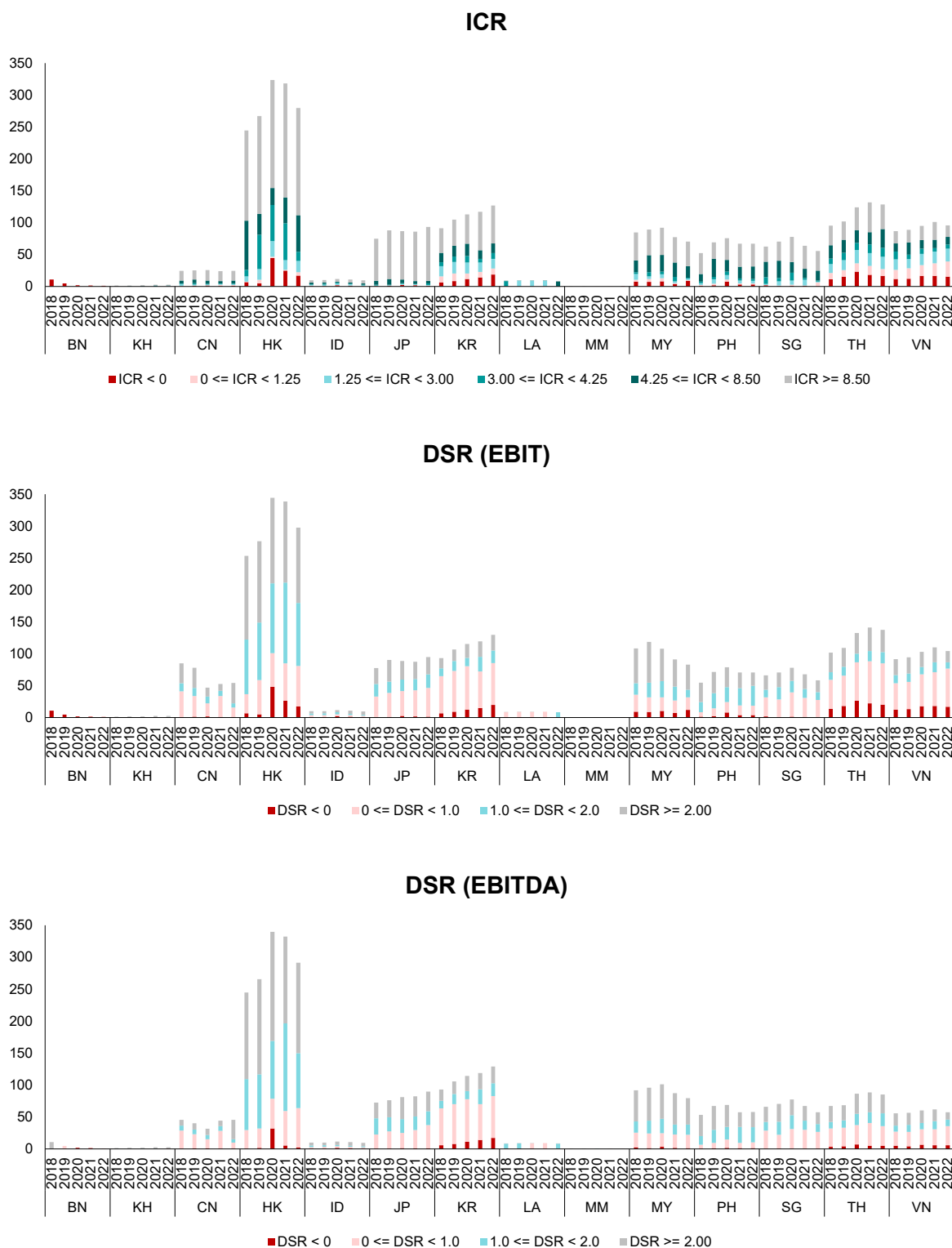
Figure 10. ASEAN+3: Share of Firms by Debt-at-Risk Bucket across Industries, Taking into Account Highly Liquid Assets, 2018–22
(Percent)



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.

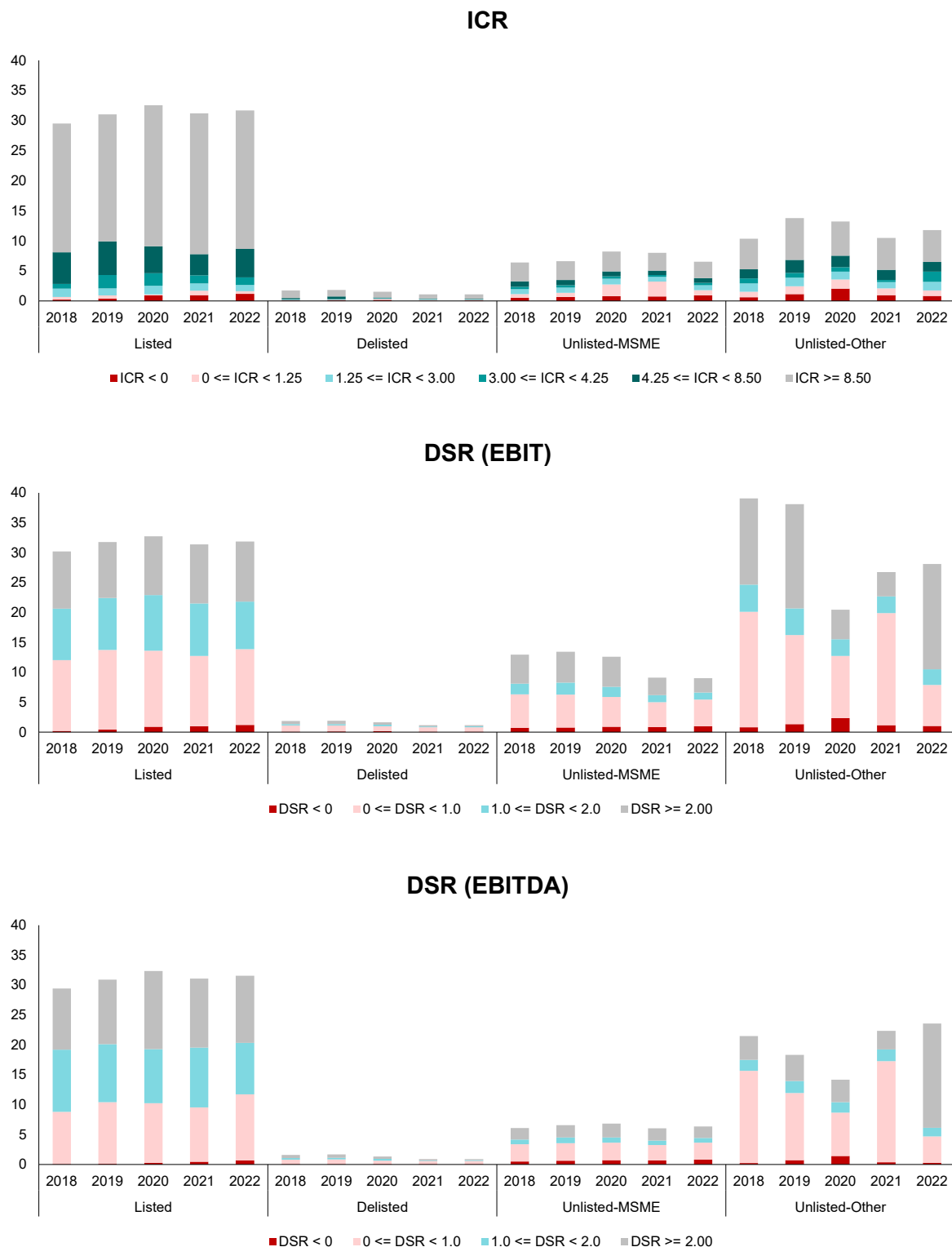
Figure 11. ASEAN+3: Firm Debt-at-Risk across Economies, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)



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.

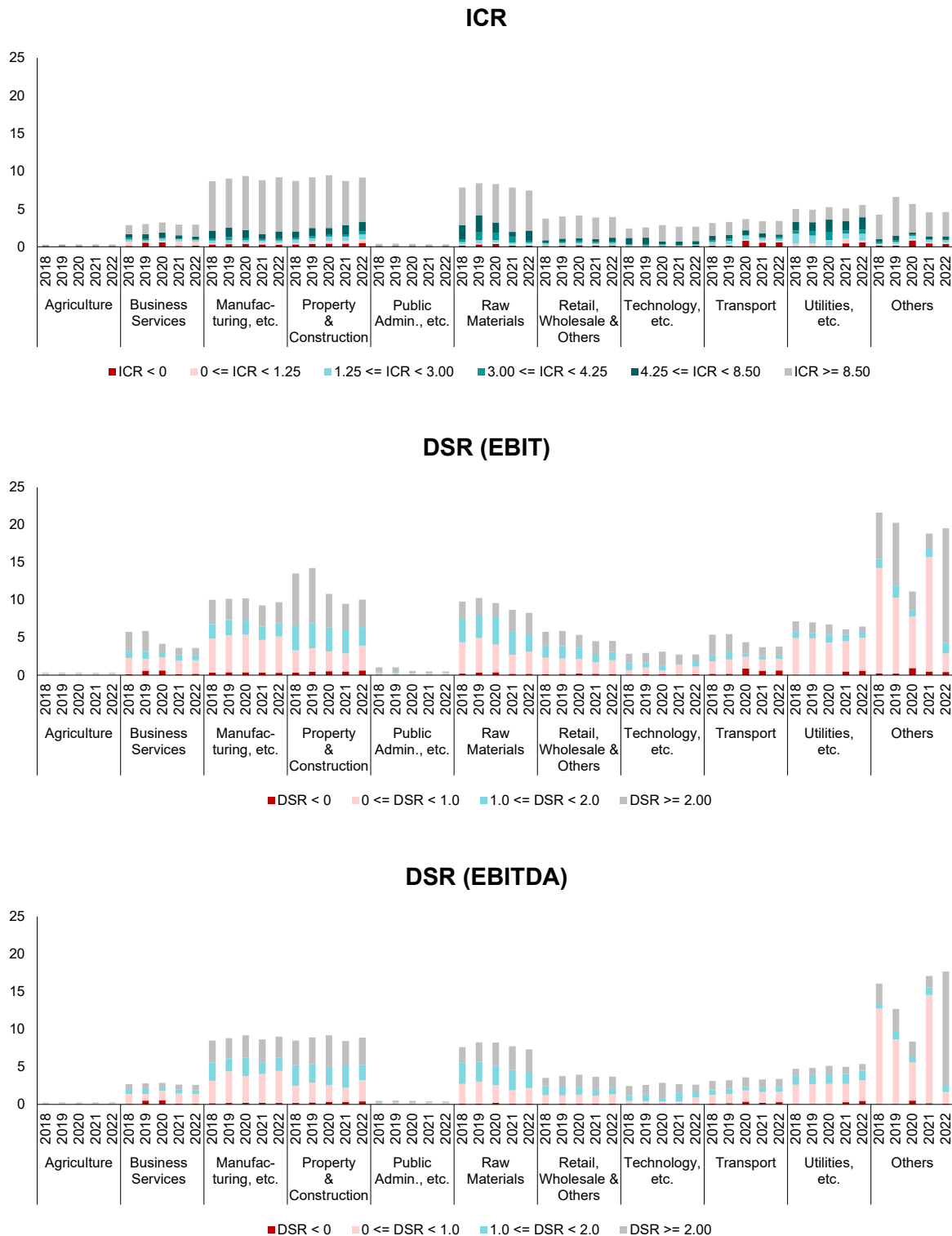
Figure 12. ASEAN+3: Firm Debt-at-Risk across Firm Types, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)



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)



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.⁴ 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.

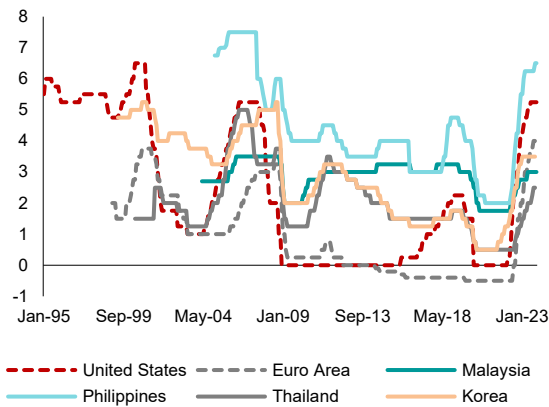
Table 1. ASEAN+3 Corporate Debt-at-Risk: Scenario Analysis Shocks

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

Source: AMRO staff assumptions.

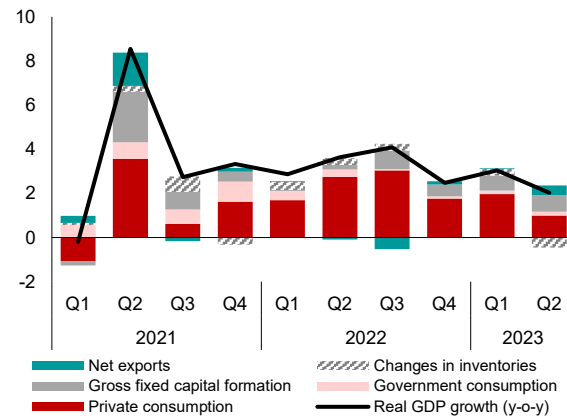
⁴ [Foley \(2023\)](#) describes how Silicon Valley Bank was forced to realize losses on its bond portfolio as interest rates rose when it had to sell those bonds to cover depositor withdrawals.

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



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)



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:

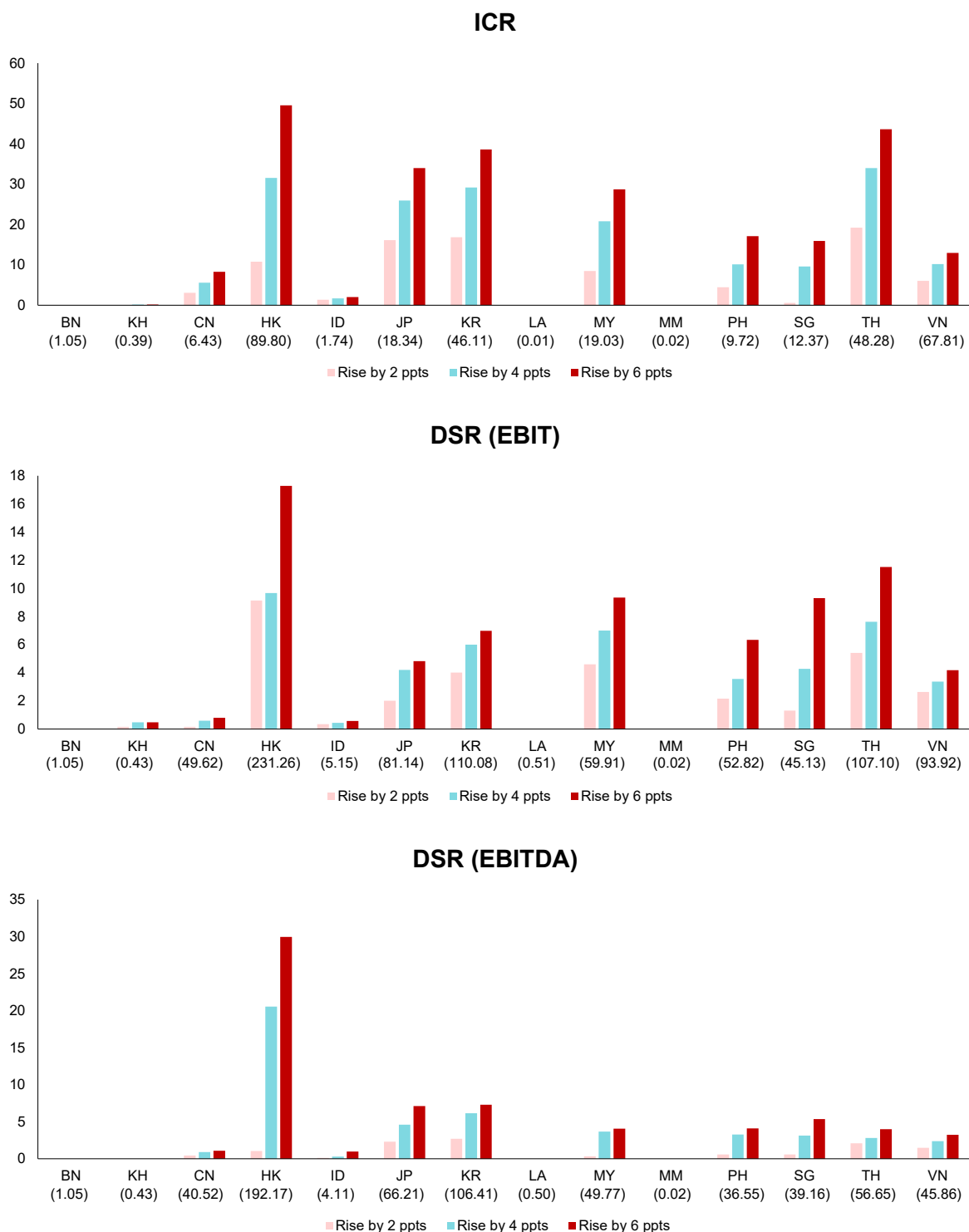
- The more vulnerable NFC sectors are the most exposed to interest rate shocks.*** Specifically, firms in Hong Kong, Japan, Korea, and Thailand would be most susceptible (Figure 16). ICR DAR grows by **up to** almost 20 percent of GDP (Thailand) when interest rates rise by an additional 2 percentage 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

18. **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.
19. **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.
20. **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.

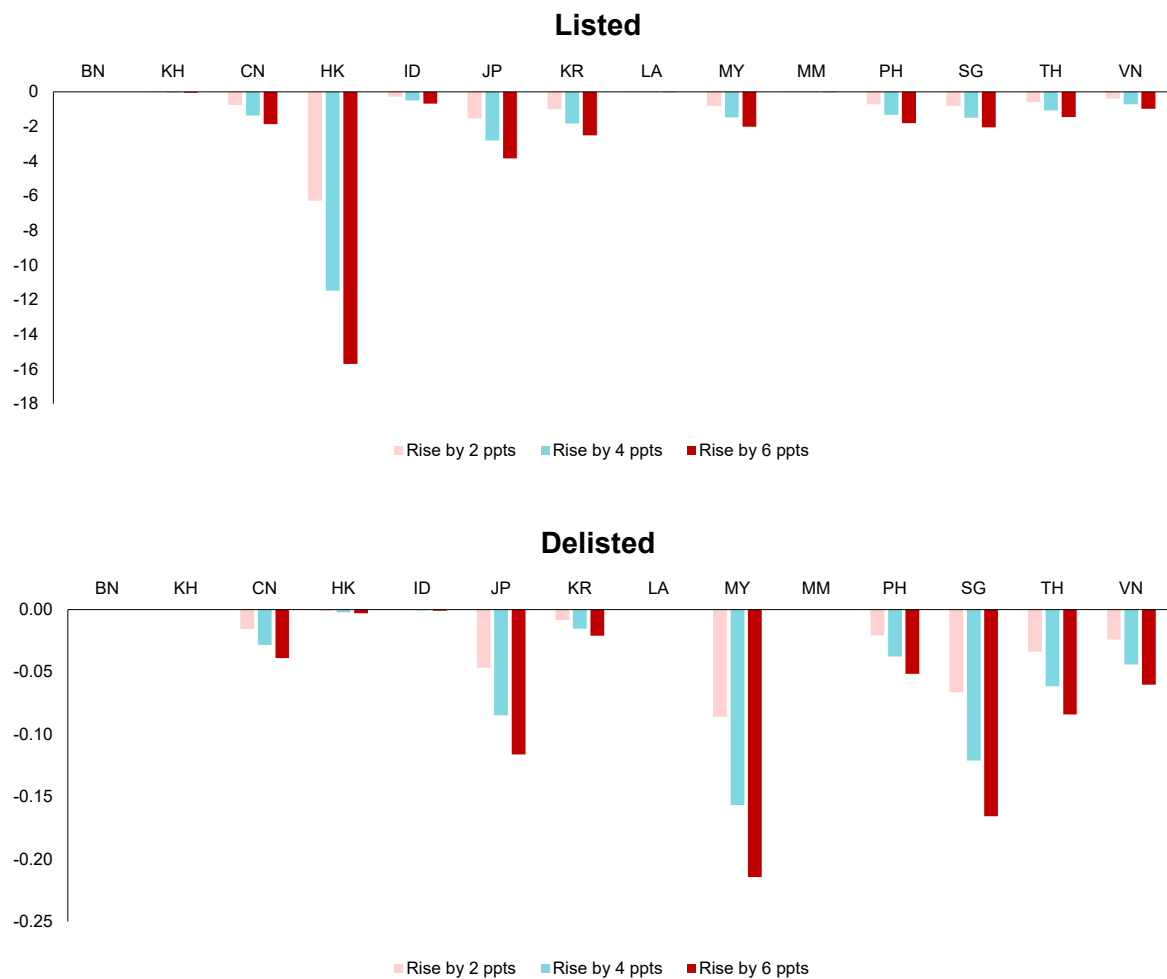
Figure 16. ASEAN+3: Change in Firm Debt-at-Risk across Economies Following Shocks to End-2022 Estimated Interest Rates
(Percent of 2022 GDP)



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.

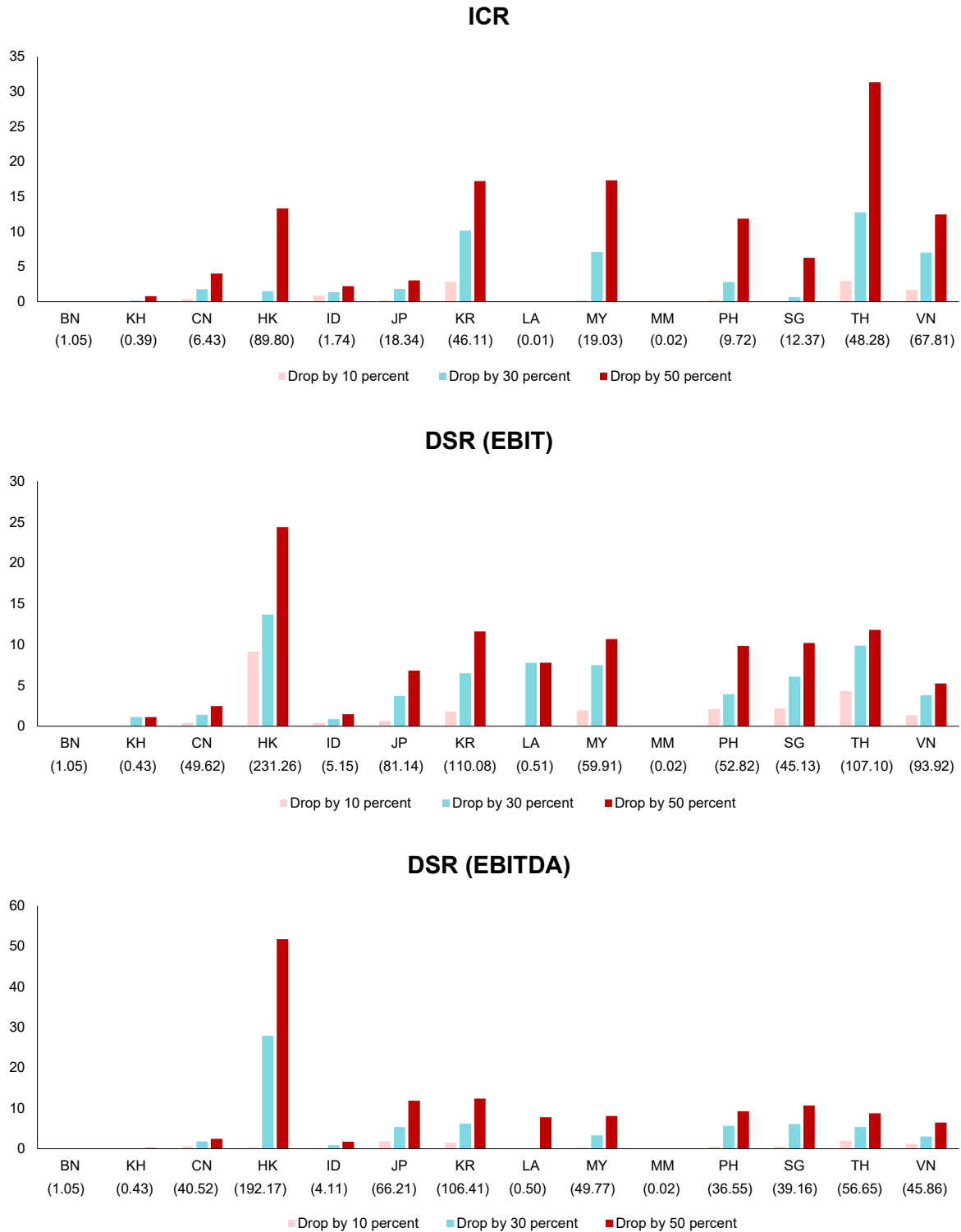
Figure 17. ASEAN+3: Change in Cash and Cash Equivalents of Listed Firms Following Shocks to End-2022 Interest Rates
(Percent of 2022 GDP)



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)



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

Institution / Member	Maximum Number of Employees	Maximum Revenues (Thousands of US dollars)	Maximum Assets (Thousands of US dollars)
African Development Bank	50	–	–
Multilateral Investment Fund (MIF) – Inter-American Development Bank (IADB)	100	3,000	–
United Nations Development Programme	200	–	–
World Bank	250	15,000	15,000
Brunei	100	3,698	2,219
Cambodia	100	–	1,000
China	3,000	42,943	57,257
Hong Kong	100	2,561	12,807
Indonesia	100	3,178	636
Japan	300	–	2,262
Korea	300	117,546	391,819
Lao PDR	100	361	361
Myanmar	600	–	476
Malaysia	200	11,330	–
Philippines	199	–	1,782
Singapore	200	74,372	–
Thailand	200	14,467	–
Vietnam	200	12,705	4,235
ASEAN+3 (Mean)	407	28,316	43,169
ASEAN+3 (Median)	200	12,018	2,219

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

Orbis Industry Classification	Reclassification Based on International Codes
Agriculture, Horticulture & Livestock	Agriculture
Banking, Insurance & Financial Services	Business Services
Biotechnology and Life Sciences	Technology, Computer, Communications, and Media
Business Services	Business Services
Chemicals, Petroleum, Rubber & Plastic	Raw Materials
Communications	Technology, Computer, Communications, and Media
Computer Hardware	Technology, Computer, Communications, and Media
Computer Software	Technology, Computer, Communications, and Media
Construction	Property and Construction
Food & Tobacco Manufacturing	Manufacturing, Industrial, and Machinery
Industrial, Electric & Electronic Machinery	Manufacturing, Industrial, and Machinery
Information Services	Technology, Computer, Communications, and Media
Leather, Stone, Clay & Glass products	Raw Materials
Media & Broadcasting	Technology, Computer, Communications, and Media
Metals & Metal Products	Raw Materials
Mining & Extraction	Raw Materials
Miscellaneous Manufacturing	Manufacturing, Industrial, and Machinery
Other	Others
Printing & Publishing	Manufacturing, Industrial, and Machinery
Property Services	Property and Construction
Public Administration, Education, Health Social Services	Public Administration, Education, Health Social Services
Retail	Retail, Wholesale, and Others
Textiles & Clothing Manufacturing	Manufacturing, Industrial, and Machinery
Transport Manufacturing	Manufacturing, Industrial, and Machinery
Transport, Freight & Storage	Transport
Travel, Personal & Leisure	Others
Utilities	Utilities and Waste Management
Waste Management & Treatment	Utilities and Waste Management
Wholesale	Retail, Wholesale, and Others
Wood, Furniture & Paper Manufacturing	Manufacturing, Industrial, and Machinery
NULL	Others

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

A firm releases annual report in 2023 March, which will be recorded as 2022 annual data

Calendar year	2022												2023		
	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan.	Feb.	Mar
2022 annual data (Fiscal year) covers :															
Adjust to calendar year	Add			Retain									Remove		

A firm releases annual report in 2022 September which will be recorded as 2022 annual data

Calendar year	2021			2022											
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022 annual data (Fiscal year) covers :															
Adjust to calendar year	Remove			Retain									Add		

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

Economy	Year	Listed			Delisted			Unlisted						Total		
								MSME			Other					
		ICR	DSR		ICR	DSR		ICR	DSR		ICR	DSR		ICR	DSR	
		EBIT	EBIT	EBITDA	EBIT	EBIT	EBITDA	EBIT	EBIT	EBITDA	EBIT	EBIT	EBITDA	EBIT	EBIT	EBITDA
Brunei	2018										1	1	1	1	1	1
	2019										1	1	1	1	1	1
	2020										1	1	1	1	1	1
	2021										1	1	1	1	1	1
	2022										1	1	1	1	1	1
Cambodia	2018	7	7	7				0	0	0	1	2	2	8	9	9
	2019	7	7	7				0	0	0	2	3	3	9	10	10
	2020	7	7	7				0	0	0	3	4	4	10	11	11
	2021	9	9	9				0	0	0	1	1	1	10	10	10
	2022	9	9	9				0	0	0	1	1	1	10	10	10
China	2018	10,087	10,891	10,045	2,198	2,553	2,201	58	62,500	71	67	3,133	76	12,410	79,077	12,393
	2019	10,474	11,289	10,457	2,194	2,553	2,201	74	26,915	87	77	3,198	88	12,819	43,955	12,833
	2020	10,814	11,604	10,821	1,038	1,253	1,044	80	13,775	94	90	2,194	101	12,022	28,826	12,060
	2021	10,812	11,615	10,822	460	605	463	83	5,360	98	91	2,118	100	11,446	19,698	11,483
	2022	10,812	11,631	10,822	460	605	463	92	5,794	107	85	2,239	92	11,449	20,269	11,484
Hong Kong	2018	196	216	216	16	19	19	17	25	19	137	162	138	366	422	392
	2019	203	216	216	17	19	19	24	36	21	168	200	173	412	471	429
	2020	204	217	217	10	12	11	29	47	29	164	197	170	407	473	427
	2021	203	216	216	5	5	5	22	40	28	125	152	134	355	413	383
	2022	203	216	216	5	5	5	22	43	28	126	156	138	356	420	387
Indonesia	2018	627	651	651	6	6	6	0	0	0	1	2	1	634	659	658
	2019	692	716	716	6	7	7	0	0	0	1	1	1	699	724	724
	2020	721	741	741	4	5	5				1	1	1	726	747	747
	2021	734	752	752	5	6	6	0	0	0	1	2	1	740	760	759
	2022	739	752	752	5	6	6	0	0	0	1	2	1	745	760	759
Japan	2018	3,146	3,444	3,389	626	729	698	259,014	304,519	296,721	3,816	4,462	4,155	266,602	313,154	304,963
	2019	3,300	3,582	3,536	607	704	678	255,617	302,902	299,124	3,882	4,557	4,325	263,406	311,745	307,663
	2020	3,376	3,655	3,616	545	647	625	236,638	280,121	278,905	3,808	4,499	4,298	244,367	288,922	287,444
	2021	3,449	3,760	3,722	459	549	528	192,024	228,755	227,892	3,449	4,088	3,903	199,381	237,152	236,045
	2022	3,462	3,770	3,733	462	552	531	193,756	234,180	233,351	3,508	4,148	3,966	201,188	242,650	241,581
Korea	2018	2,075	2,167	2,154	217	227	227	253,056	314,405	314,402	394	435	434	255,742	317,234	317,217
	2019	2,257	2,281	2,267	226	236	236	299,654	377,691	377,692	454	492	489	302,591	380,700	380,684
	2020	2,348	2,360	2,348	195	206	206	290,287	360,558	360,558	522	571	567	293,352	363,695	363,679
	2021	2,382	2,397	2,381	158	169	169	265,367	327,406	327,402	551	593	593	268,458	330,565	330,545
	2022	2,387	2,399	2,383	158	169	169	275,264	347,075	347,070	547	590	590	278,356	350,233	350,212

Economy	Year	Listed			Delisted			Unlisted						Total		
								MSME			Other					
		ICR	DSR		ICR	DSR		ICR	DSR		ICR	DSR		ICR	DSR	
		EBIT	EBIT	EBITDA	EBIT	EBIT	EBITDA	EBIT	EBIT	EBITDA	EBIT	EBIT	EBITDA	EBIT	EBIT	EBITDA
Lao PDR	2018	7	8	8				1	1	1				8	9	9
	2019	8	8	8				1	1	1				9	9	9
	2020	8	8	8				0	0	0				8	8	8
	2021	8	8	8				0	0	0				8	8	8
	2022	8	8	8				0	0	0				8	8	8
Malaysia	2018	714	876	874	94	213	150	25	134	28	771	125,034	4,612	1,604	126,257	5,664
	2019	740	885	883	90	232	153	18	487	49	817	146,386	8,048	1,665	147,990	9,133
	2020	749	886	884	71	232	136	10	562	68	620	151,011	12,691	1,450	152,691	13,779
	2021	751	886	886	50	189	112	6	168	51	439	98,695	14,187	1,246	99,938	15,236
	2022	753	888	888	50	203	112	7	98	44	440	107,514	16,323	1,250	108,703	17,367
Myanmar	2018	2	3	3										2	3	3
	2019	2	3	3										2	3	3
	2020	2	3	3										2	3	3
	2021	2	3	3										2	3	3
	2022	2	3	3										2	3	3
Philippines	2018	187	228	227	16	20	18	978	9,922	6,283	3,175	7,648	6,286	4,356	17,818	12,814
	2019	200	235	233	19	24	19	1,630	11,840	7,043	4,952	9,860	7,615	6,801	21,959	14,910
	2020	205	239	236	16	21	14	2,182	14,441	3,757	5,955	11,272	5,490	8,358	25,973	9,497
	2021	206	243	241	14	16	8	2,016	20,633	3,487	4,884	11,446	3,060	7,120	32,338	6,796
	2022	209	243	241	14	16	8	2,022	22,152	3,657	4,891	11,709	3,096	7,136	34,120	7,002
Singapore	2018	501	533	533	73	76	76	2	3	3	21	33	26	597	645	638
	2019	522	541	539	73	76	76	4	4	3	22	35	28	621	656	646
	2020	528	542	540	55	58	57	4	6	4	23	36	29	610	642	630
	2021	520	538	535	36	36	35	4	6	4	27	45	34	587	625	608
	2022	521	539	536	36	36	35	4	7	4	27	49	33	588	631	608
Thailand	2018	629	670	660	80	98	75	6	41	5	135,264	337,864	17,559	135,979	338,673	18,299
	2019	635	674	663	79	98	75	13	118	2	145,680	387,314	11,999	146,407	388,204	12,739
	2020	644	667	658	83	94	69	13	165	1	148,817	401,936	10,801	149,557	402,862	11,529
	2021	636	659	656	81	91	53	15	168	1	148,025	401,471	7,287	148,757	402,389	7,997
	2022	636	660	657	81	91	54	15	168	1	158,886	422,421	7,398	159,618	423,340	8,110
Vietnam	2018	1,249	1,353	1,348	177	187	176	193,796	470,965	16,964	5,625	6,398	3,061	200,847	478,903	21,549
	2019	1,245	1,354	1,353	177	189	186	213,034	564,741	19,593	5,393	6,110	3,114	219,849	572,394	24,246
	2020	1,234	1,346	1,345	163	177	174	209,239	603,161	20,449	5,335	6,051	3,261	215,971	610,735	25,229
	2021	1,196	1,333	1,332	150	163	160	204,343	585,046	20,850	5,197	5,936	3,216	210,886	592,478	25,558
	2022	1,201	1,333	1,332	150	164	161	223,327	652,812	23,228	5,075	5,745	3,260	229,753	660,054	27,981

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

Economy	Year	Industry											
		Agriculture	Business Services	Manufac- turing, etc.	Property & Construc- tion	Public Administra- tion, etc.	Raw Materials	Retail, Wholesale, & Others	Techno- logy, etc.	Transport	Utilities, etc.	Others	Total
Brunei	2018									1			1
	2019									1			1
	2020									1			1
	2021									1			1
	2022									1			1
Cambodia	2018		1	1	3	0		1	0	2	1	0	9
	2019		1	2	3	0		1	0	2	1	0	10
	2020		1	2	3	0		1	0	2	1	1	11
	2021		1	1	3	1		0	1	2	1	0	10
	2022		1	1	3	1		0	1	2	1	0	10
China	2018	611	5,687	21,859	3,124	514	10,868	22,037	4,431	1,925	755	7,266	79,077
	2019	376	2,377	14,725	1,510	313	6,992	9,088	3,188	977	635	3,774	43,955
	2020	313	2,042	8,985	1,248	262	4,582	5,320	2,175	674	523	2,702	28,826
	2021	236	1,822	6,024	1,113	226	3,280	2,471	1,685	429	477	1,935	19,698
	2022	242	1,860	6,200	1,128	230	3,379	2,547	1,721	442	484	2,036	20,269
Hong Kong	2018		66	49	60	8	29	18	24	15	10	143	422
	2019		69	51	61	14	29	20	25	16	10	176	471
	2020		67	48	56	17	30	19	25	17	11	183	473
	2021		61	46	55	9	28	17	24	16	9	148	413
	2022		62	46	55	10	28	17	24	16	9	153	420
Indonesia	2018	27	31	129	96	13	150	60	47	52	8	46	659
	2019	31	35	146	104	14	159	66	52	60	8	49	724
	2020	33	41	148	103	16	160	74	58	60	8	46	747
	2021	32	46	150	105	17	162	73	56	63	8	48	760
	2022	32	46	150	105	17	162	73	56	63	8	48	760
Japan	2018	1,538	43,659	40,058	136,463	5,750	12,676	48,196	2,817	8,944	3,658	9,396	313,155
	2019	1,612	43,572	40,047	134,234	5,701	12,729	48,841	2,951	9,005	3,617	9,437	311,746
	2020	1,511	39,599	37,644	121,078	5,199	12,340	47,883	2,892	8,695	3,428	8,654	288,923
	2021	1,268	31,797	32,152	93,963	4,011	11,155	43,110	2,687	7,579	2,943	6,487	237,152
	2022	1,308	32,809	32,634	96,566	4,150	11,249	43,774	2,761	7,700	2,983	6,718	242,652
Korea	2018	4,697	28,611	72,549	55,099	8,849	37,745	66,264	17,216	8,402	4,831	12,975	317,238
	2019	5,571	35,343	84,405	66,086	11,633	43,573	80,787	20,981	9,837	5,822	16,670	380,708
	2020	5,795	34,917	79,999	66,148	8,851	41,127	75,509	21,336	9,301	5,910	14,810	363,703
	2021	5,667	30,805	73,047	61,859	7,410	37,312	67,065	20,263	8,081	5,437	13,623	330,569
	2022	6,050	33,753	76,030	65,741	7,810	38,531	71,507	22,138	8,434	5,669	14,574	350,237
Lao PDR	2018	1			2	-	2	3			1		9

Economy	Year	Industry											Total
		Agriculture	Business Services	Manufacturing, etc.	Property & Construction	Public Administration, etc.	Raw Materials	Retail, Wholesale, & Others	Technology, etc.	Transport	Utilities, etc.	Others	
	2019	1			2		2	3			1		9
	2020	1			2		2	2			1		8
	2021	1			2		2	2			1		8
	2022	1			2		2	2			1		8
Malaysia	2018	4,321	24,250	9,596	20,151	3,157	7,243	38,009	1,427	5,488	657	11,958	126,257
	2019	4,831	27,690	10,961	23,077	3,652	8,308	44,203	1,805	6,269	782	16,412	147,990
	2020	4,895	27,876	11,100	23,240	3,731	8,399	45,122	1,929	6,344	820	19,235	152,691
	2021	3,364	17,189	7,872	14,340	2,207	6,085	31,052	1,255	4,363	612	11,601	99,940
	2022	3,550	18,313	8,261	15,335	2,365	6,363	33,082	1,373	4,649	662	14,752	108,705
Myanmar	2018								1	1		1	3
	2019								1	1		1	3
	2020								1	1		1	3
	2021								1	1		1	3
	2022								1	1		1	3
Philippines	2018	379	2,042	2,456	2,392	524	1,397	5,618	406	994	222	1,389	17,819
	2019	422	2,529	2,848	2,919	766	1,607	6,720	497	1,204	284	2,168	21,964
	2020	390	2,611	2,720	2,942	771	1,536	6,582	543	1,146	319	6,416	25,976
	2021	374	2,663	2,586	3,137	789	1,447	6,504	547	1,200	308	12,783	32,338
	2022	377	2,727	2,613	3,214	797	1,464	6,604	558	1,223	312	14,231	34,120
Singapore	2018	8	60	166	118	25	85	54	42	25	7	55	645
	2019	10	62	166	120	26	85	55	42	26	7	57	656
	2020	11	60	156	119	26	84	53	42	26	7	58	642
	2021	11	58	151	111	26	76	52	41	27	7	65	625
	2022	11	59	151	111	26	77	52	41	27	7	69	631
Thailand	2018	1,816	45,082	31,772	66,734	4,686	18,960	118,813	5,380	14,664	2,165	28,605	338,677
	2019	2,217	52,596	35,031	76,575	5,597	20,726	136,546	6,180	17,110	2,465	33,162	388,205
	2020	2,401	55,059	35,984	78,629	6,123	21,254	142,921	6,313	17,923	2,566	33,691	402,864
	2021	2,531	55,634	35,727	77,697	6,296	21,161	144,096	6,215	17,895	2,740	32,399	402,391
	2022	3,131	58,743	37,105	80,627	6,963	21,849	152,562	6,738	19,013	2,968	33,643	423,342
Vietnam	2018	4,921	103,087	42,076	74,982	9,040	28,564	151,027	8,179	11,920	3,488	41,631	478,915
	2019	5,846	116,155	50,394	91,909	12,567	33,305	181,394	10,314	17,767	4,240	48,509	572,400
	2020	6,224	119,976	53,745	100,388	14,803	35,206	191,828	11,112	21,265	5,033	51,158	610,738
	2021	5,807	111,860	50,546	93,590	13,450	33,467	177,648	10,199	19,328	4,946	71,642	592,483
	2022	5,996	113,653	51,864	96,003	13,867	34,244	182,039	10,472	20,256	5,128	126,542	660,064

Sources: Orbis; and AMRO staff calculations.

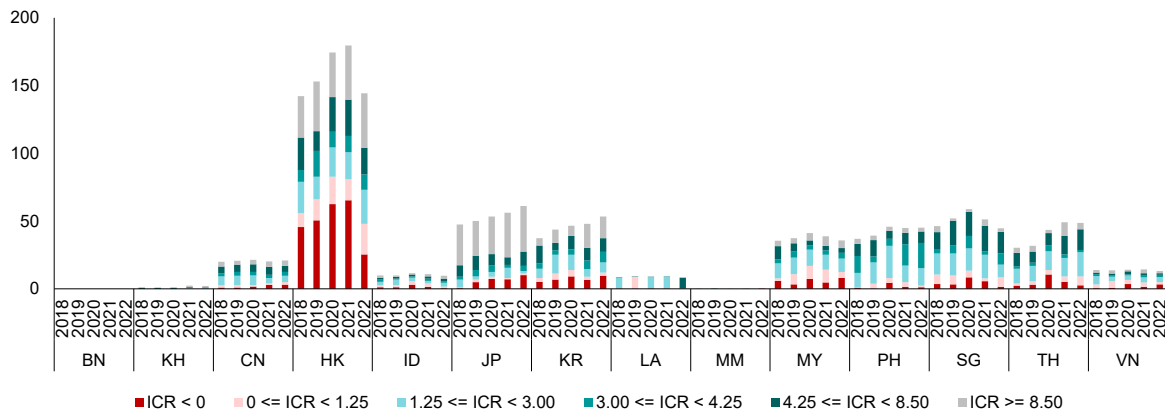
Note: Blank cell means there is no firm in that particular category; "0" means there are firms in that category but there is insufficient information for estimating debt-at-risk. Firms are included in the number if they have sufficient information to estimate either their interest coverage ratios or debt service ratios.

Appendix IV. Firm Debt-at-Risk across ASEAN+3 Economies by Firm Type

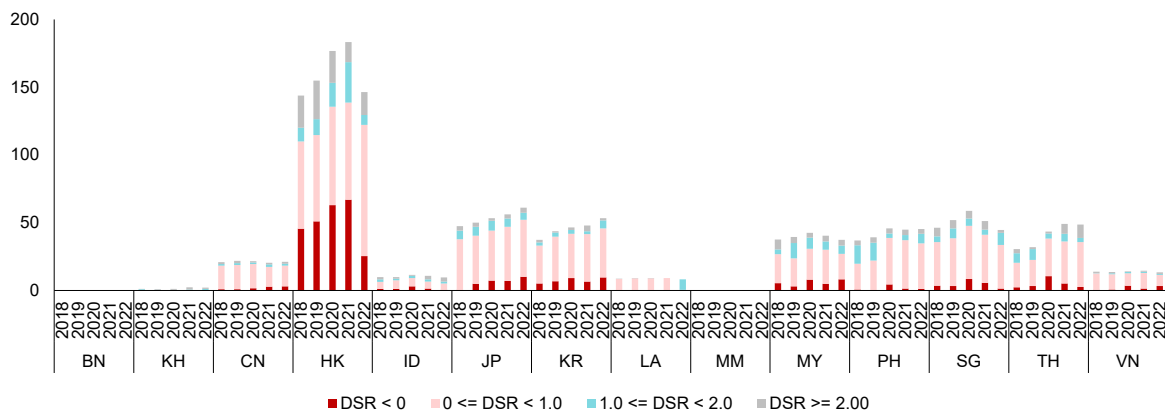
Appendix Figure 2. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, 2018–22
(Percent of GDP)

Listed

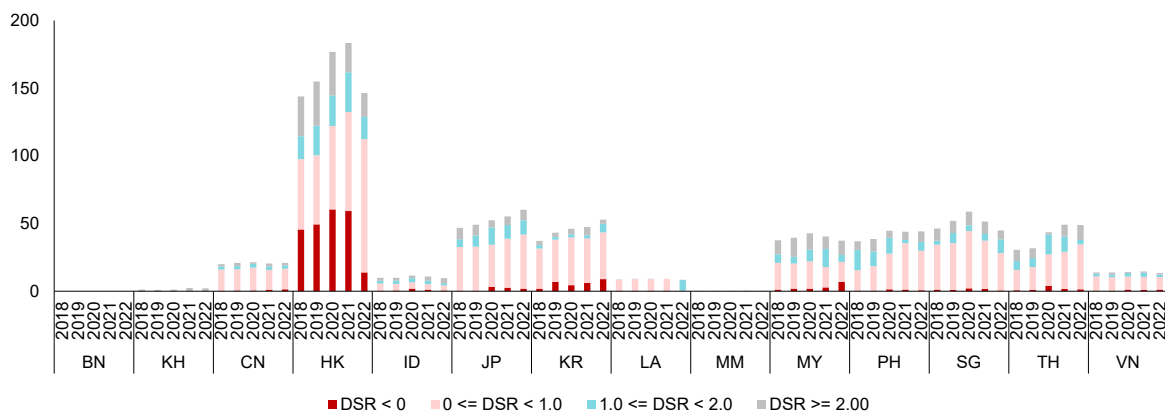
ICR



DSR (EBIT)



DSR (EBITDA)



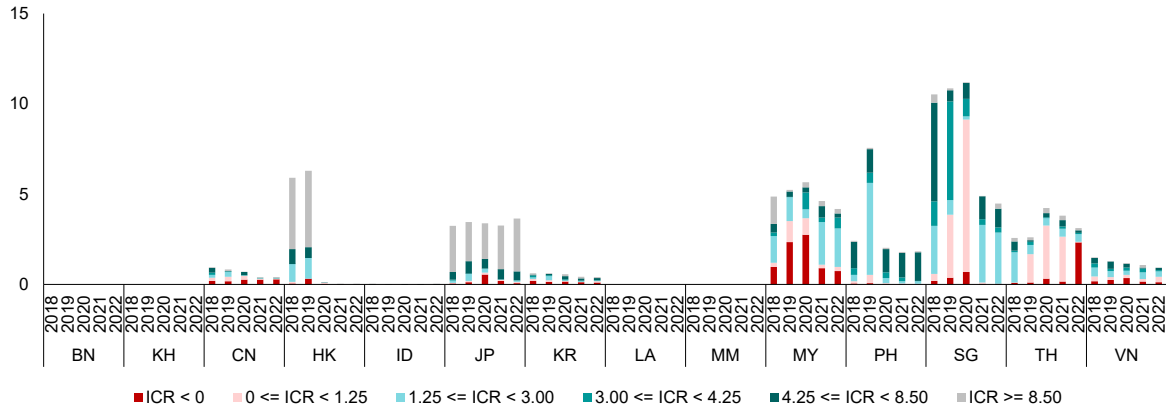
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

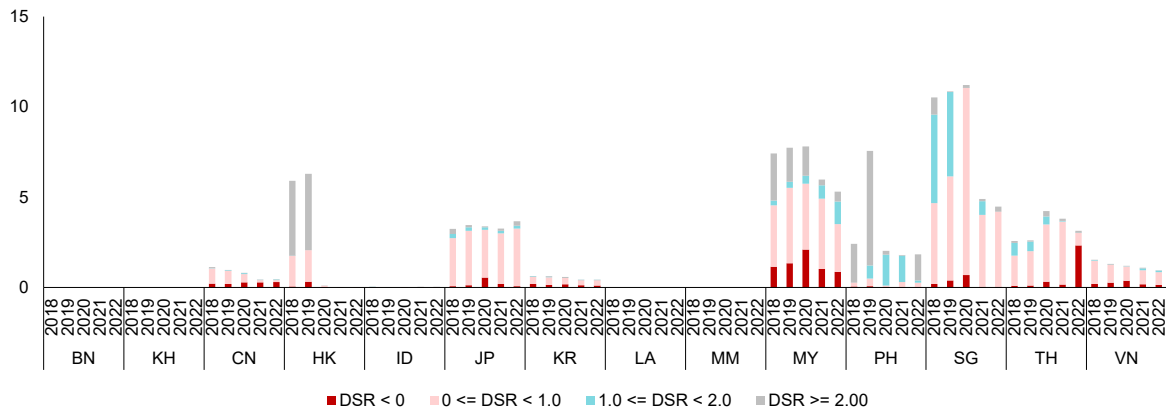
Appendix Figure 2. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type, 2018–22
(Percent of GDP)
(Continued)

Delisted

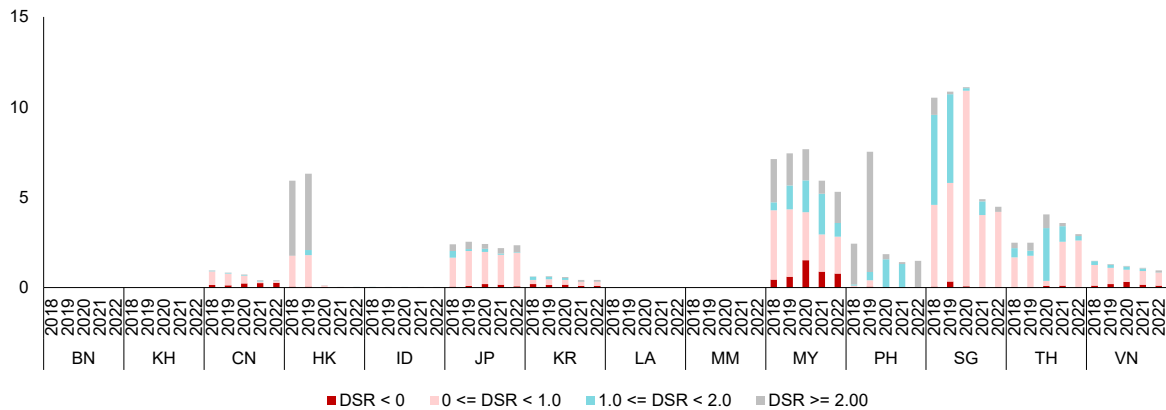
ICR



DSR (EBIT)



DSR (EBITDA)

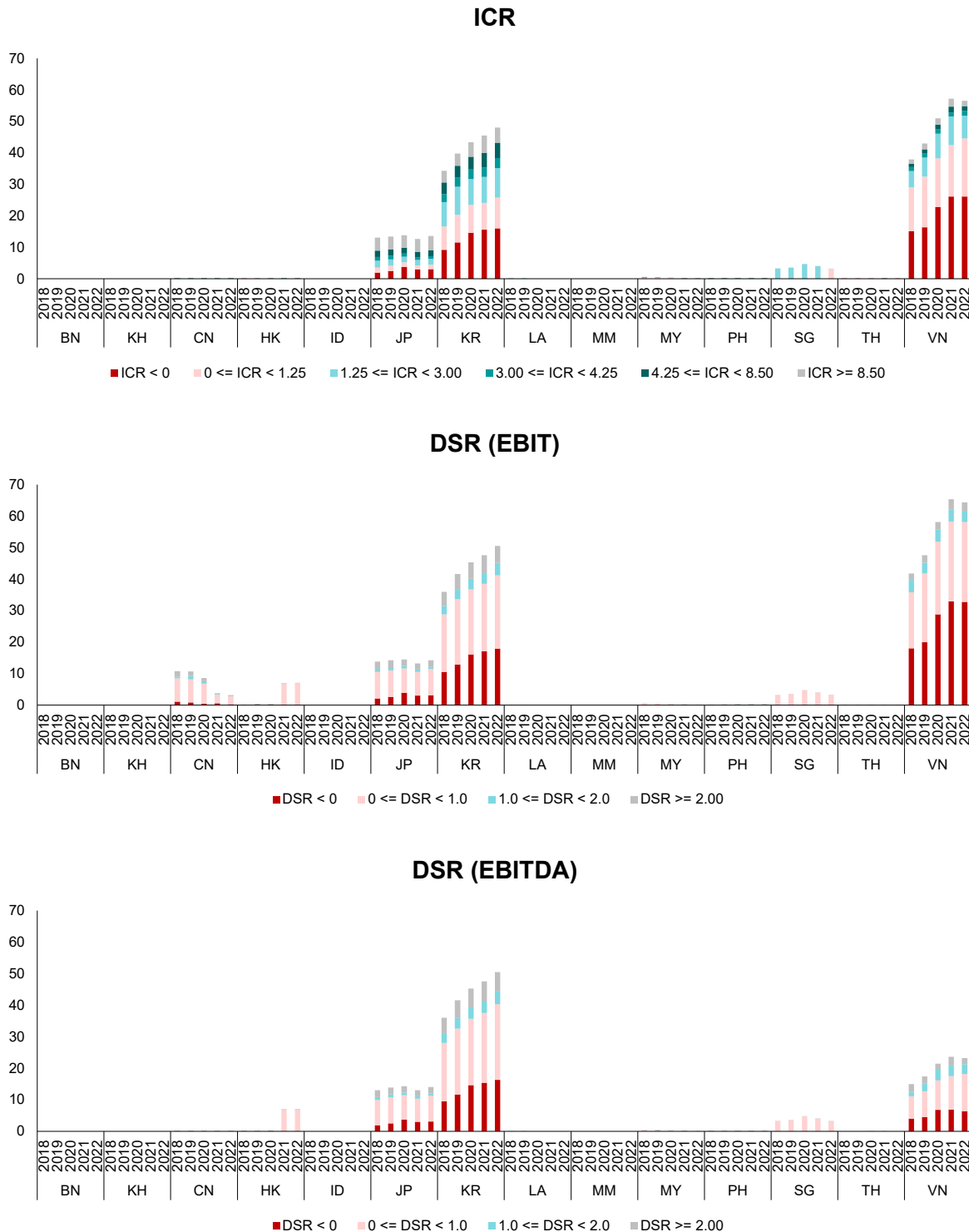


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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



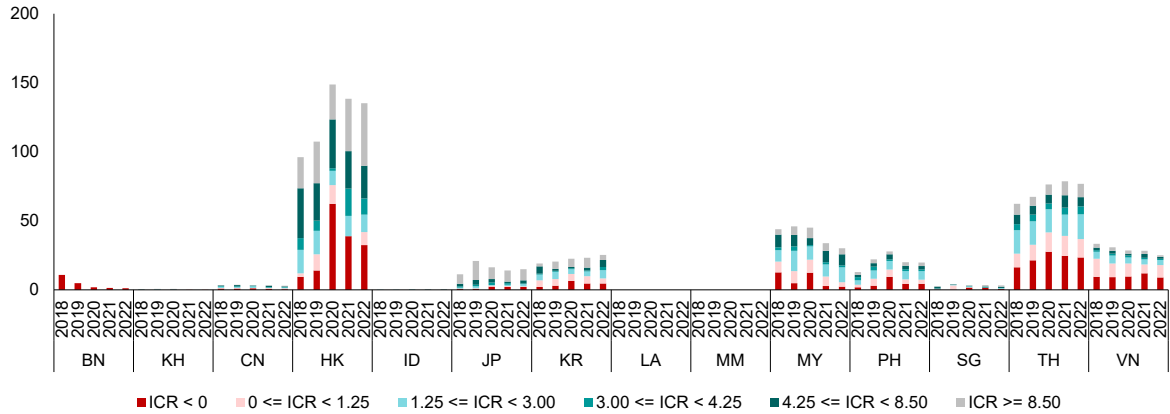
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

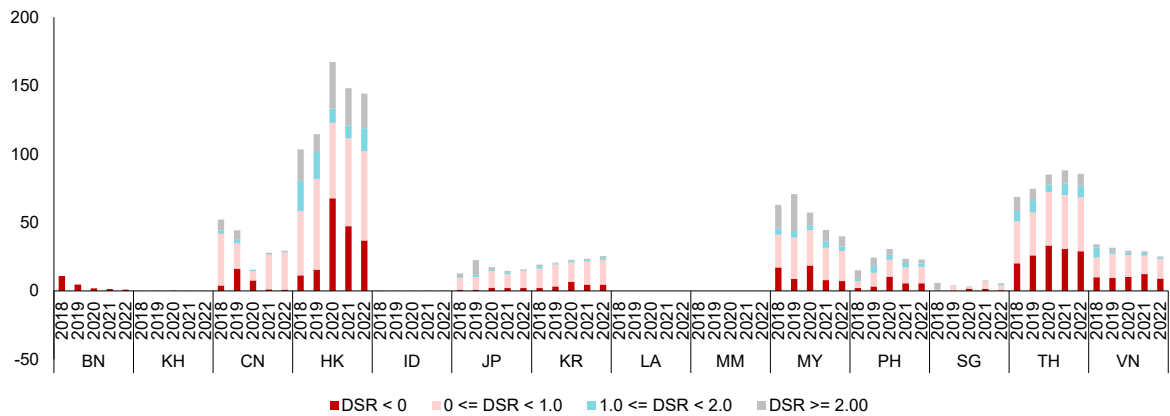
**Appendix Figure 2. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type,
2018–22**
(Percent of GDP)
(Continued)

Unlisted: Other

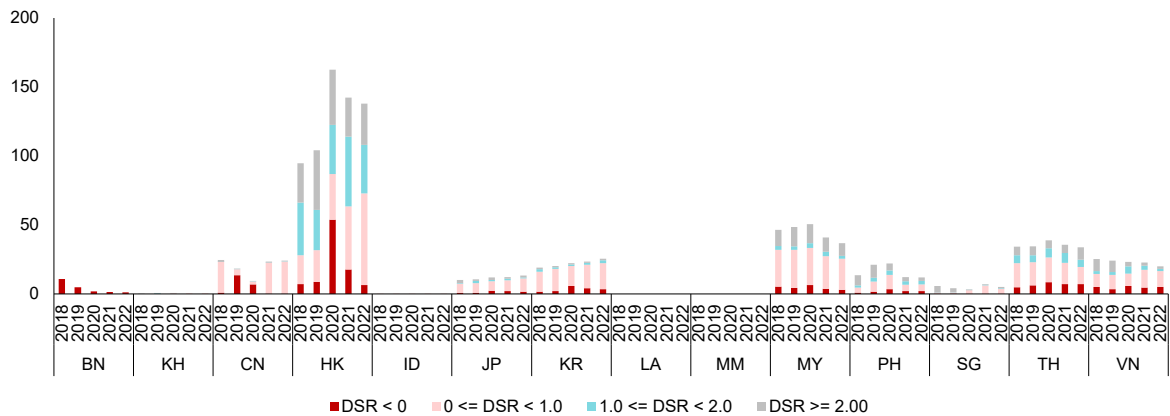
ICR



DSR (EBIT)



DSR (EBITDA)



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

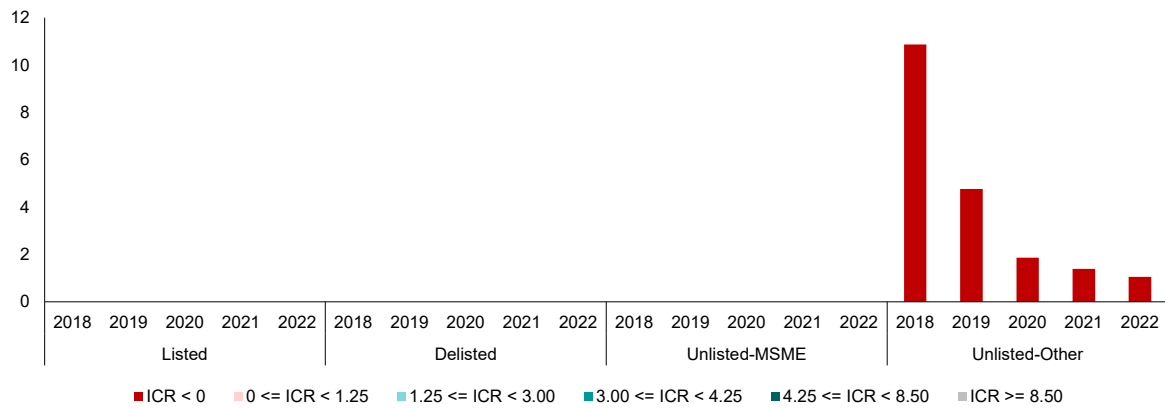
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.

Appendix V. Firm Debt-at-Risk across Firm Types for Individual ASEAN+3 Economies

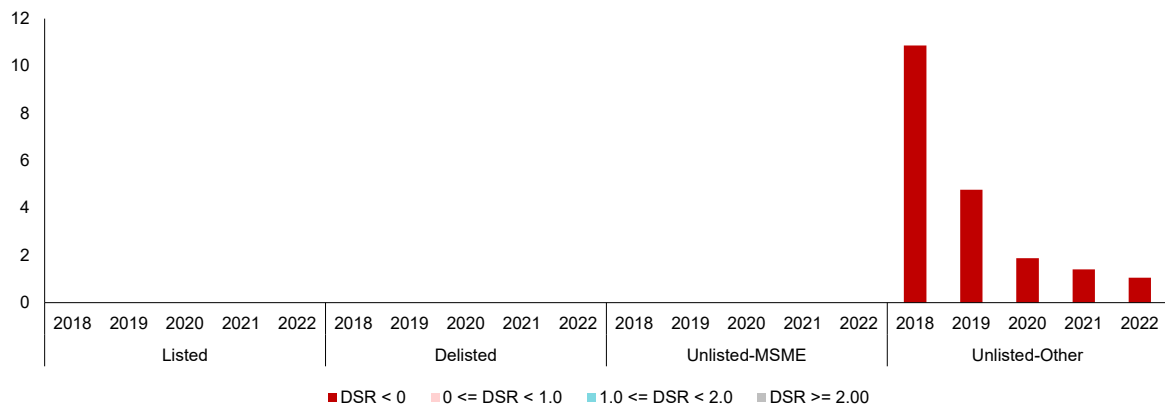
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)

Brunei

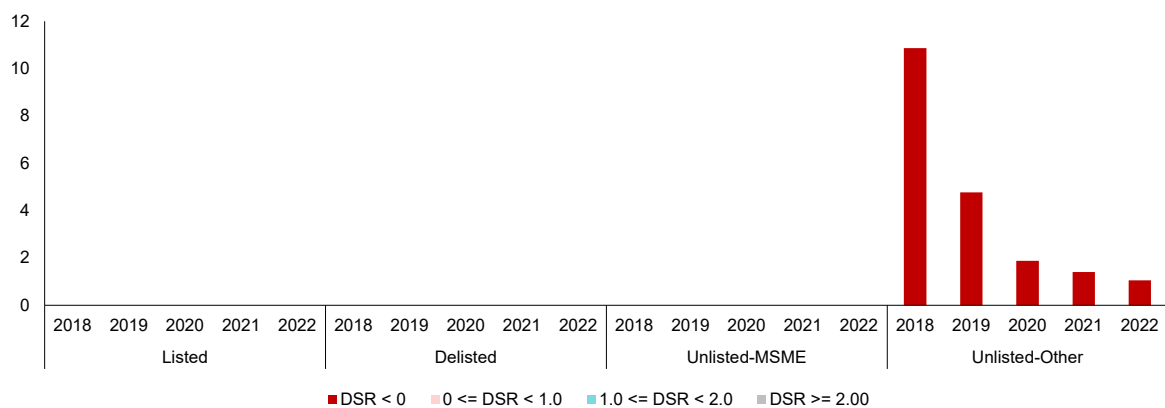
ICR



DSR (EBIT)



DSR (EBITDA)

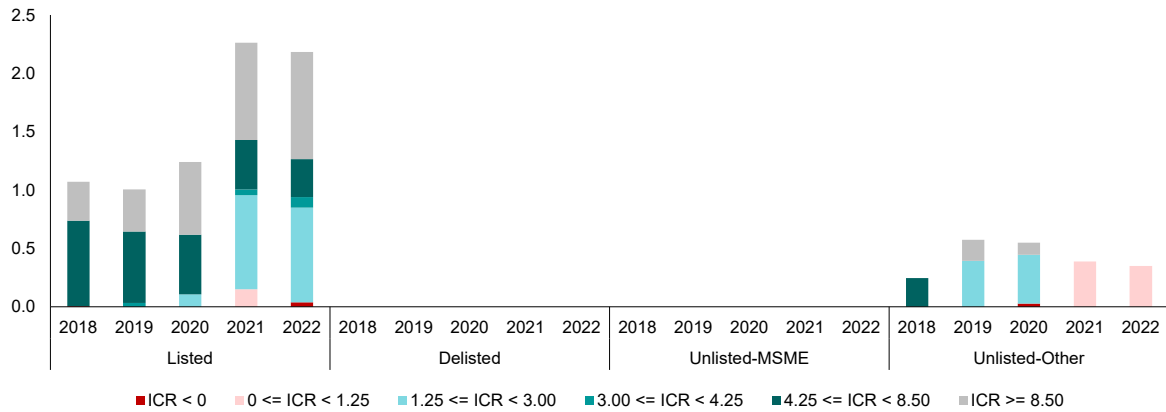


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

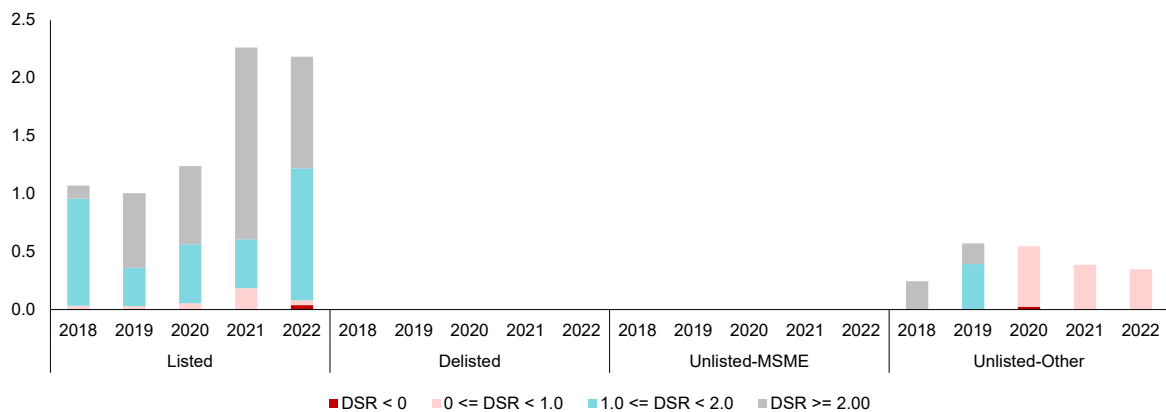
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Cambodia

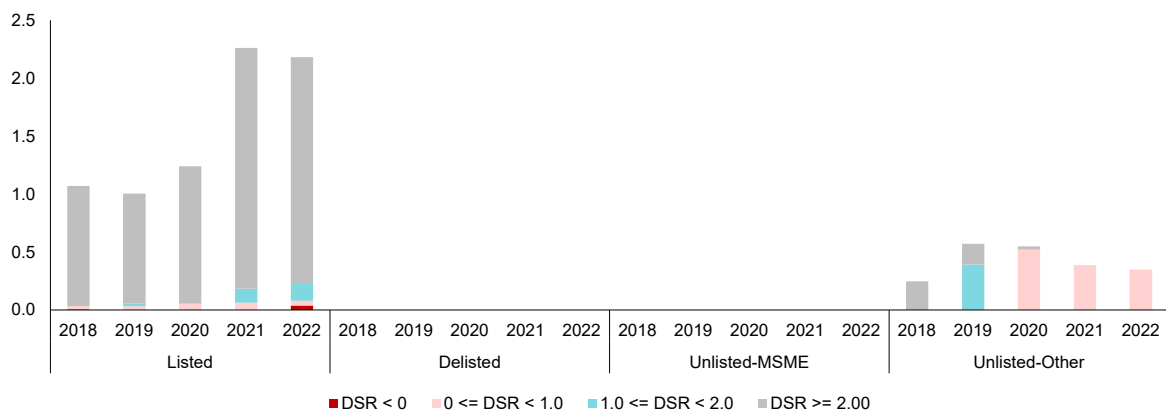
ICR



DSR (EBIT)



DSR (EBITDA)

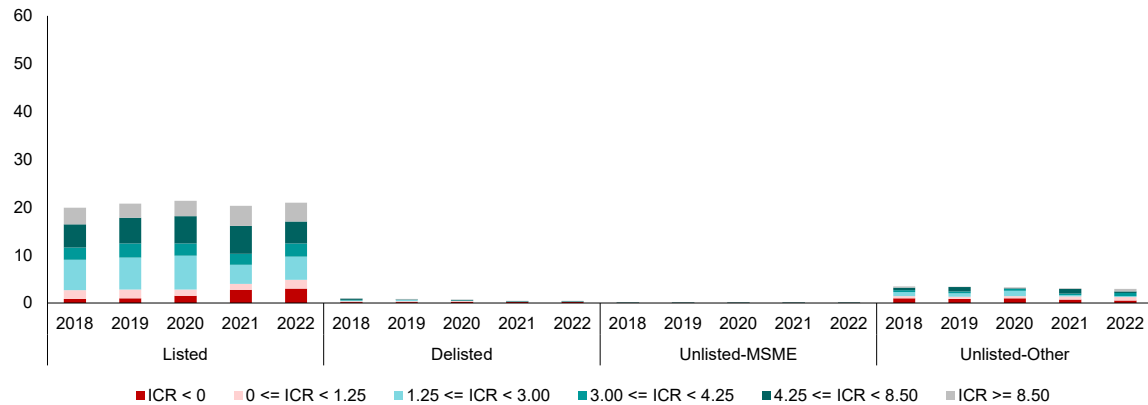


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

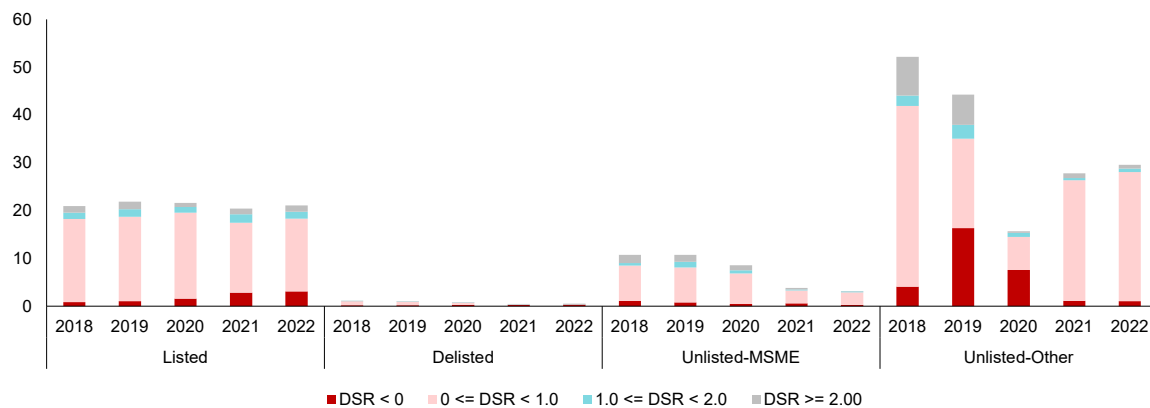
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

China

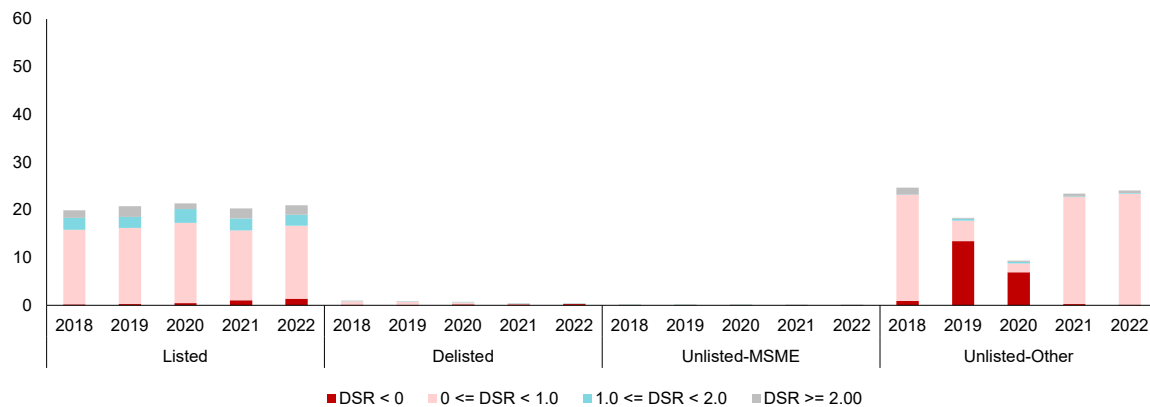
ICR



DSR (EBIT)



DSR (EBITDA)

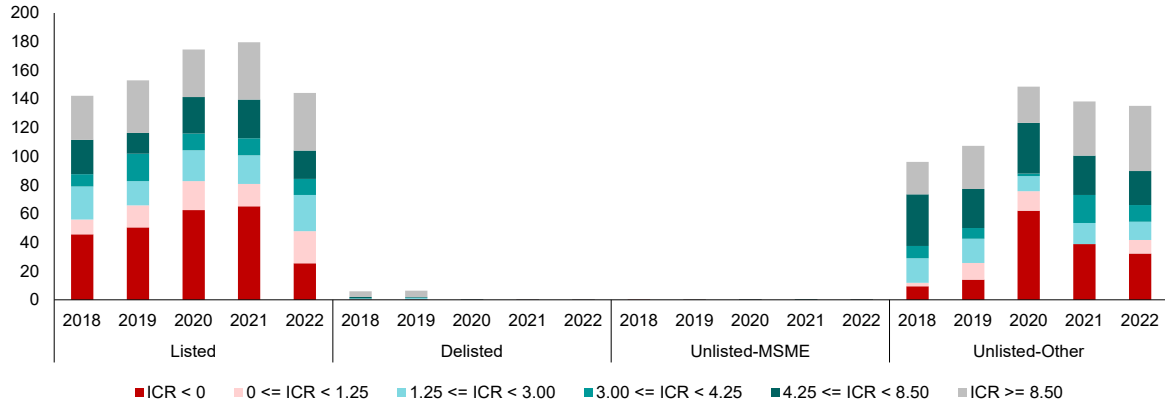


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

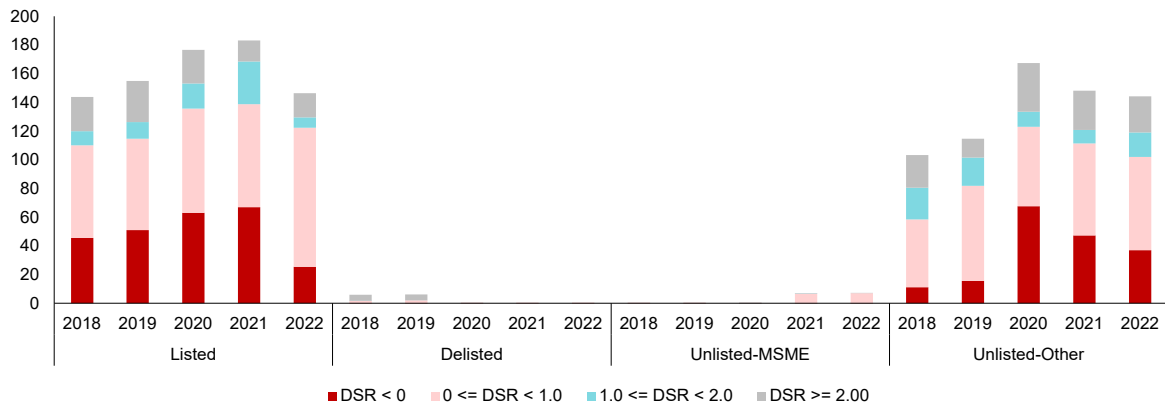
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Hong Kong

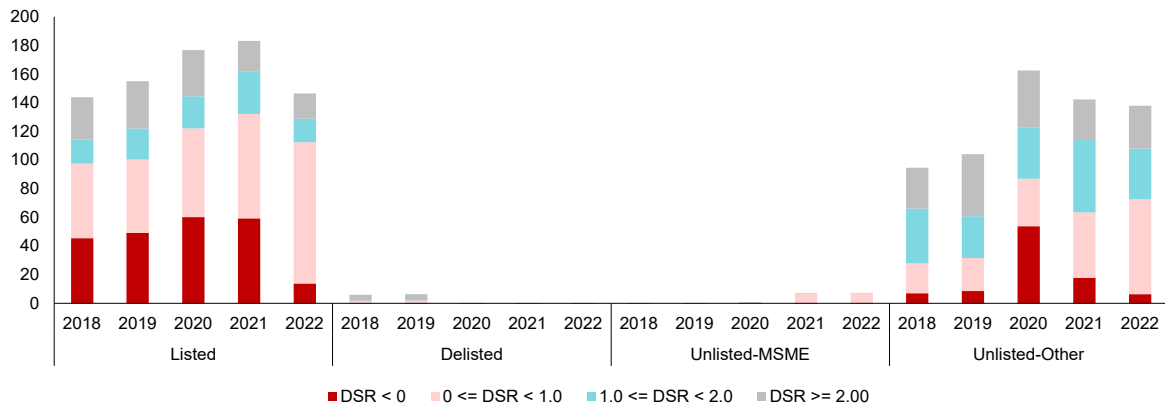
ICR



DSR (EBIT)



DSR (EBITDA)

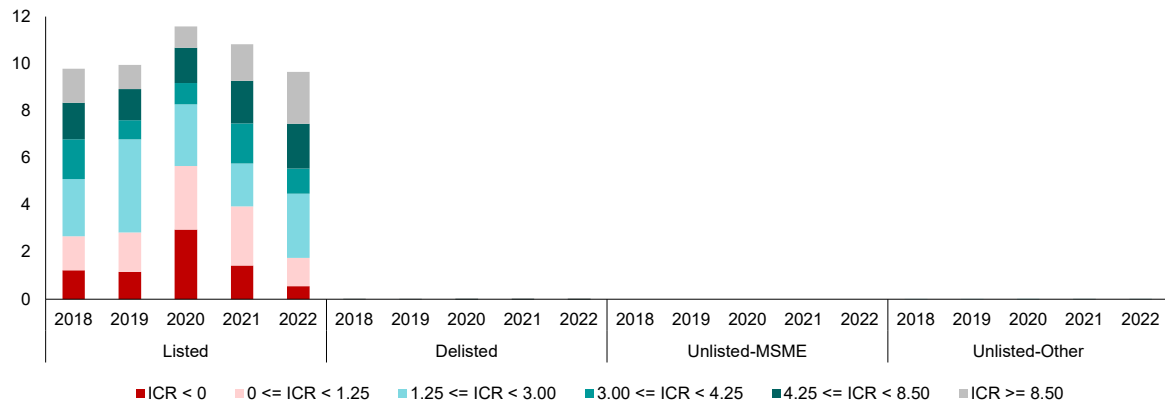


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

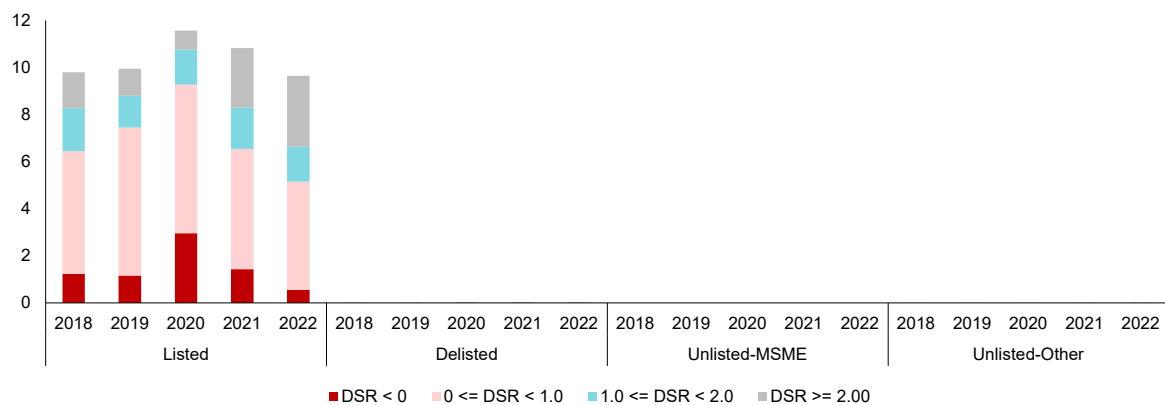
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Indonesia

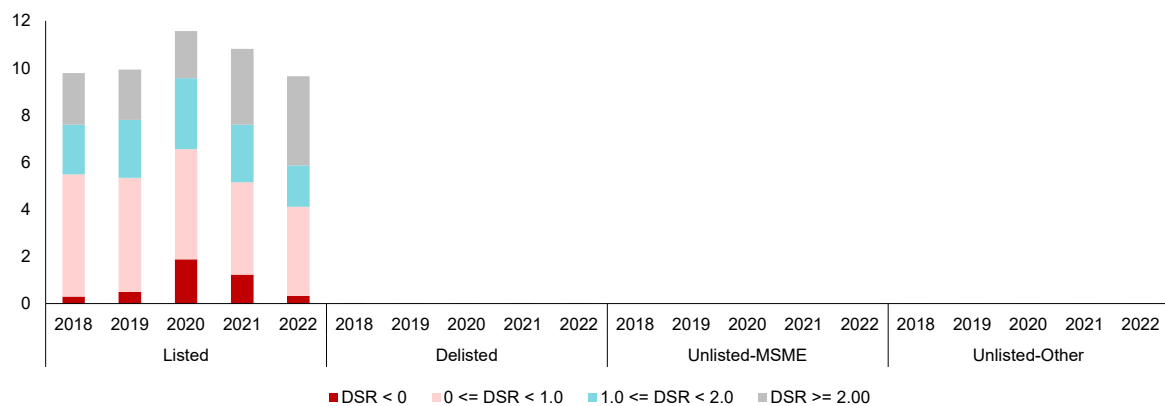
ICR



DSR (EBIT)



DSR (EBITDA)

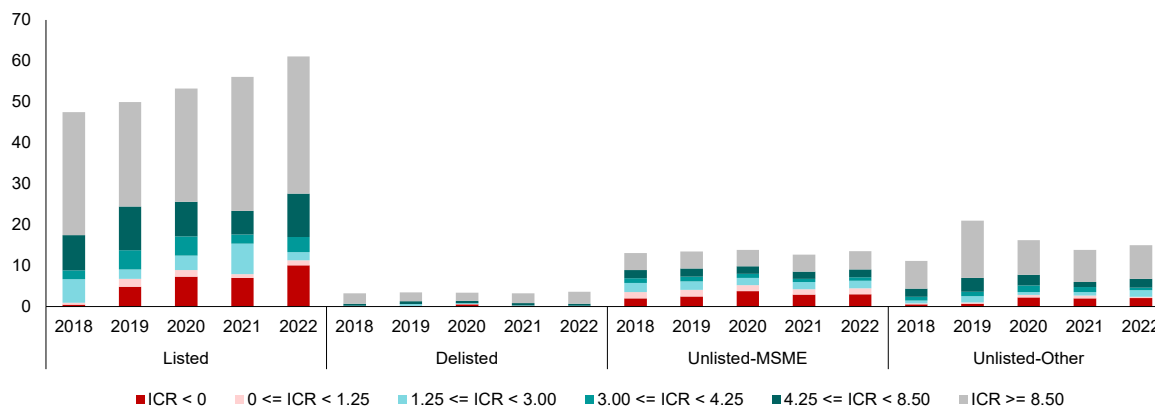


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

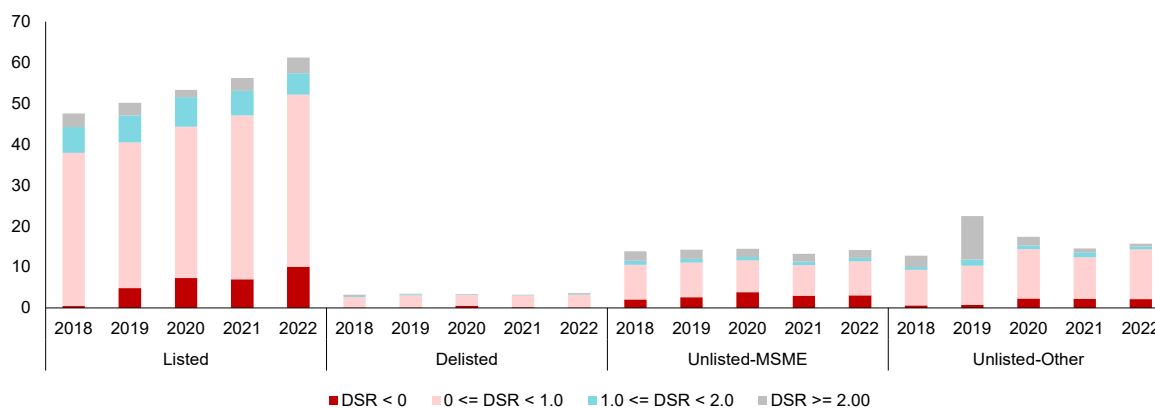
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Japan

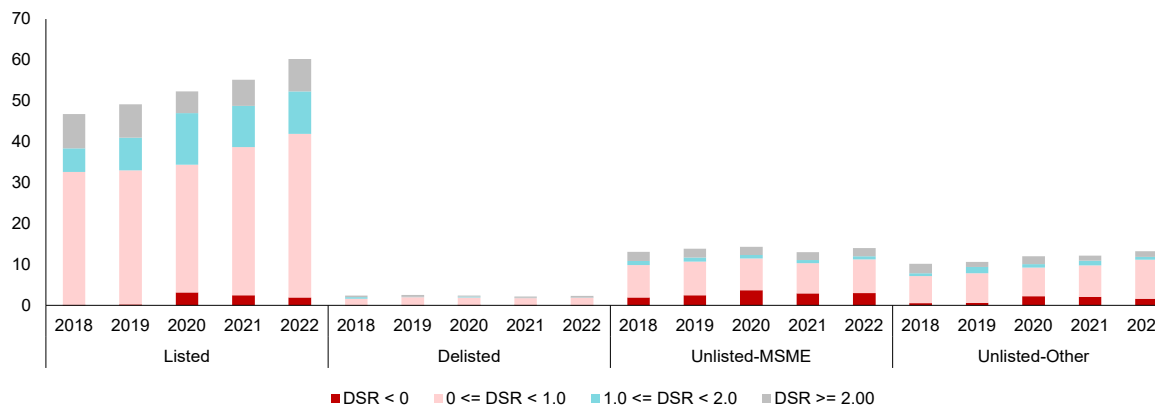
ICR



DSR (EBIT)



DSR (EBITDA)

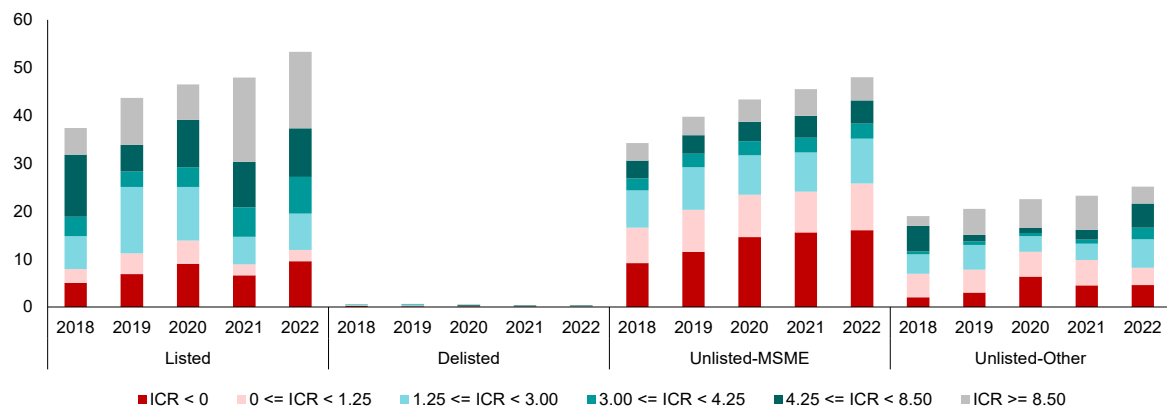


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

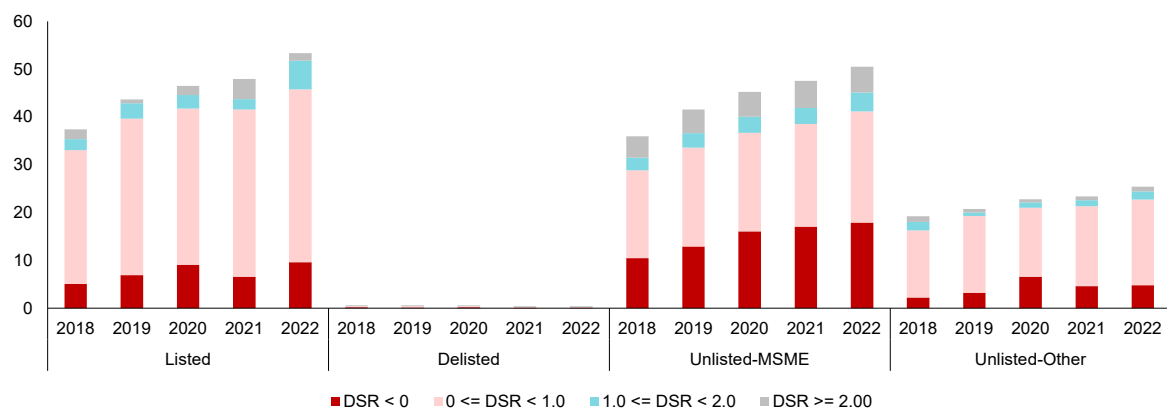
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Korea

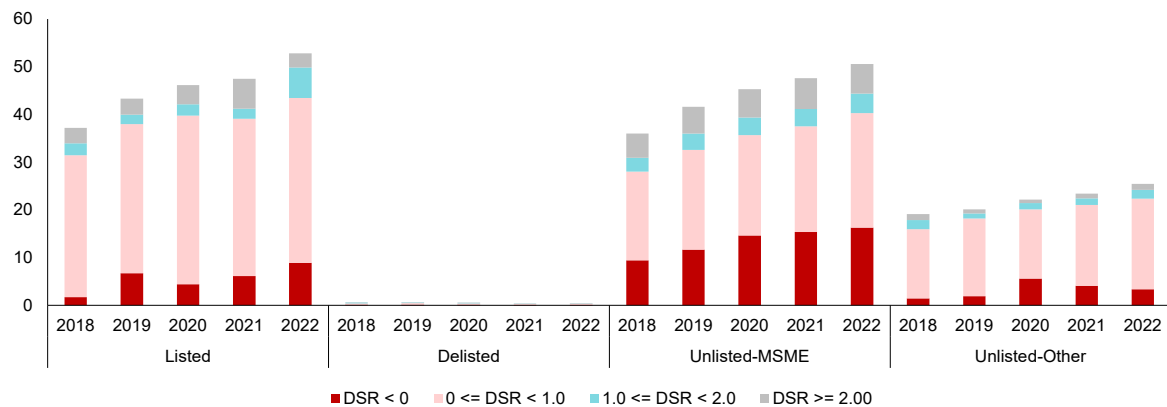
ICR



DSR (EBIT)



DSR (EBITDA)

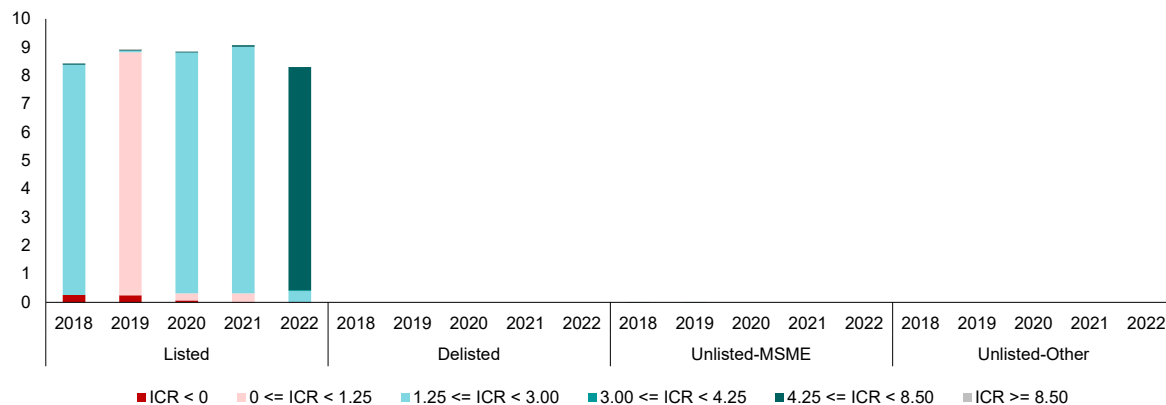


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

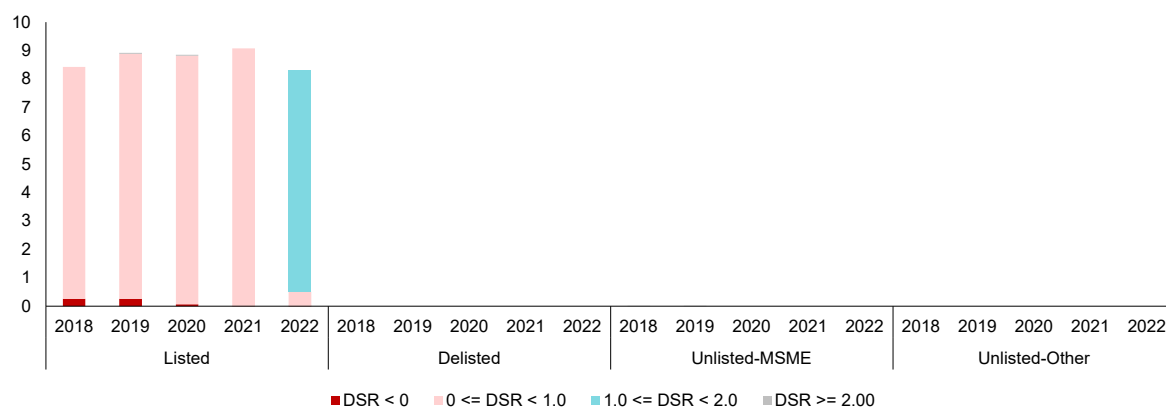
**Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
2018–22**
(Percent of GDP)
(Continued)

Lao PDR

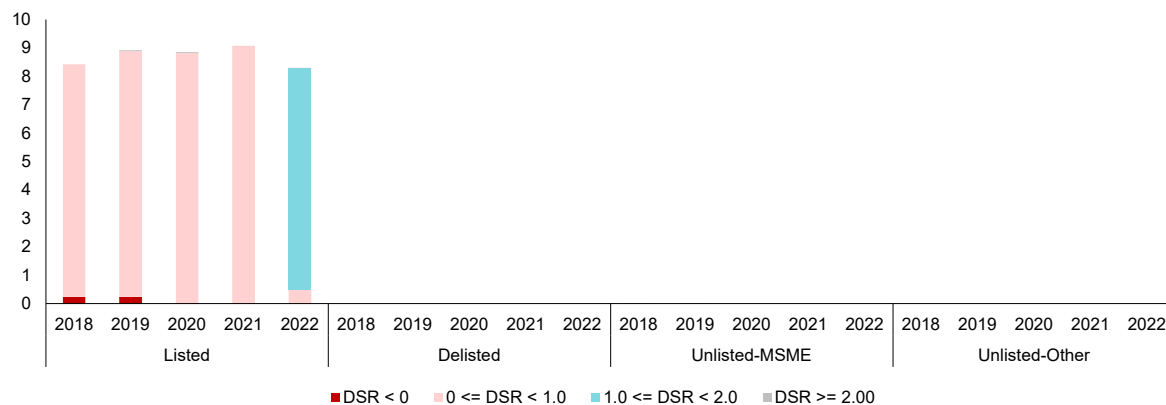
ICR



DSR (EBIT)



DSR (EBITDA)

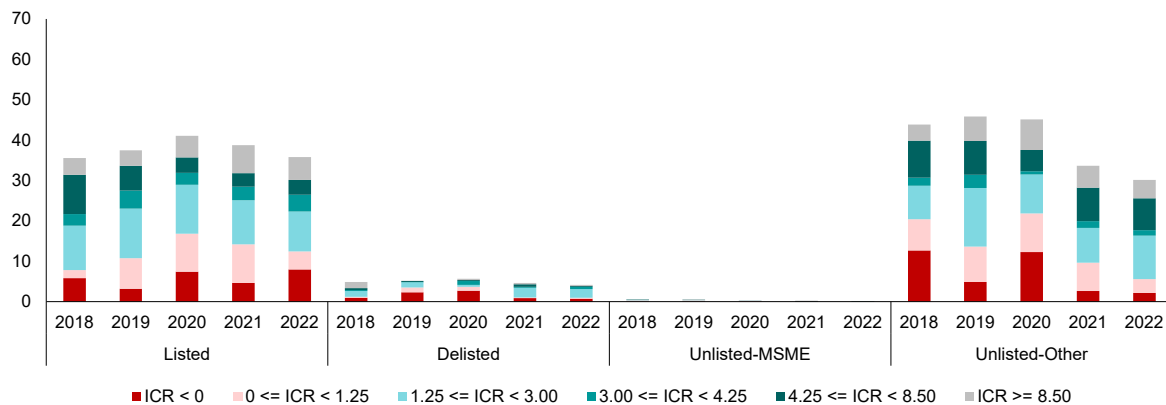


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

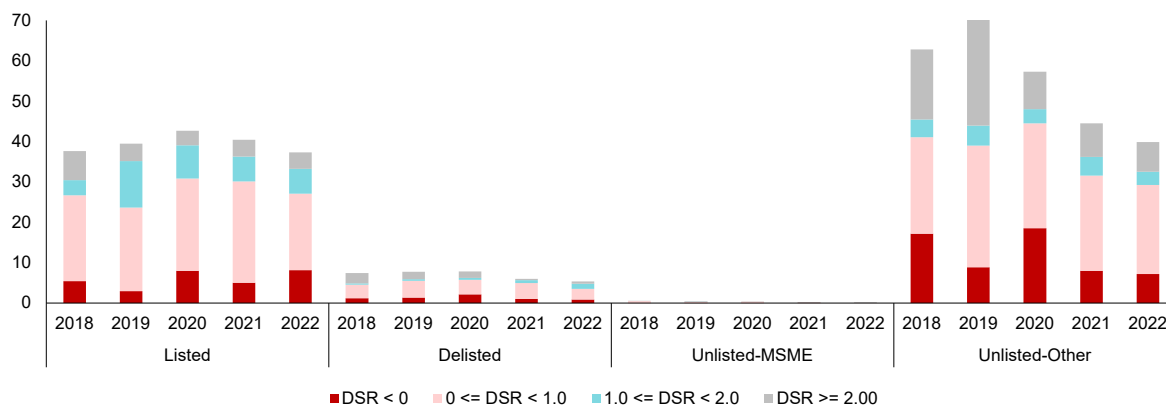
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Malaysia

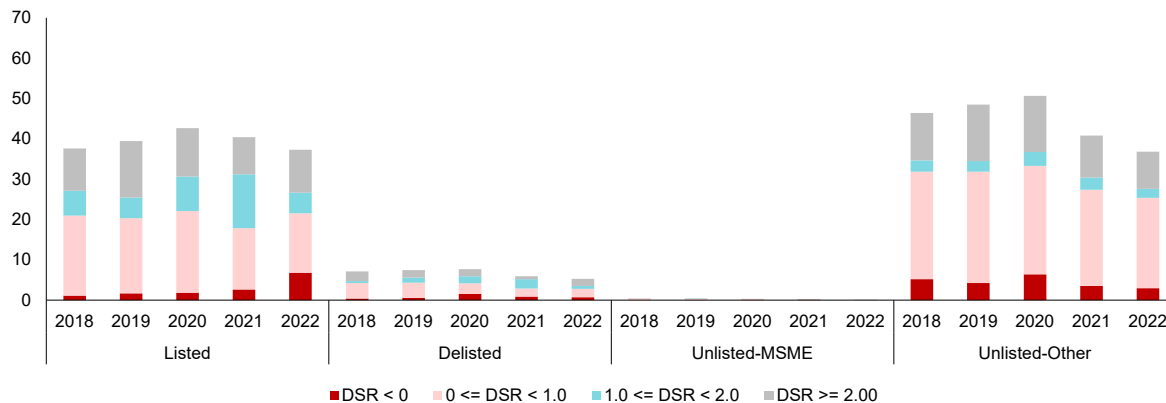
ICR



DSR (EBIT)



DSR (EBITDA)

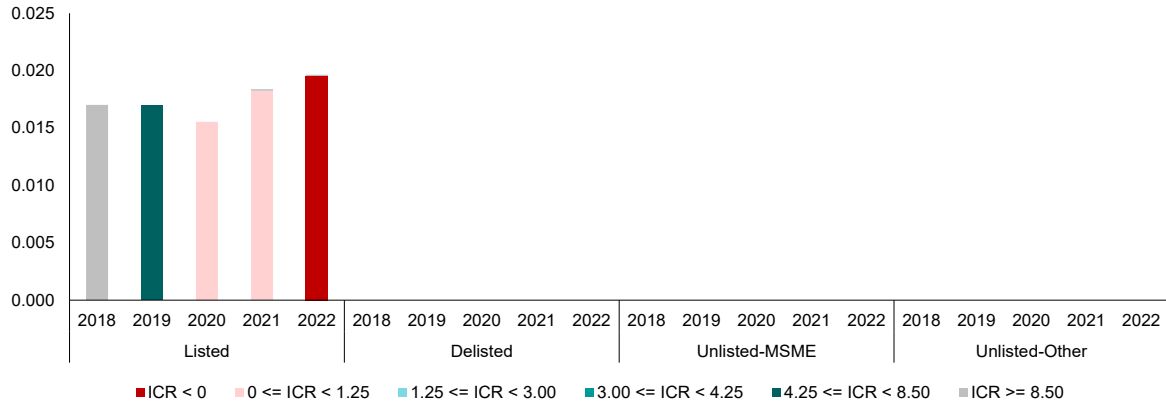


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

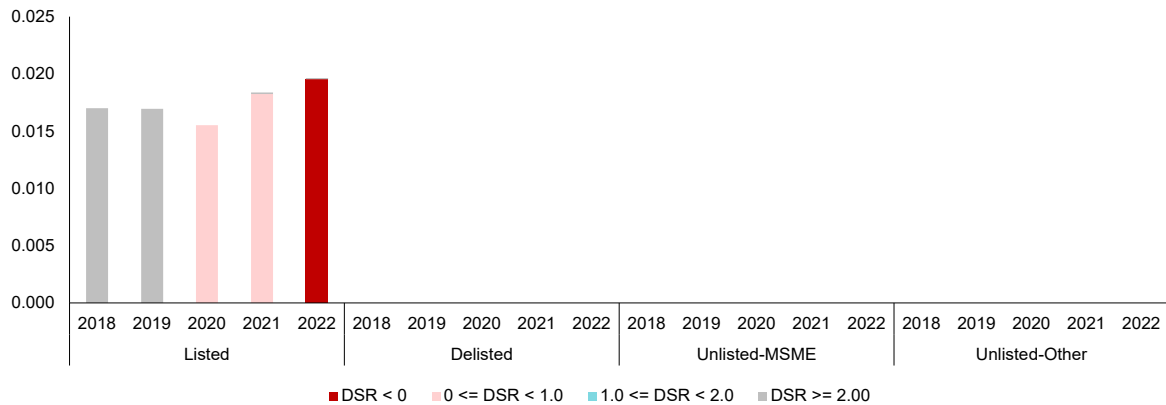
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Myanmar

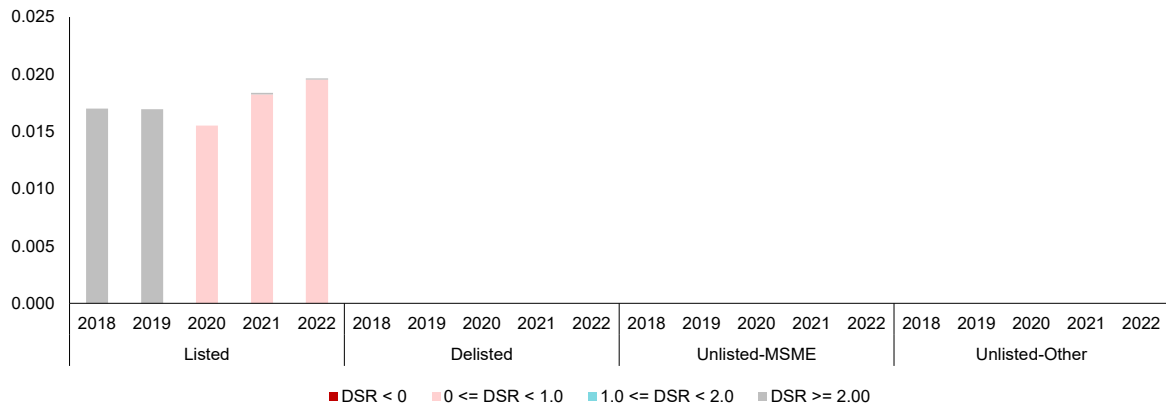
ICR



DSR (EBIT)



DSR (EBITDA)

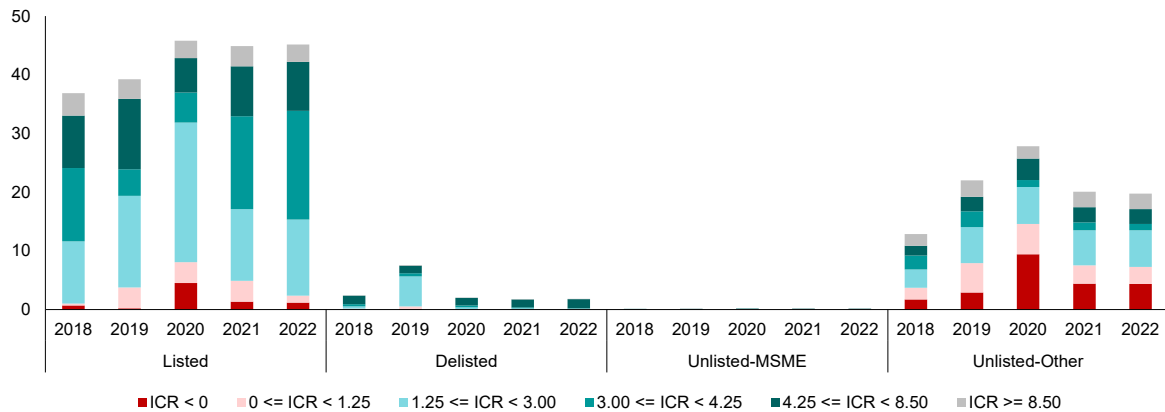


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

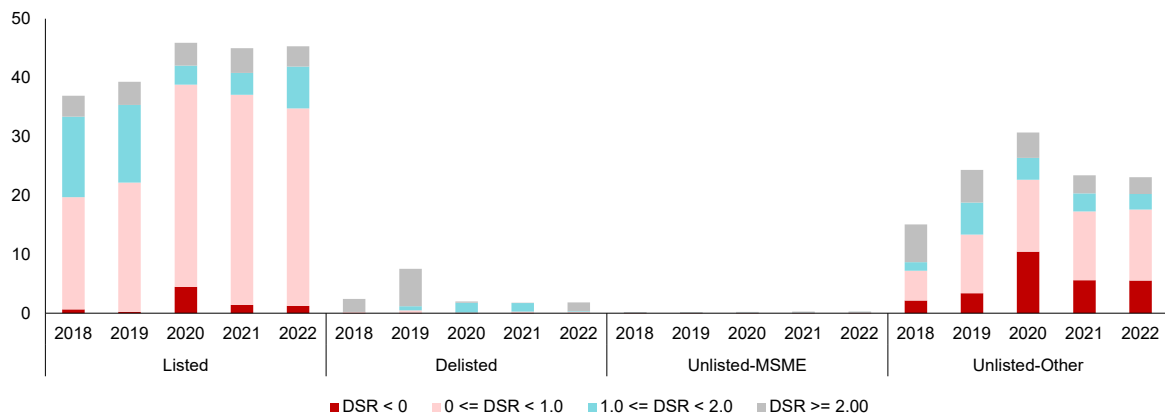
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Philippines

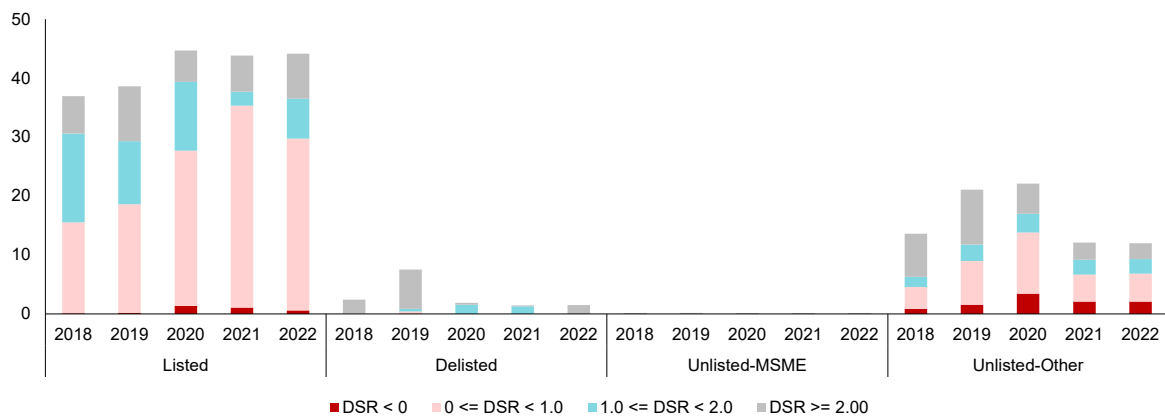
ICR



DSR (EBIT)



DSR (EBITDA)

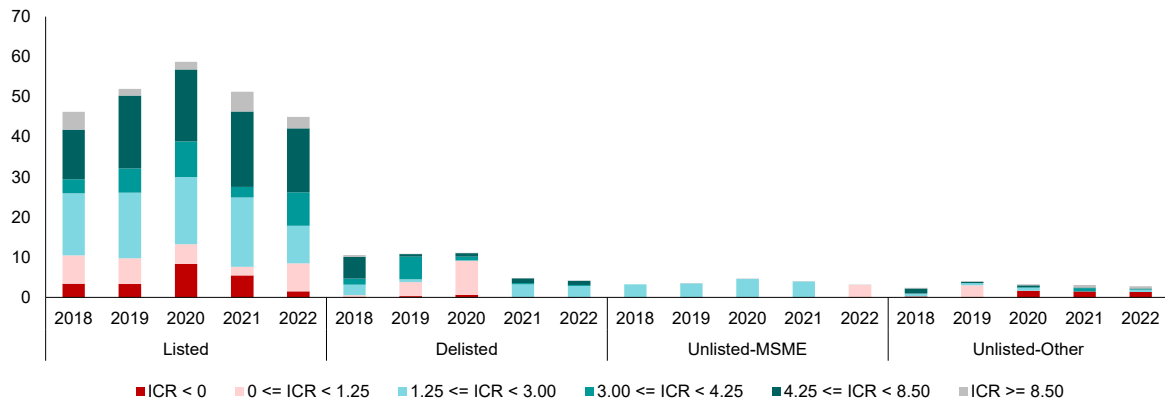


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

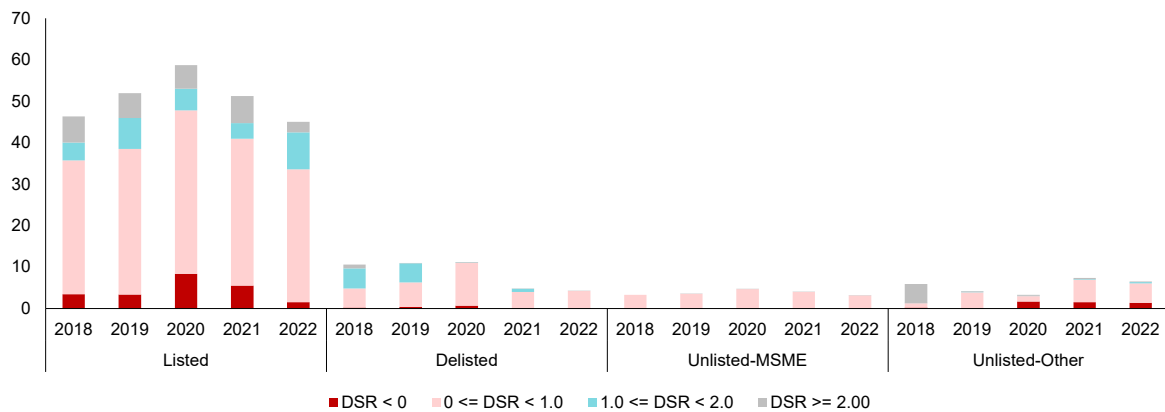
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Singapore

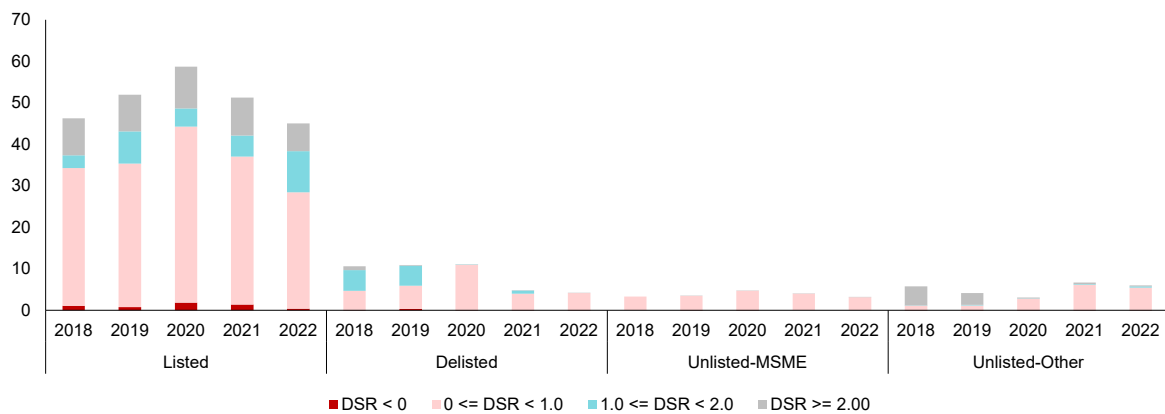
ICR



DSR (EBIT)



DSR (EBITDA)

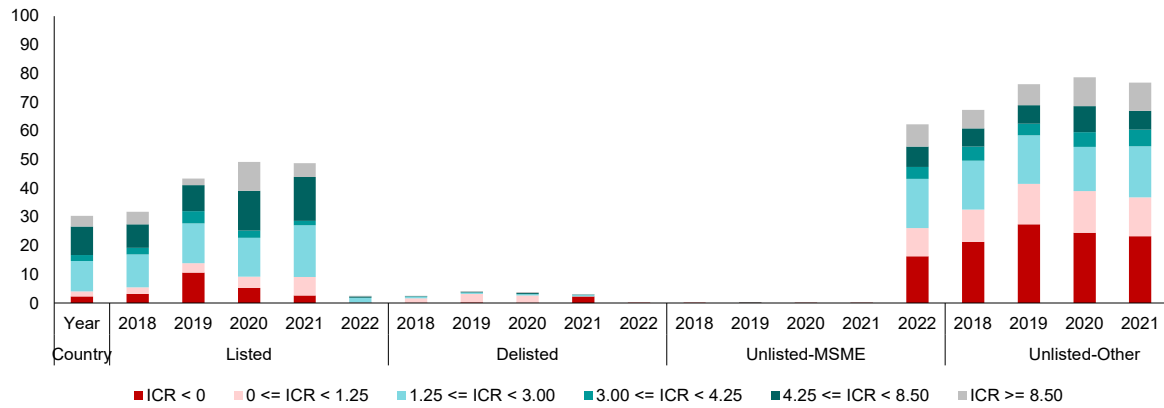


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

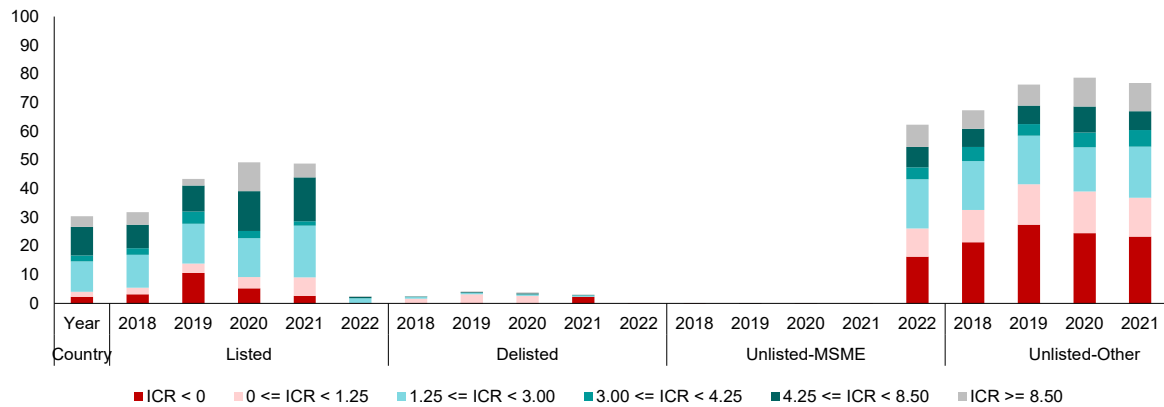
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Thailand

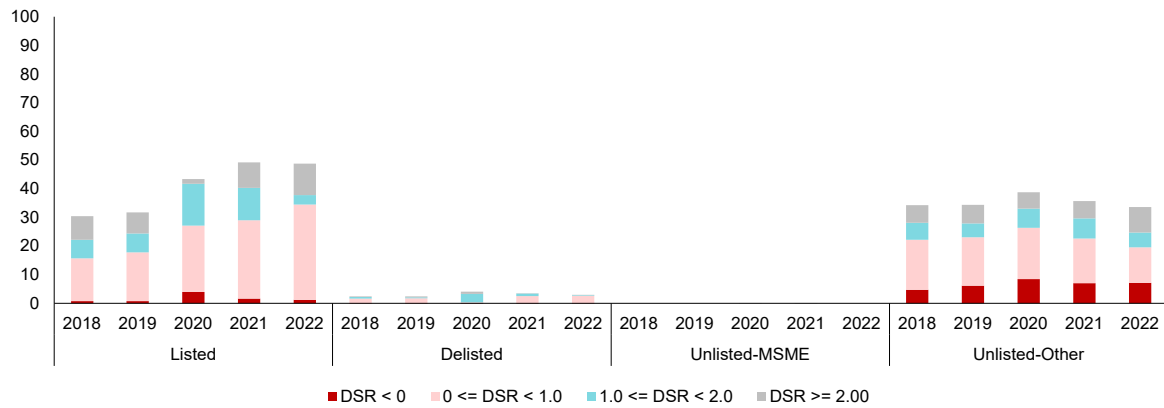
ICR



DSR (EBIT)



DSR (EBITDA)

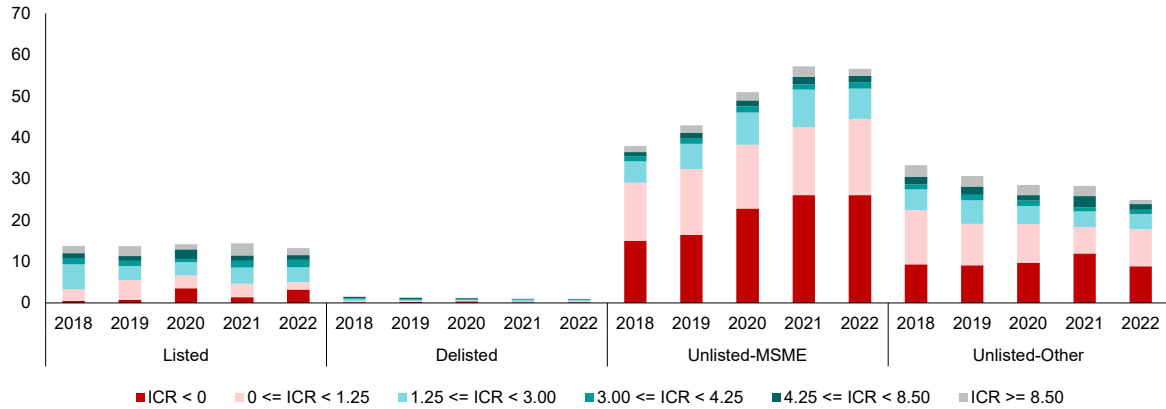


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

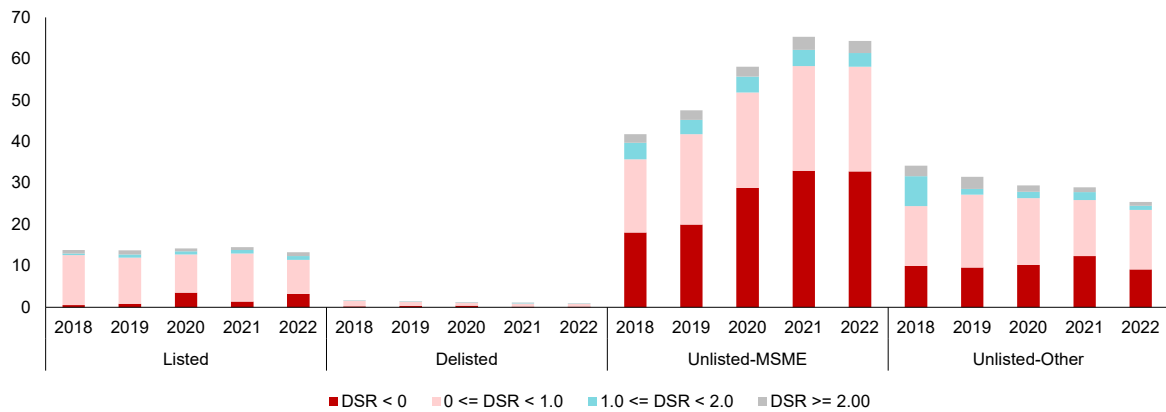
Appendix Figure 3. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, 2018–22
(Percent of GDP)
(Continued)

Vietnam

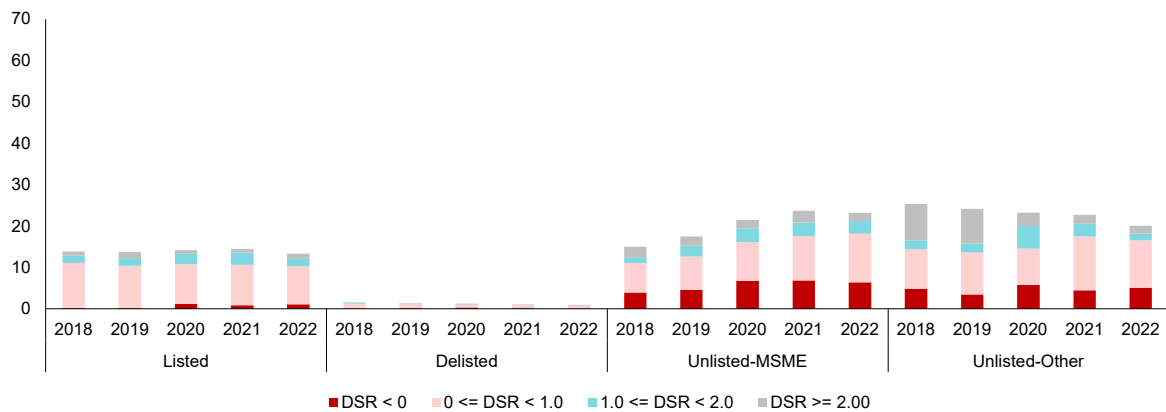
ICR



DSR (EBIT)



DSR (EBITDA)

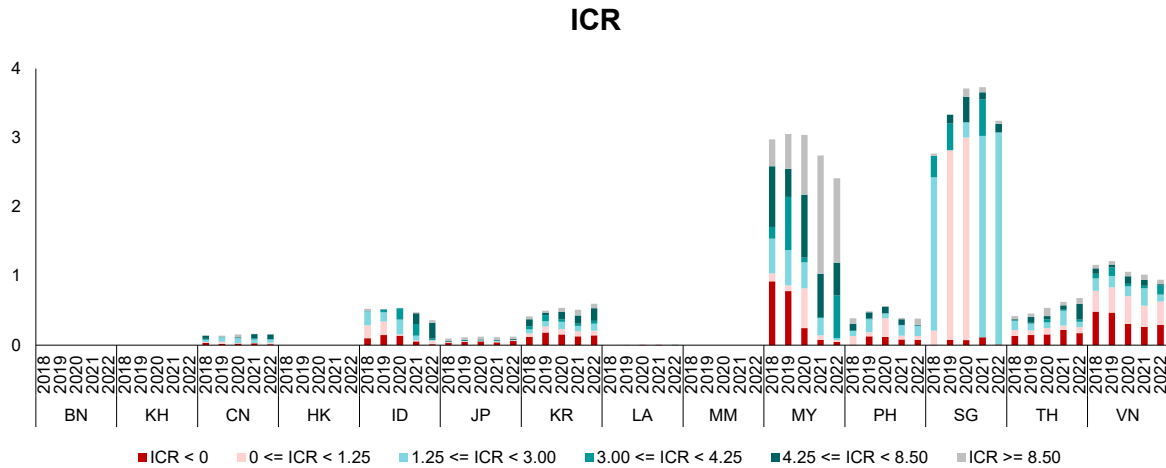


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

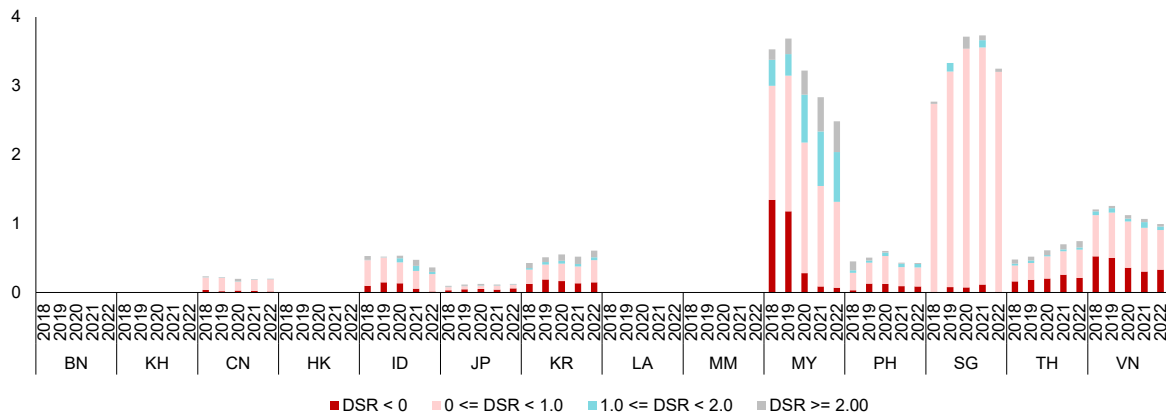
Appendix VI. Firm Debt-at-Risk across ASEAN+3 Economies by Industry

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

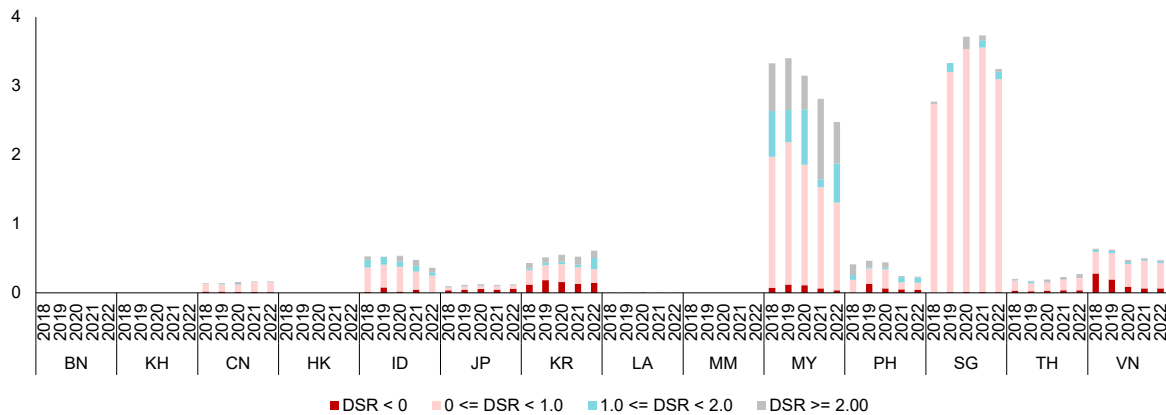
Agriculture



DSR (EBIT)



DSR (EBITDA)

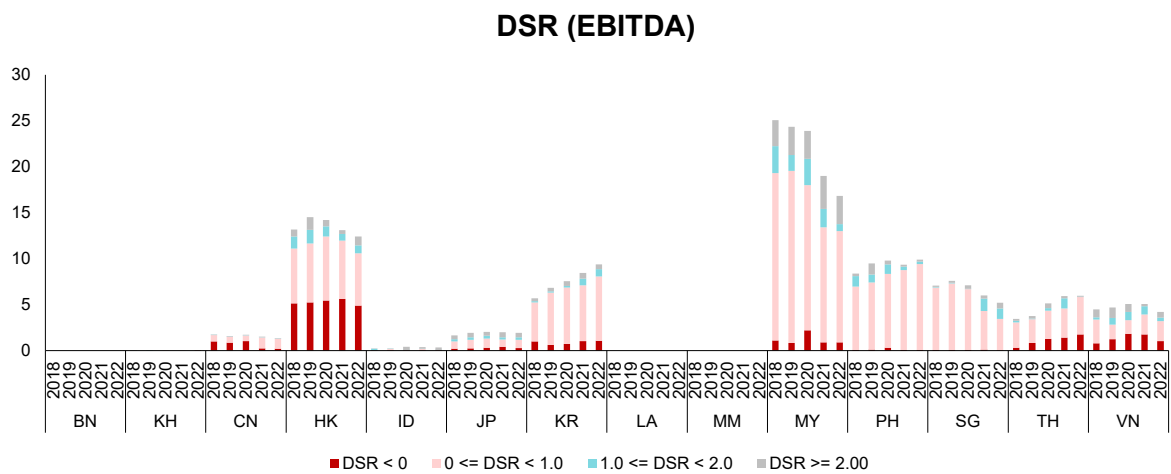
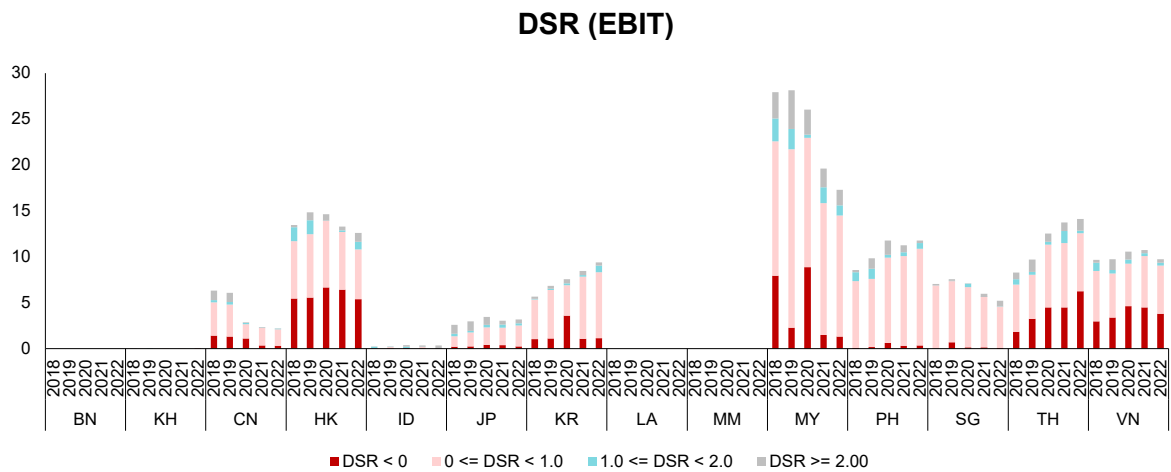
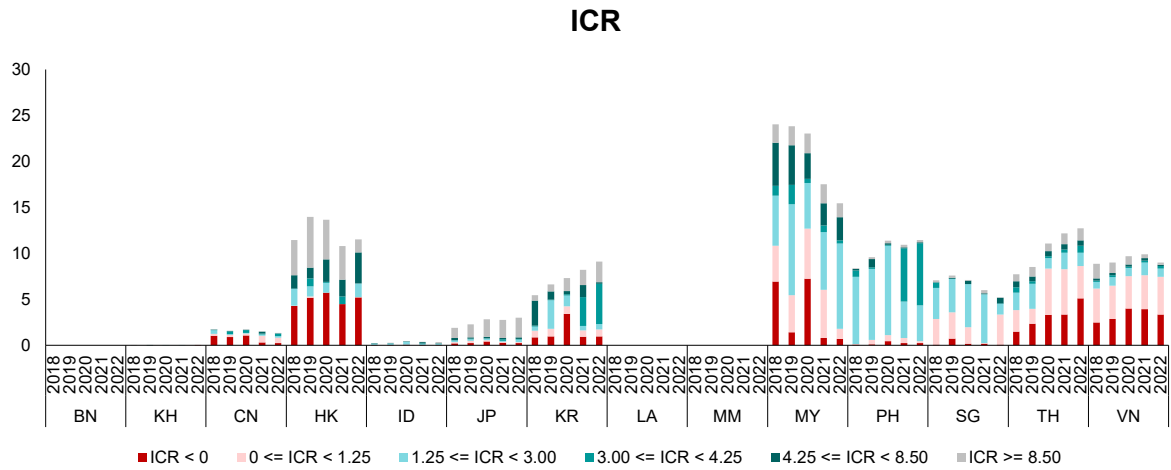


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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

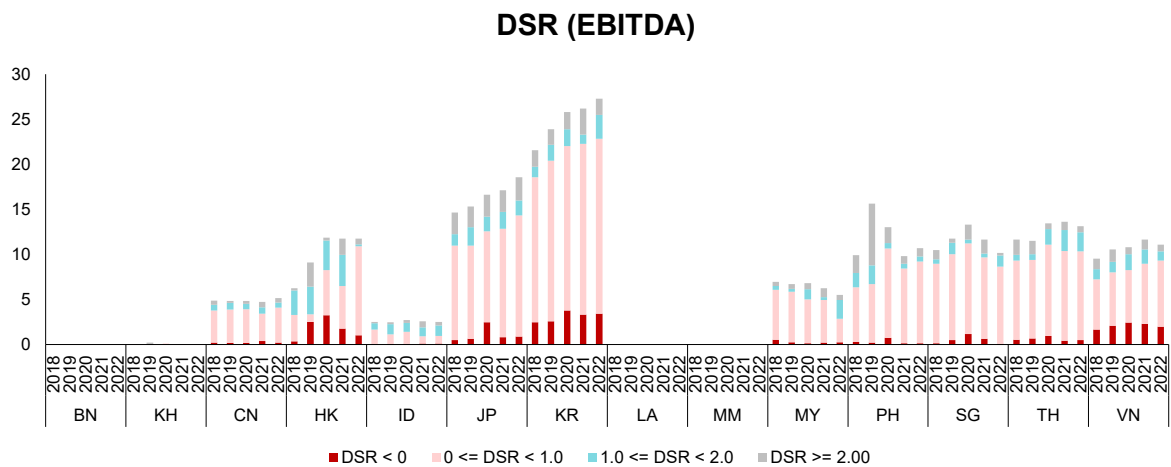
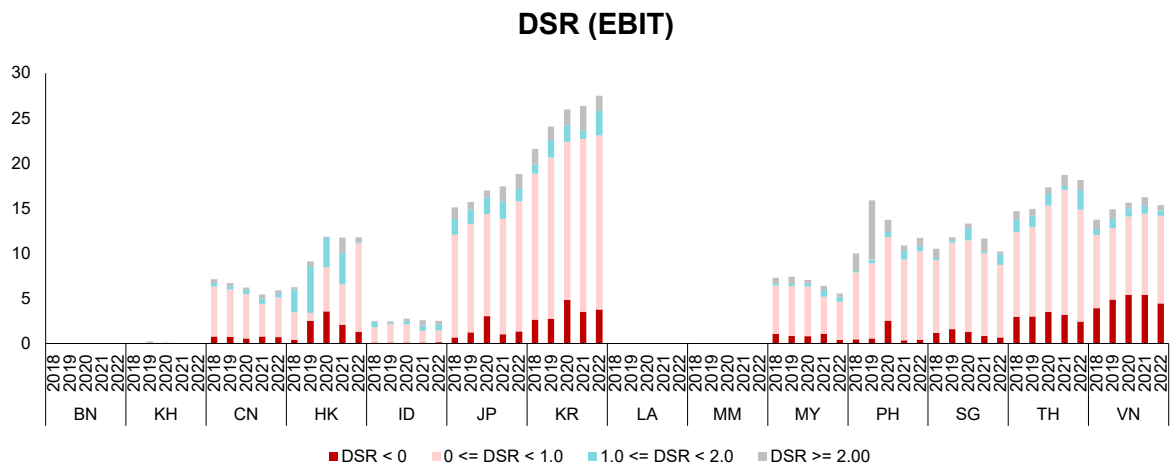
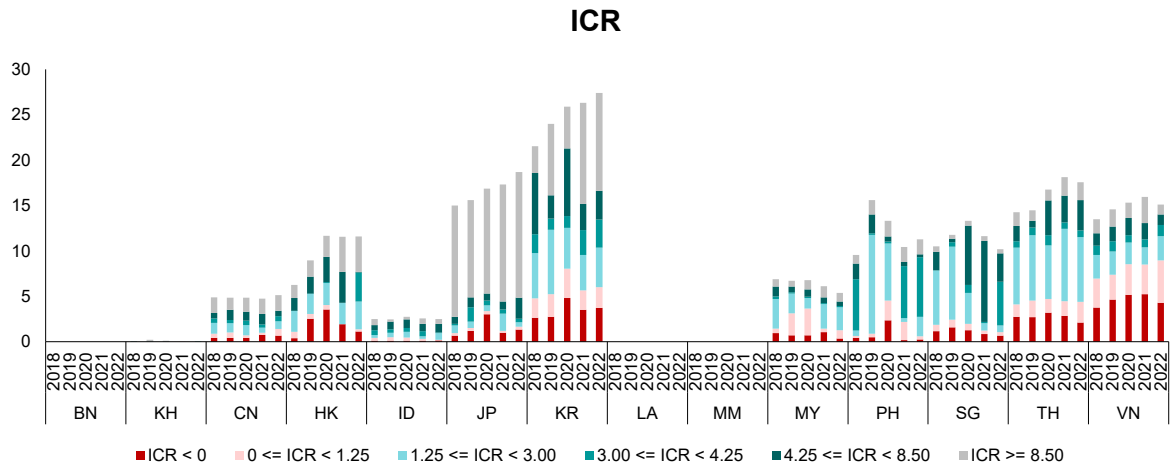


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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



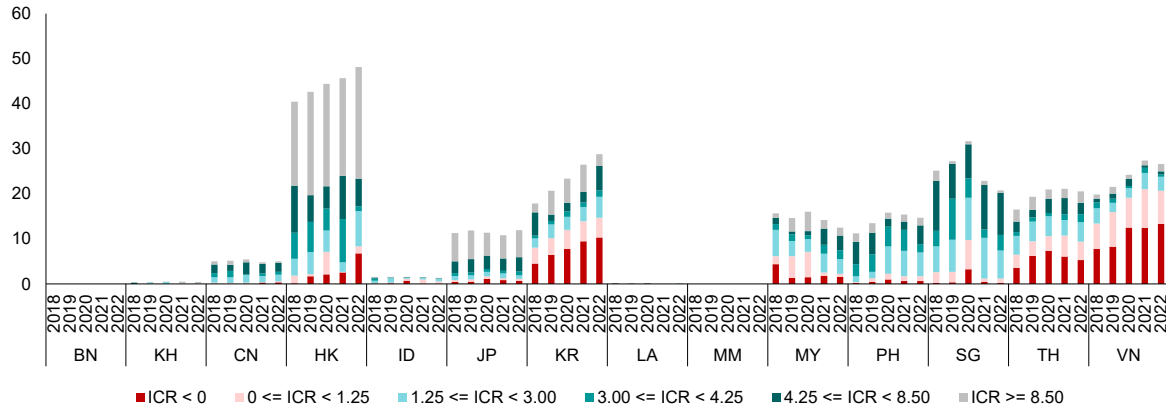
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

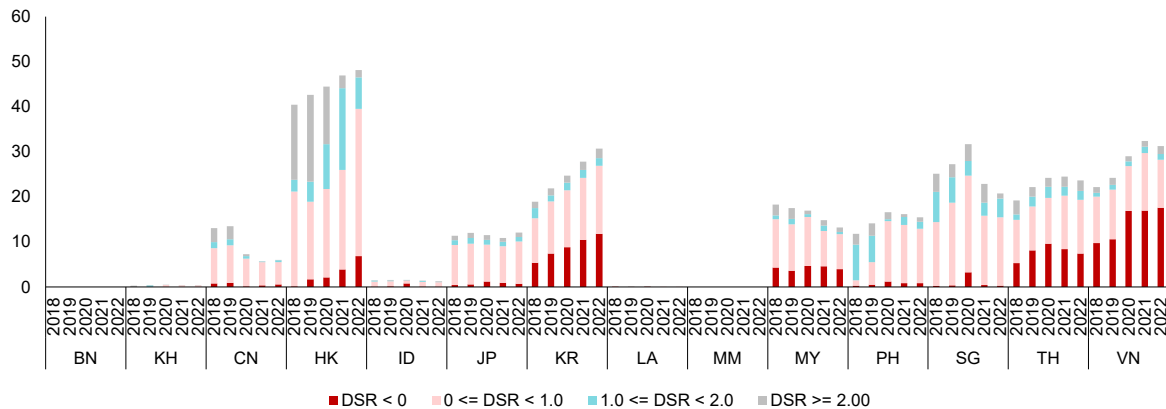
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Property and Construction

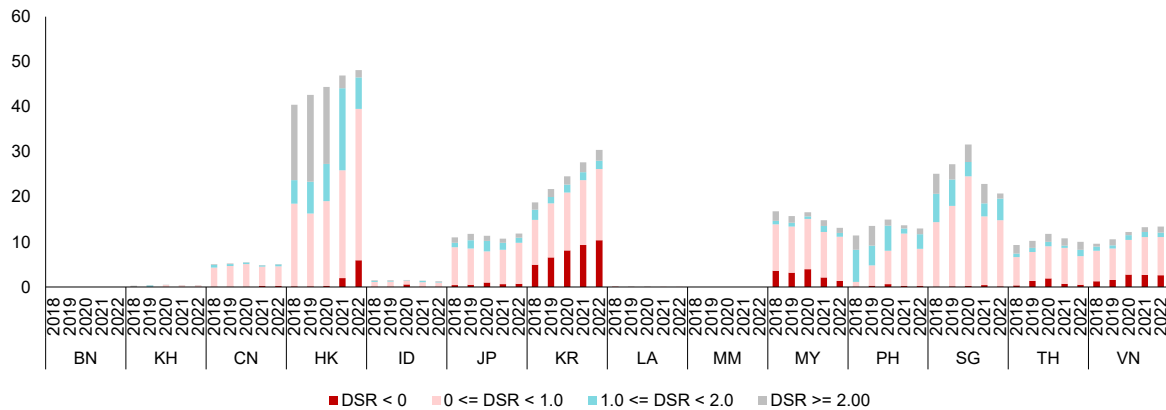
ICR



DSR (EBIT)



DSR (EBITDA)



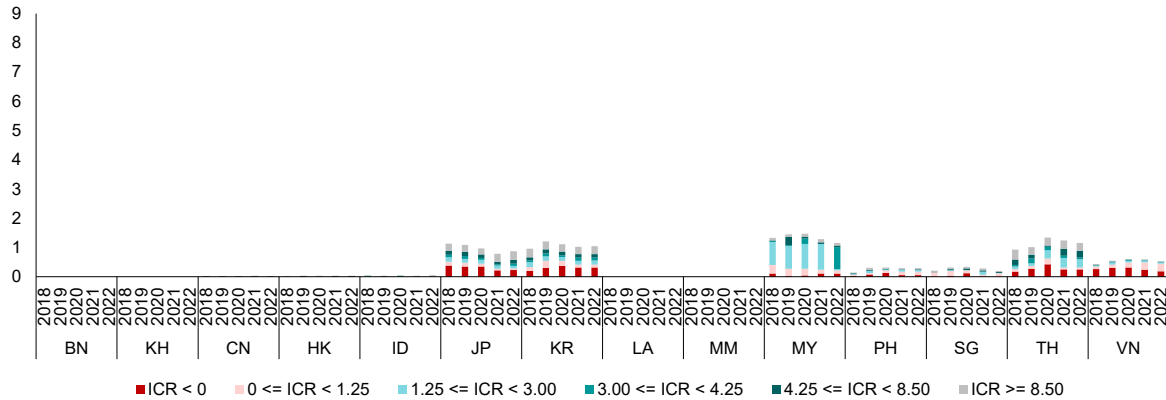
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

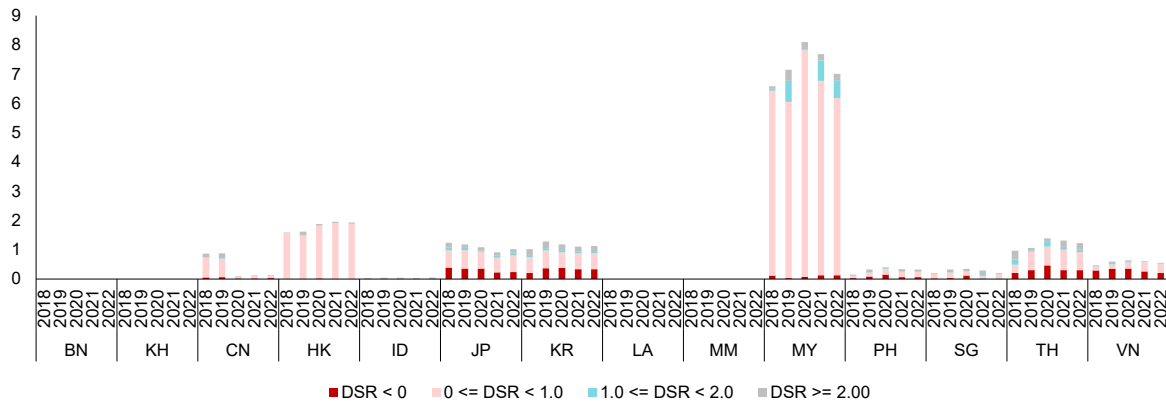
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Public Administration, Education, and Health Social Services

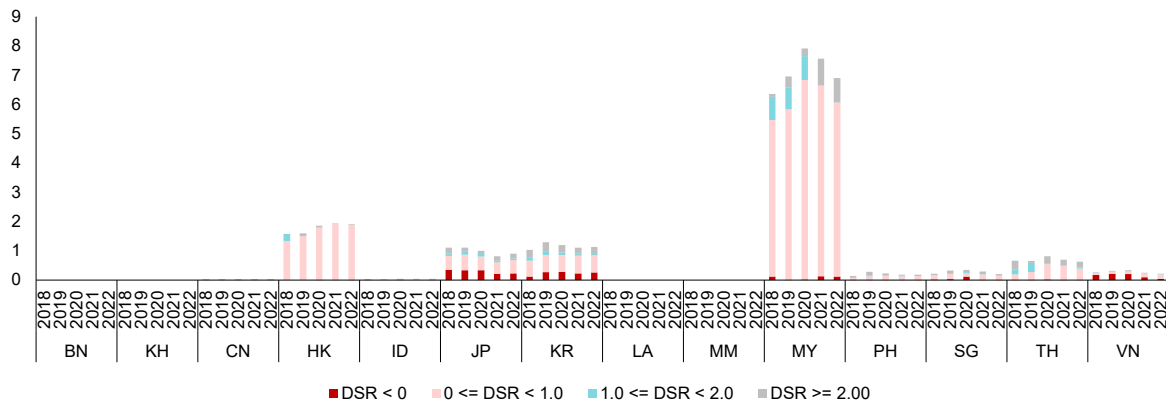
ICR



DSR (EBIT)



DSR (EBITDA)



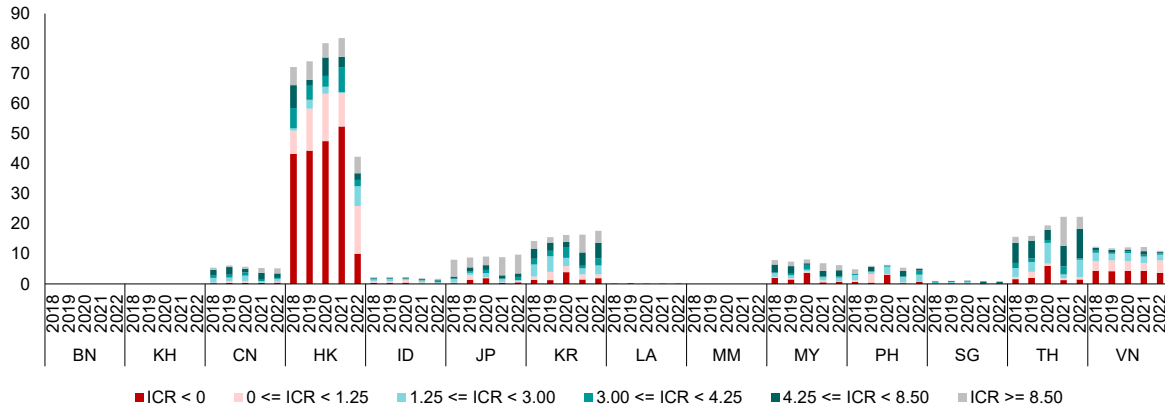
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

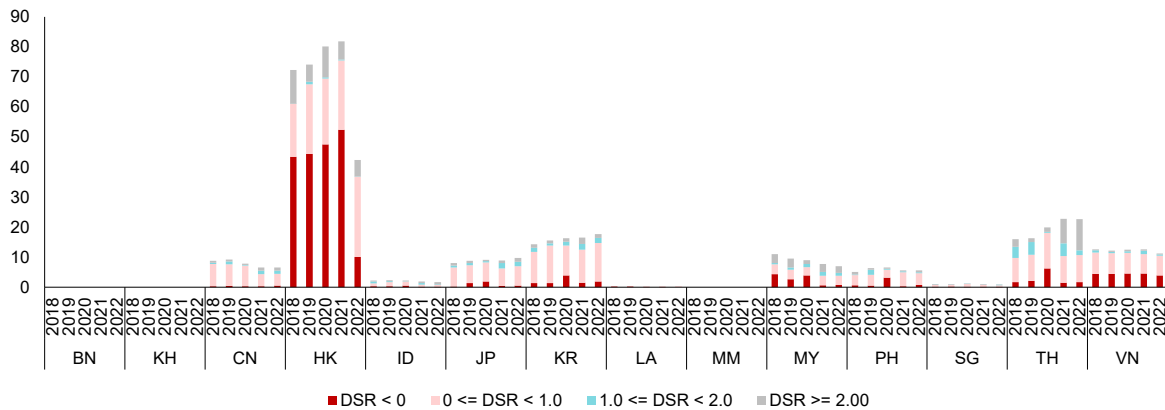
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Raw Materials

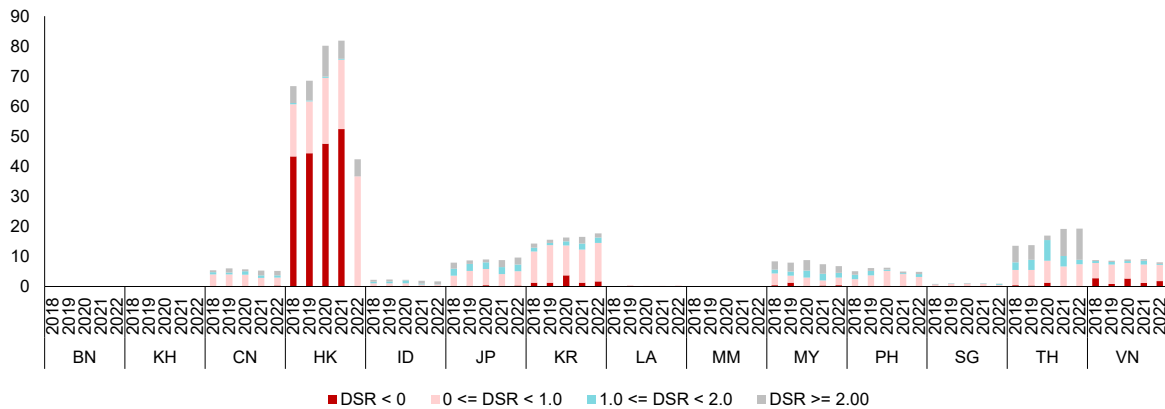
ICR



DSR (EBIT)



DSR (EBITDA)

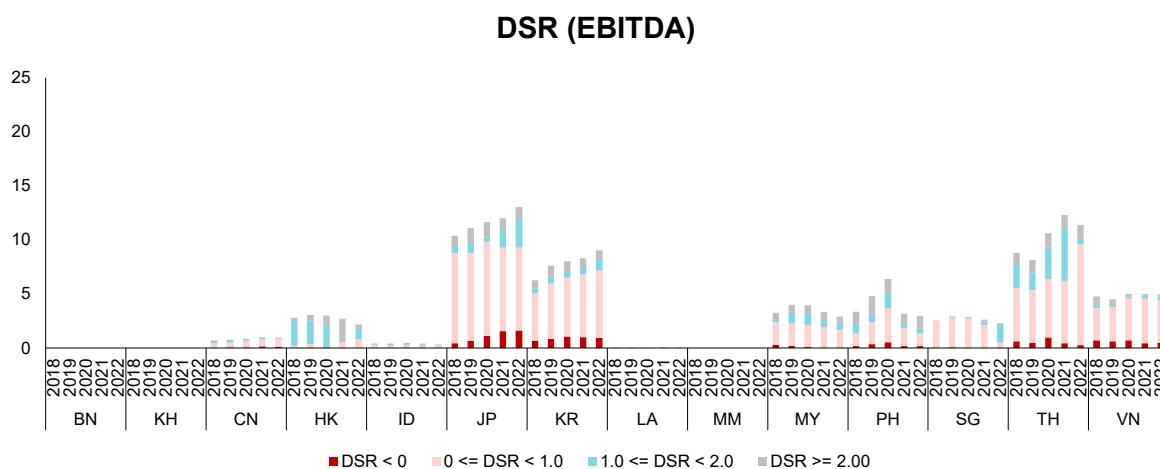
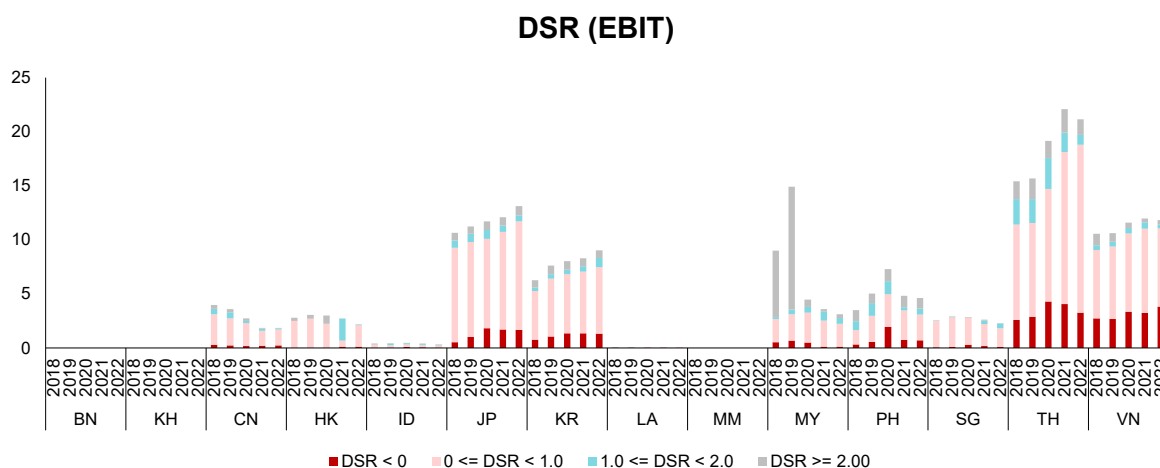
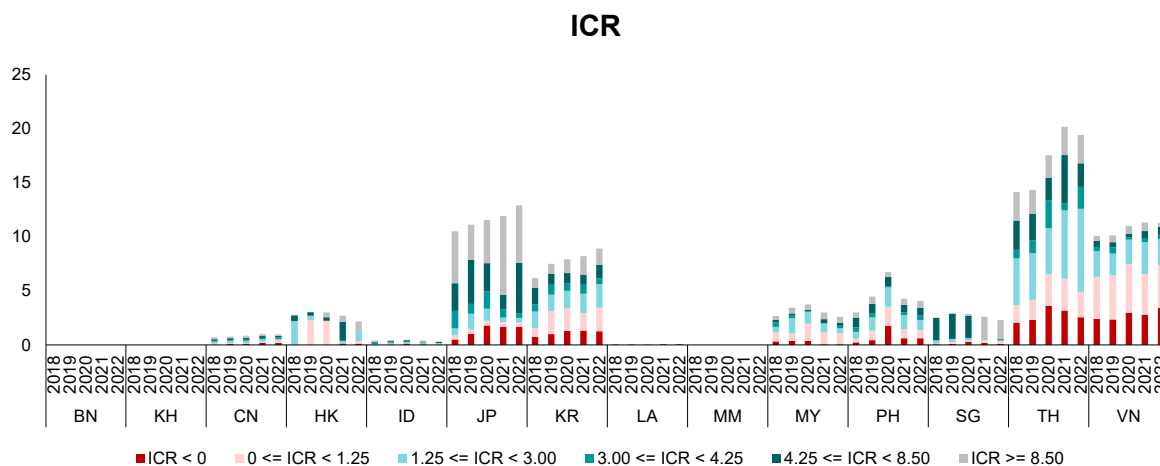


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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



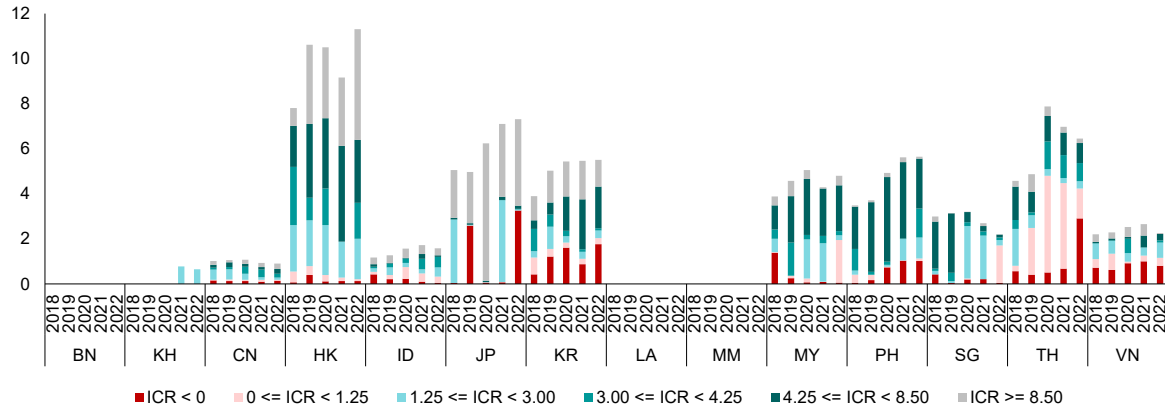
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

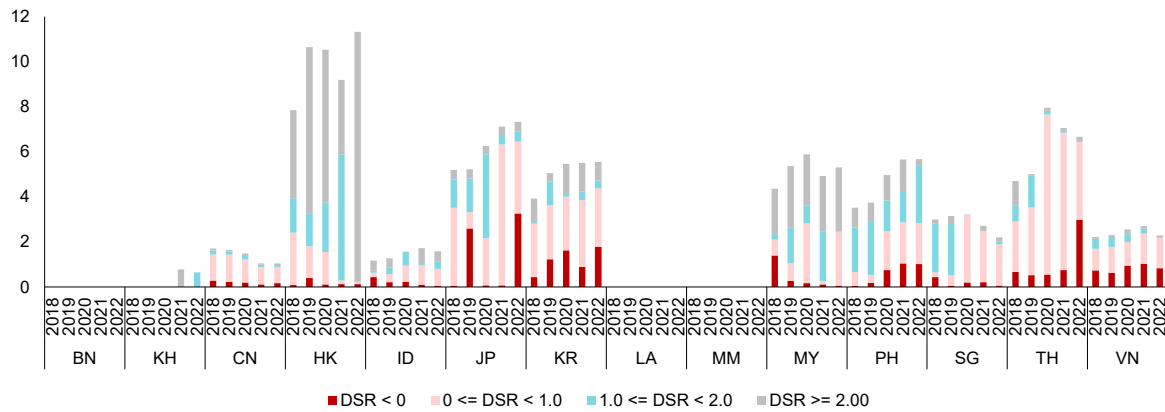
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Technology, Media, Computer, and Communications

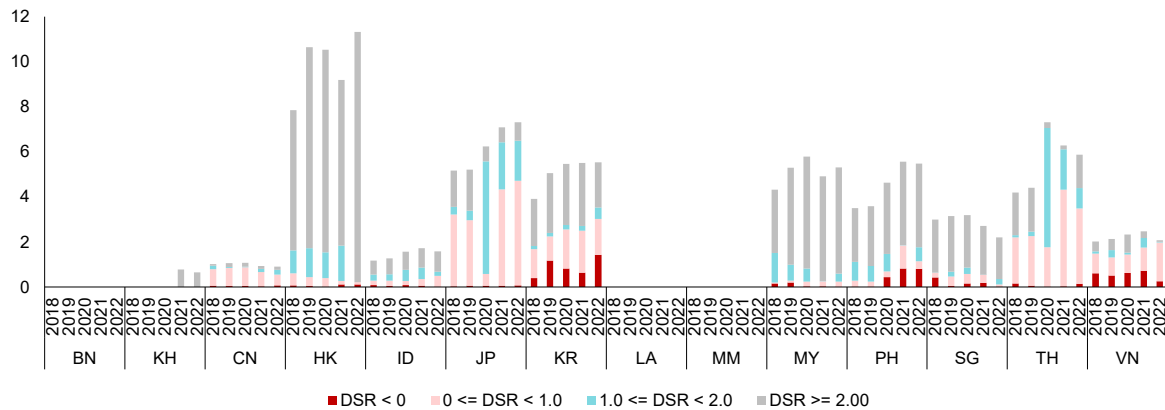
ICR



DSR (EBIT)



DSR (EBITDA)



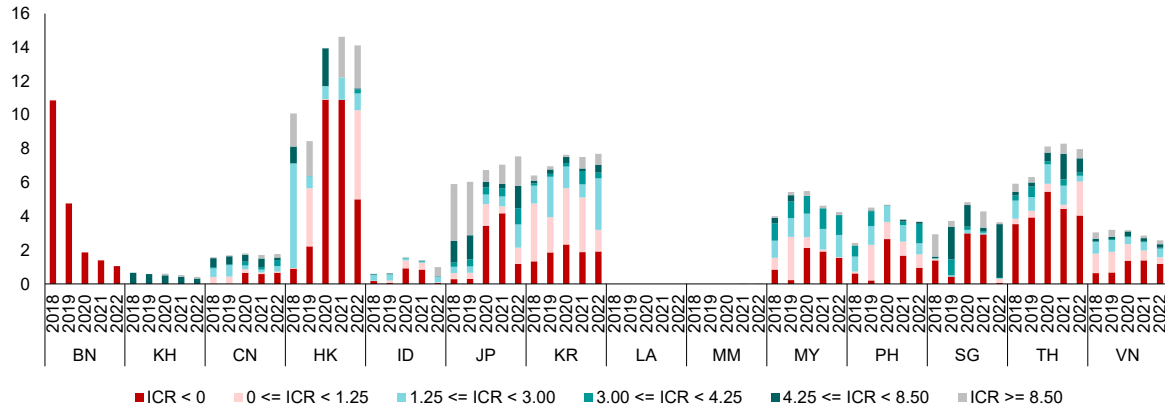
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

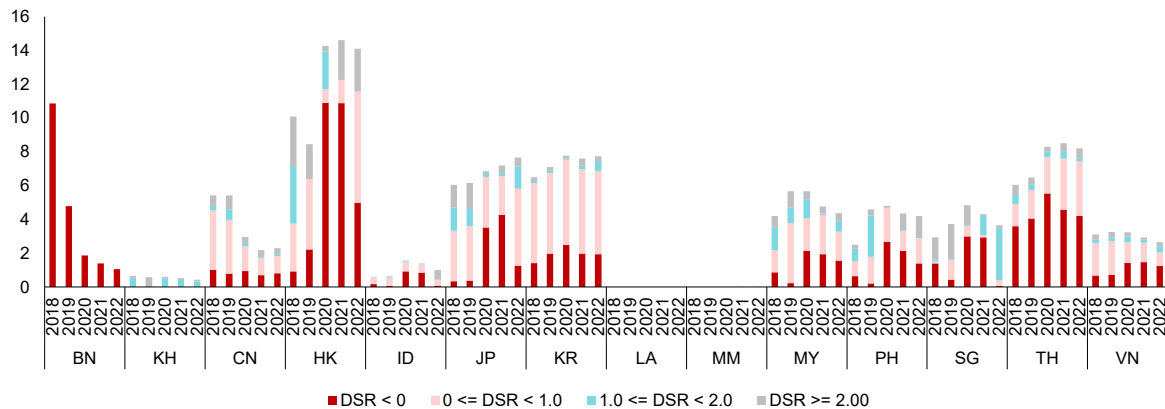
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Transport

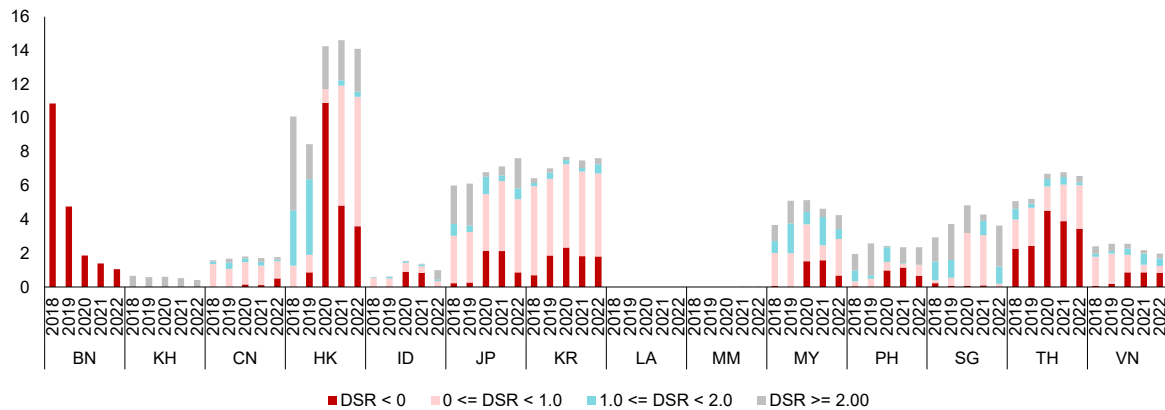
ICR



DSR (EBIT)



DSR (EBITDA)



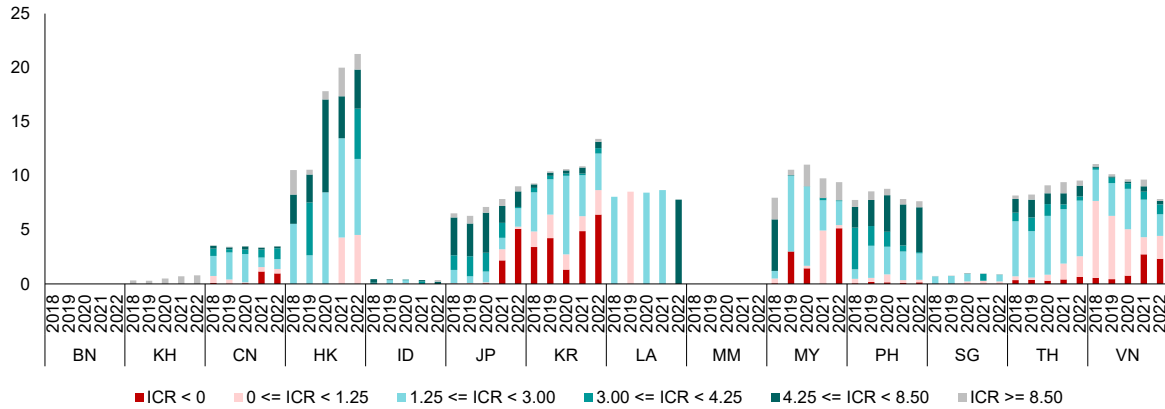
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

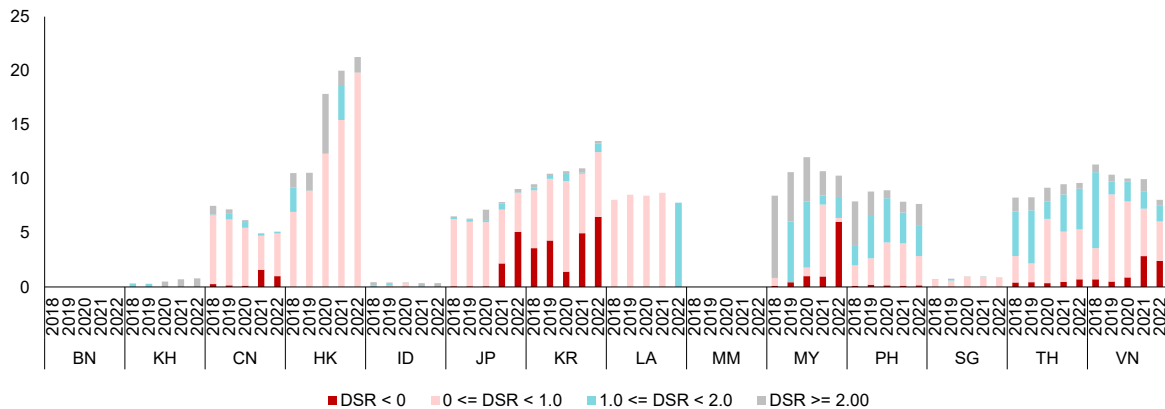
Appendix Figure 4. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, 2018–22
(Percent of GDP)
(Continued)

Utilities and Waste Management

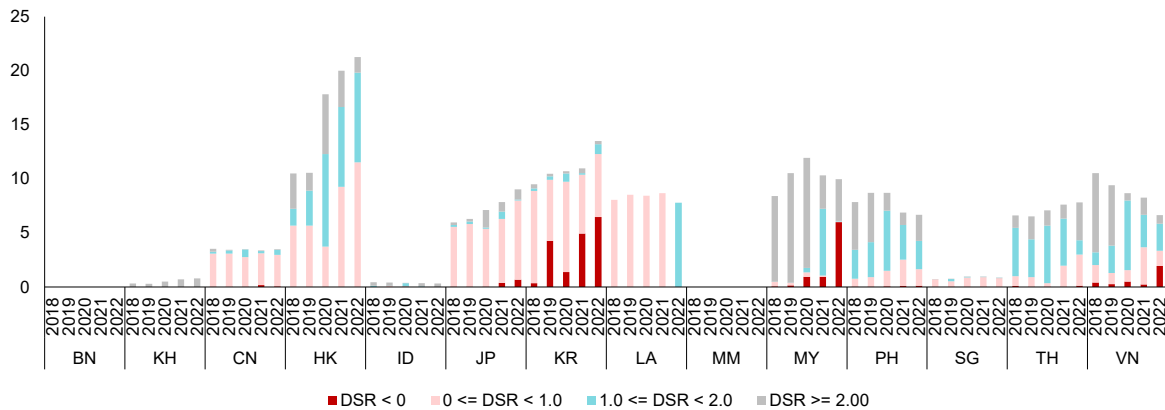
ICR



DSR (EBIT)



DSR (EBITDA)



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

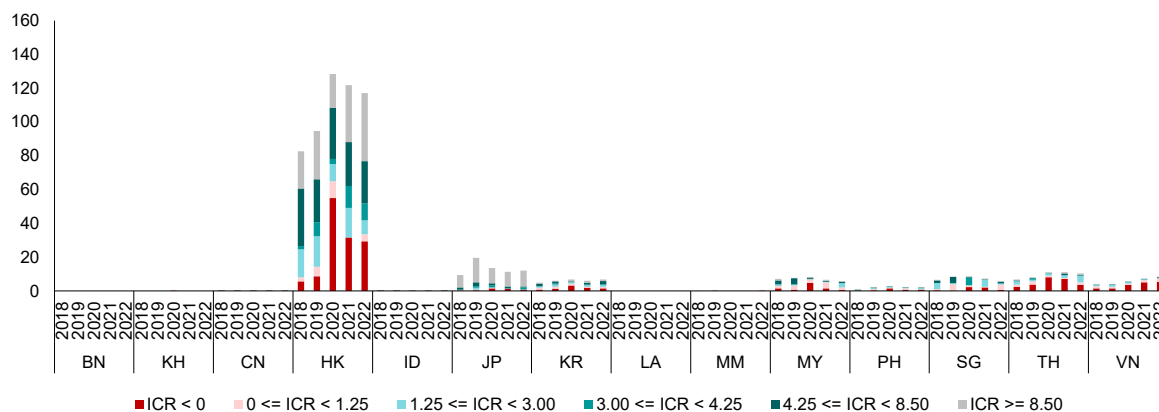
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.

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

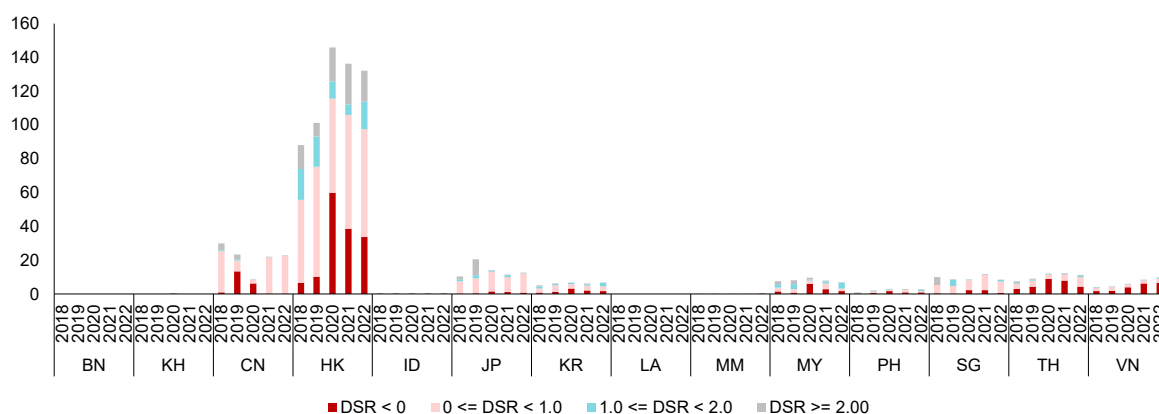
22
(Percent of GDP)
(Continued)

Others

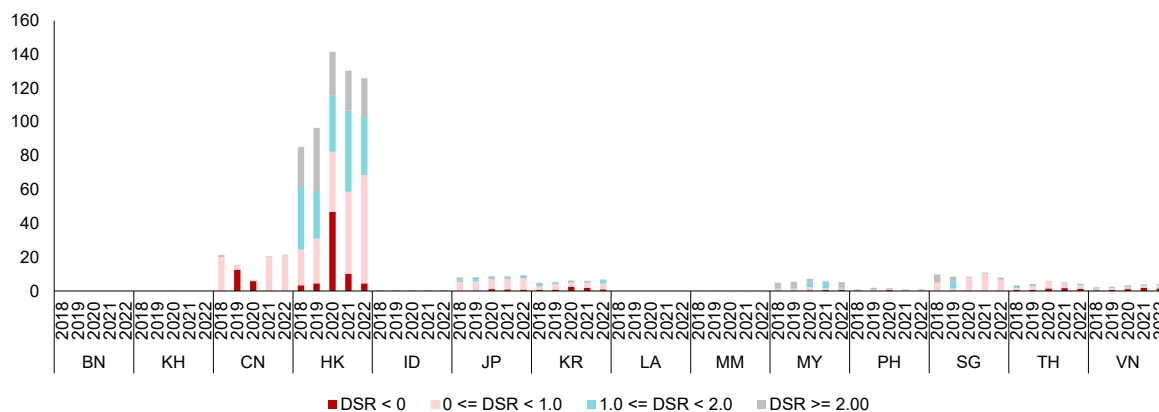
ICR



DSR (EBIT)



DSR (EBITDA)



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

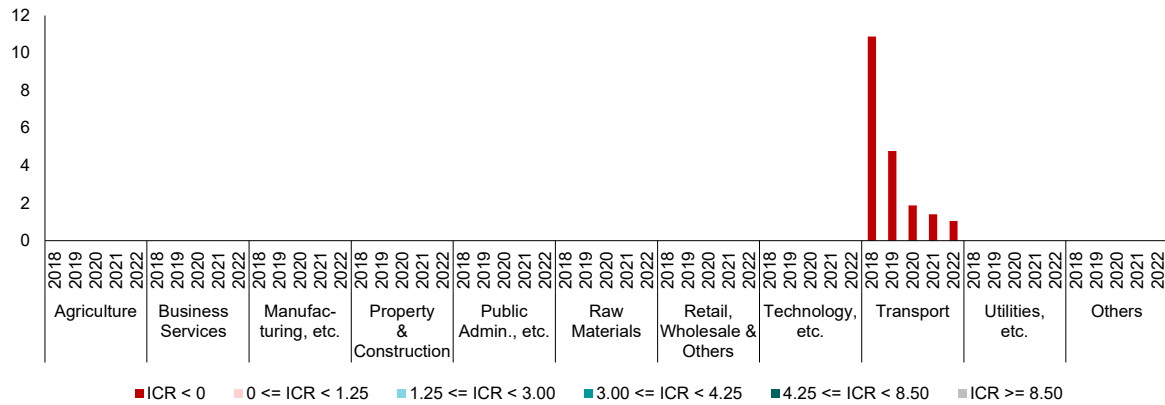
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.

Appendix VII. Firm Debt-at-Risk across Industries for Individual ASEAN+3 Economies

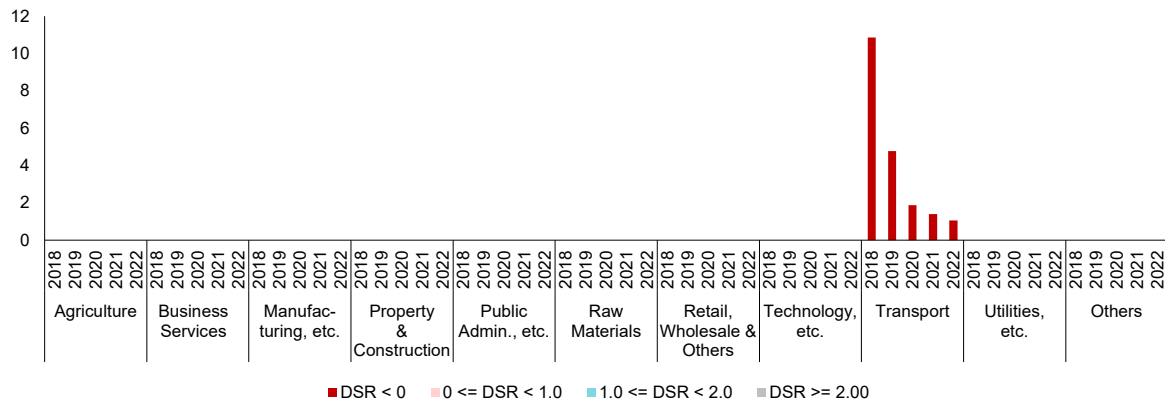
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)

Brunei

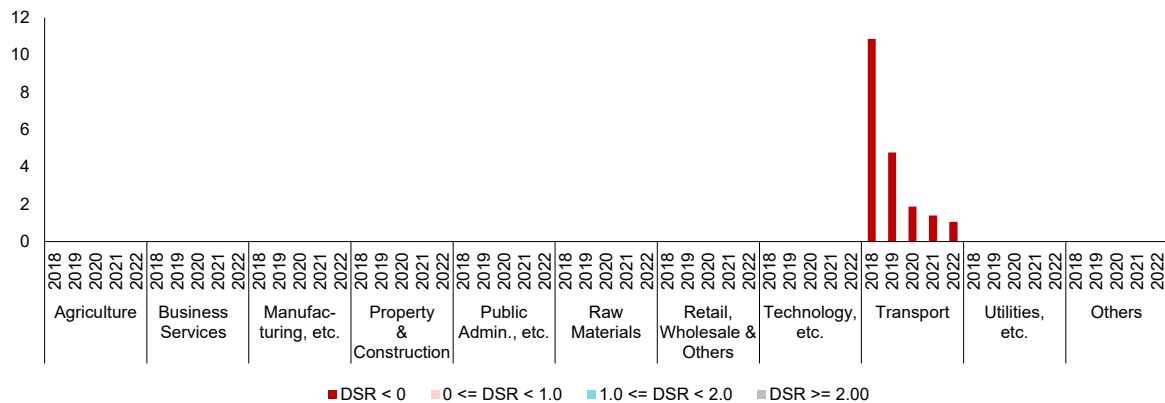
ICR



DSR (EBIT)



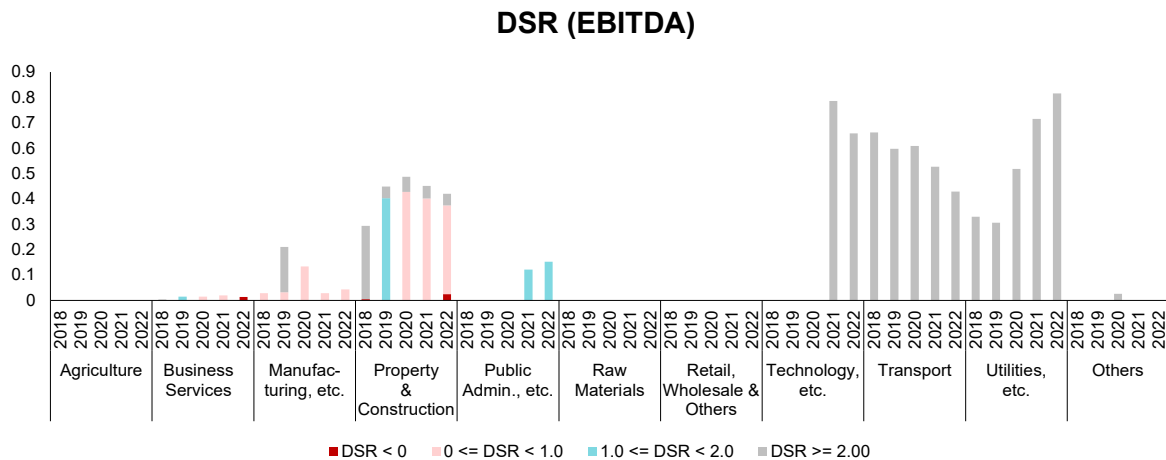
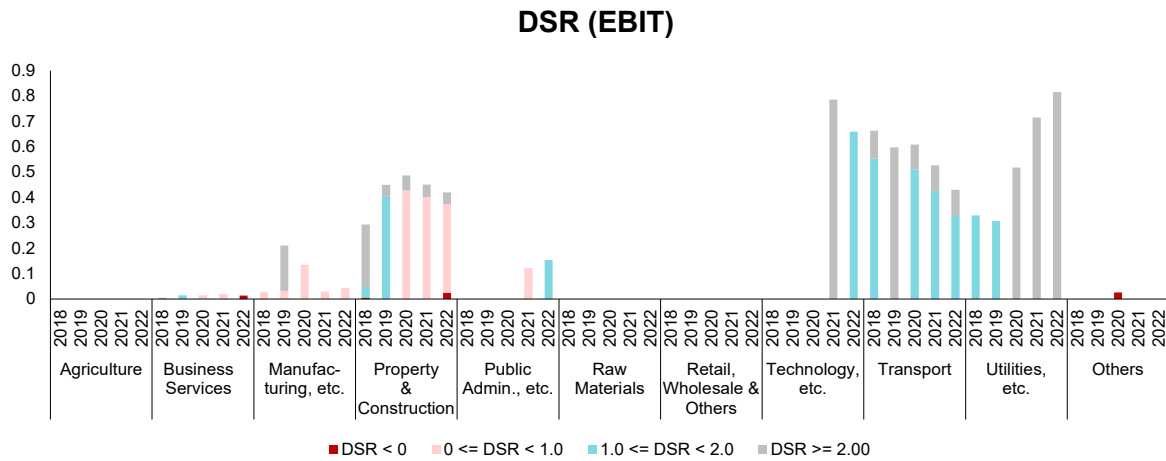
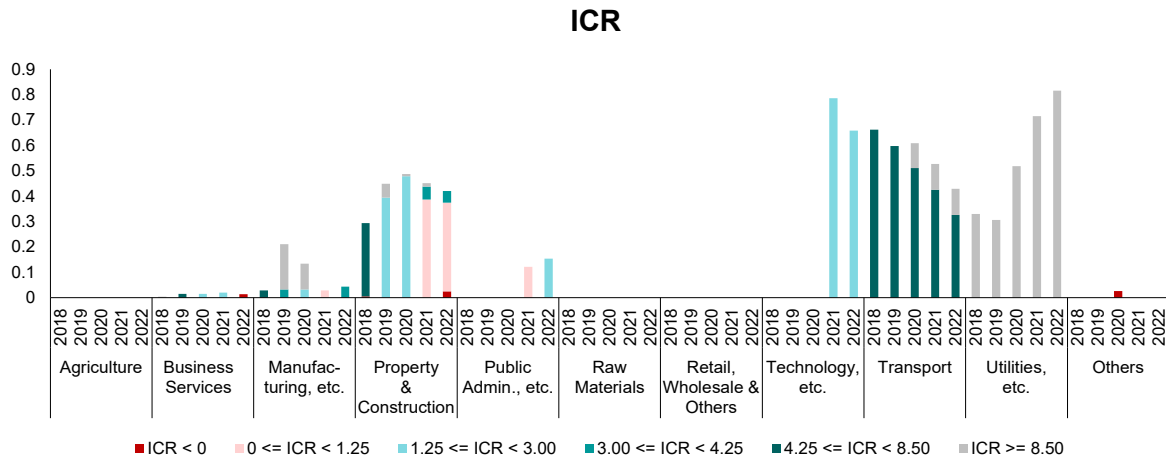
DSR (EBITDA)



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)

Cambodia

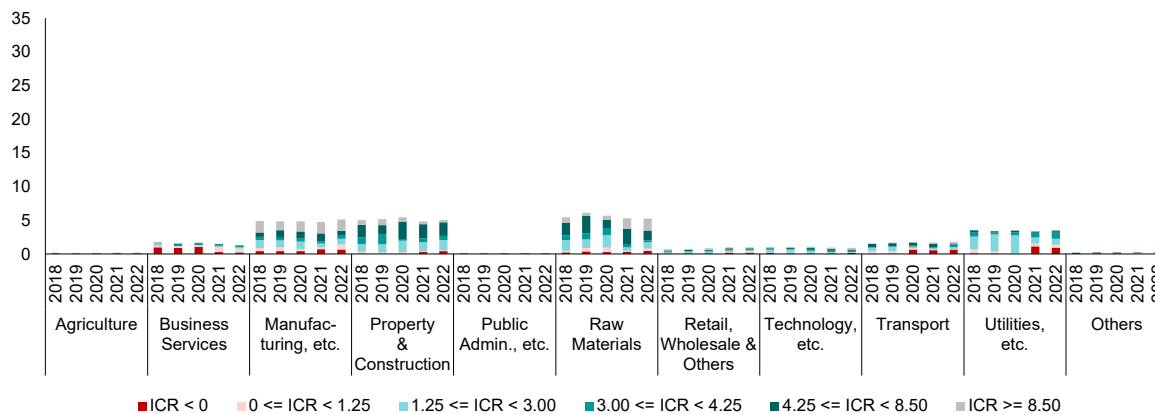


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

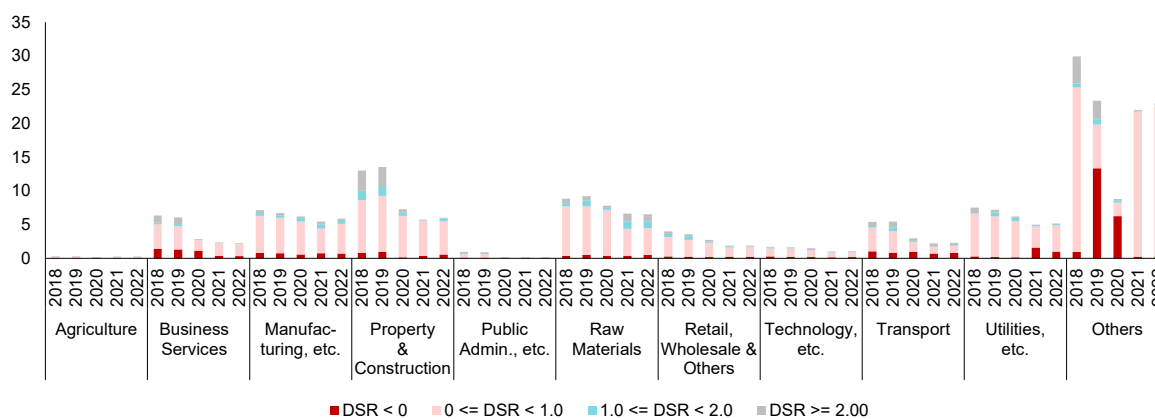
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

China

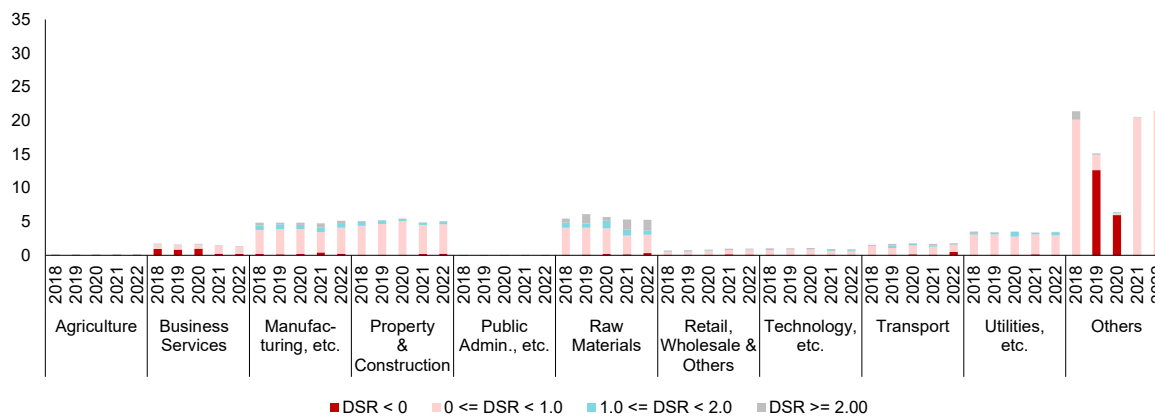
ICR



DSR (EBIT)



DSR (EBITDA)

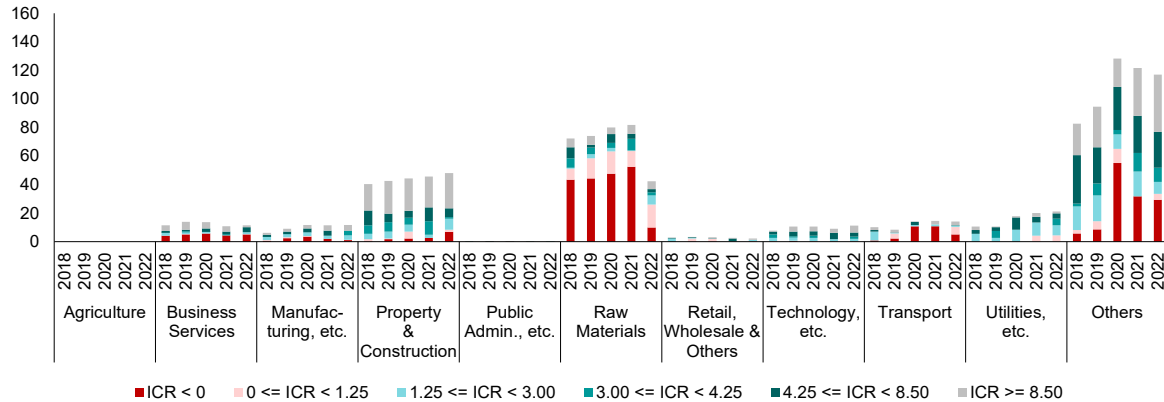


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

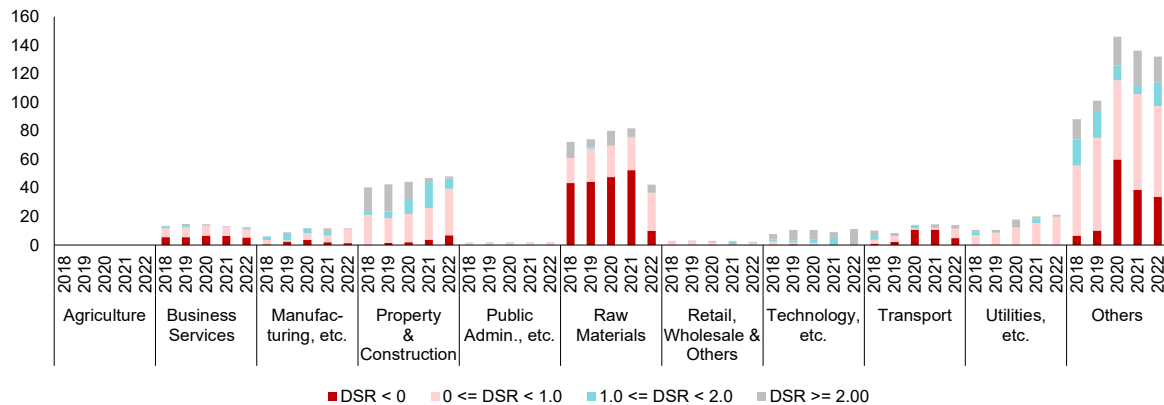
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Hong Kong

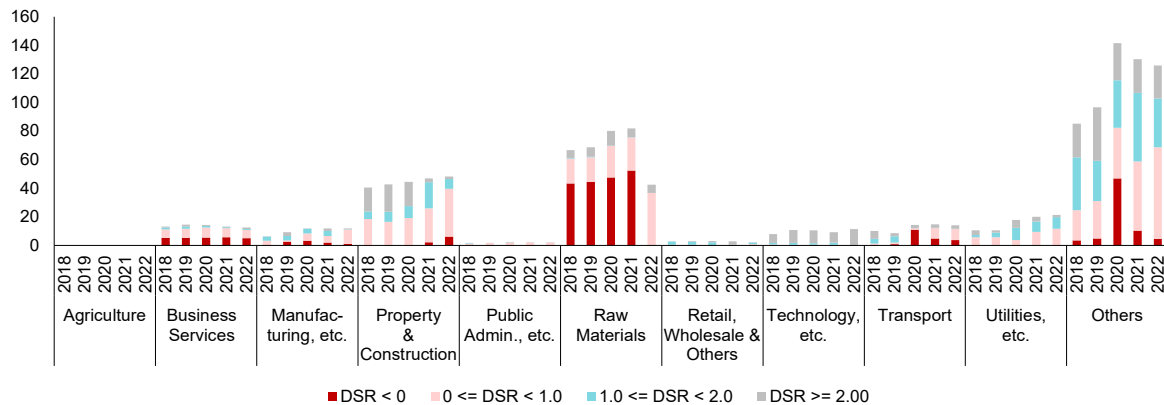
ICR



DSR (EBIT)



DSR (EBITDA)

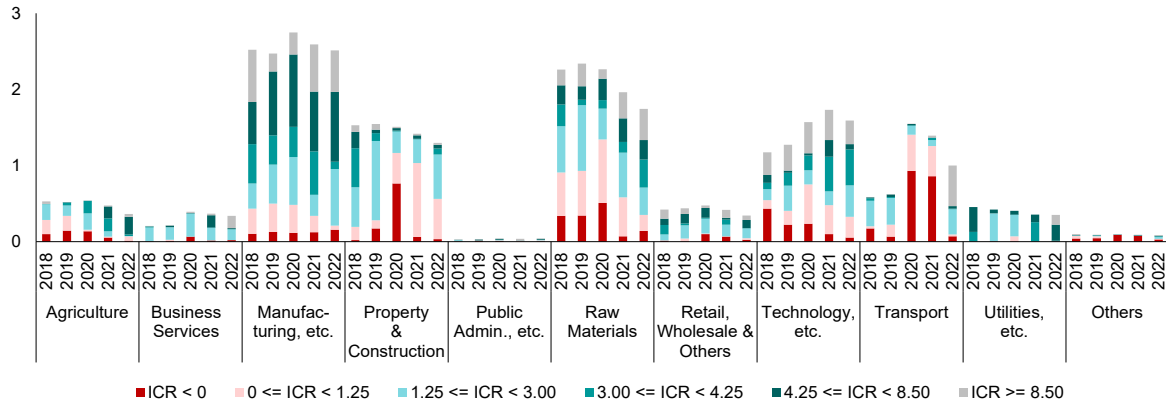


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

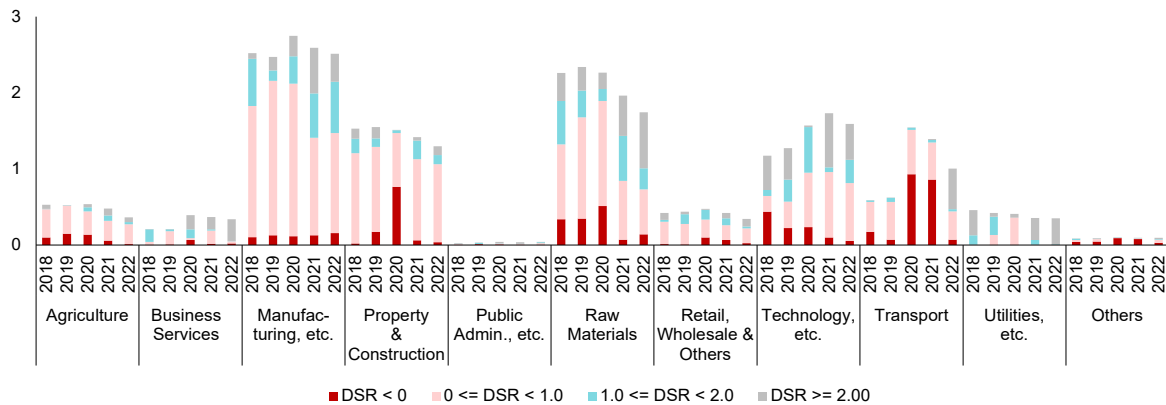
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Indonesia

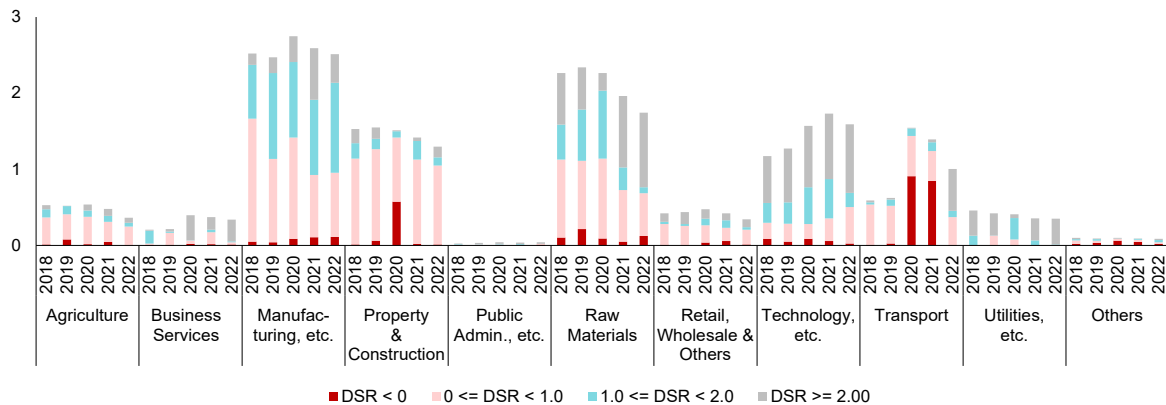
ICR



DSR (EBIT)



DSR (EBITDA)

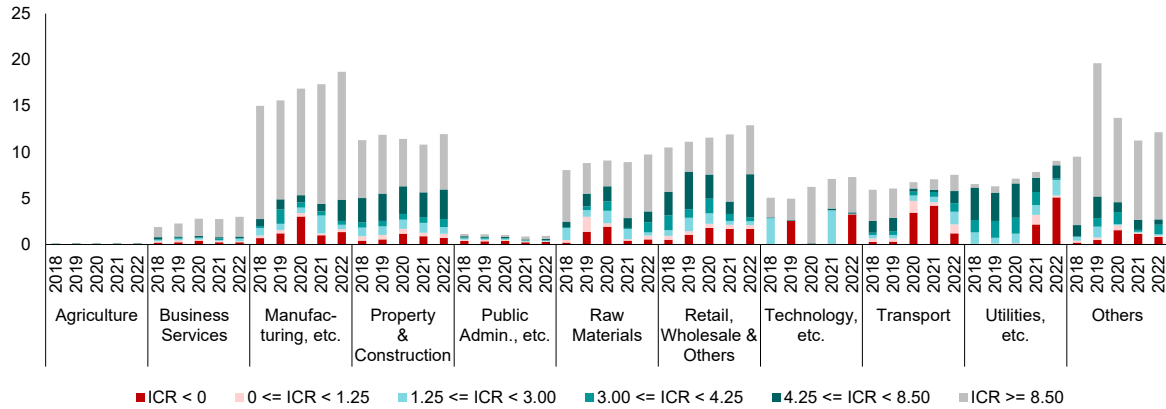


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

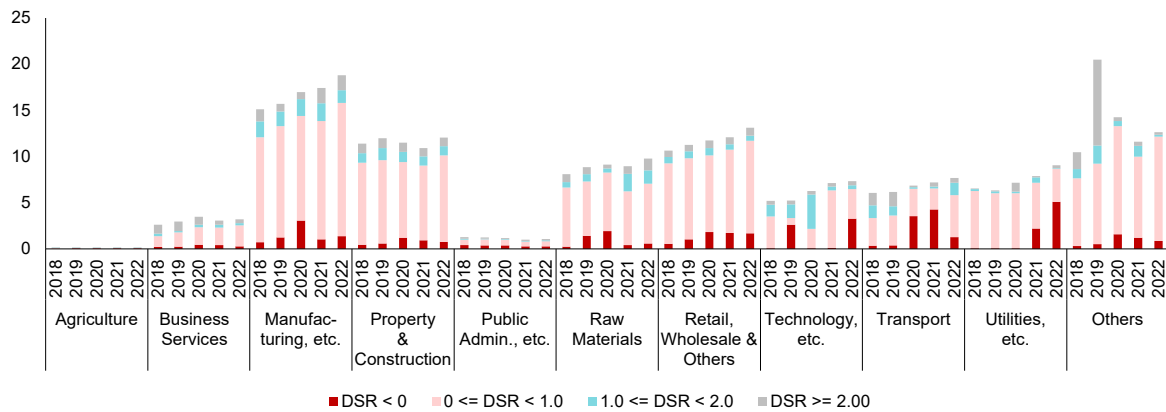
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Japan

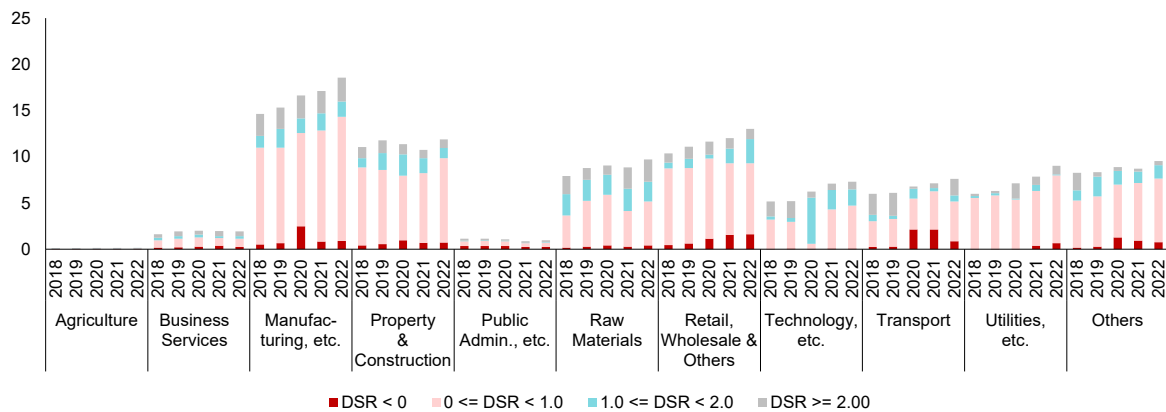
ICR



DSR (EBIT)



DSR (EBITDA)

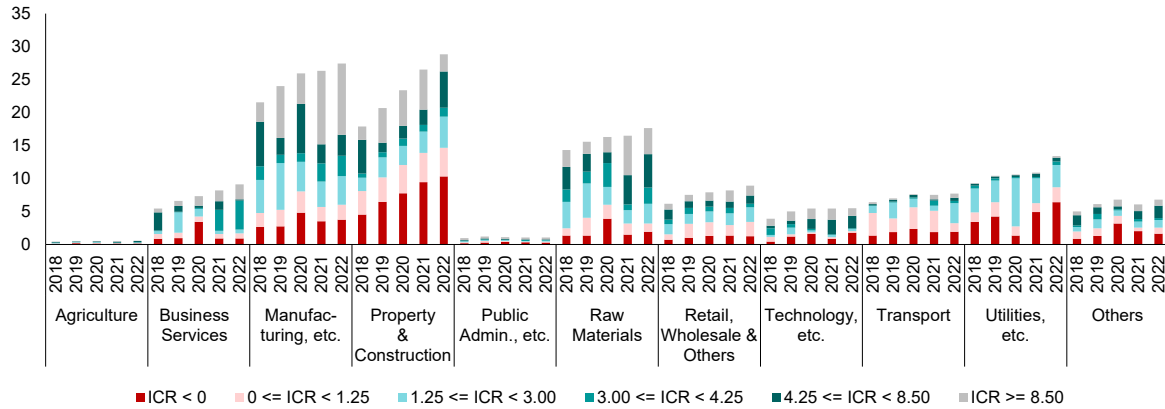


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

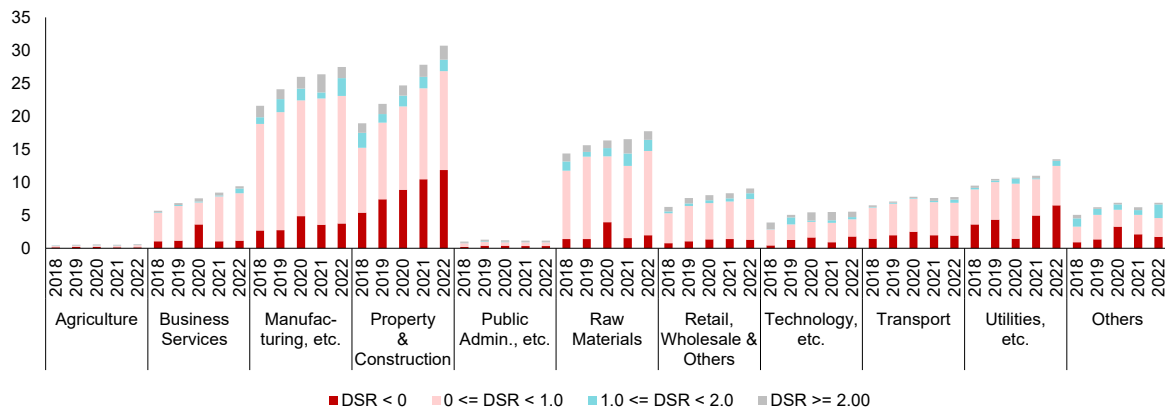
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Korea

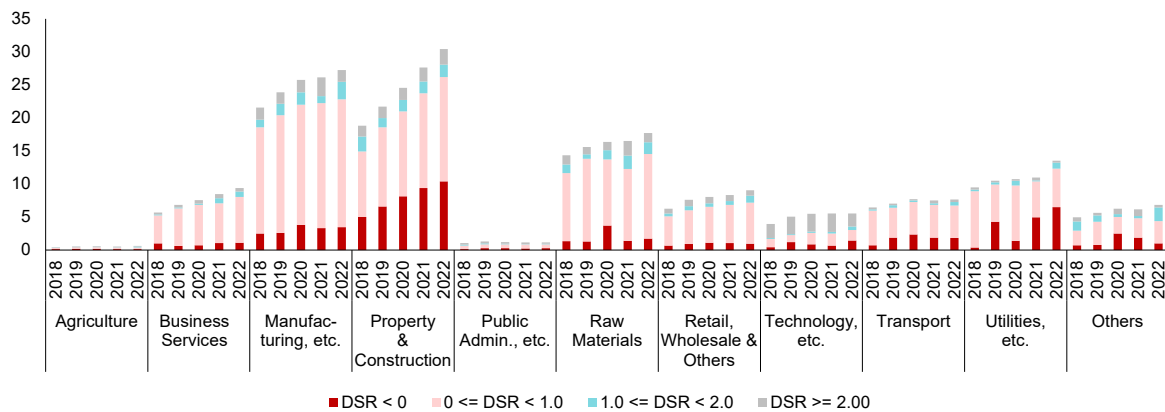
ICR



DSR (EBIT)



DSR (EBITDA)

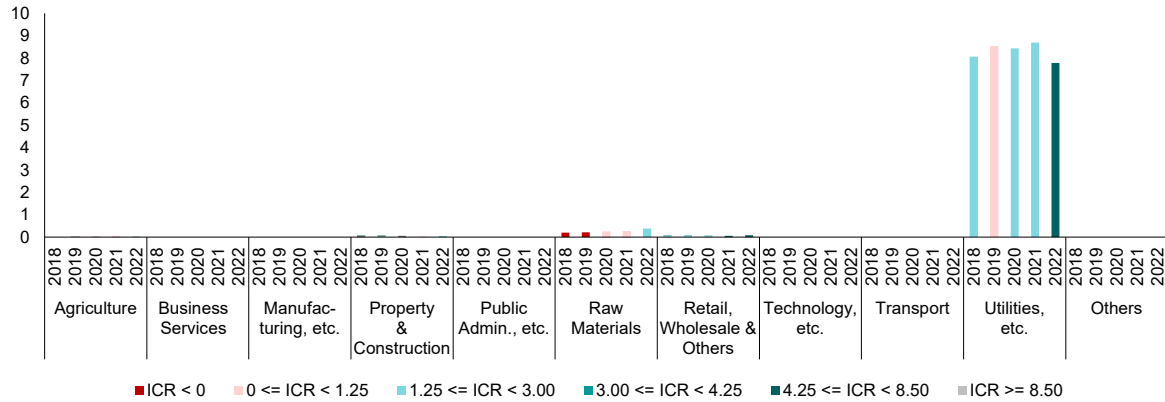


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

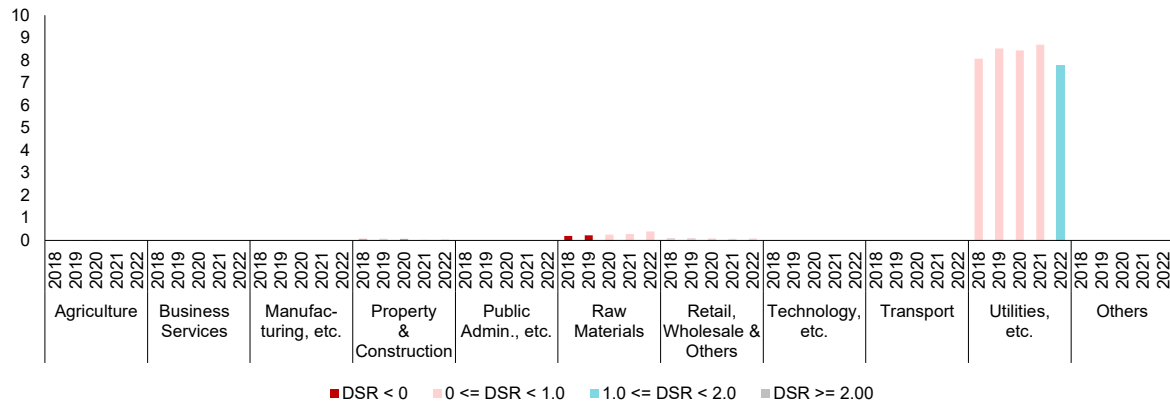
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Lao PDR

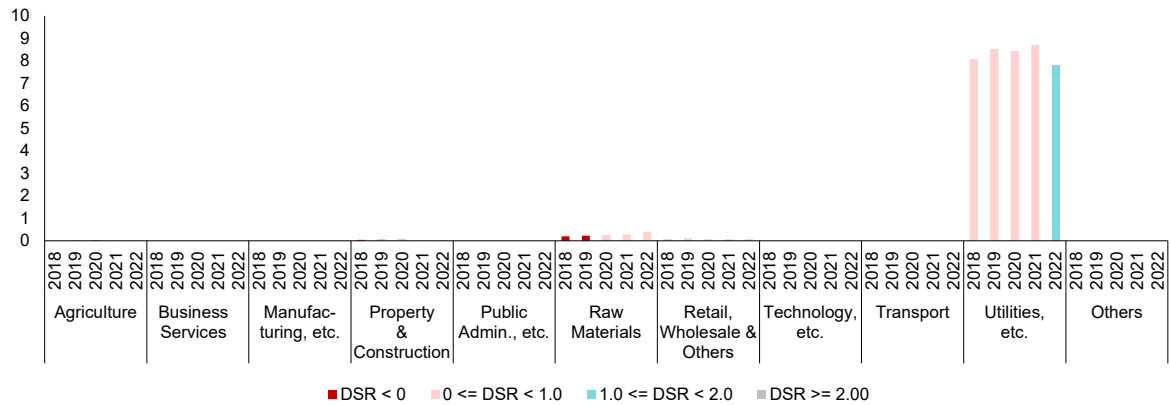
ICR



DSR (EBIT)



DSR (EBITDA)

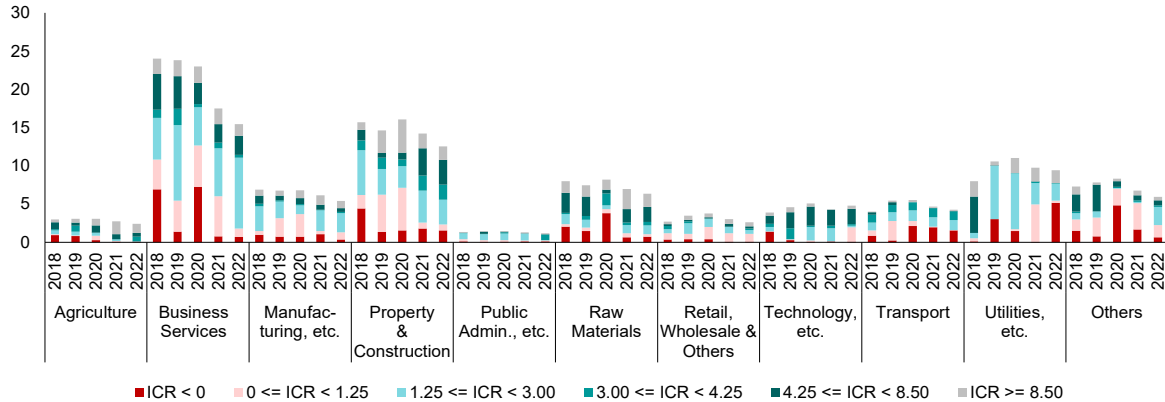


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

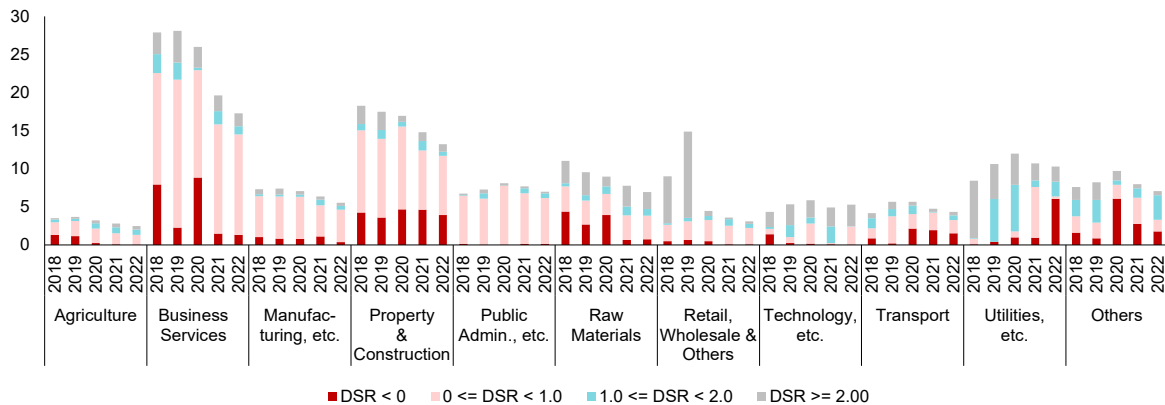
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Malaysia

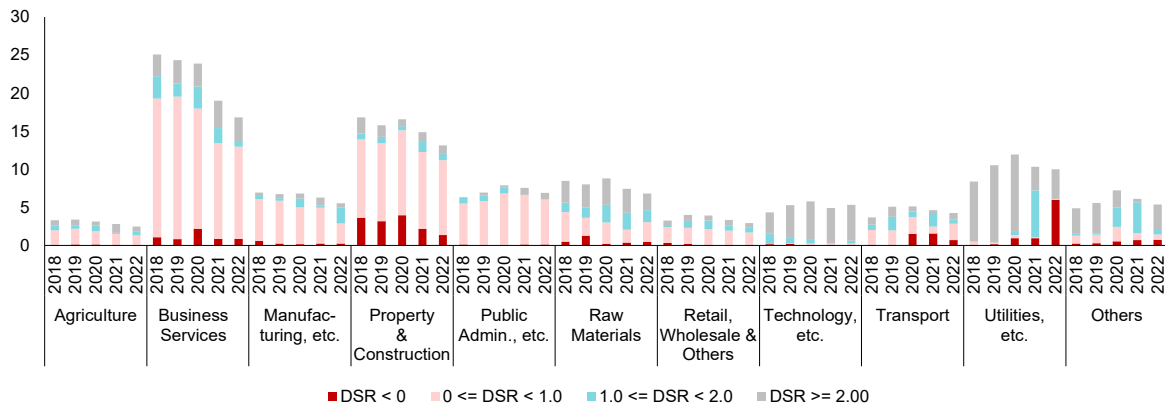
ICR



DSR (EBIT)



DSR (EBITDA)

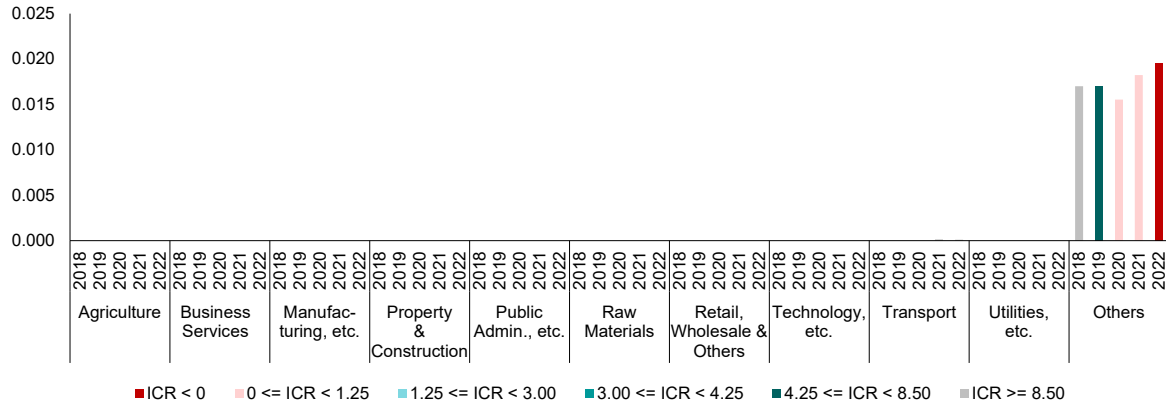


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

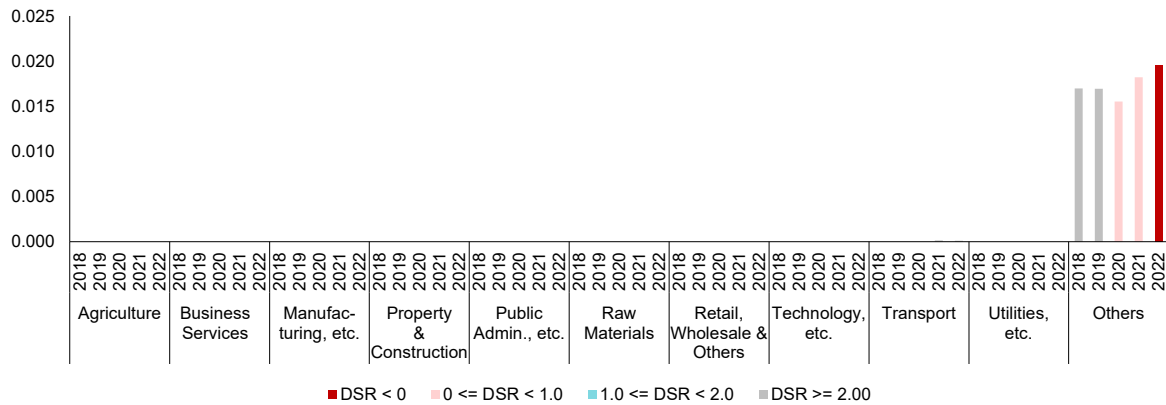
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Myanmar

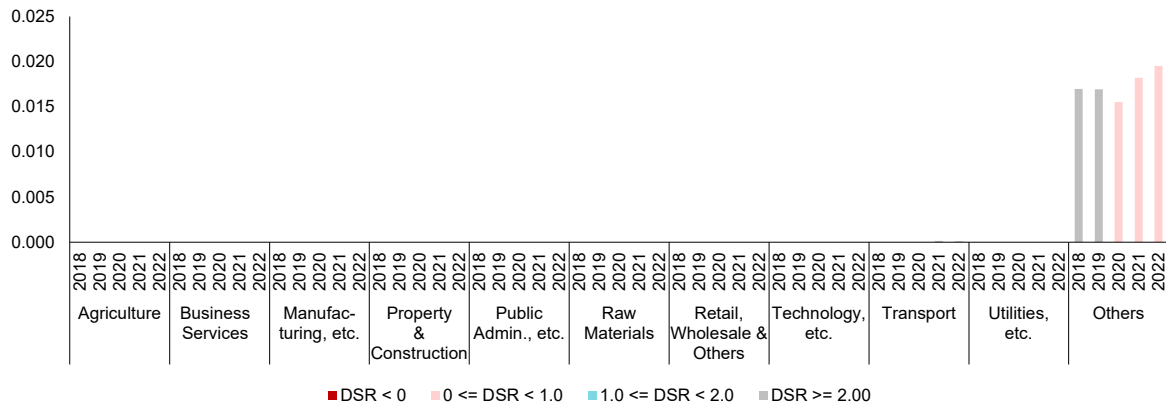
ICR



DSR (EBIT)



DSR (EBITDA)

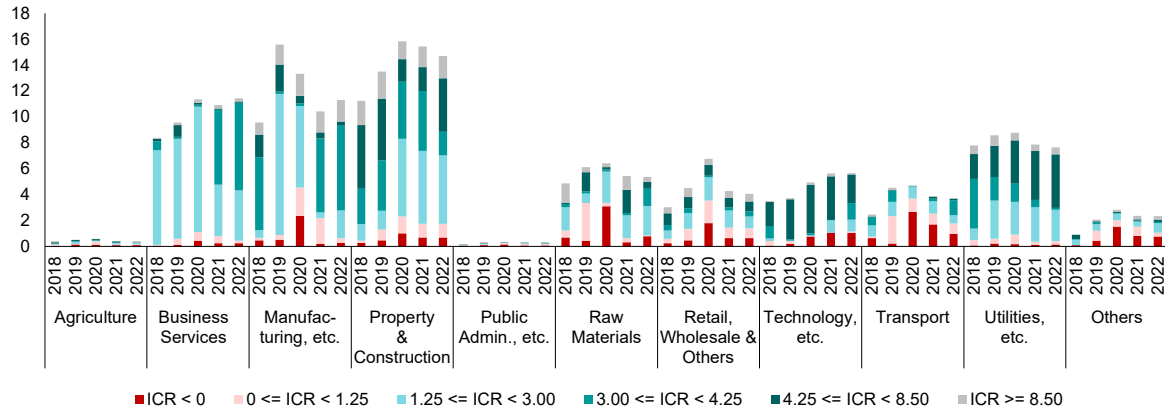


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

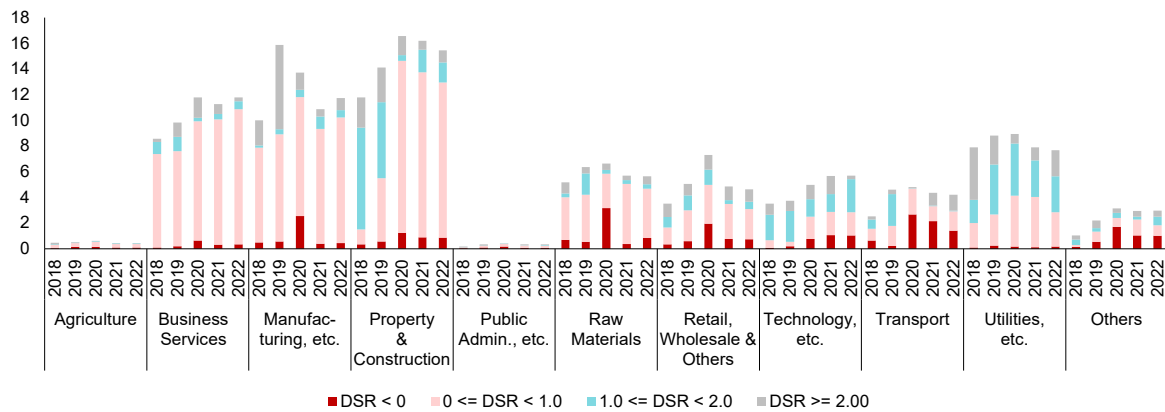
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Philippines

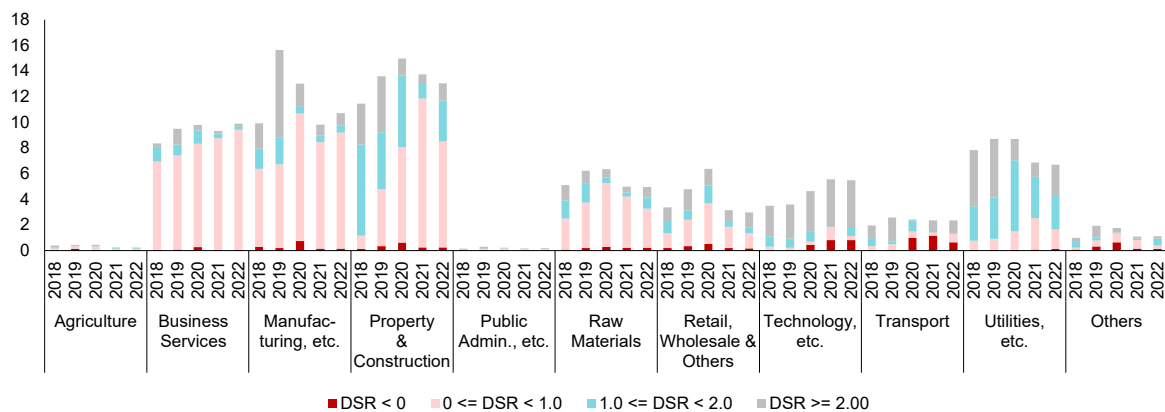
ICR



DSR (EBIT)



DSR (EBITDA)

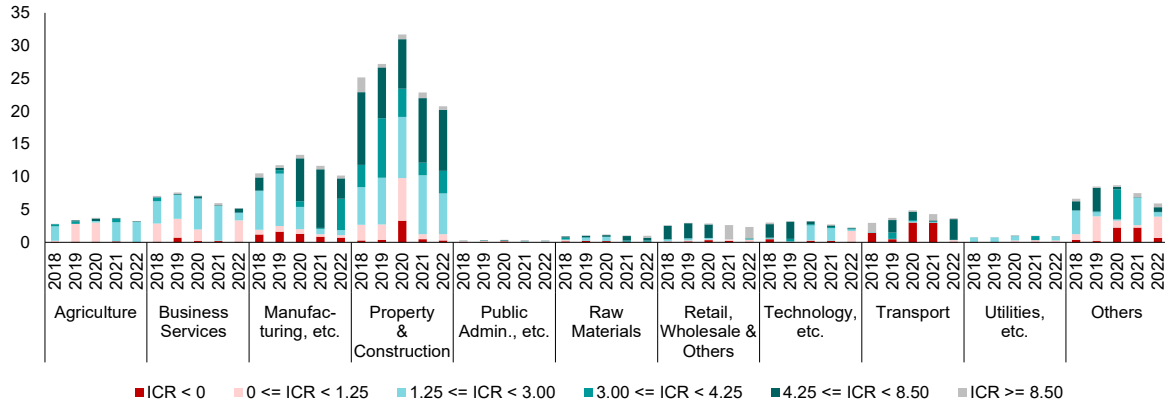


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

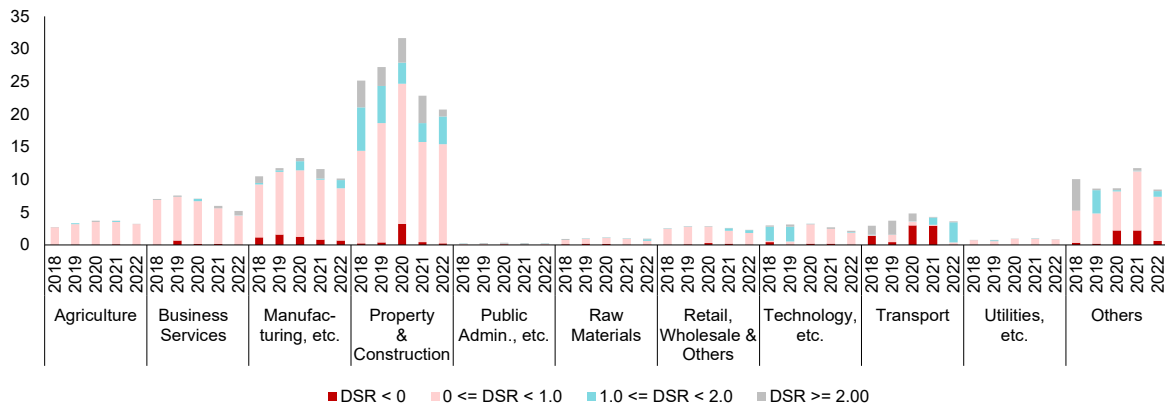
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Singapore

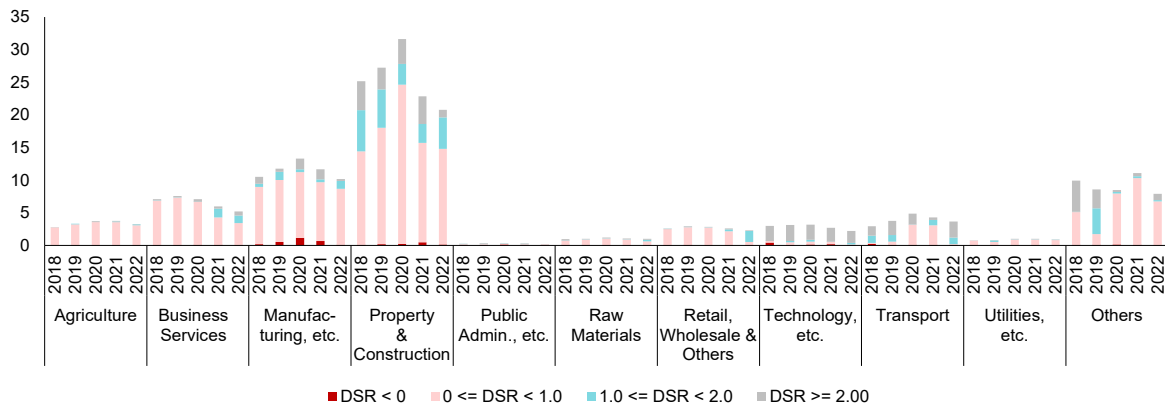
ICR



DSR (EBIT)



DSR (EBITDA)

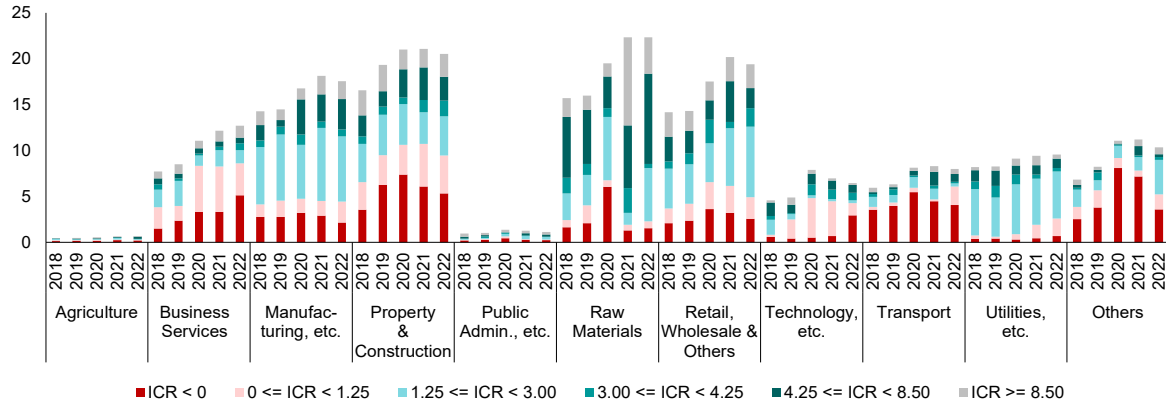


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

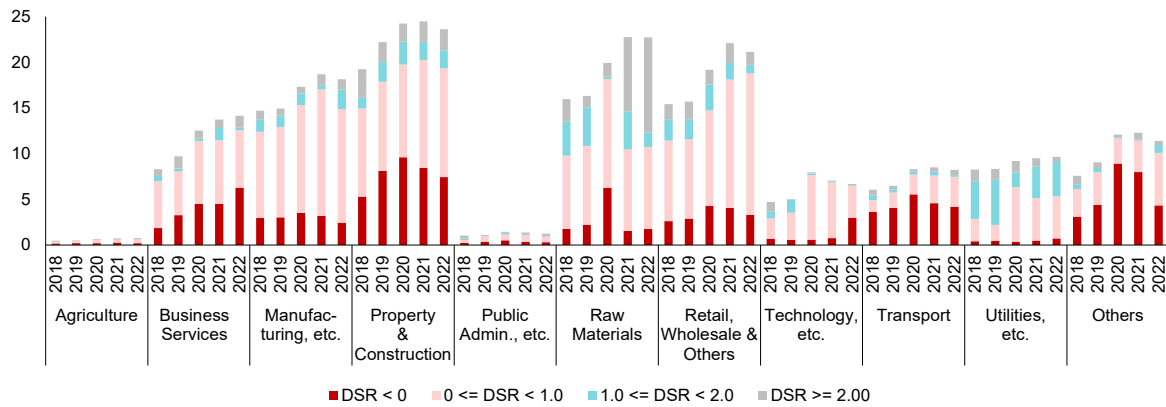
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Thailand

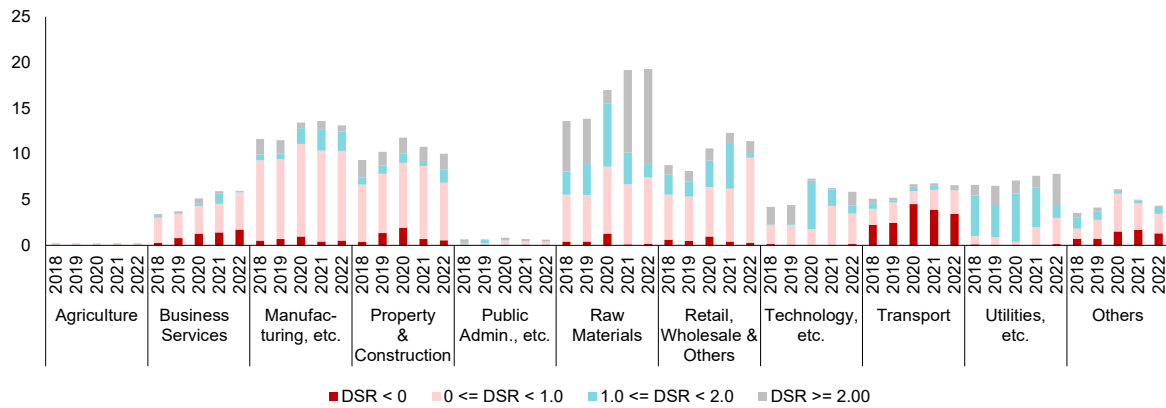
ICR



DSR (EBIT)



DSR (EBITDA)

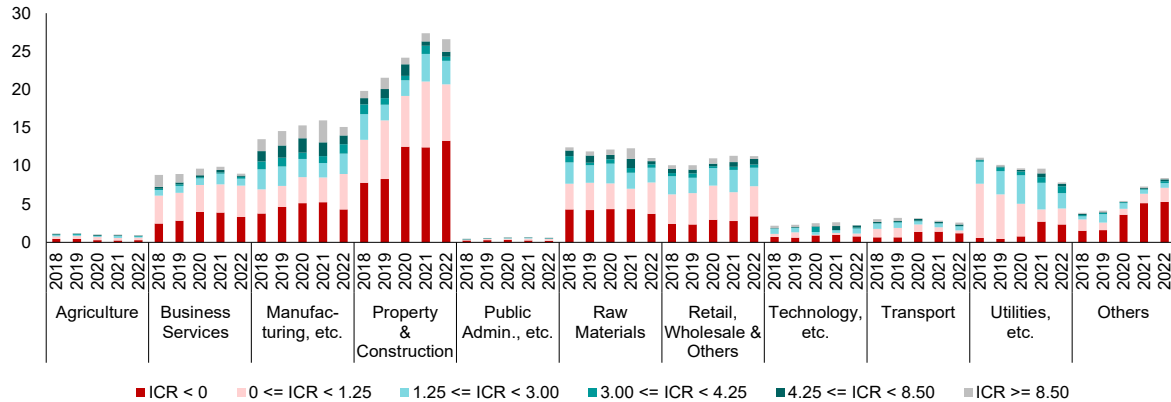


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

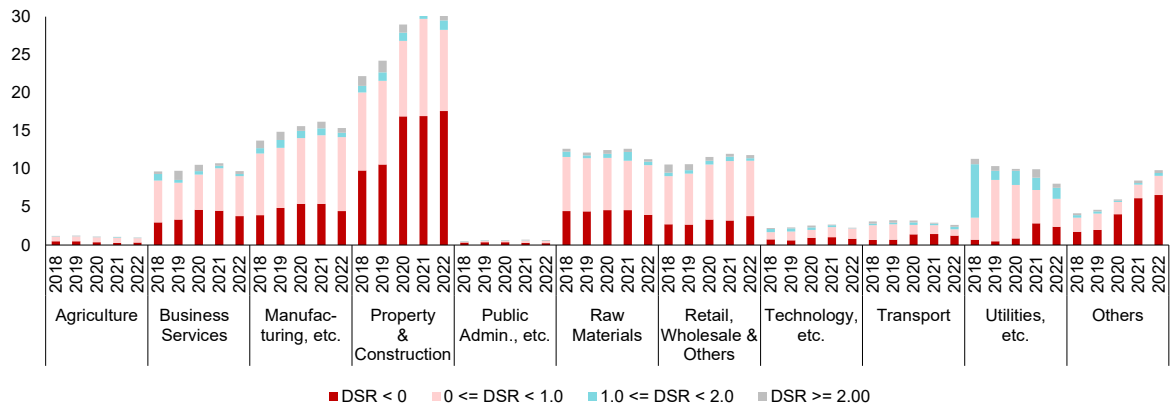
Appendix Figure 5. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, 2018–22
(Percent of GDP)
(Continued)

Vietnam

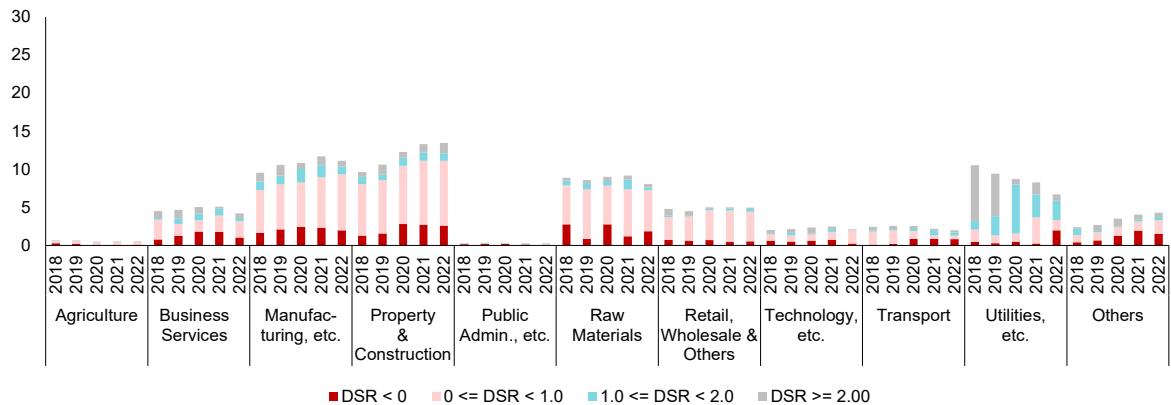
ICR



DSR (EBIT)



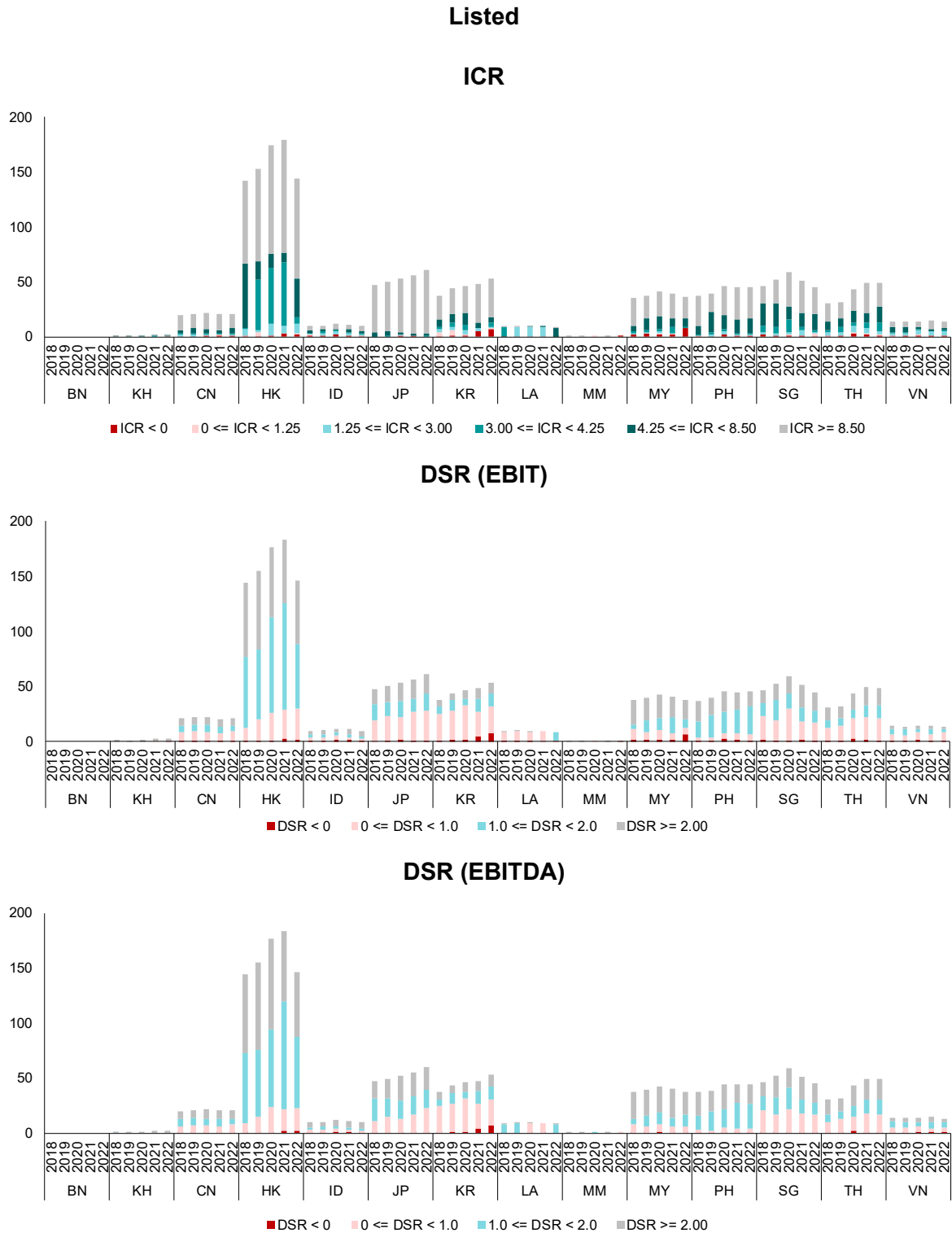
DSR (EBITDA)



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)



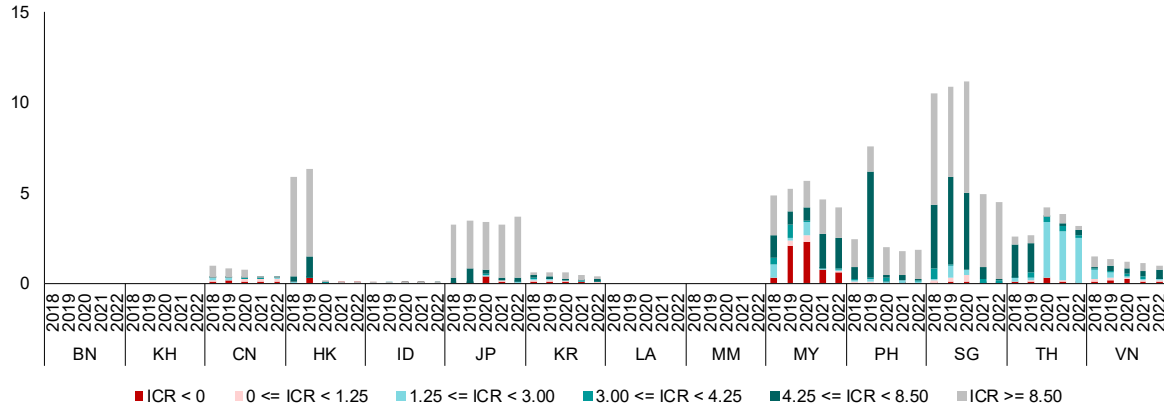
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

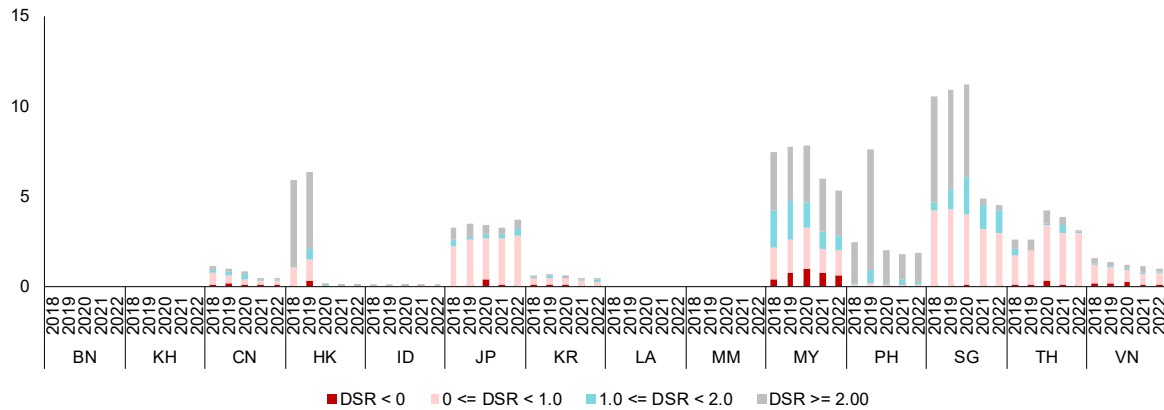
**Appendix Figure 6. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Delisted

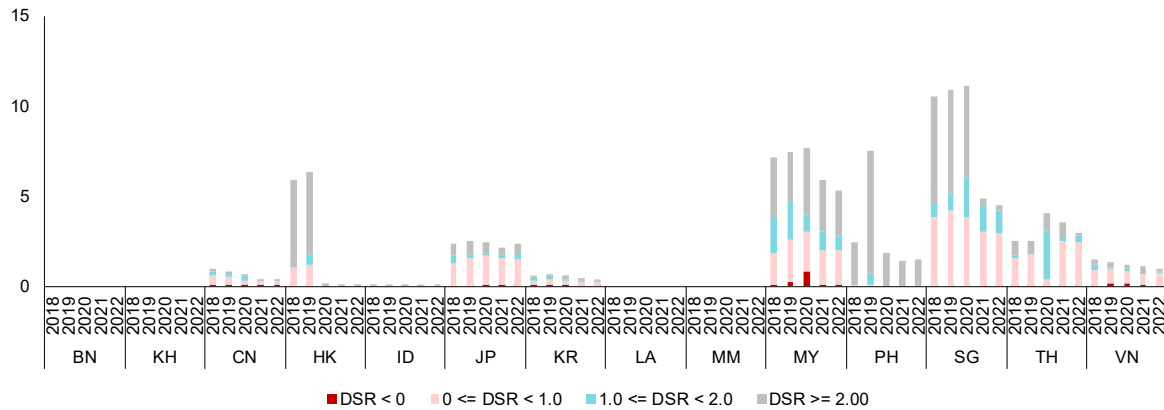
ICR



DSR (EBIT)



DSR (EBITDA)

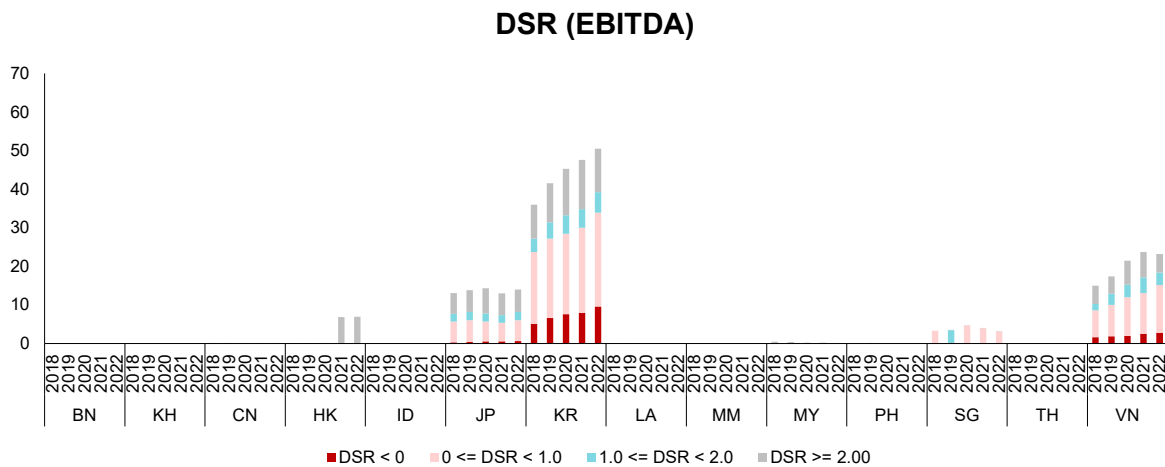
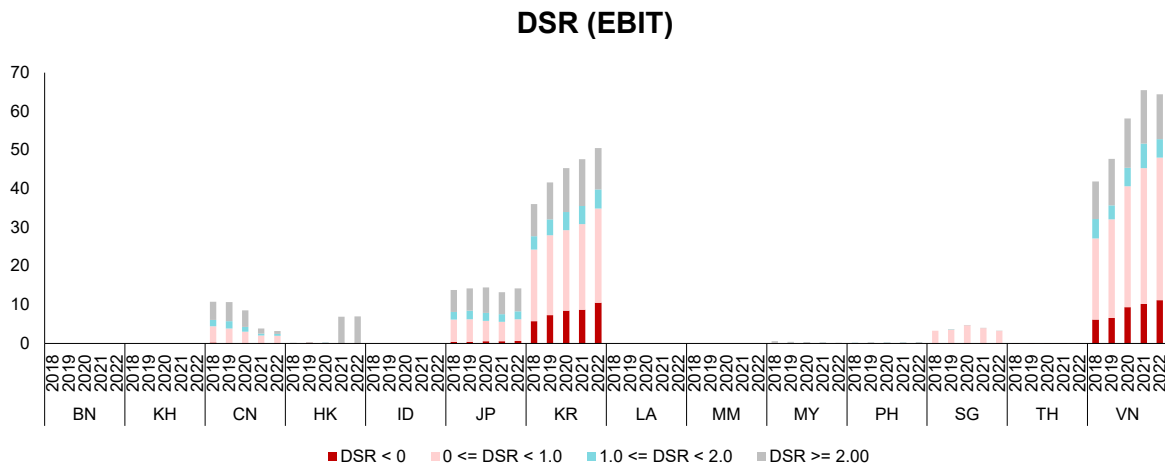
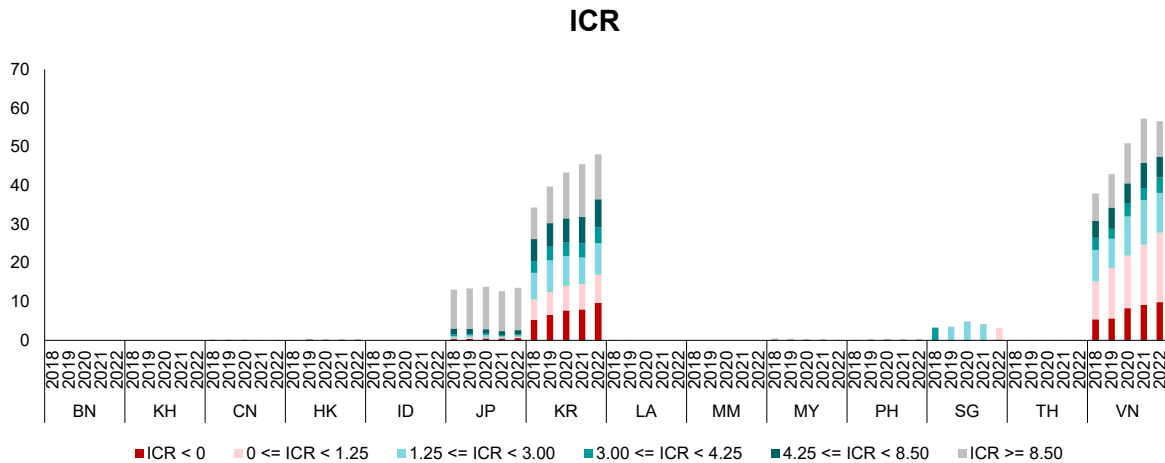


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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



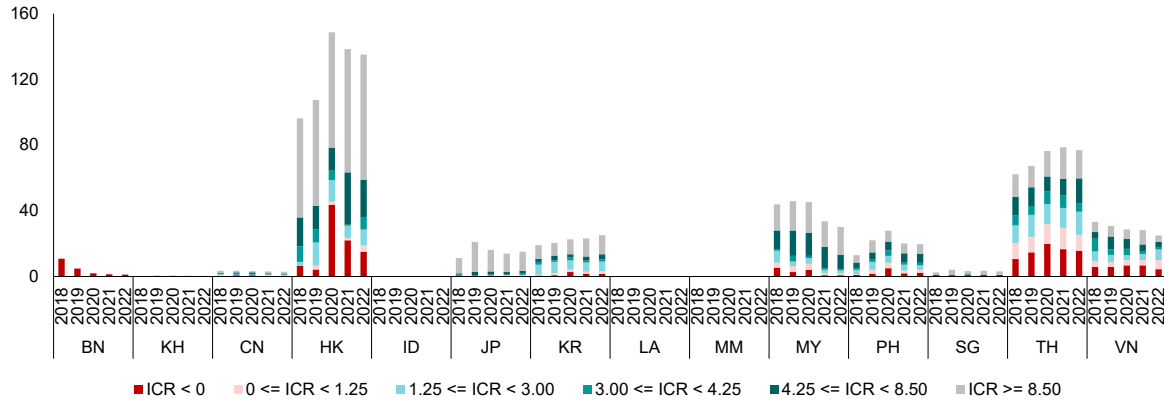
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

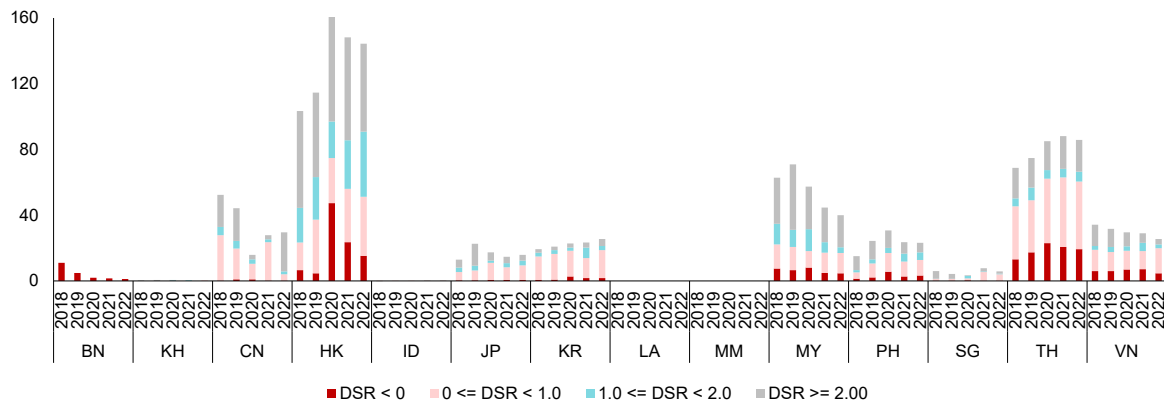
**Appendix Figure 6. ASEAN+3: Firm Debt-at-Risk across Economies by Firm Type,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Unlisted: Other

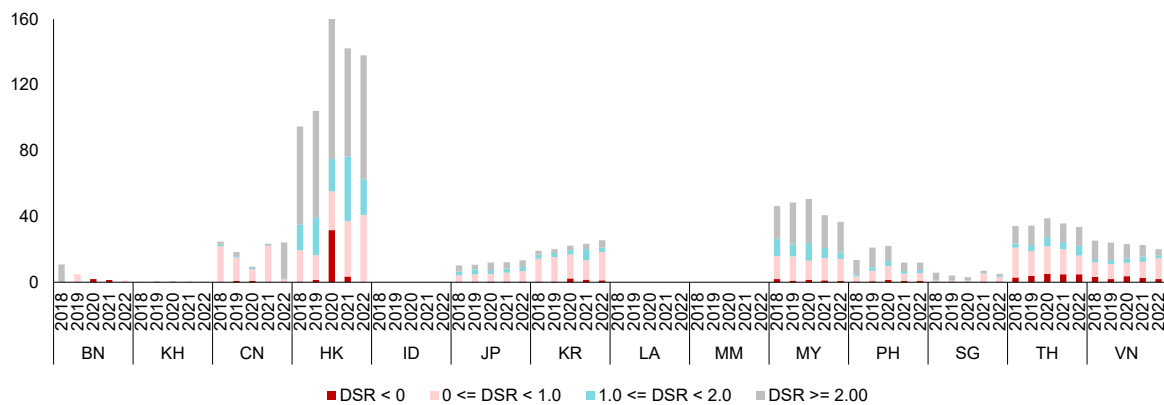
ICR



DSR (EBIT)



DSR (EBITDA)



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

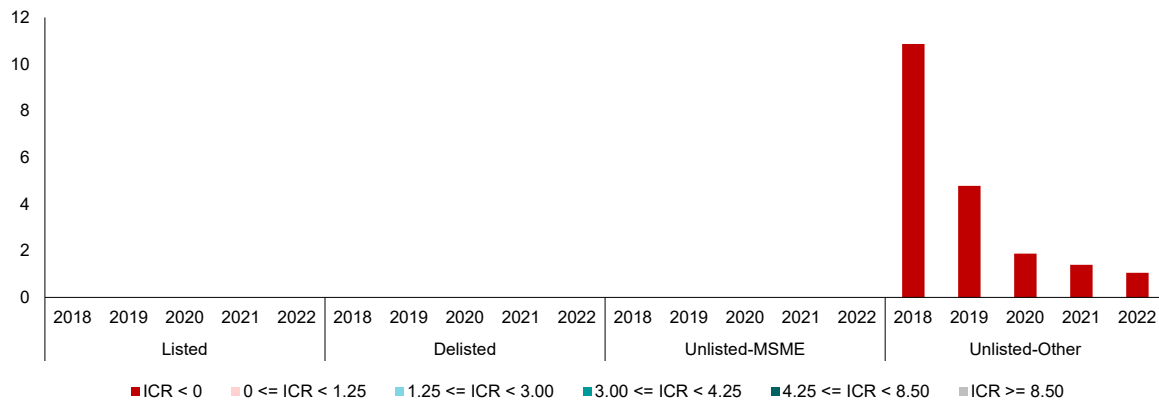
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.

Appendix IX. Firm Debt-at-Risk across Firm Types for Individual ASEAN+3 Economies, with Liquidity Buffers

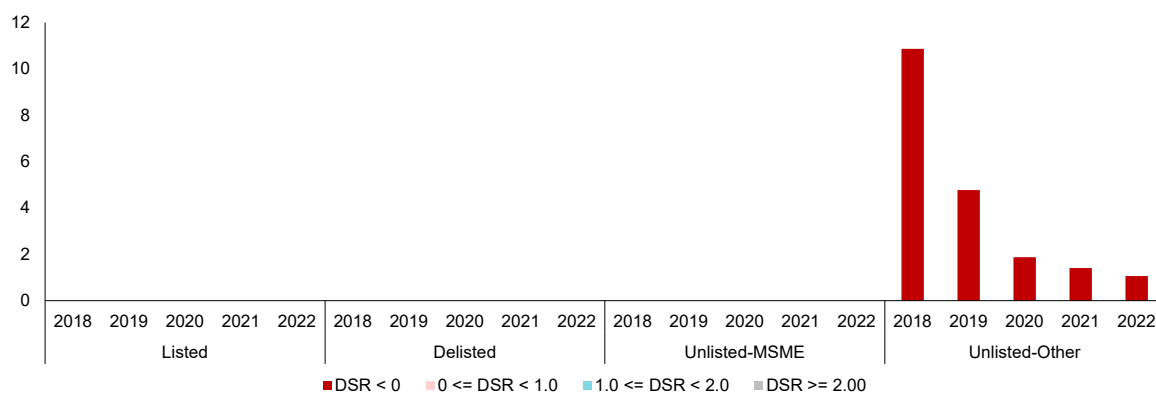
Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)

Brunei

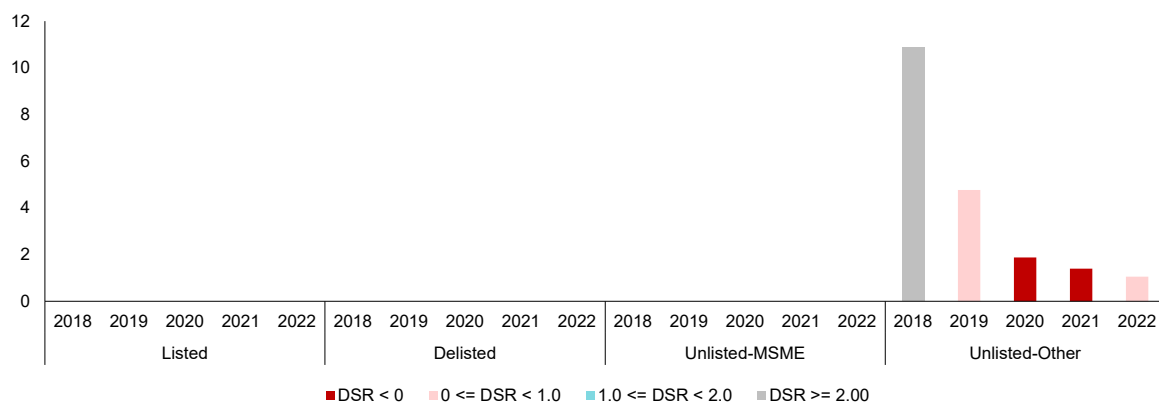
ICR



DSR (EBIT)



DSR (EBITDA)

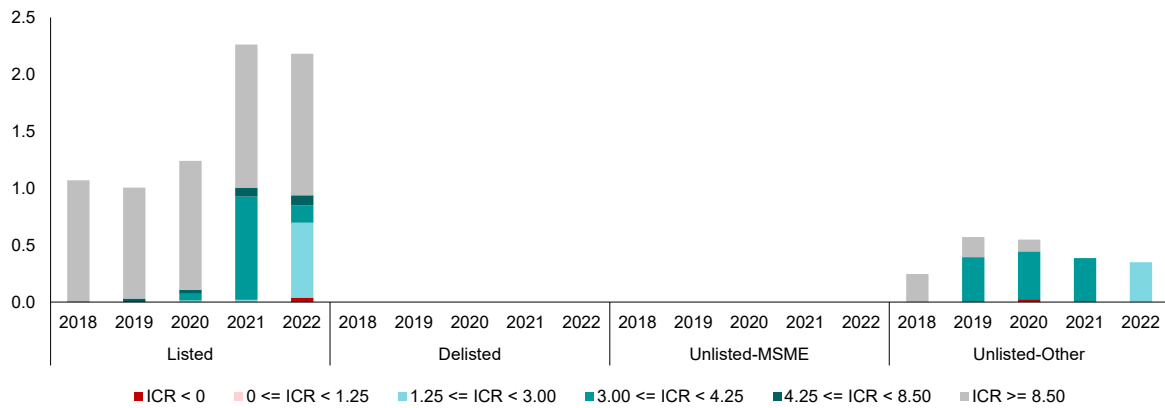


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

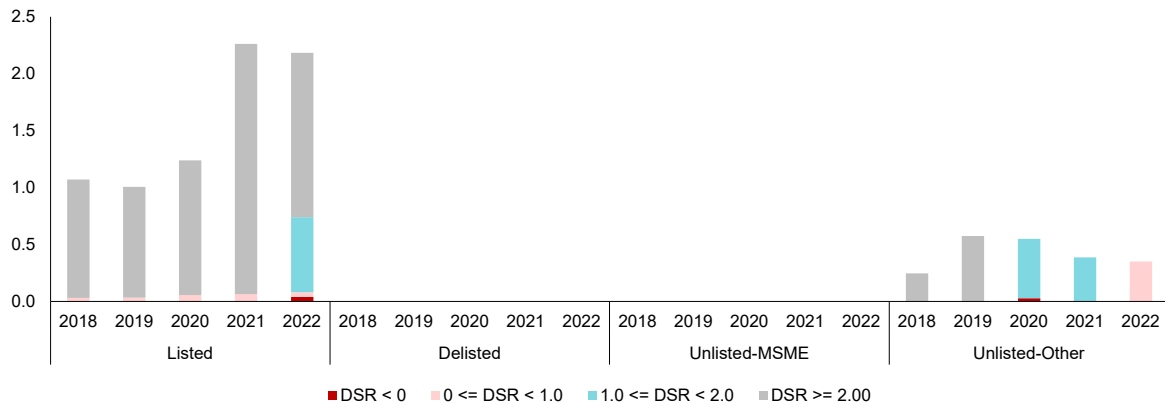
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Cambodia

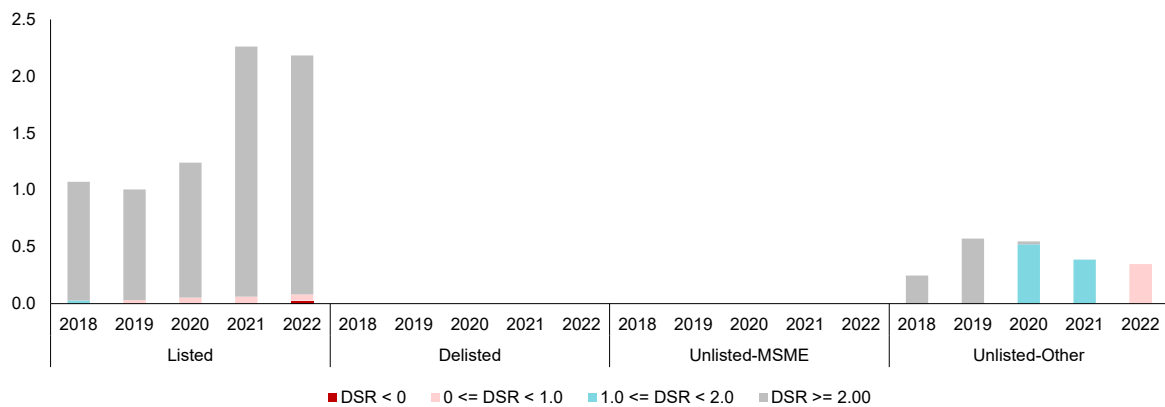
ICR



DSR (EBIT)



DSR (EBITDA)

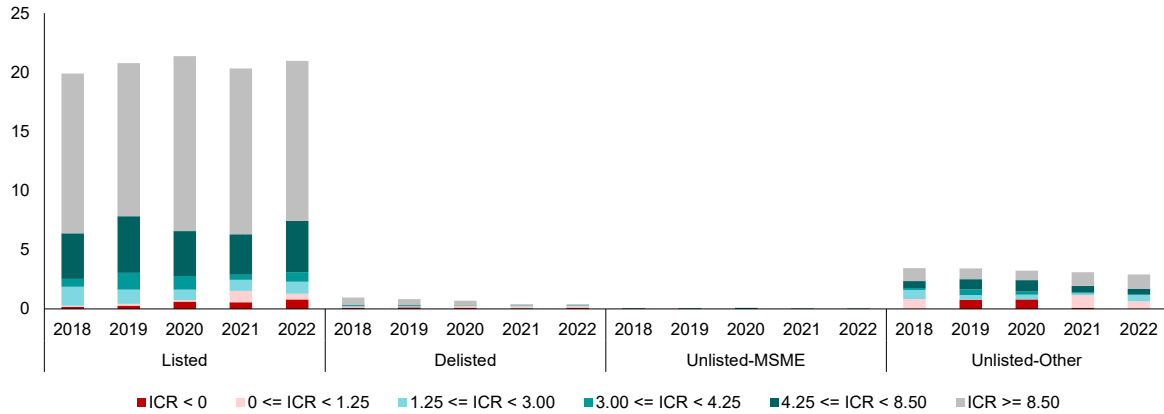


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

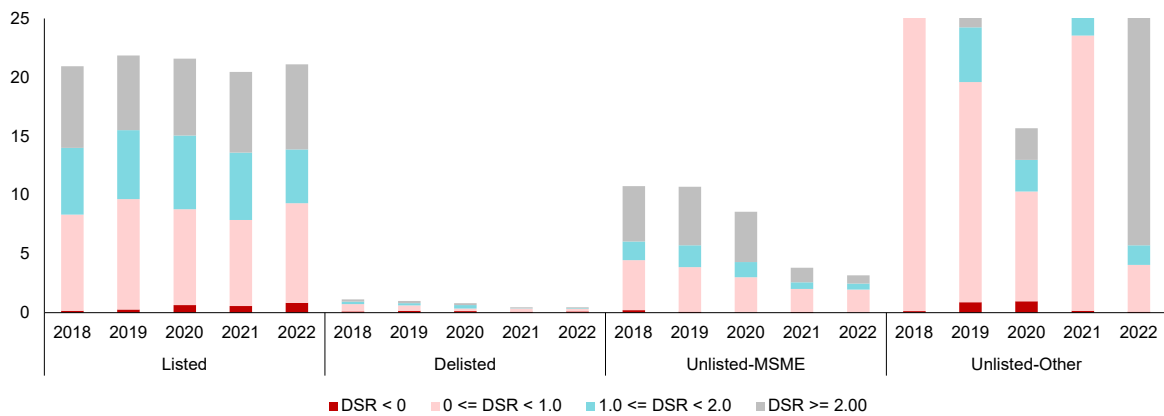
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

China

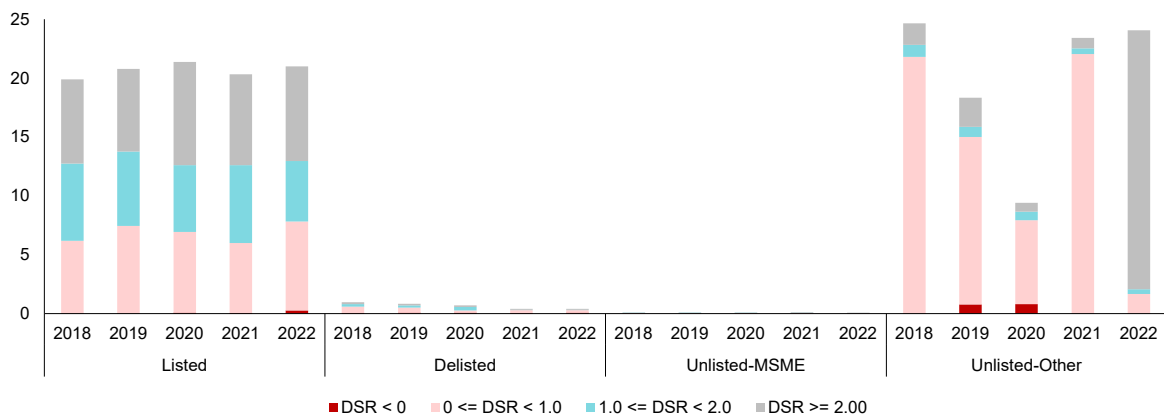
ICR



DSR (EBIT)



DSR (EBITDA)

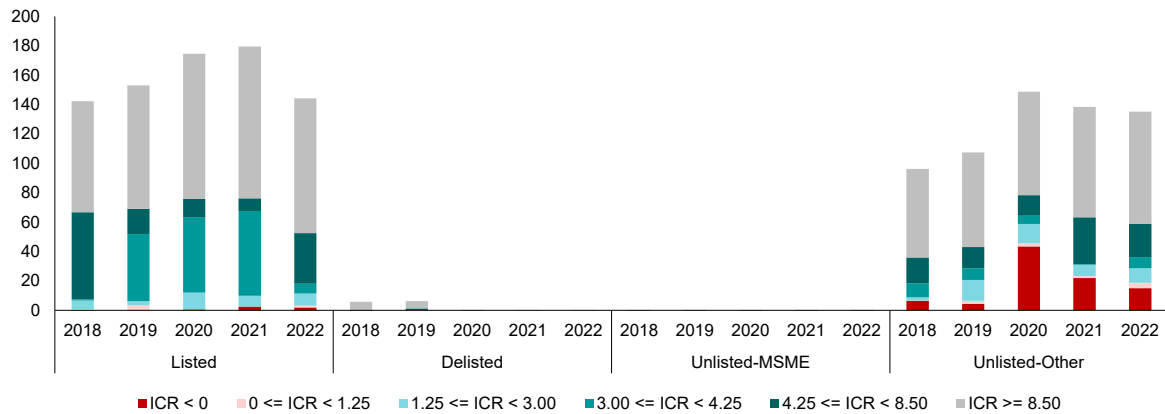


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

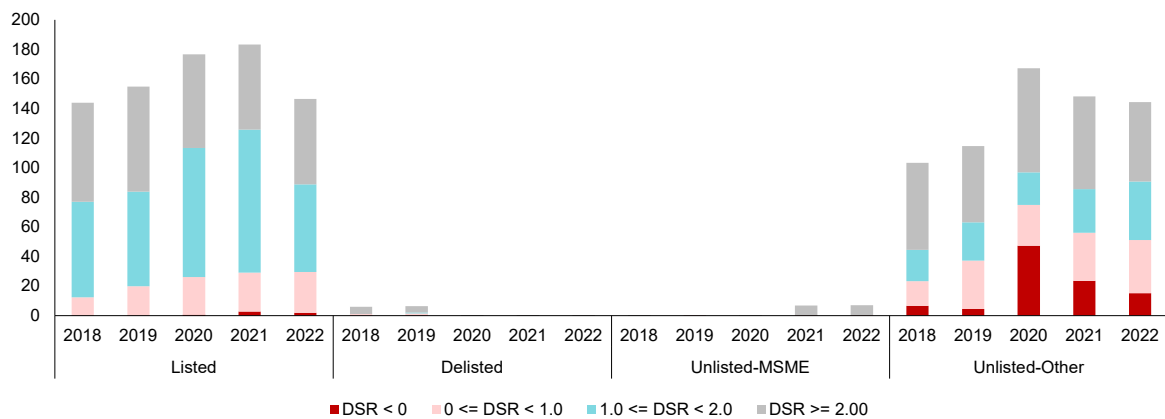
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Hong Kong

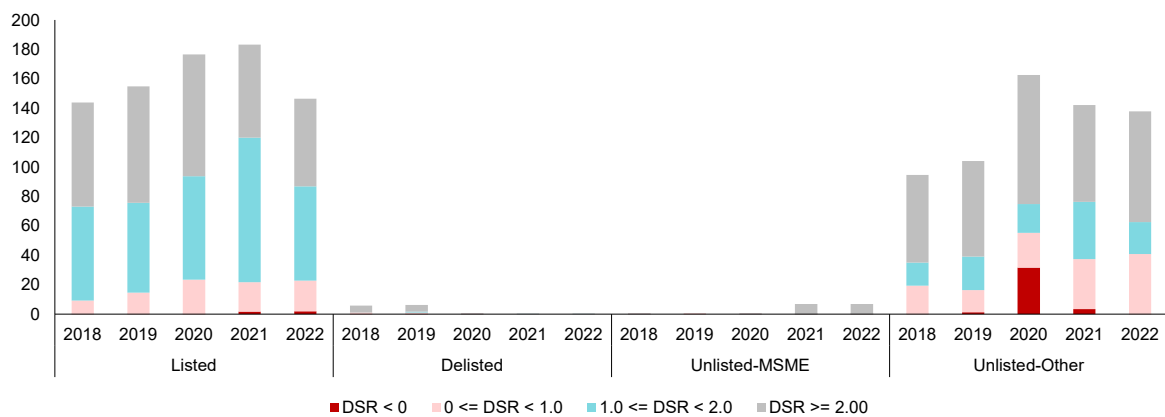
ICR



DSR (EBIT)



DSR (EBITDA)

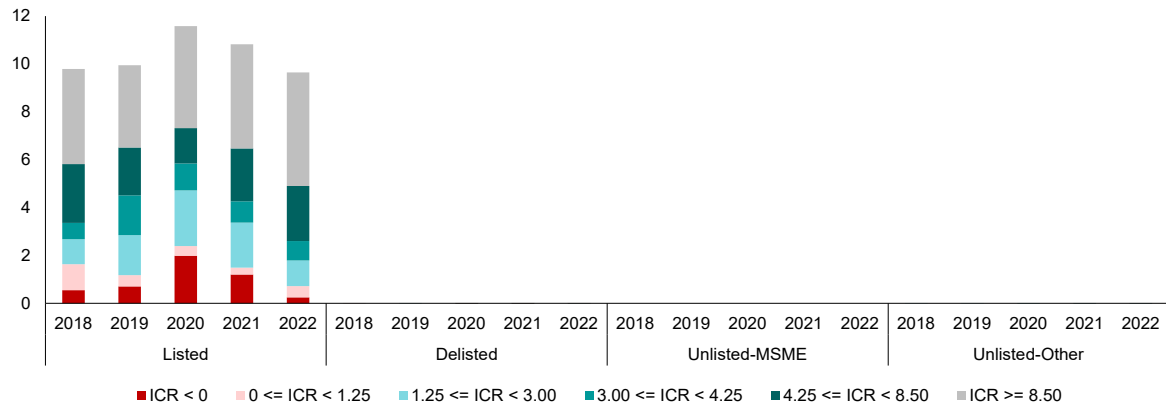


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

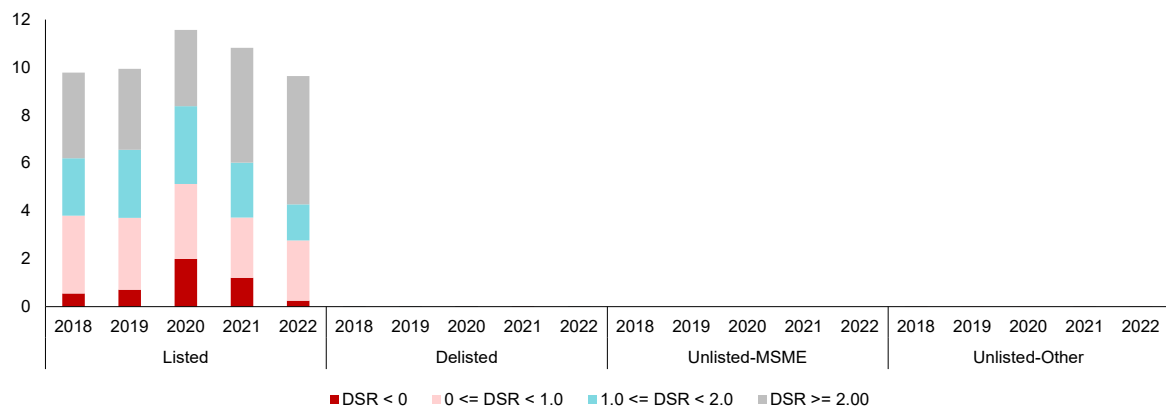
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Indonesia

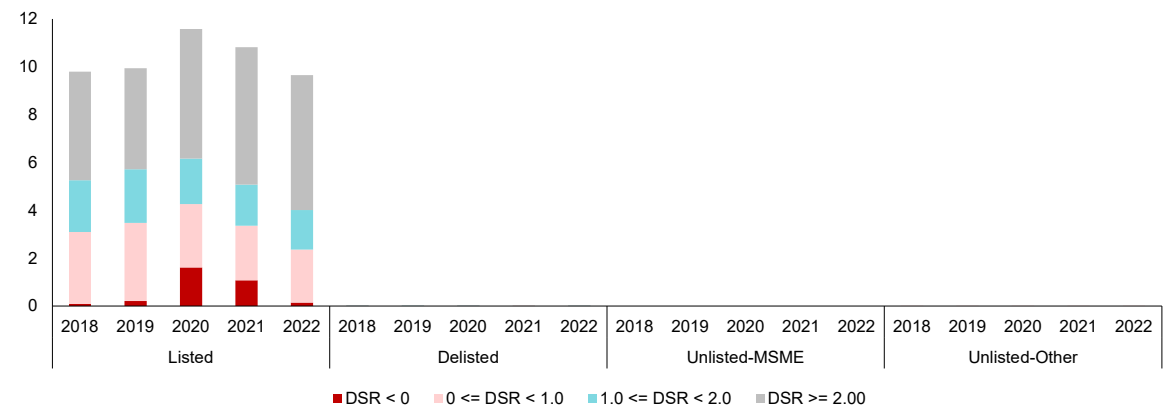
ICR



DSR (EBIT)



DSR (EBITDA)

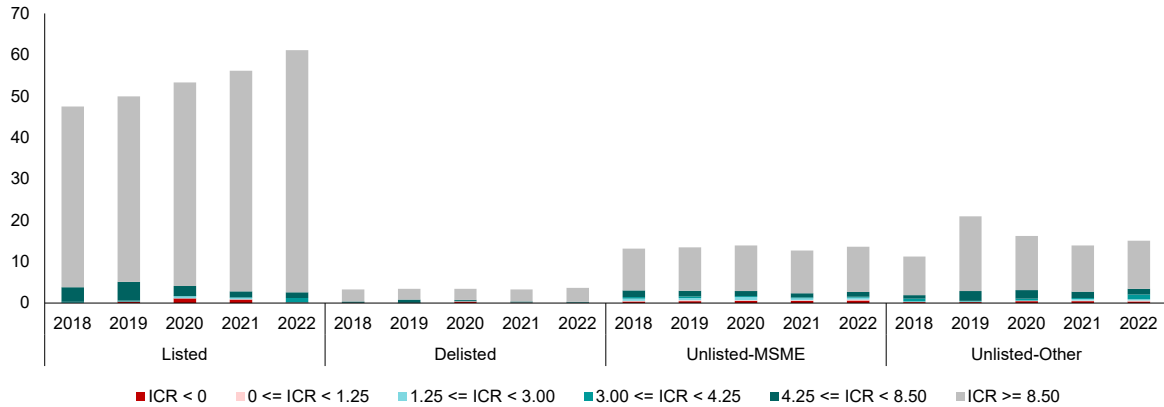


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

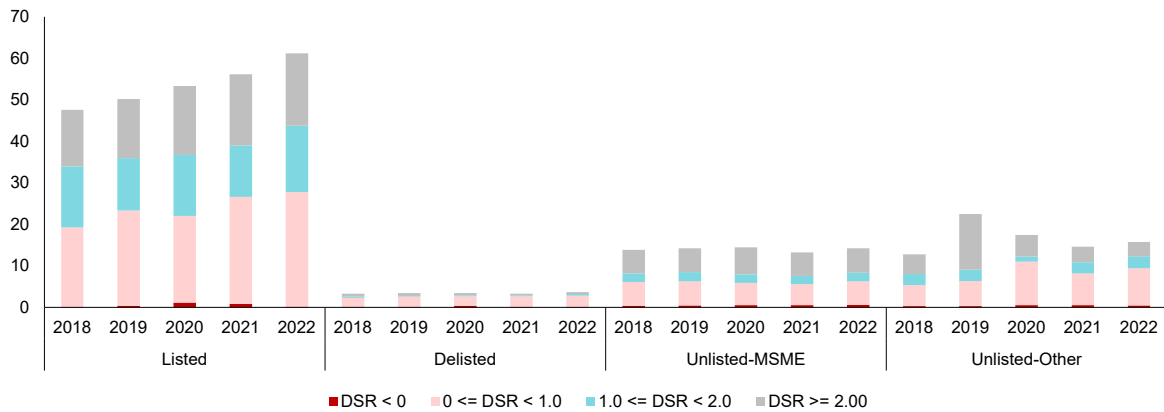
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Japan

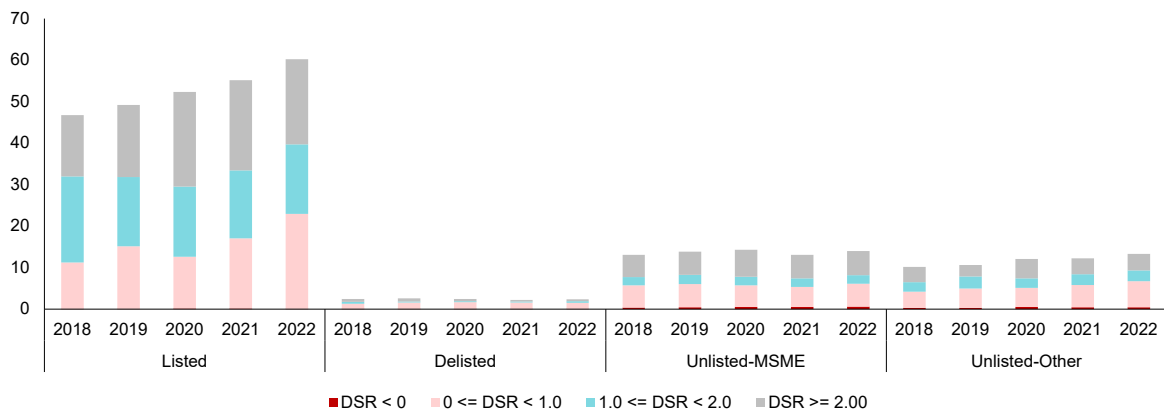
ICR



DSR (EBIT)



DSR (EBITDA)

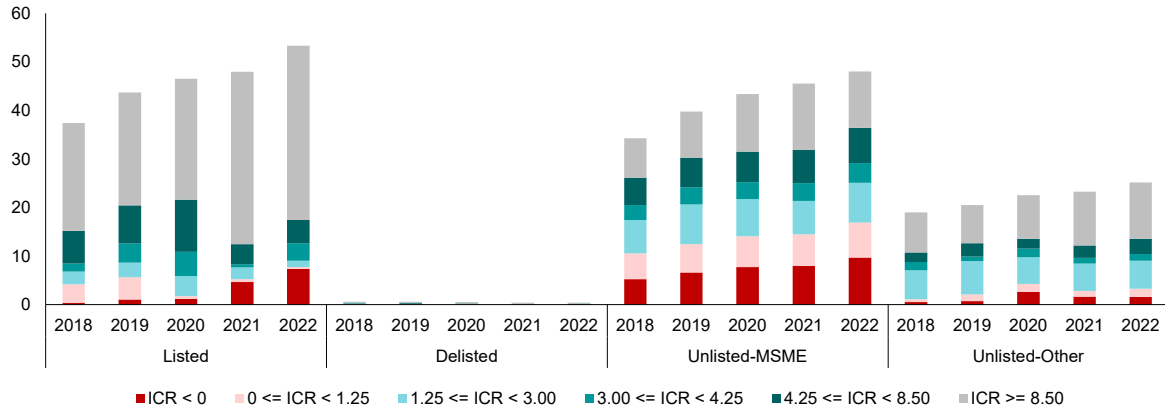


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

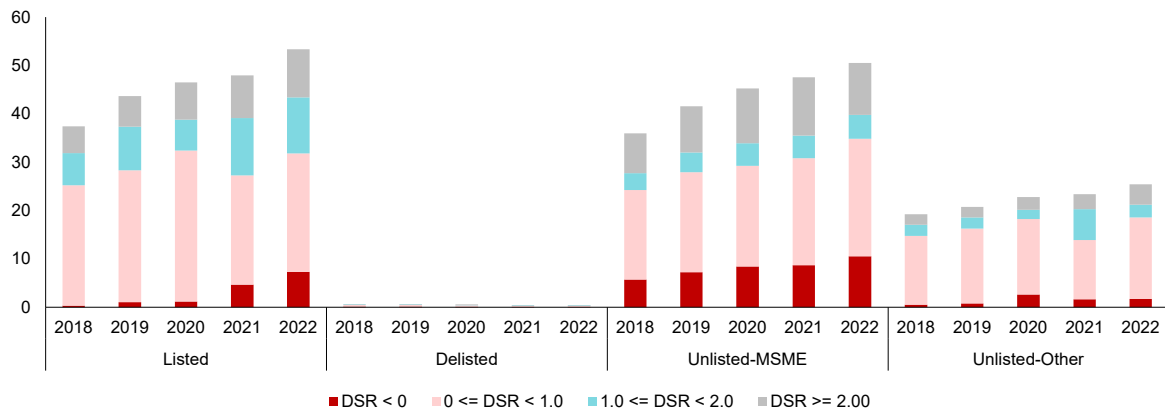
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Korea

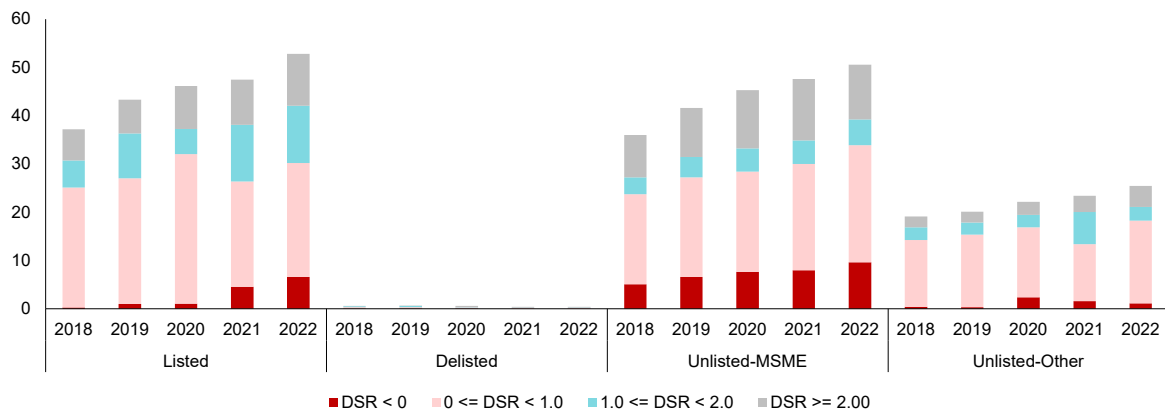
ICR



DSR (EBIT)



DSR (EBITDA)

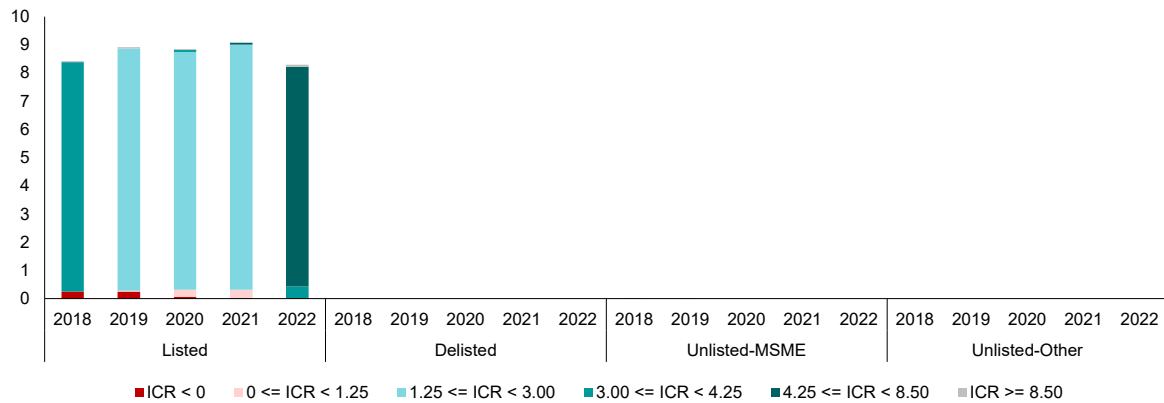


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

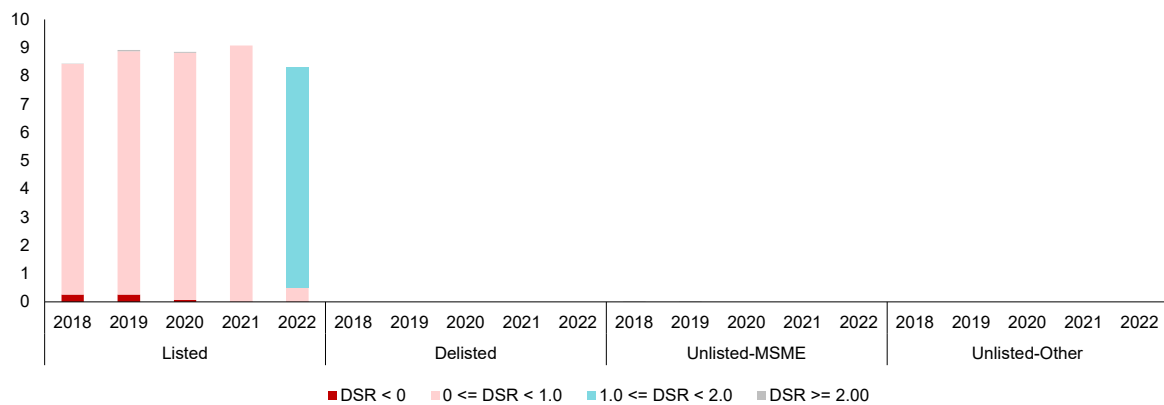
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Lao PDR

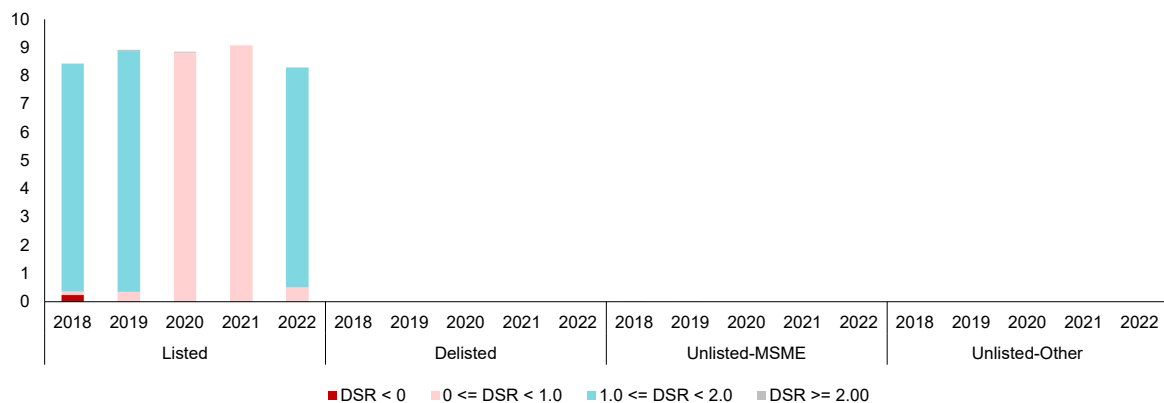
ICR



DSR (EBIT)



DSR (EBITDA)

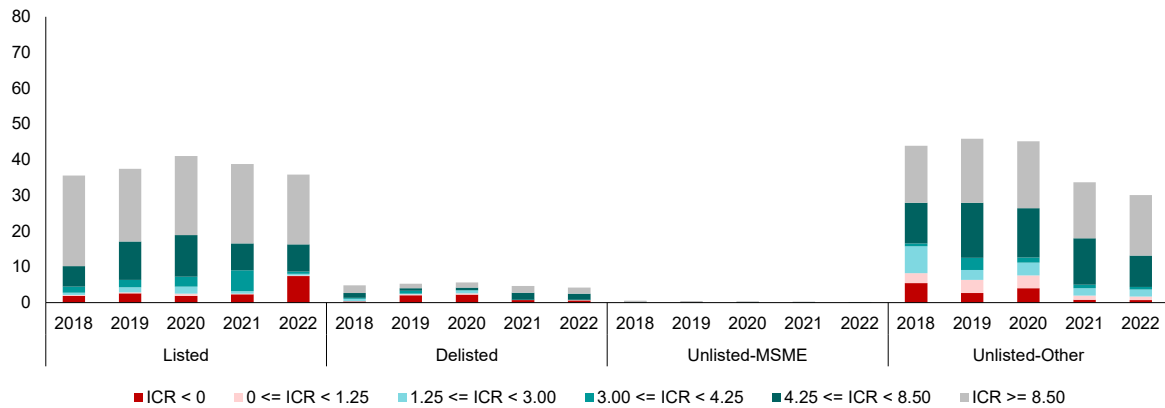


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

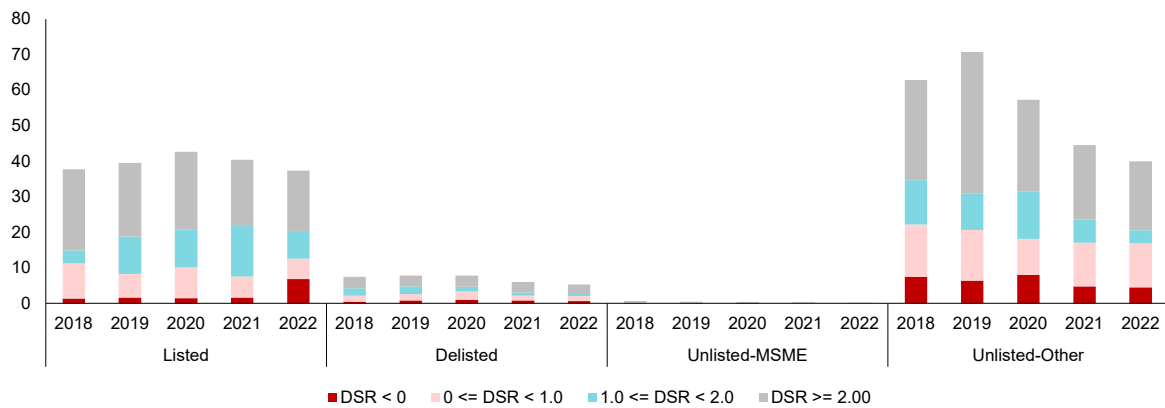
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Malaysia

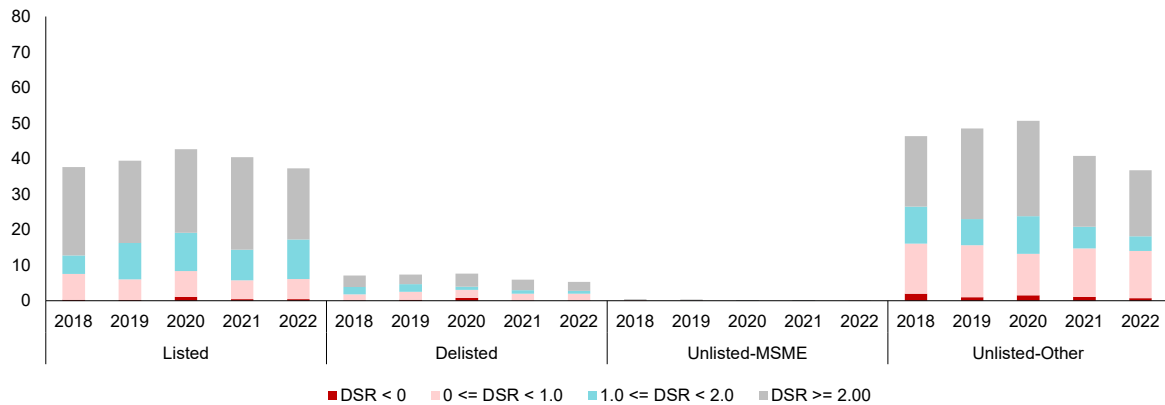
ICR



DSR (EBIT)



DSR (EBITDA)

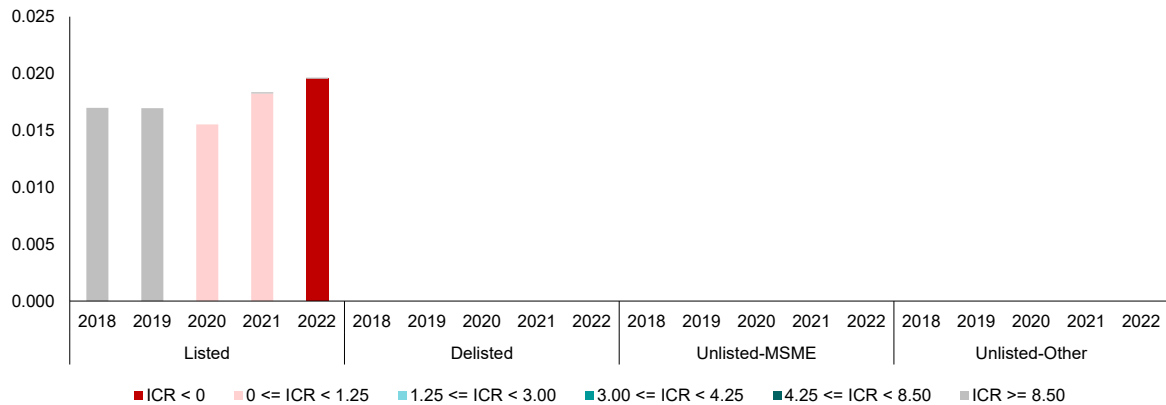


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

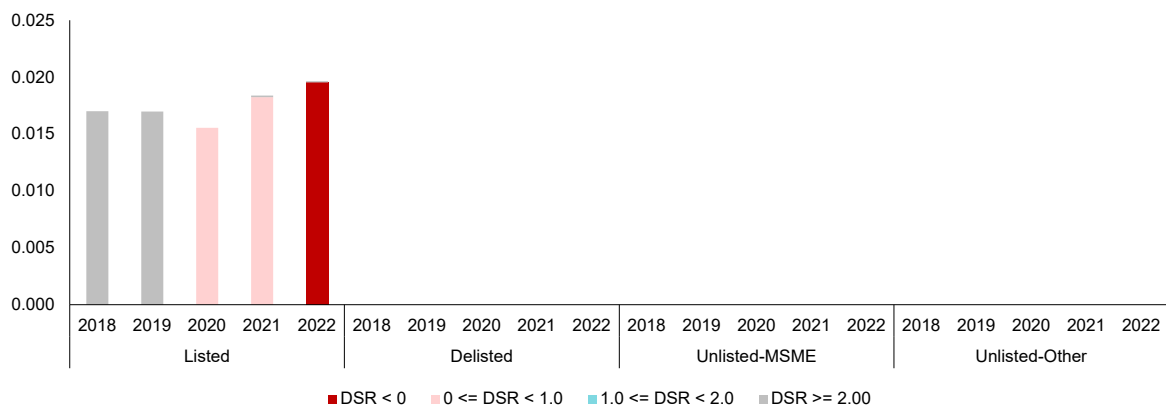
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Myanmar

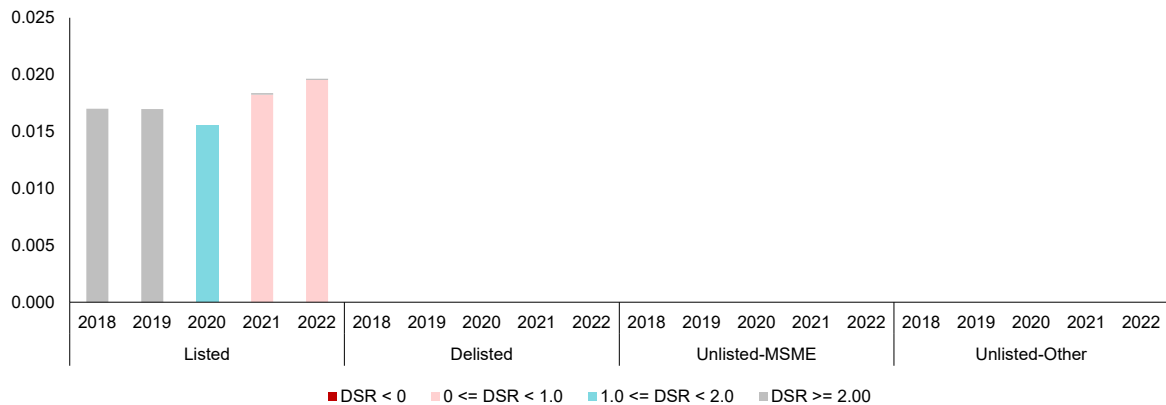
ICR



DSR (EBIT)



DSR (EBITDA)

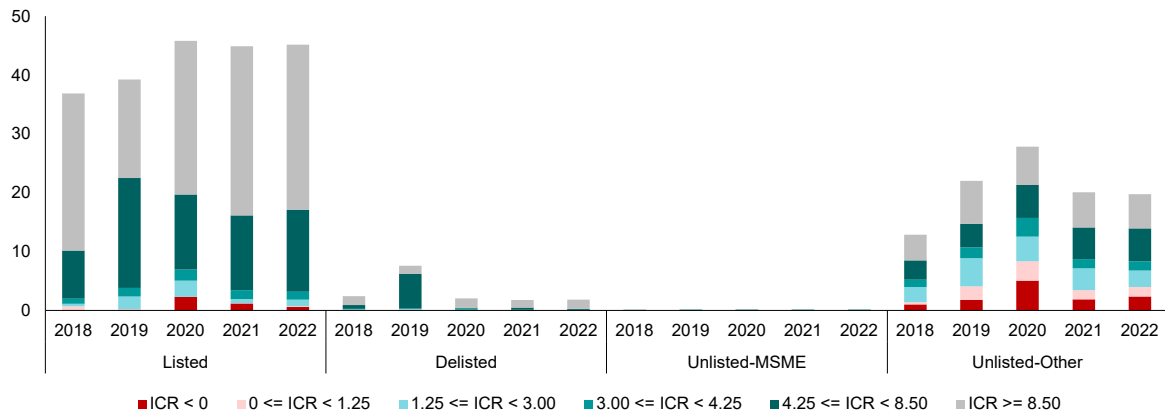


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

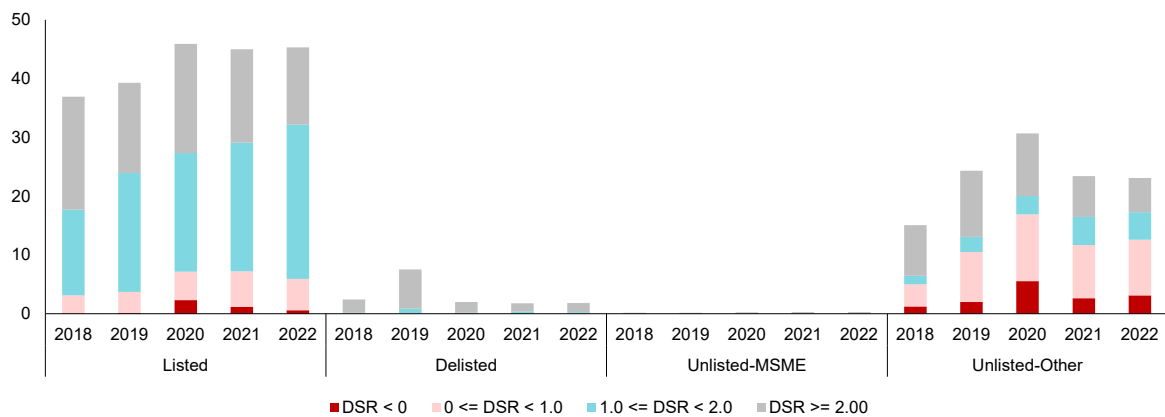
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Philippines

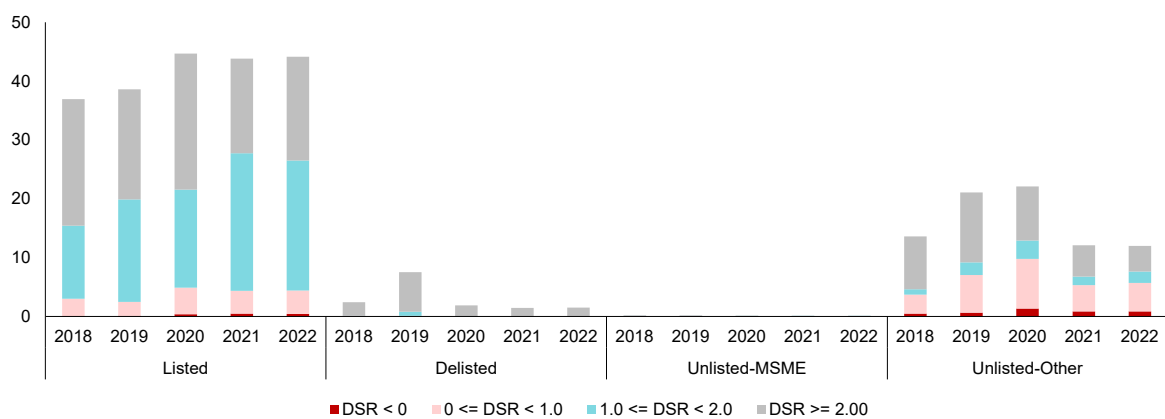
ICR



DSR (EBIT)



DSR (EBITDA)

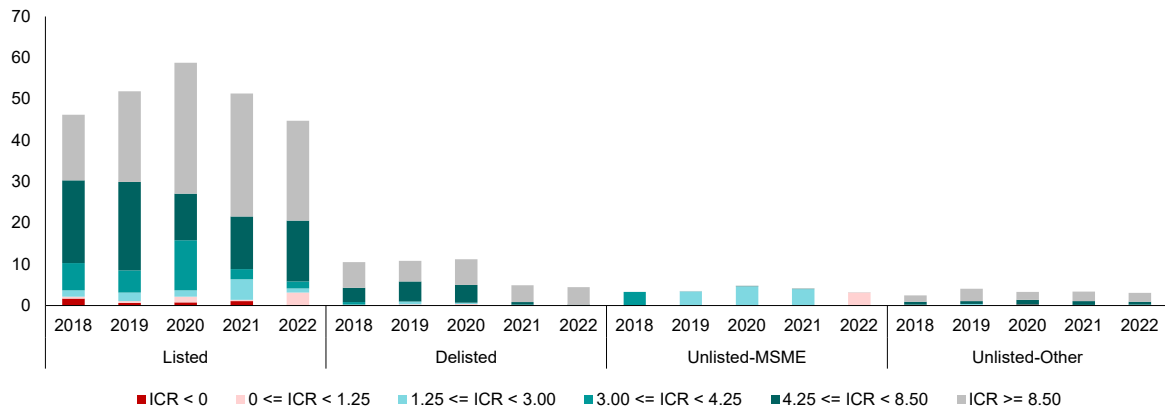


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

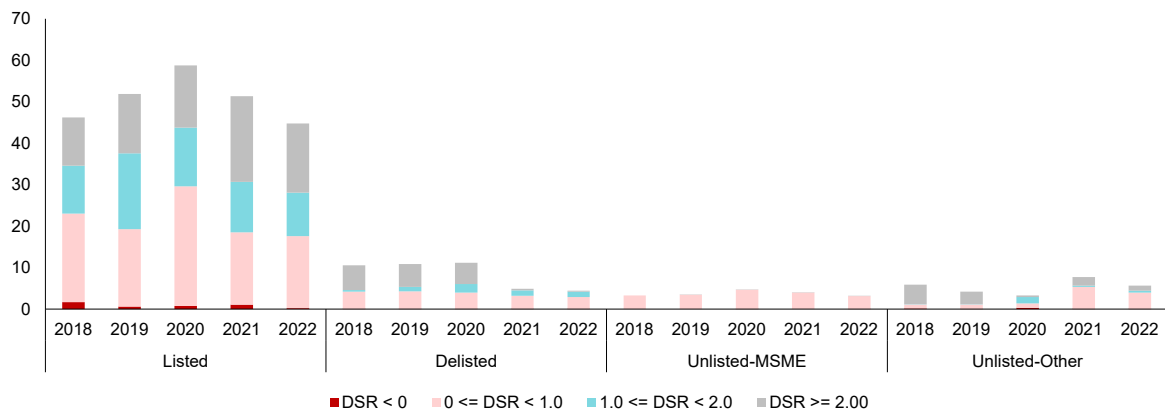
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Singapore

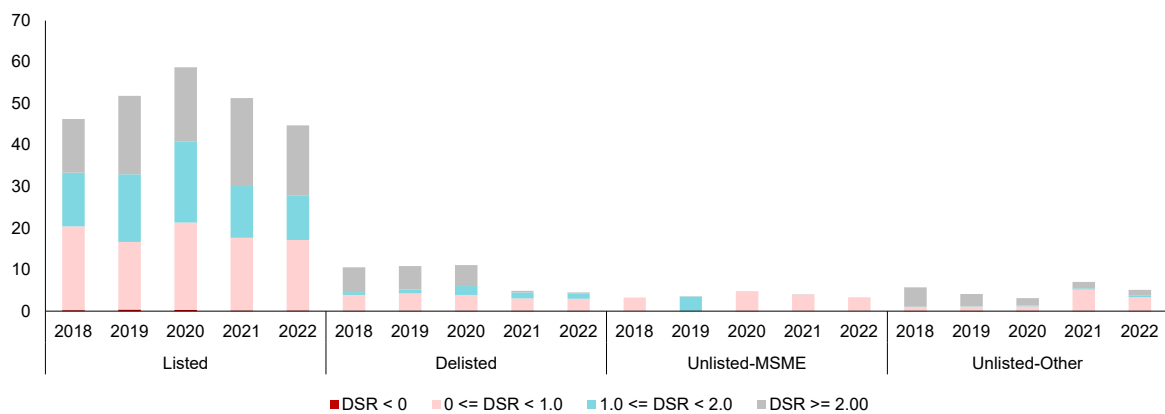
ICR



DSR (EBIT)



DSR (EBITDA)

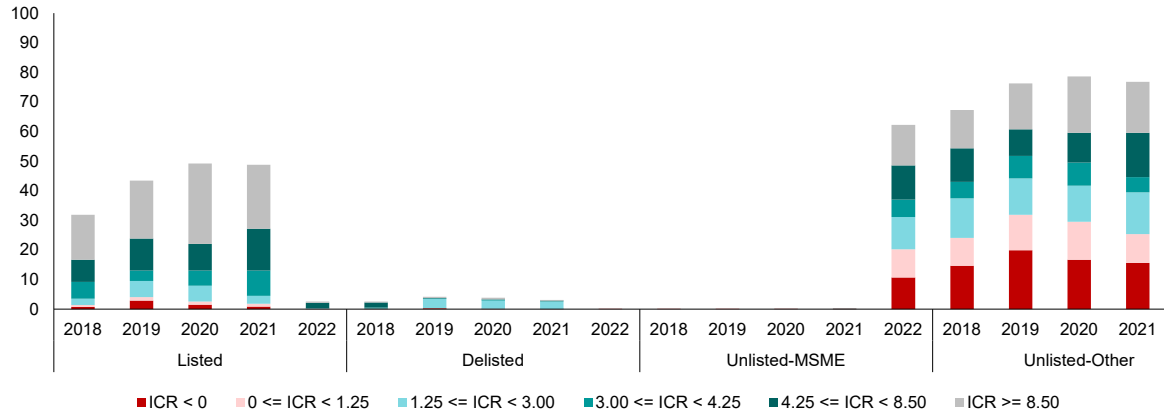


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

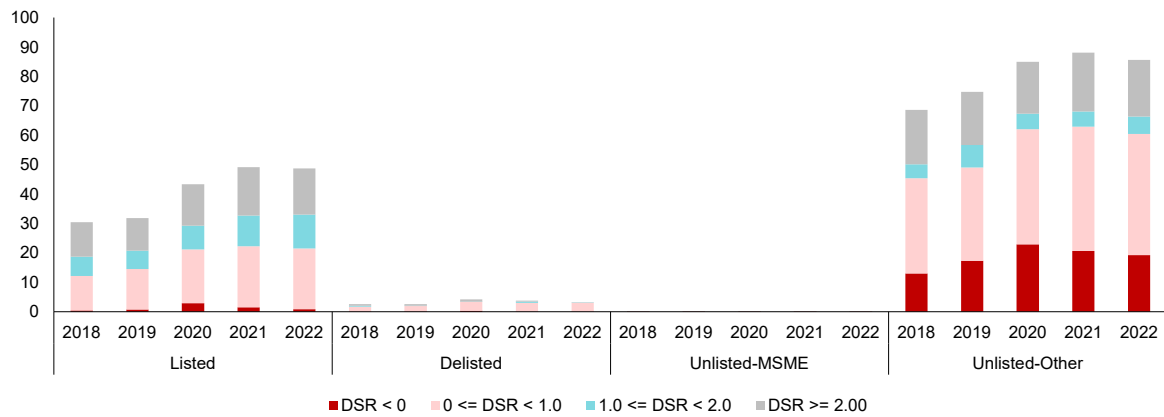
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Thailand

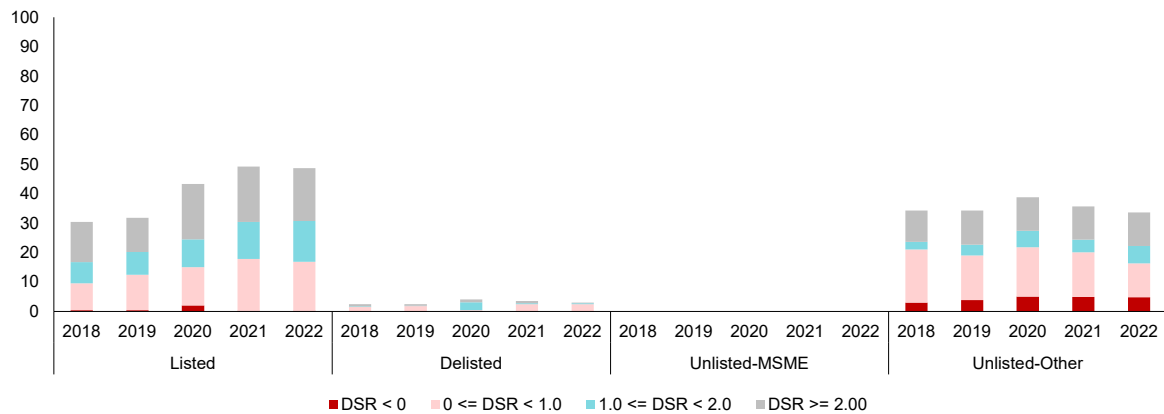
ICR



DSR (EBIT)



DSR (EBITDA)

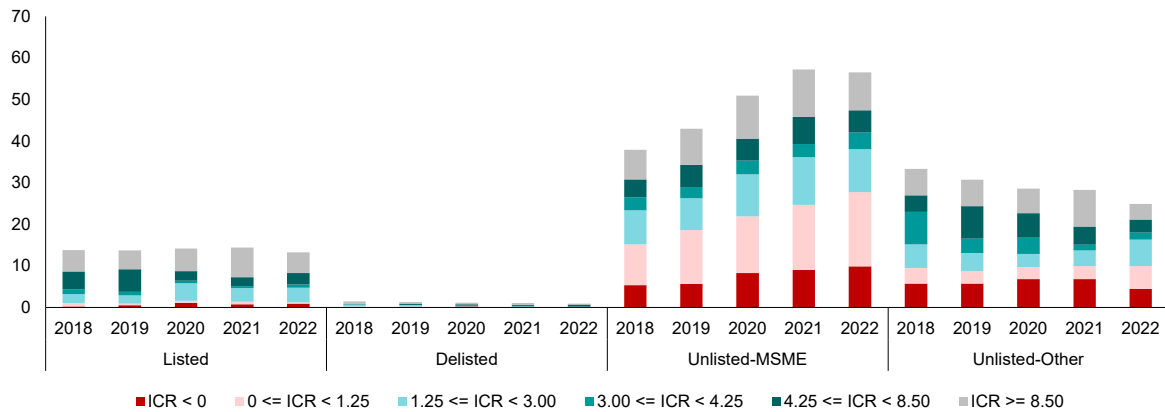


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

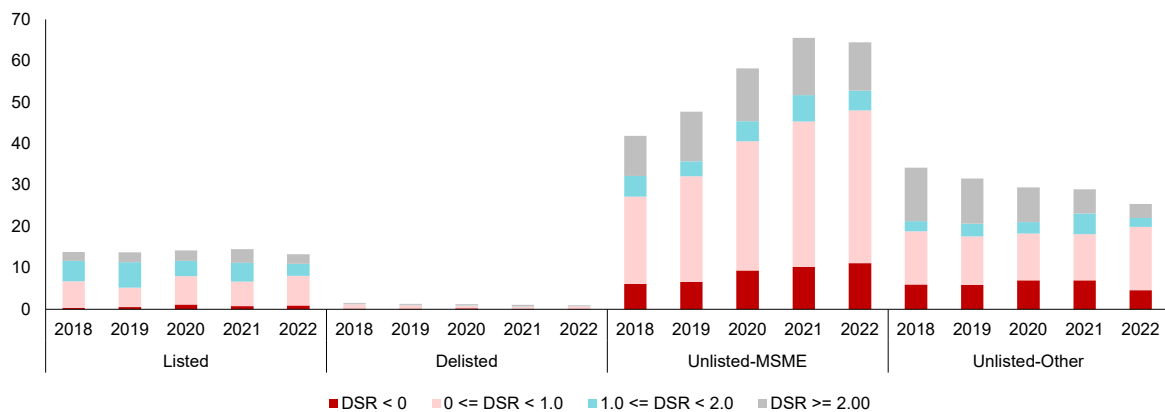
**Appendix Figure 7. ASEAN+3: Firm Debt-at-Risk across Firm Types by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Vietnam

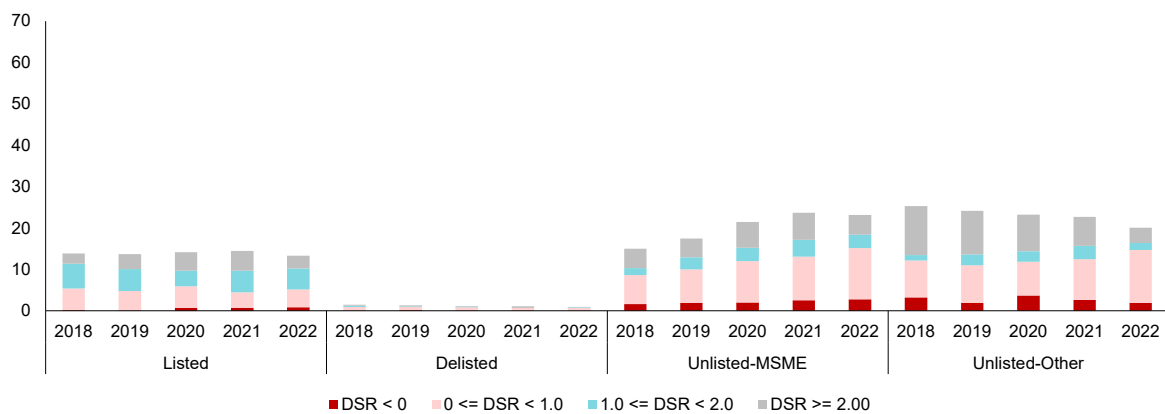
ICR



DSR (EBIT)



DSR (EBITDA)



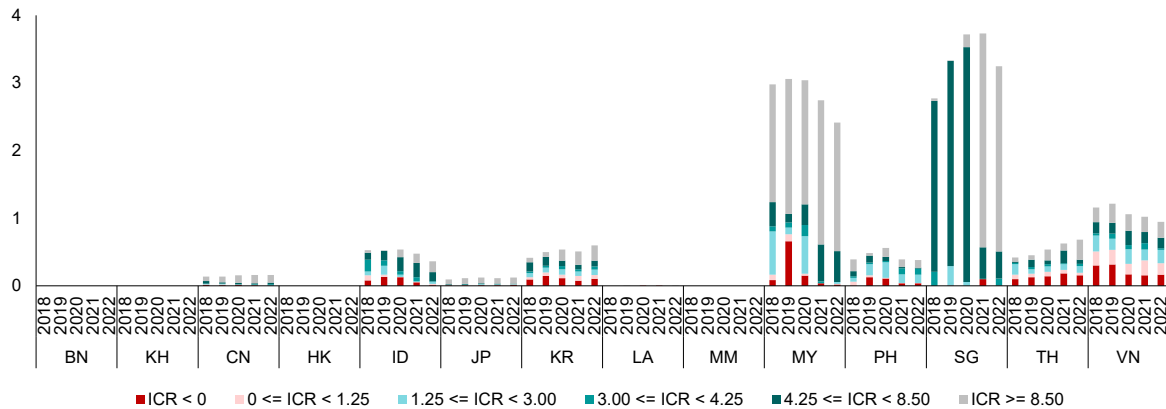
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

Appendix X. Firm Debt-at-Risk across ASEAN+3 Economies by Industry, with Liquidity Buffers

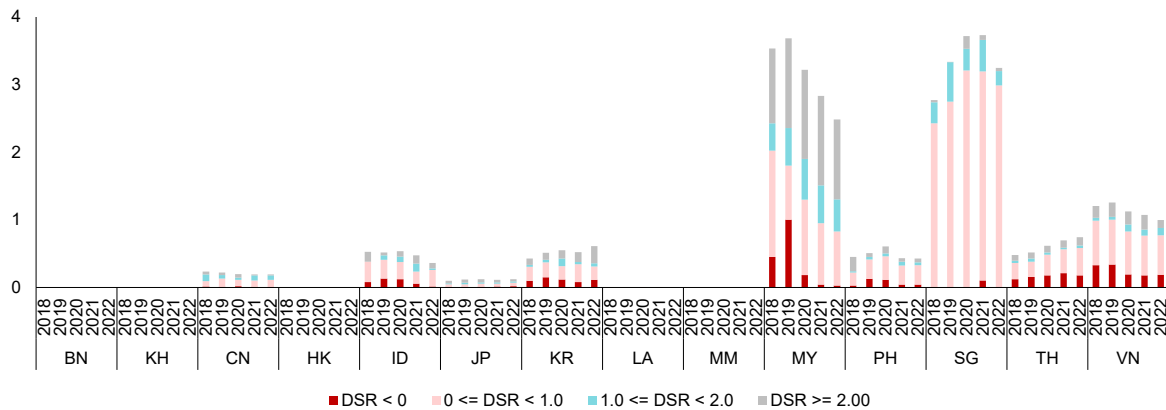
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)

Agriculture

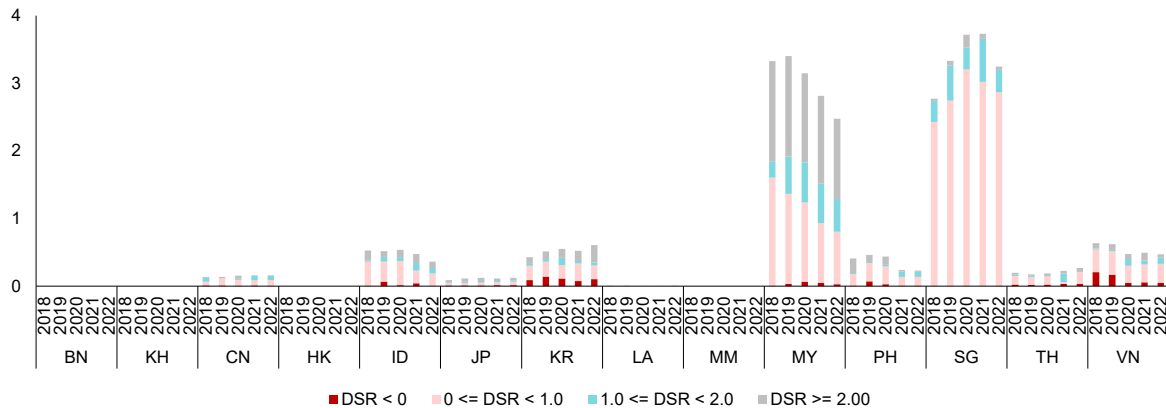
ICR



DSR (EBIT)



DSR (EBITDA)

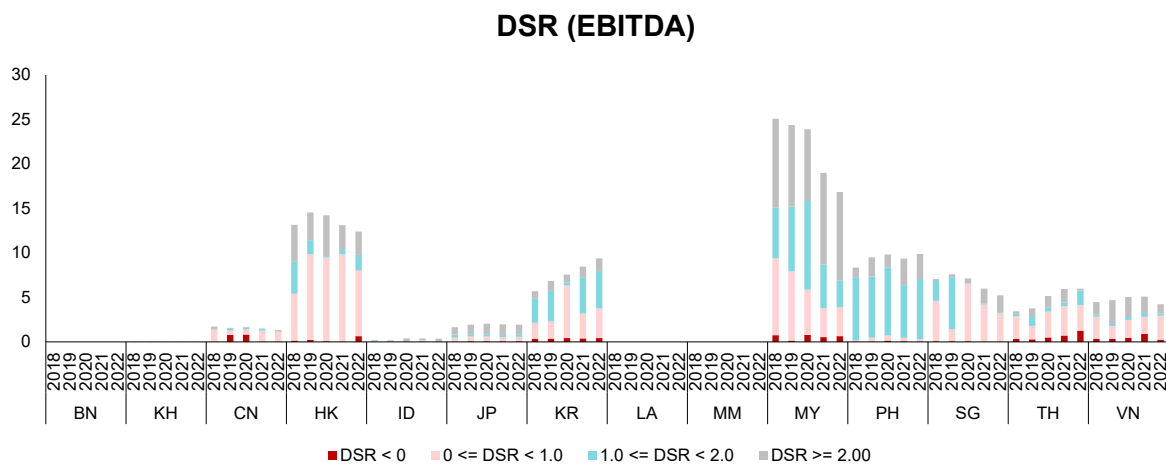
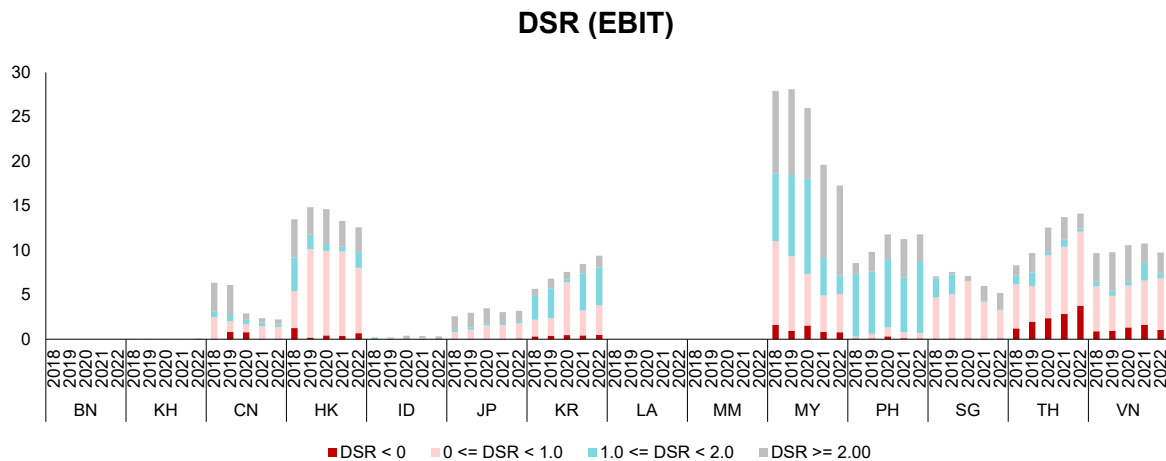
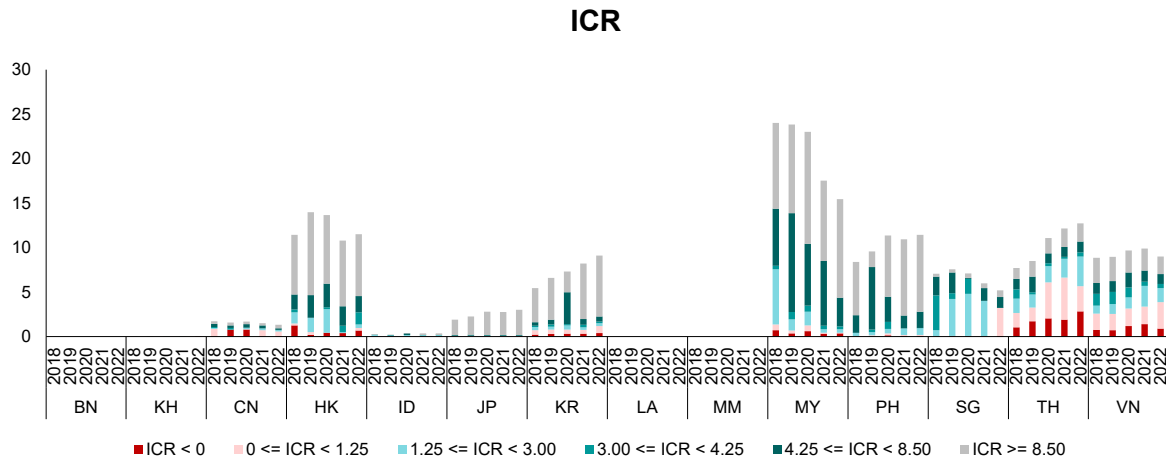


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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

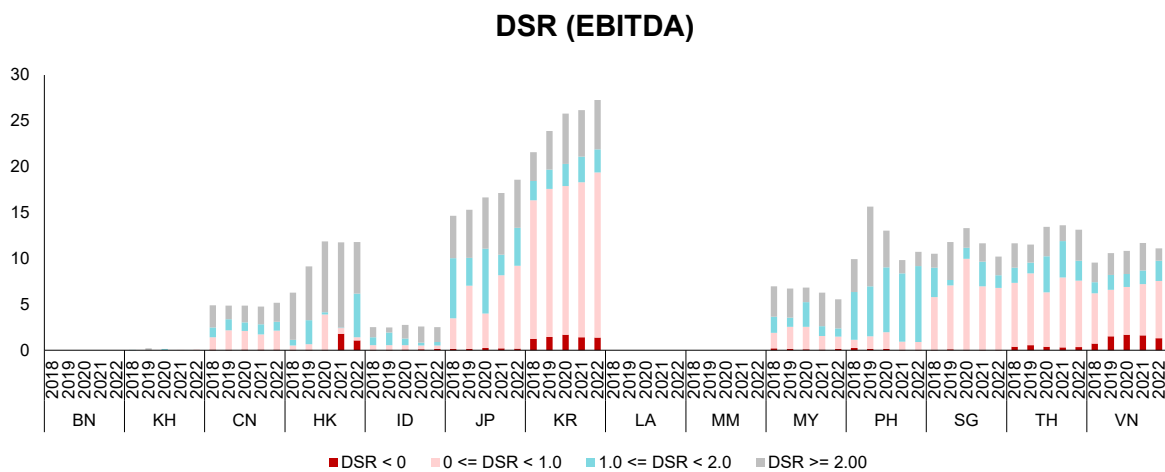
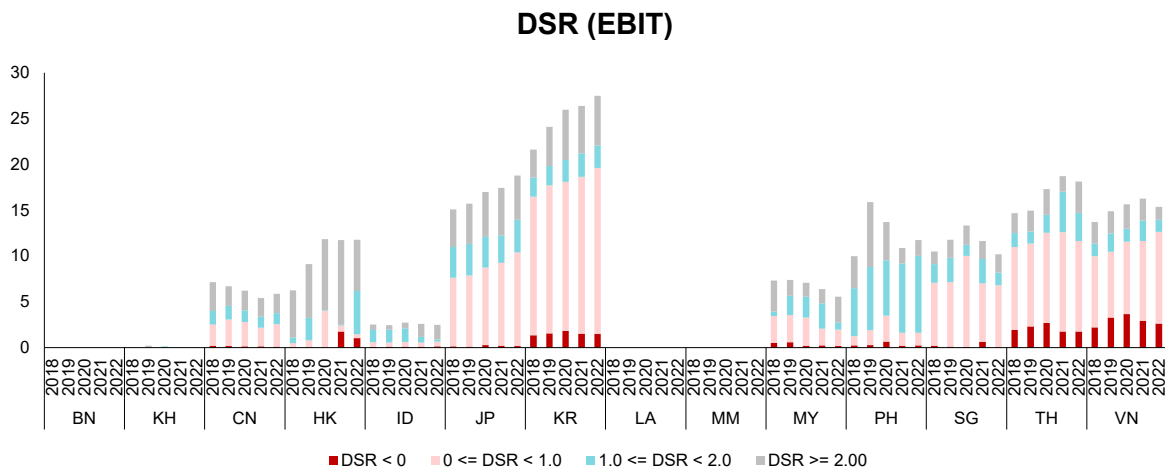
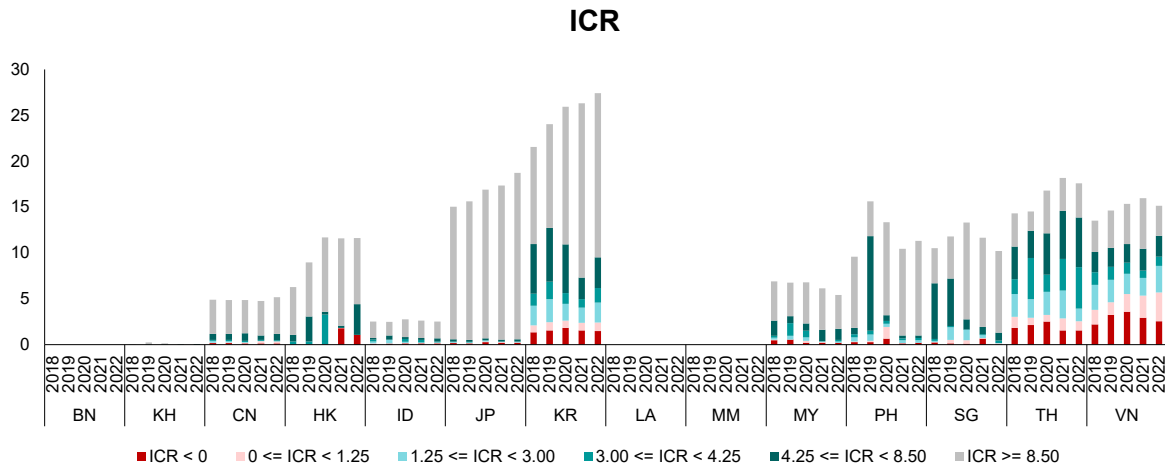


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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



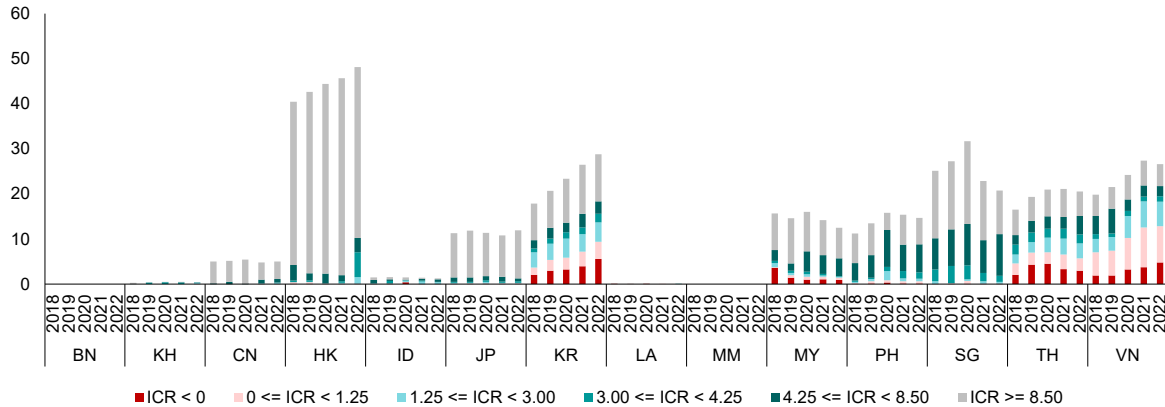
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

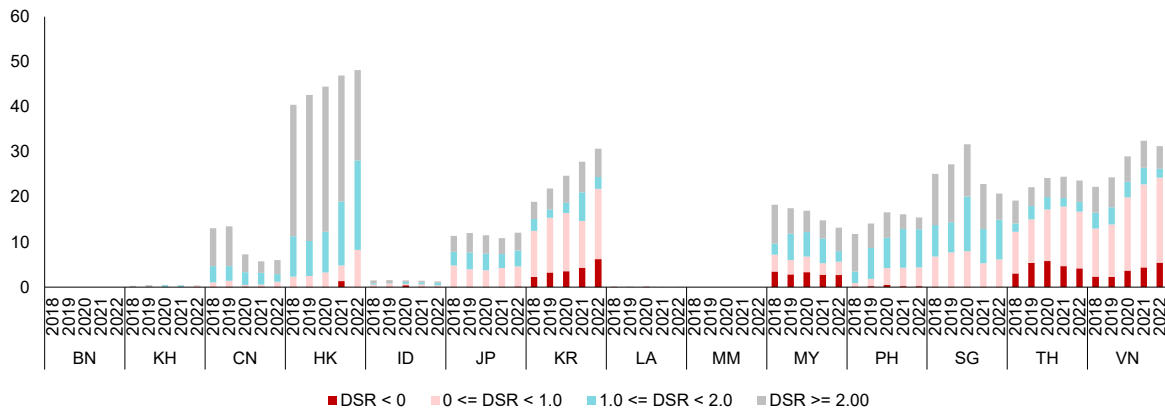
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry,
Taking into Account Highly Liquid Assets, 2018–22
 (Percent of GDP)
 (Continued)

Property and Construction

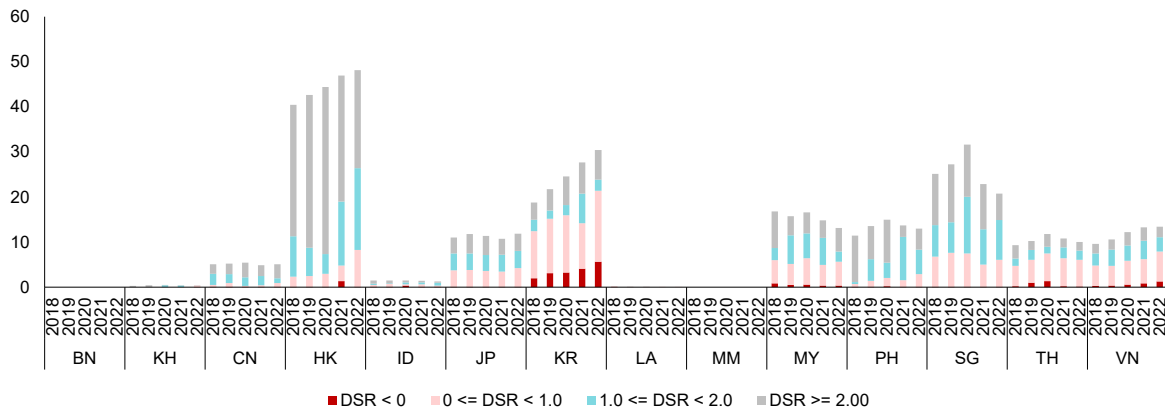
ICR



DSR (EBIT)



DSR (EBITDA)



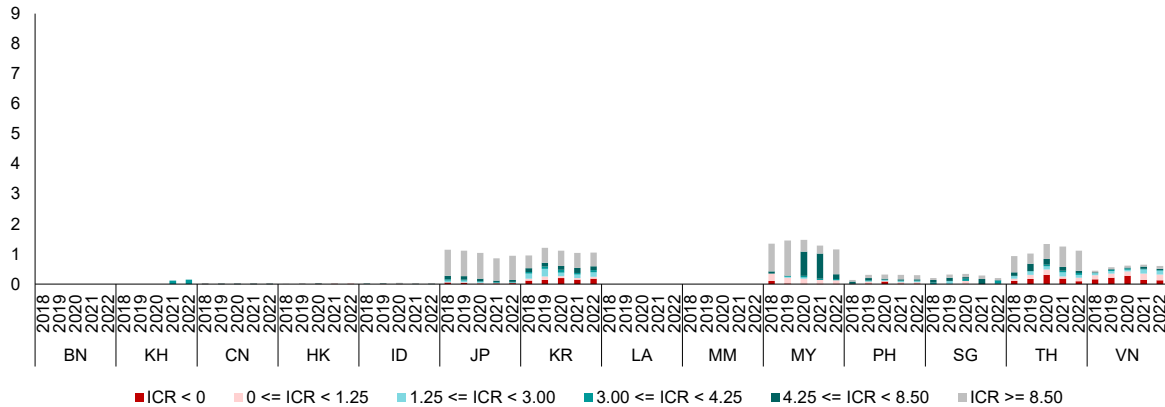
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

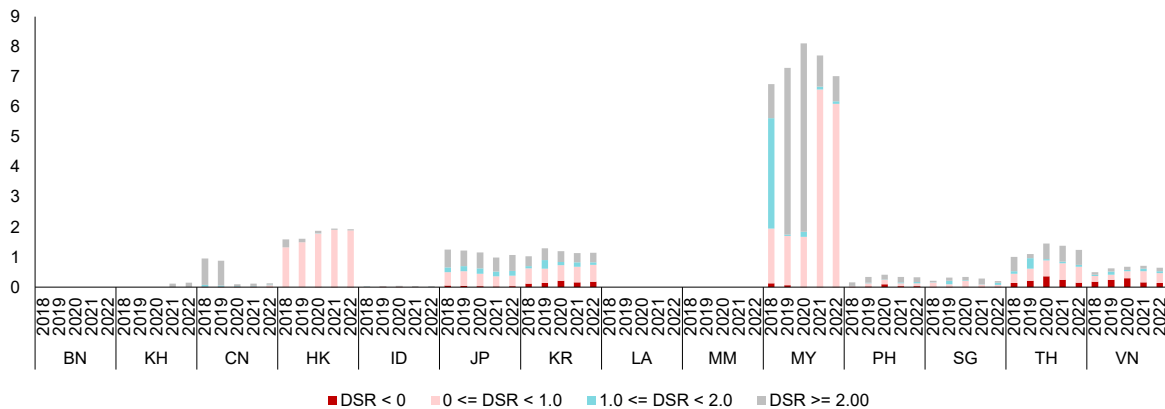
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry,
Taking into Account Highly Liquid Assets, 2018–22
 (Percent of GDP)
 (Continued)

Public Administration, Education, and Health Social Services

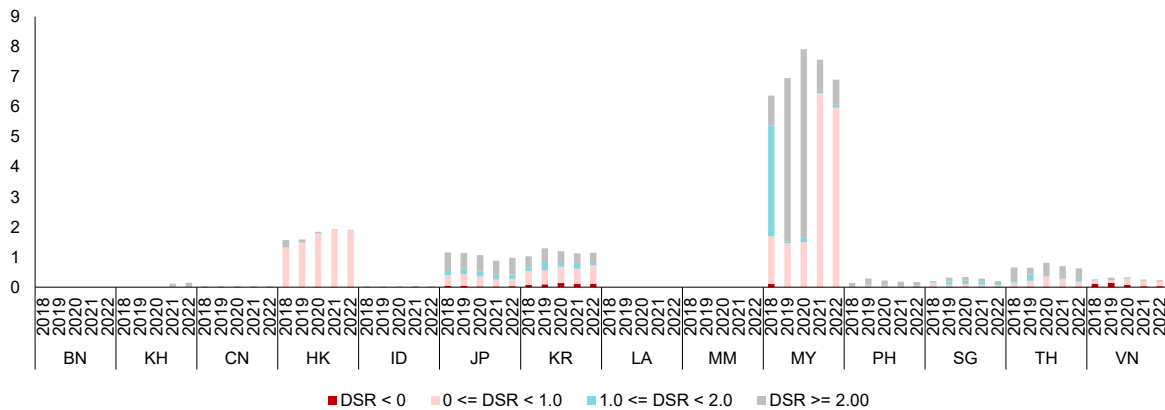
ICR



DSR (EBIT)



DSR (EBITDA)



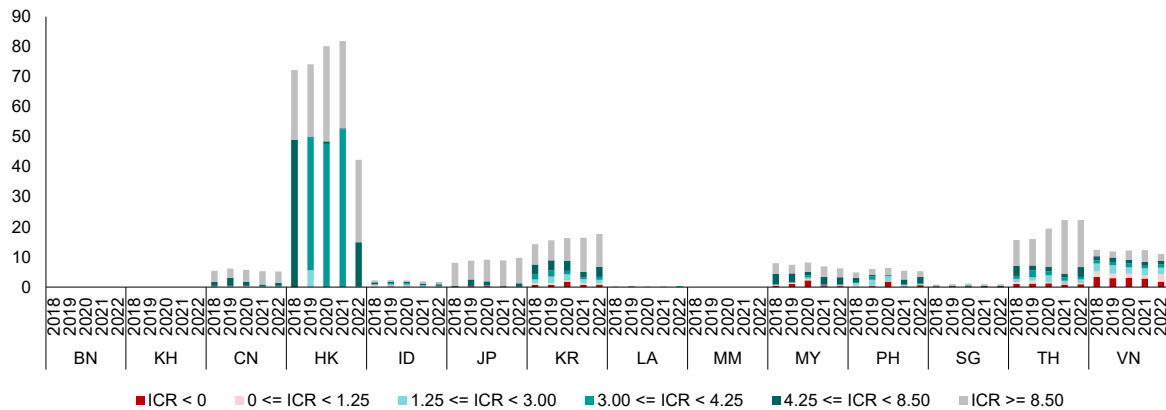
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

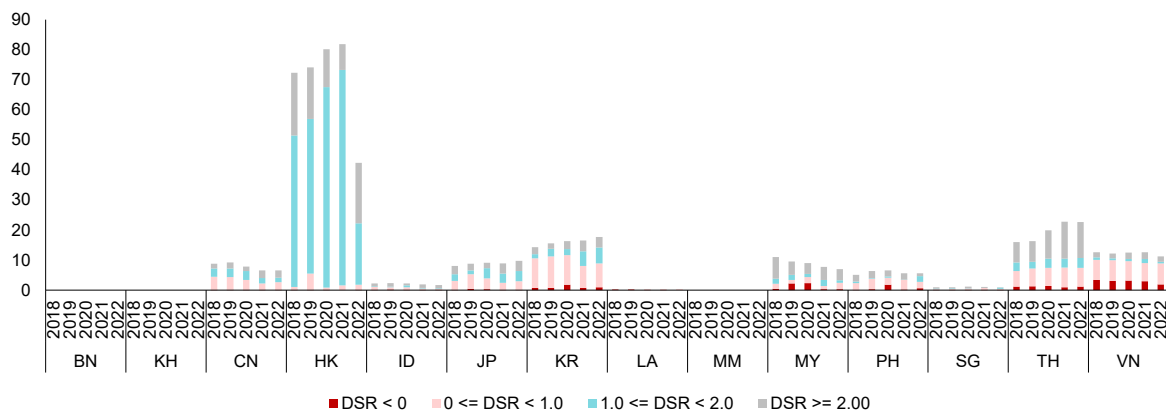
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry,
Taking into Account Highly Liquid Assets, 2018–22
 (Percent of GDP)
 (Continued)

Raw Materials

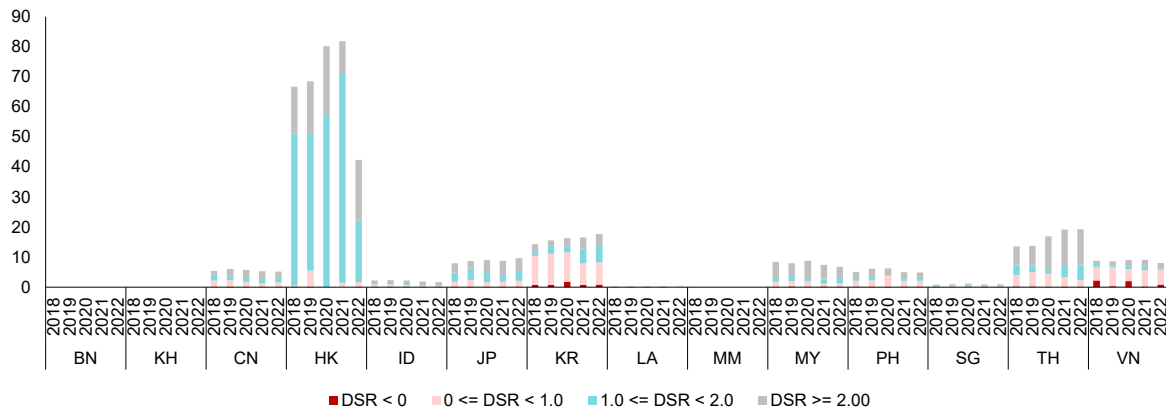
ICR



DSR (EBIT)



DSR (EBITDA)

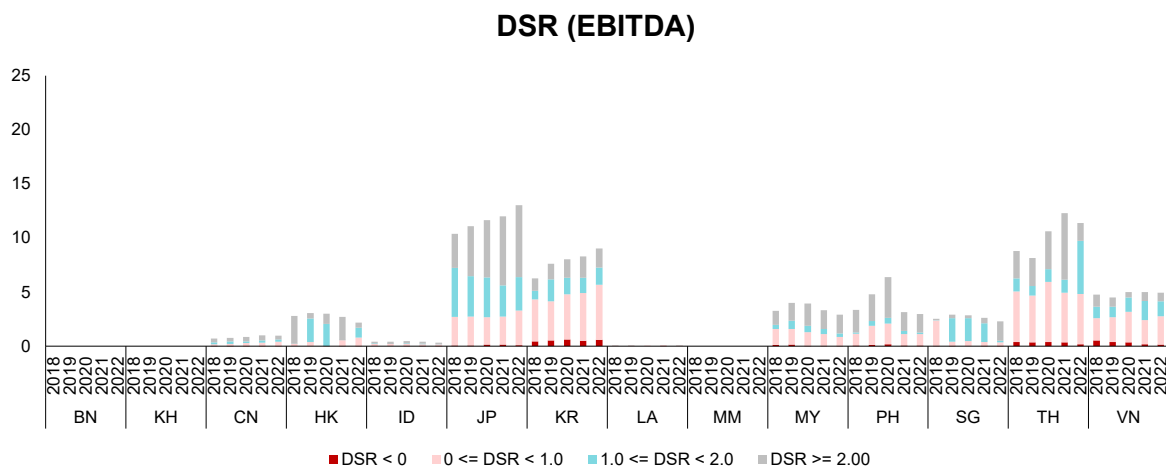
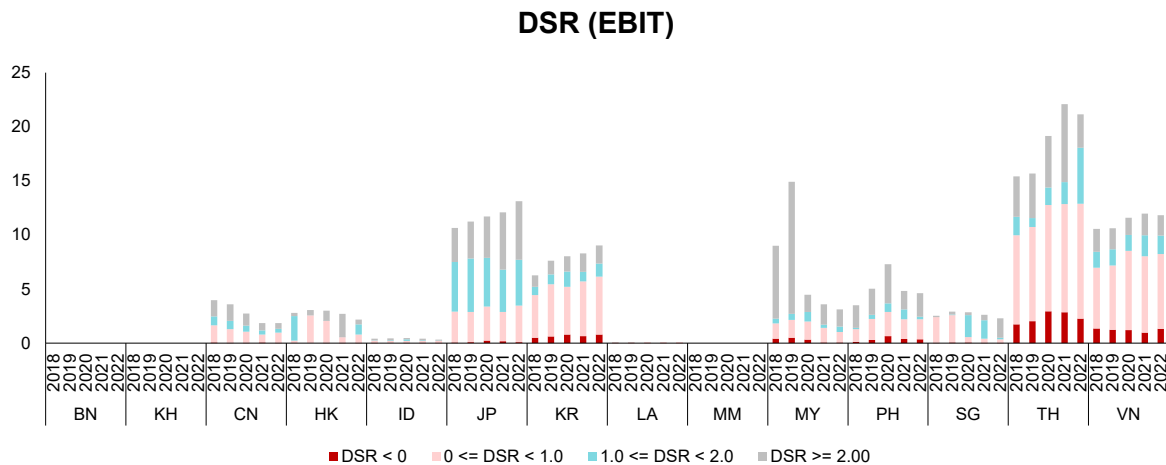
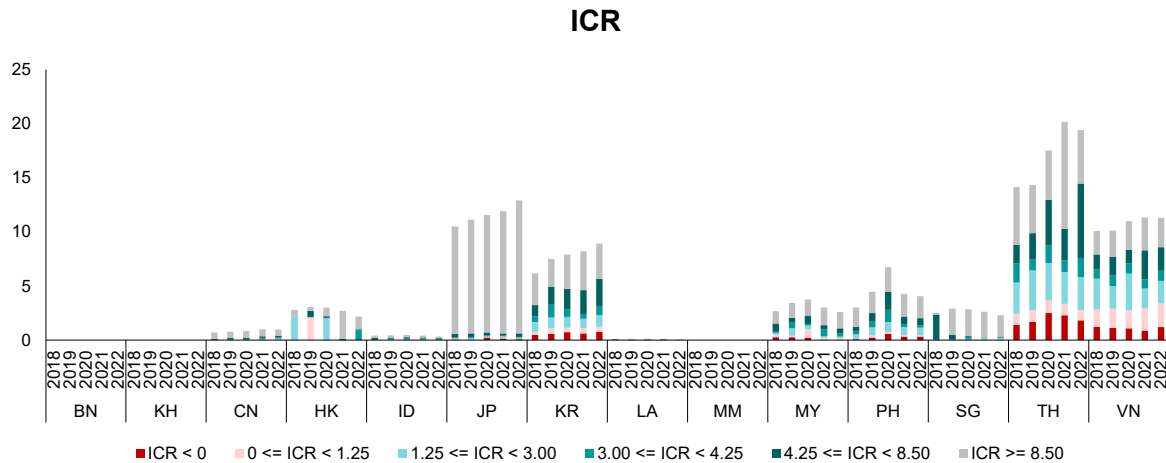


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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

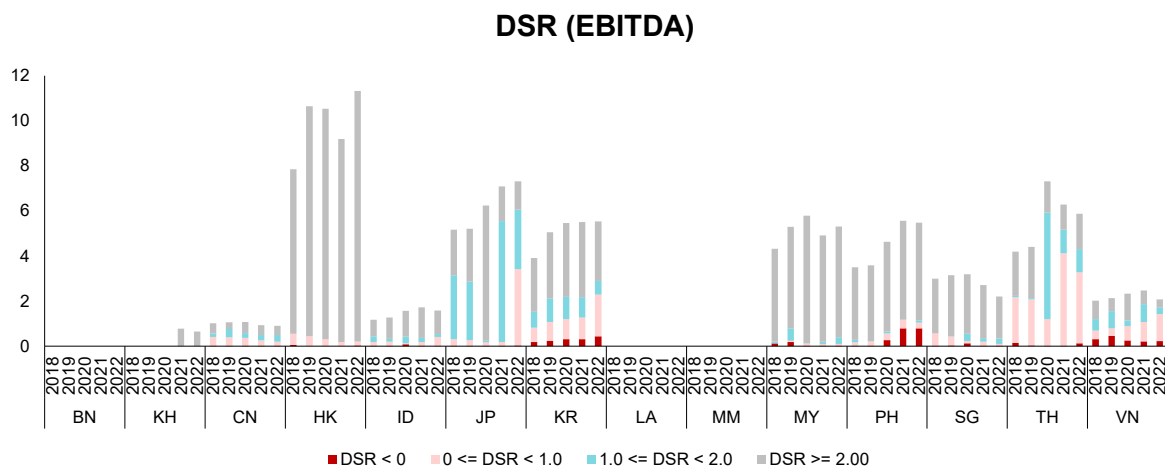
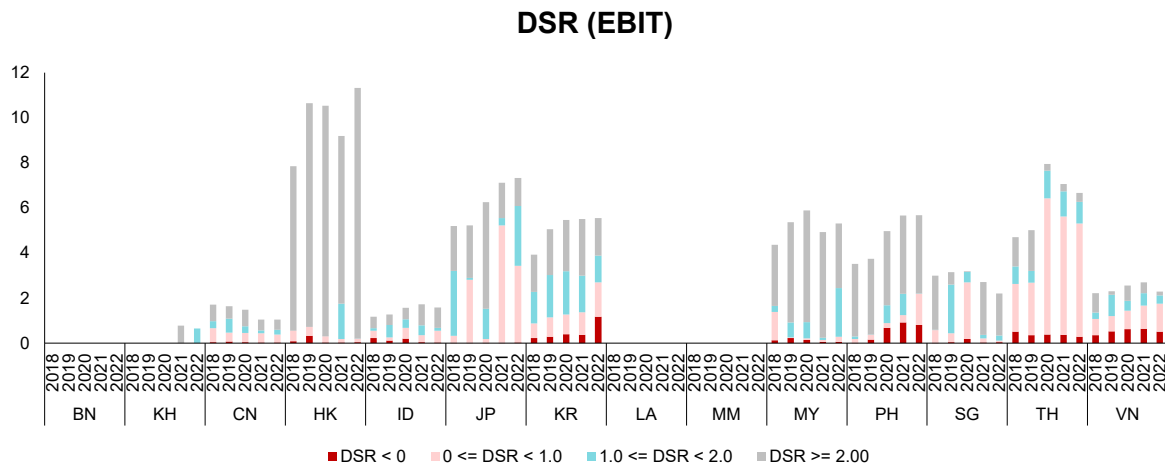
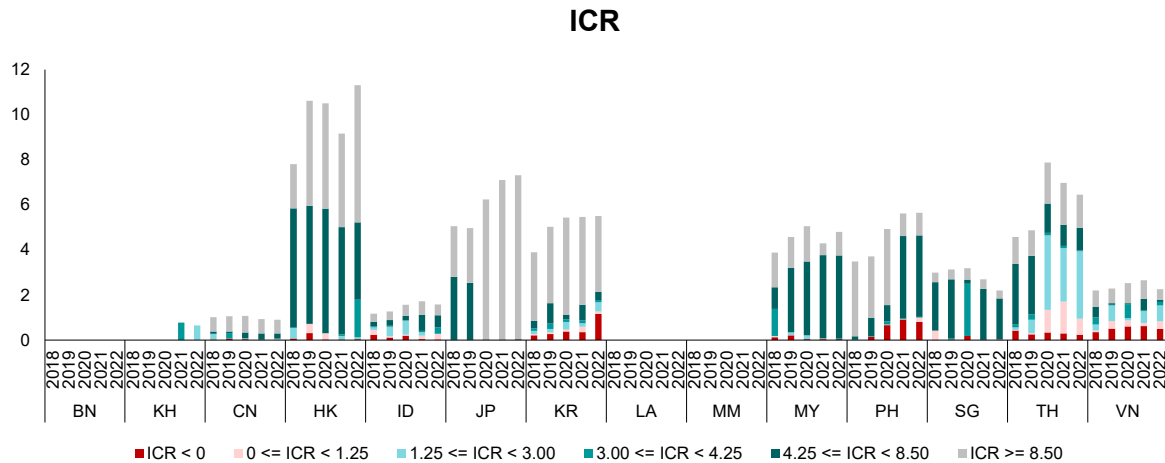


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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



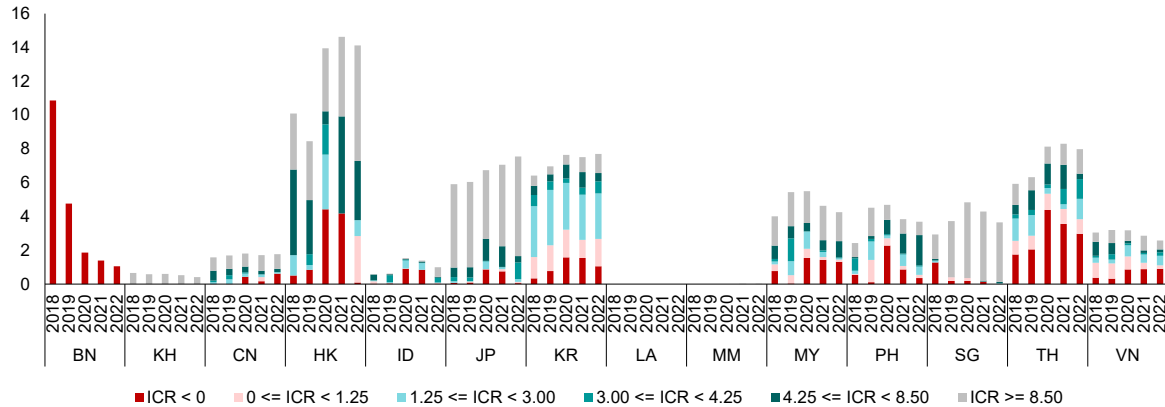
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

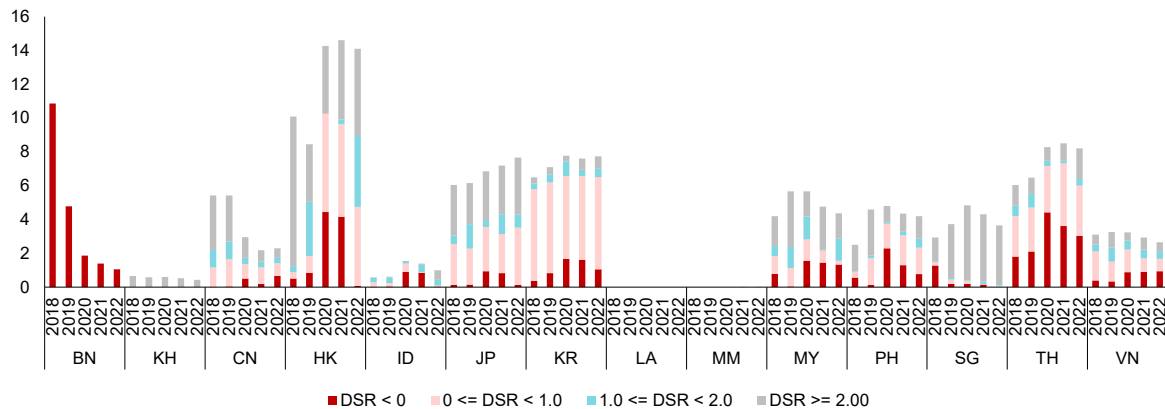
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry,
Taking into Account Highly Liquid Assets, 2018–22
 (Percent of GDP)
 (Continued)

Transport

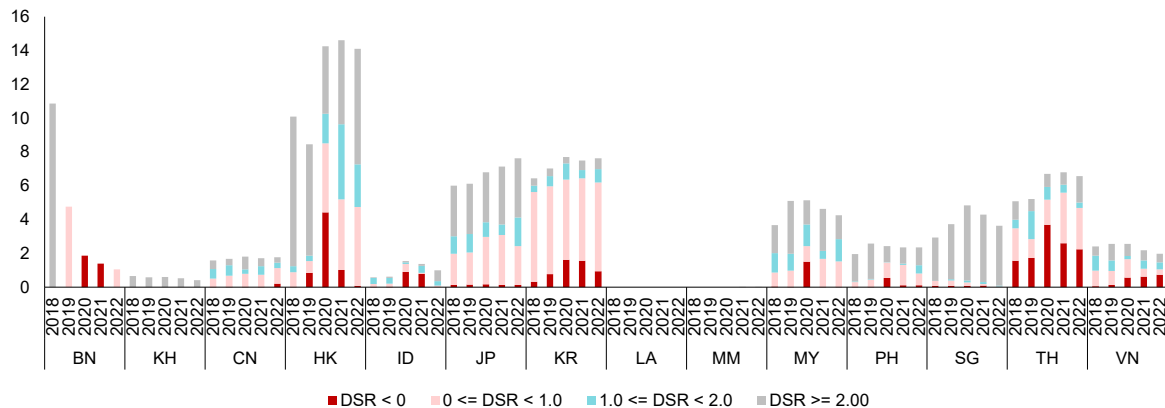
ICR



DSR (EBIT)



DSR (EBITDA)

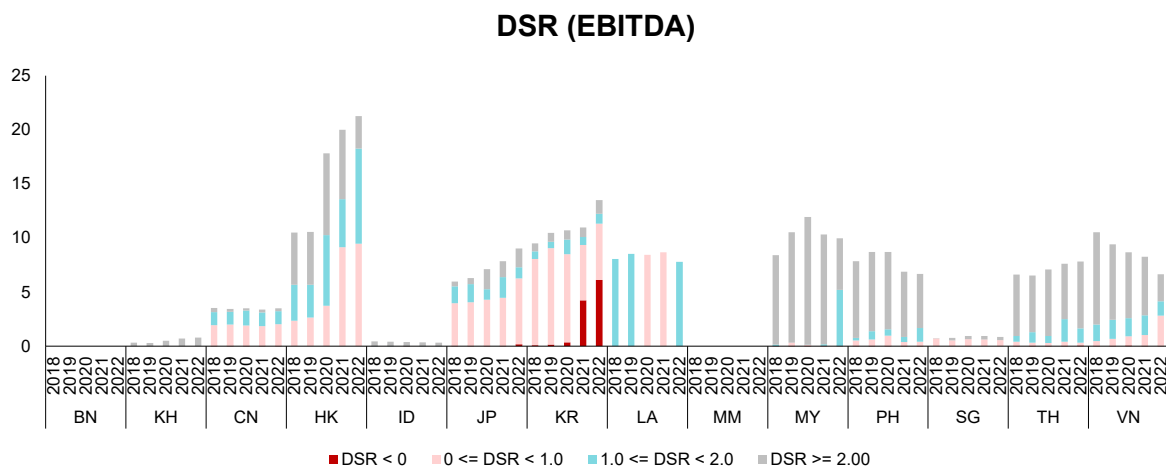
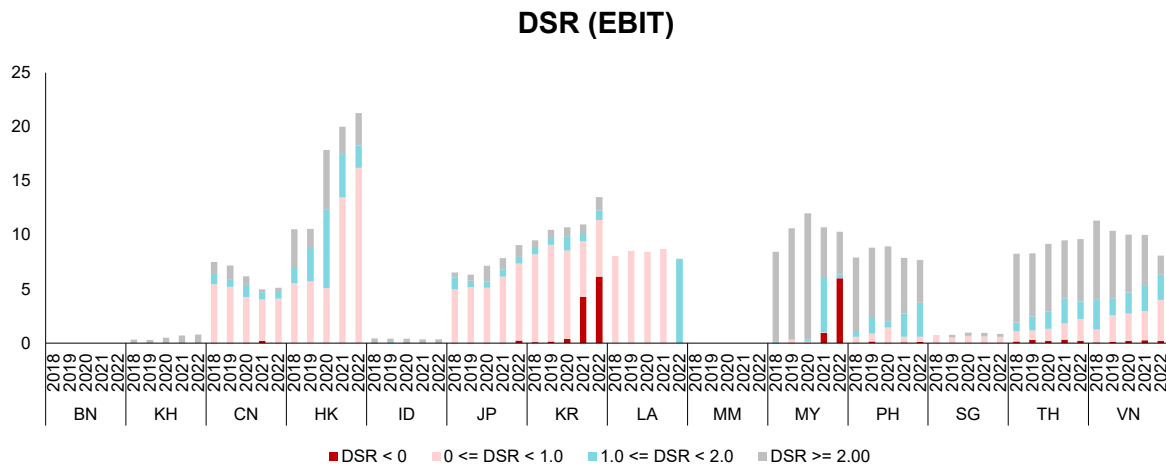
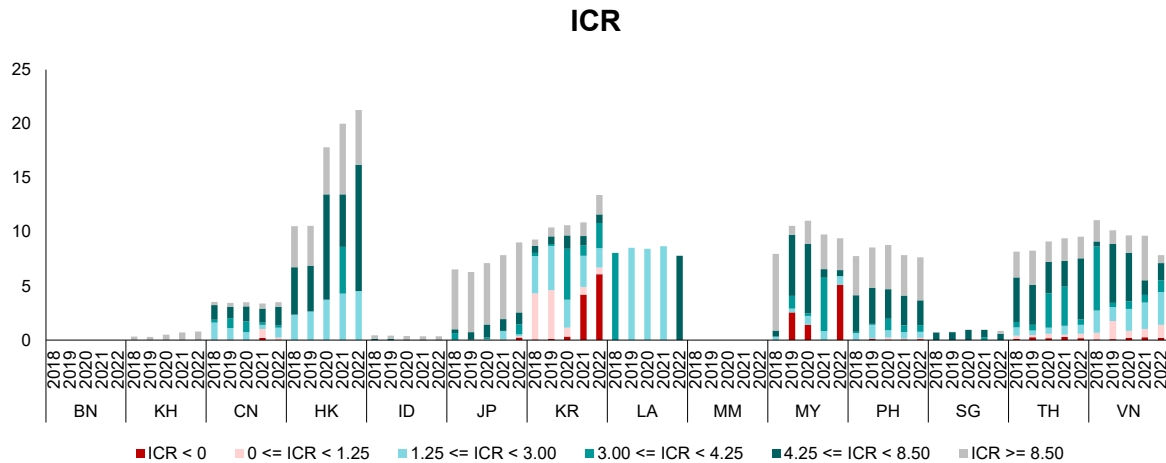


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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



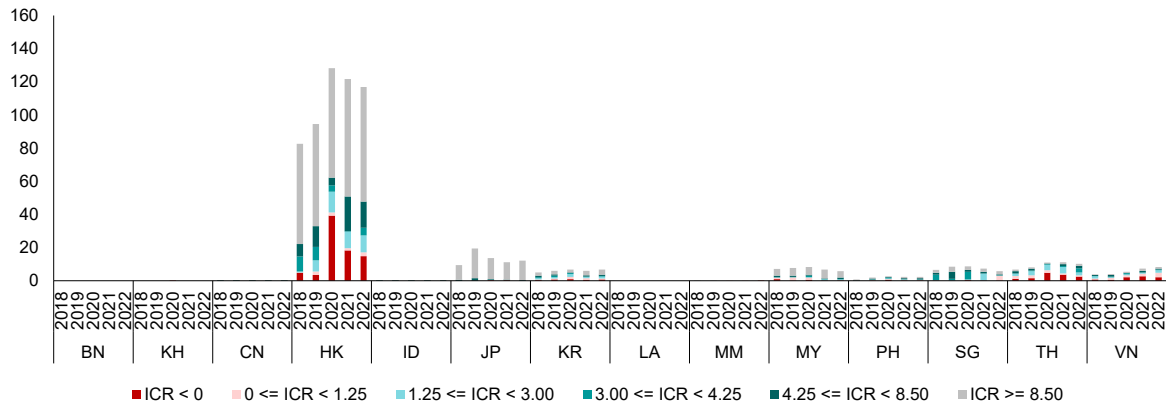
Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

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.

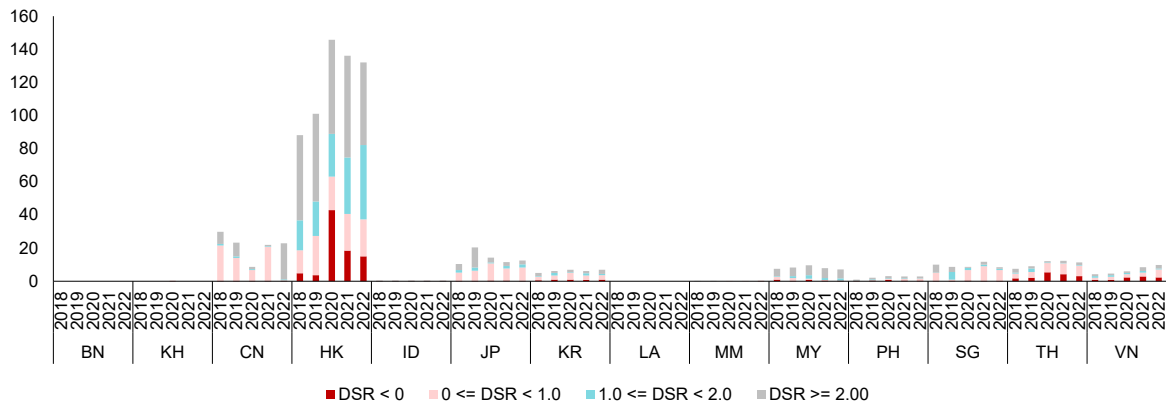
Appendix Figure 8. ASEAN+3: Firm Debt-at-Risk across Economies by Industry,
Taking into Account Highly Liquid Assets, 2018–22
 (Percent of GDP)
 (Continued)

Others

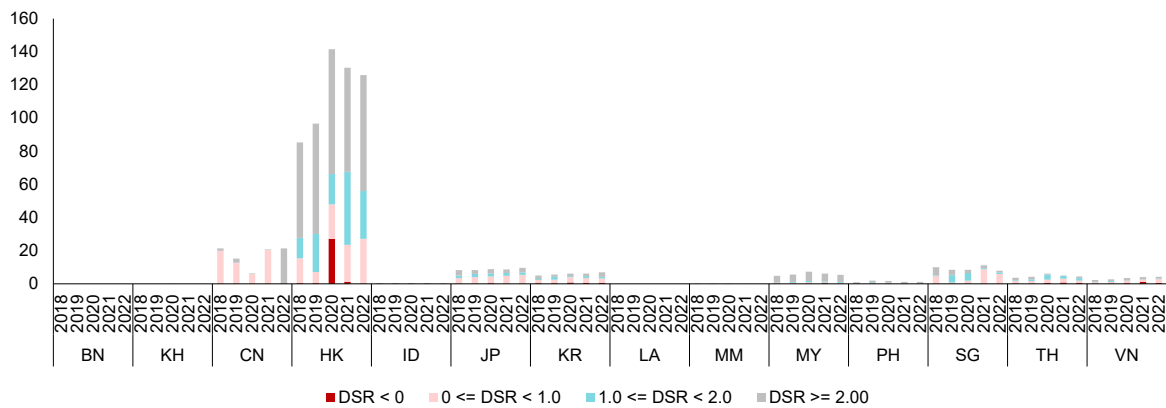
ICR



DSR (EBIT)



DSR (EBITDA)



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

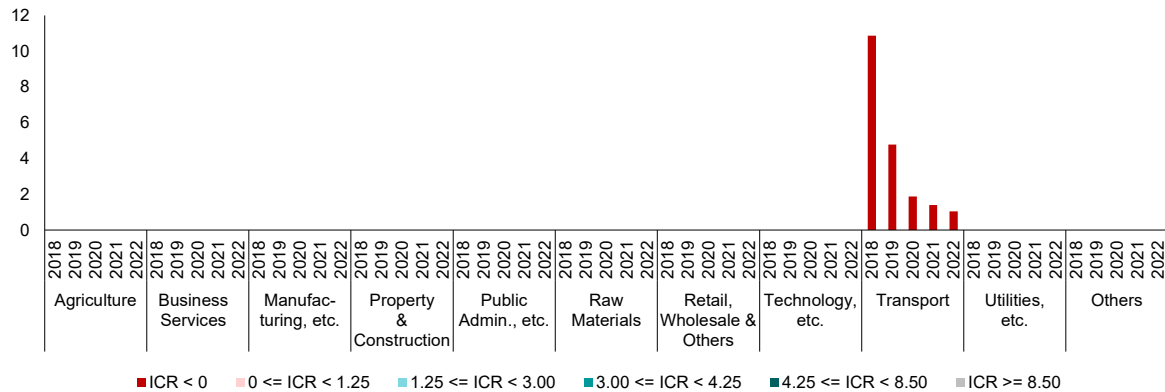
Note: BN = Brunei, KH = Cambodia, CN = China, HK = Hong Kong, ID = Indonesia, JP = Japan, KR = Korea, LA = Lao PDR, MY = Malaysia, MM = Myanmar, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam.

Appendix XI. Firm Debt-at-Risk across Industries for Individual ASEAN+3 Economies, with Liquidity Buffers

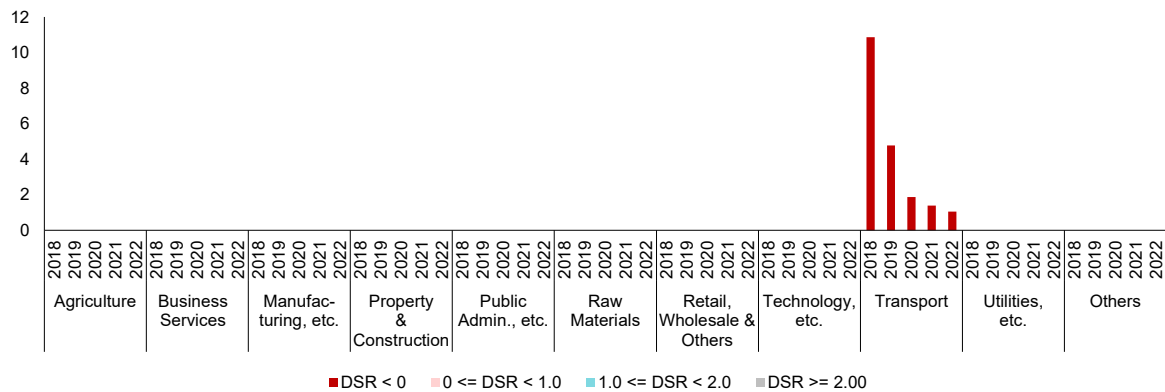
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)

Brunei

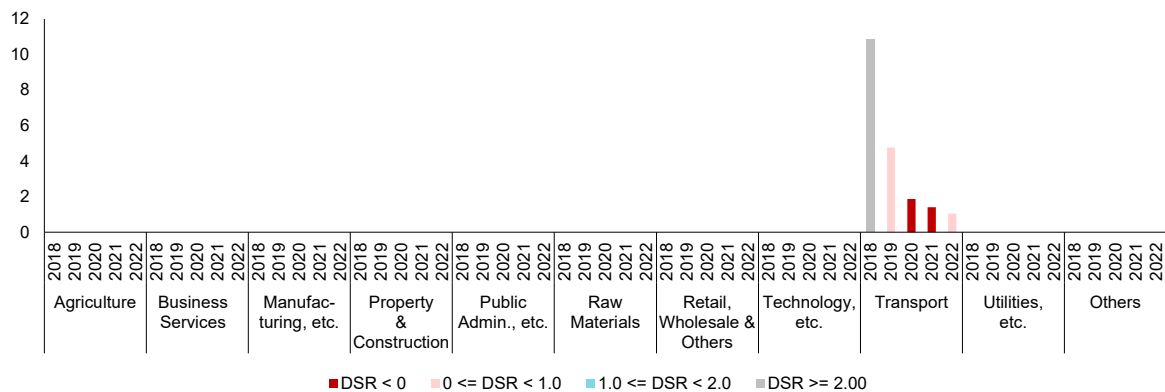
ICR



DSR (EBIT)



DSR (EBITDA)

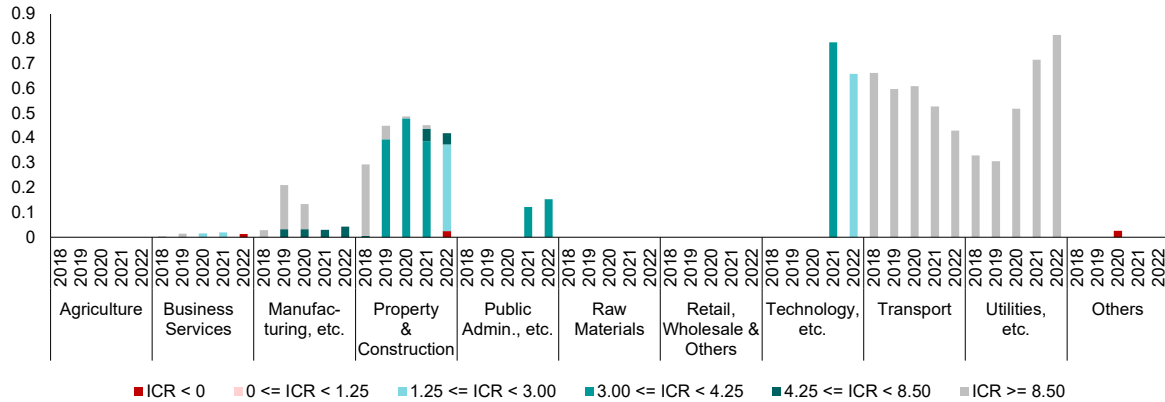


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

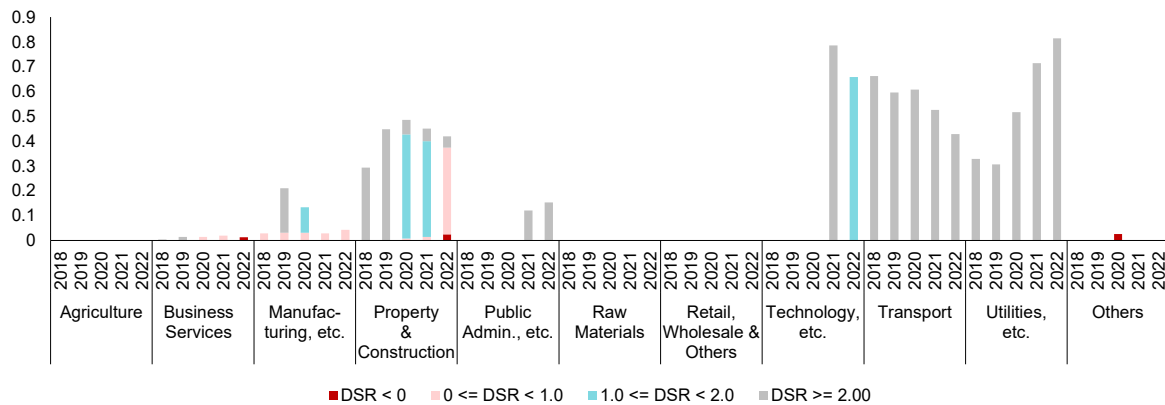
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Cambodia

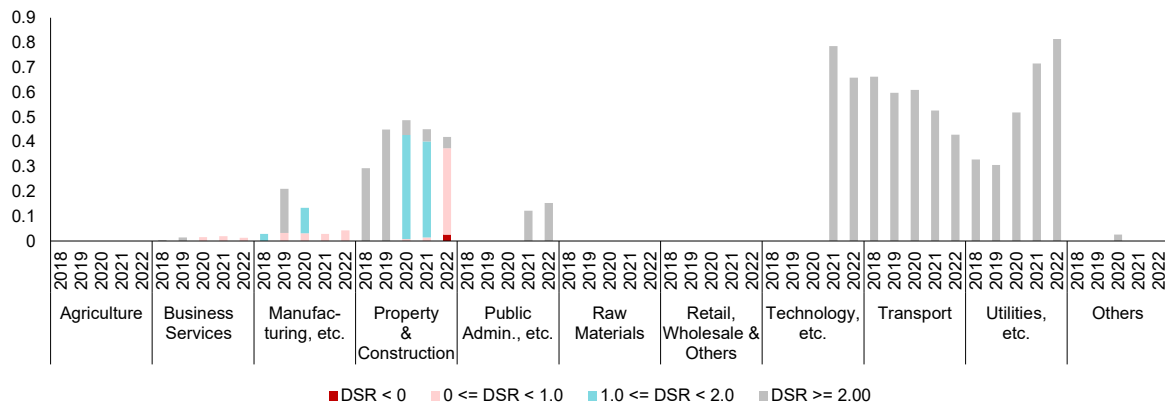
ICR



DSR (EBIT)



DSR (EBITDA)

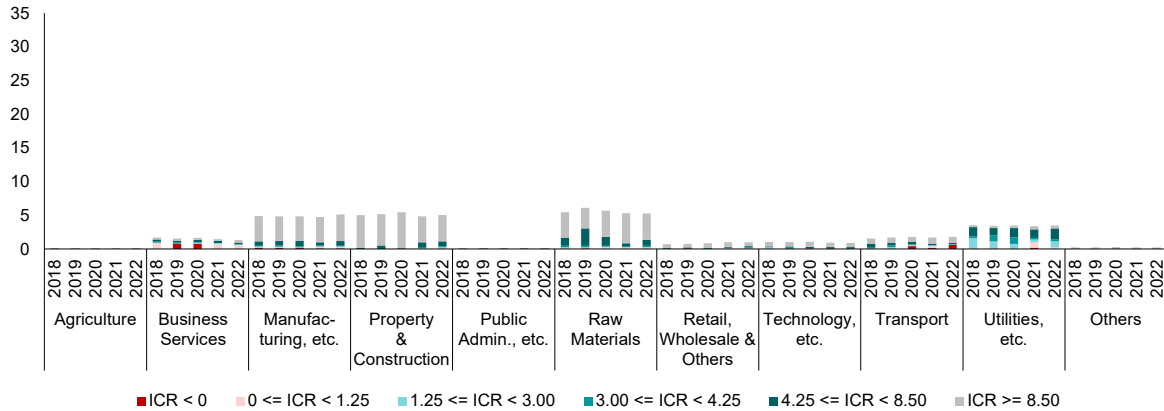


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

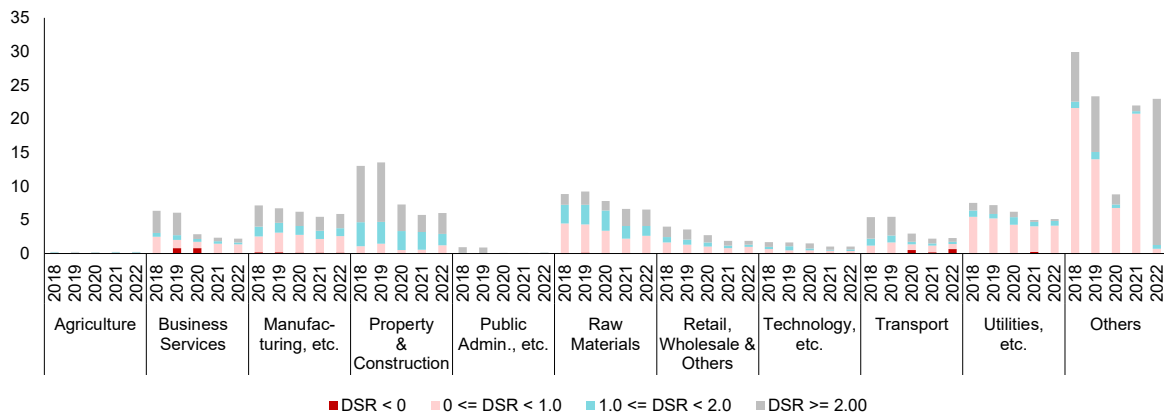
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

China

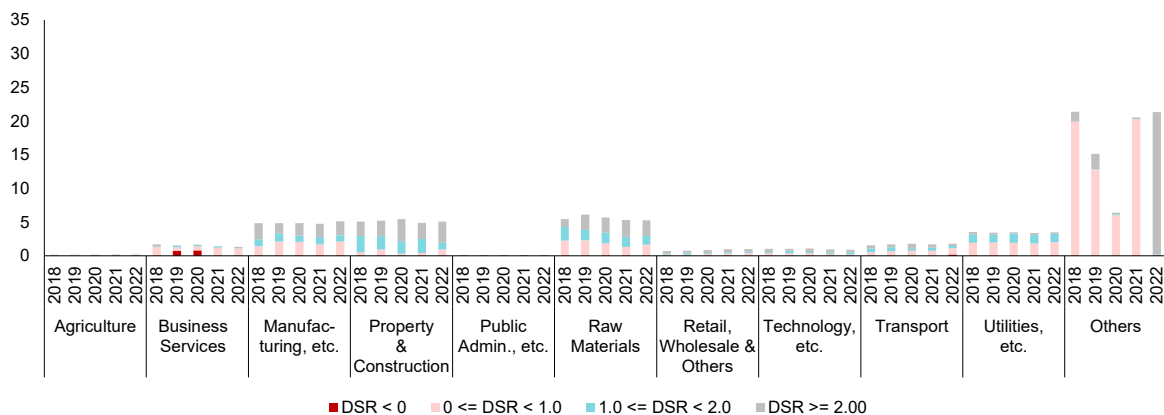
ICR



DSR (EBIT)



DSR (EBITDA)

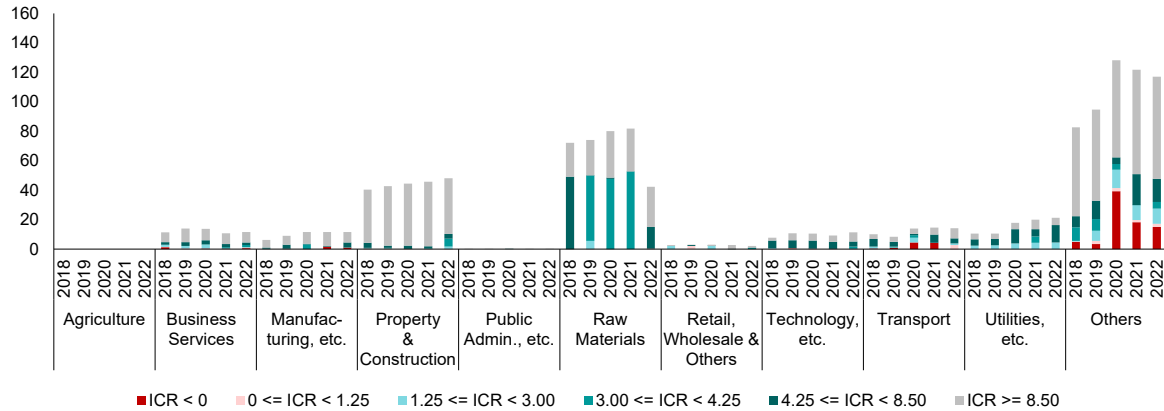


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

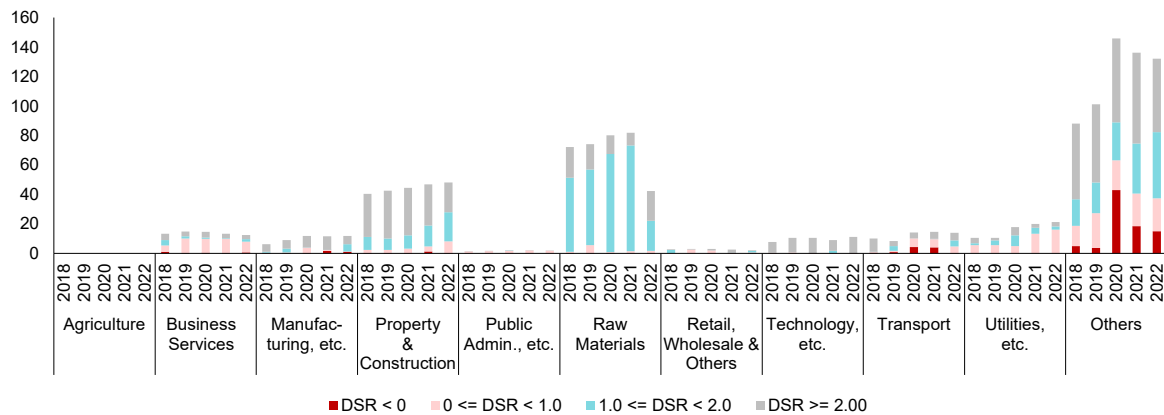
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Hong Kong

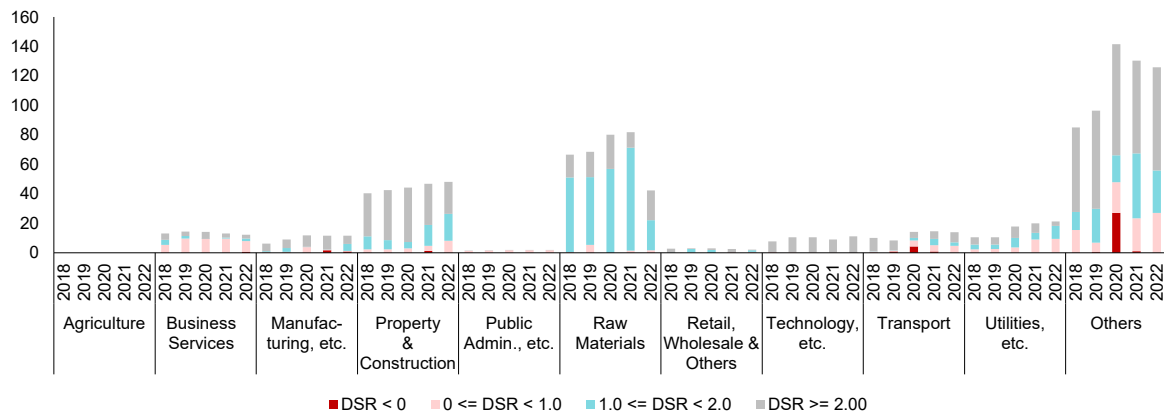
ICR



DSR (EBIT)



DSR (EBITDA)

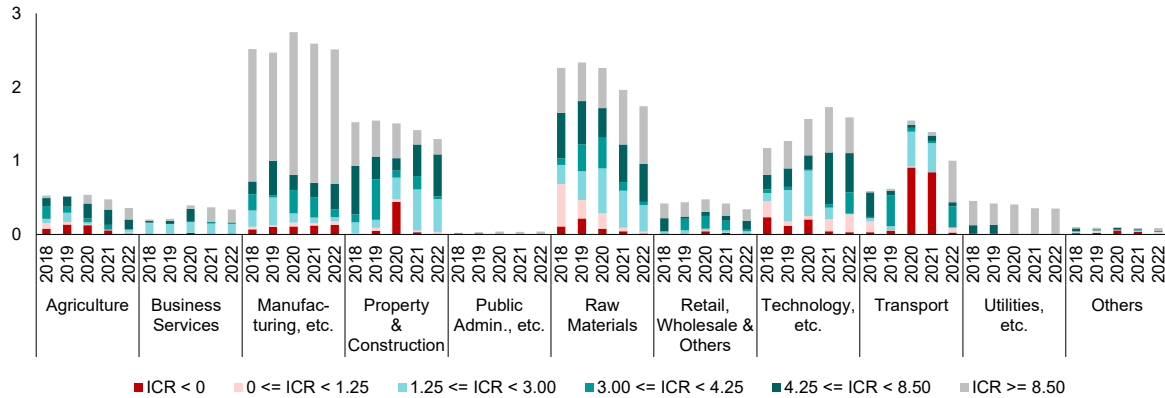


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates

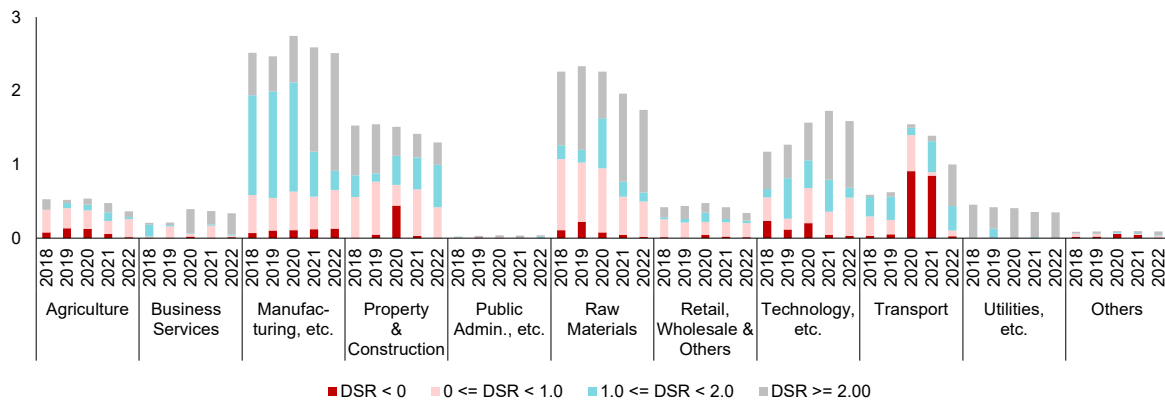
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Indonesia

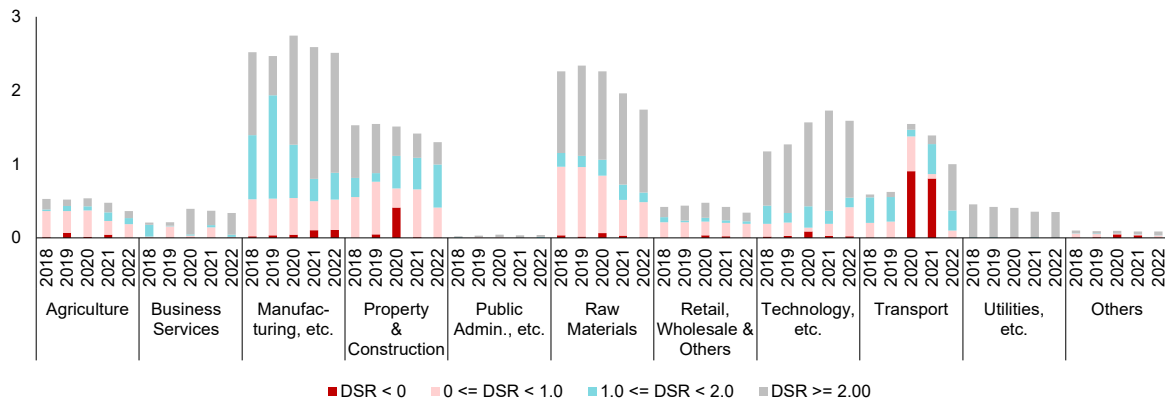
ICR



DSR (EBIT)



DSR (EBITDA)

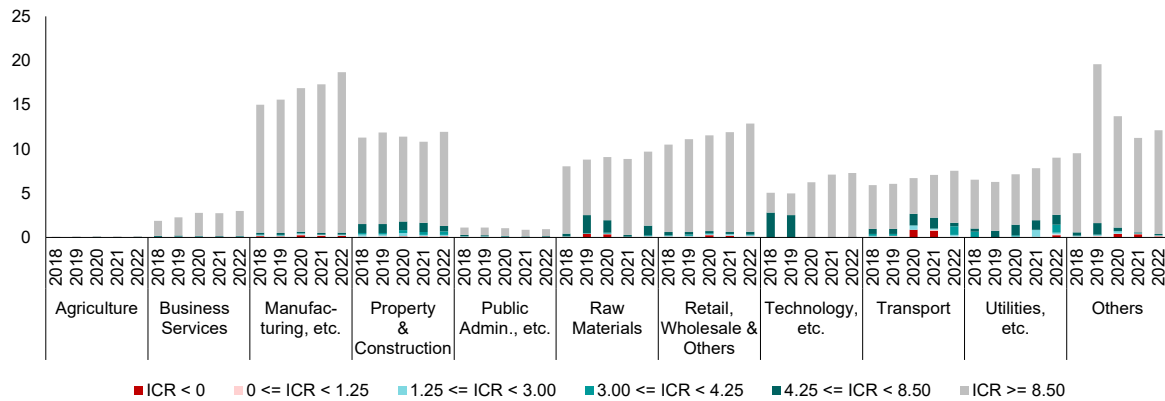


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

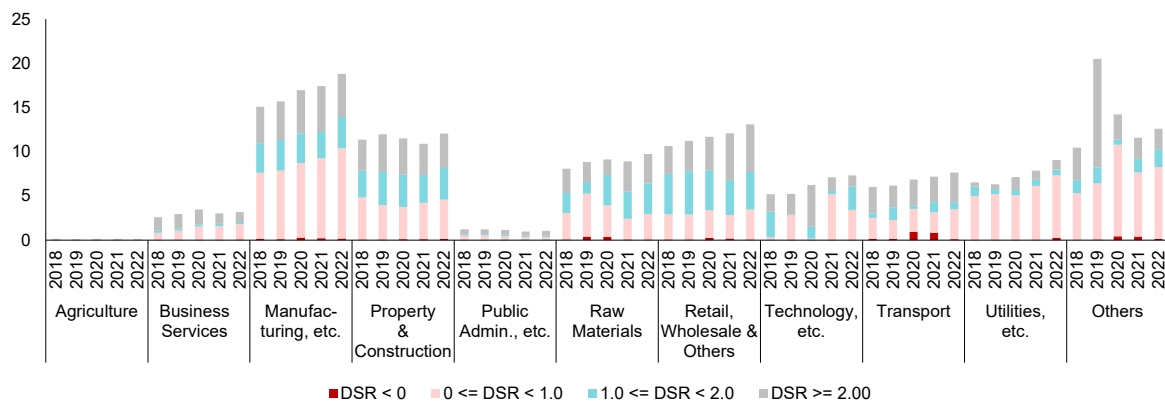
**Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Japan

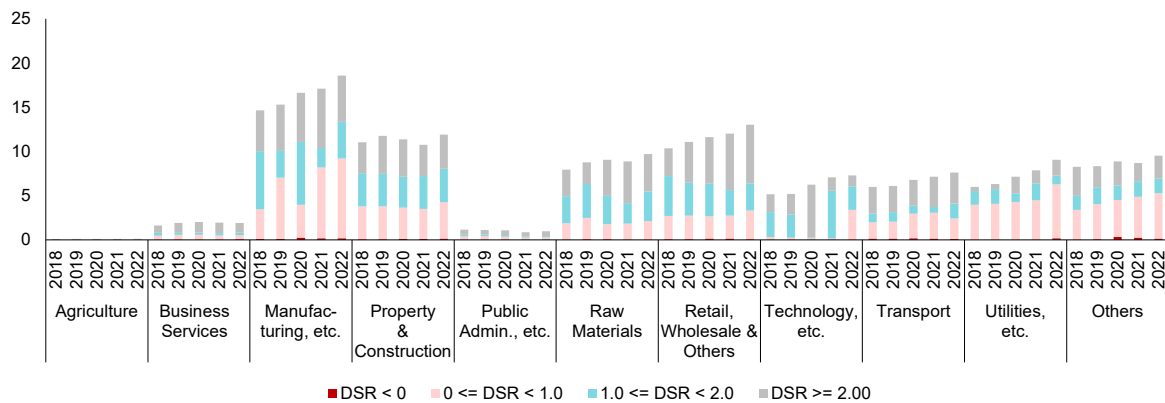
ICR



DSR (EBIT)



DSR (EBITDA)

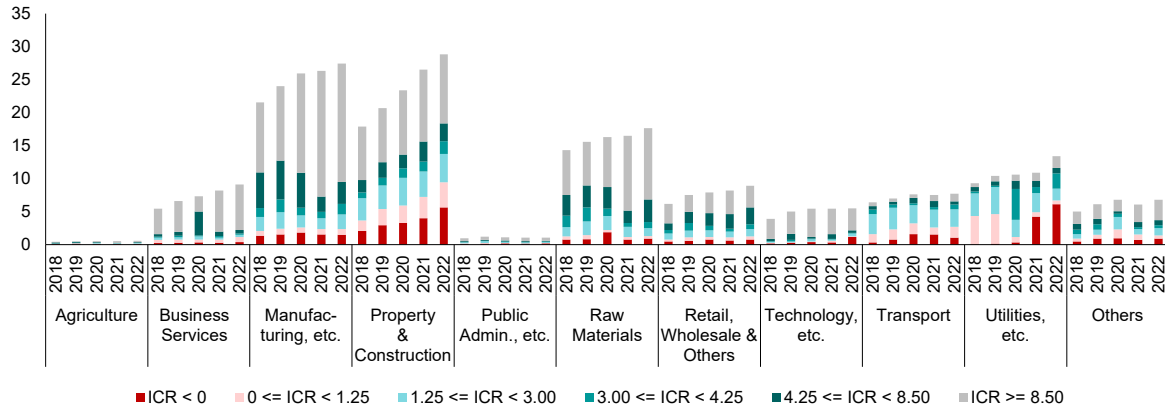


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

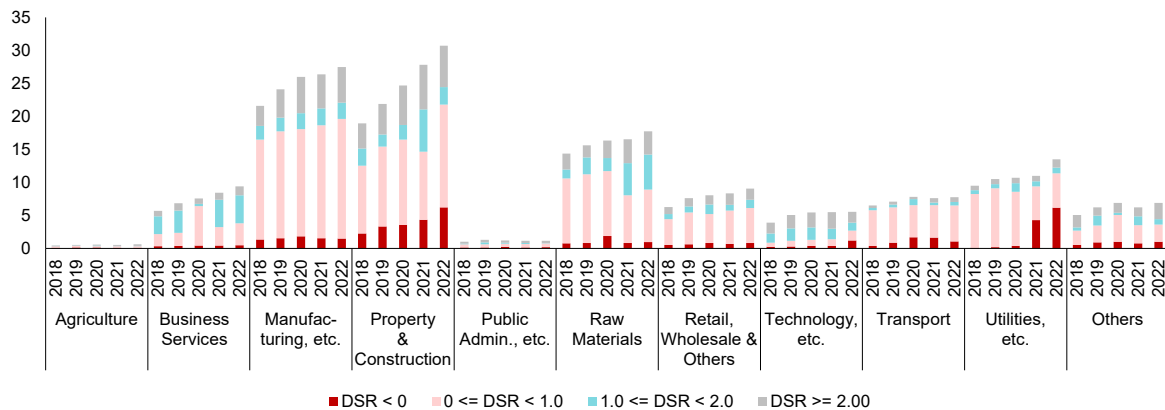
**Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Korea

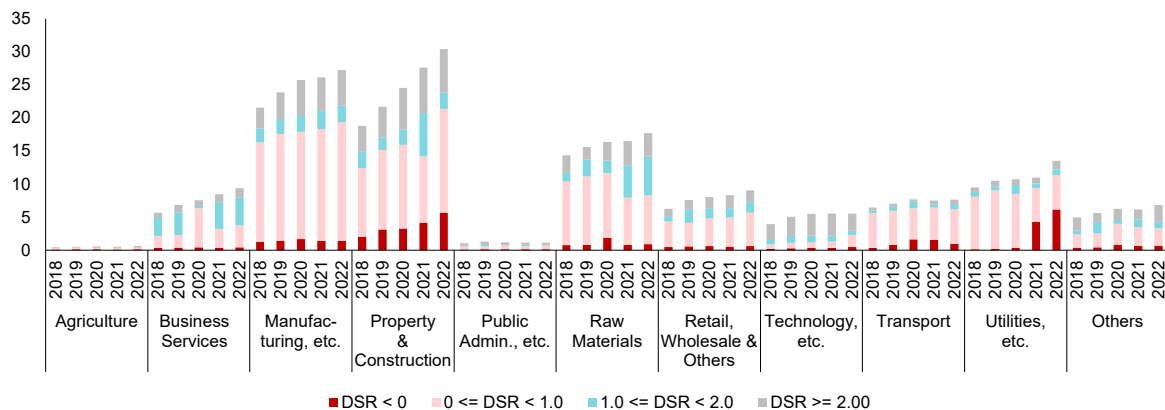
ICR



DSR (EBIT)



DSR (EBITDA)

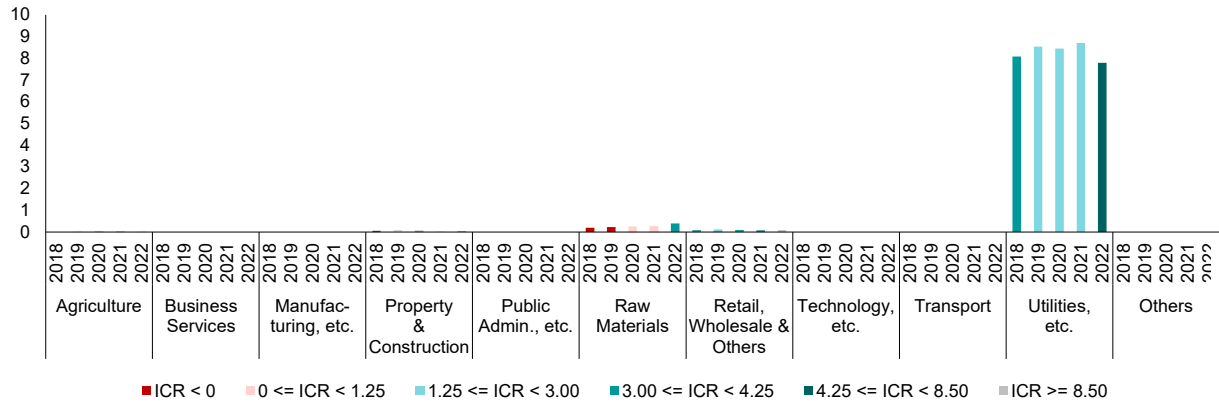


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

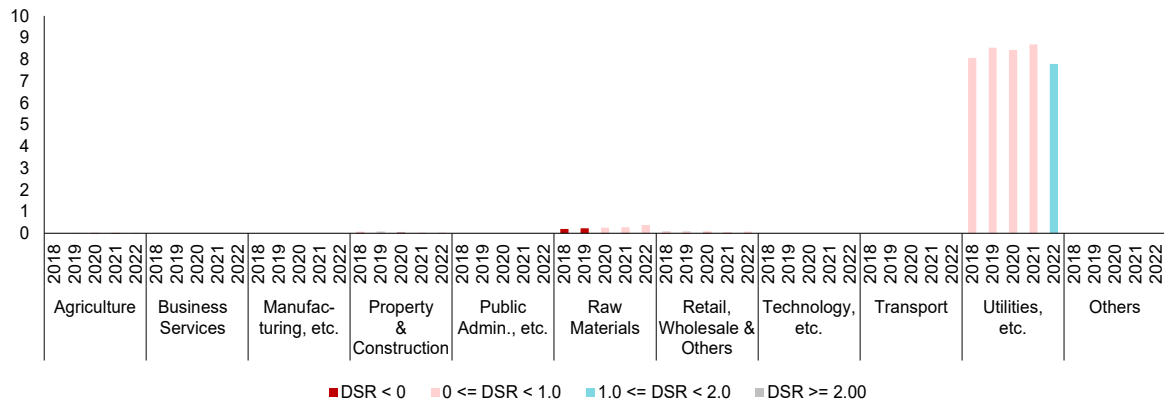
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy,
Taking into Account Highly Liquid Assets, 2018–22
 (Percent of GDP)
 (Continued)

Lao PDR

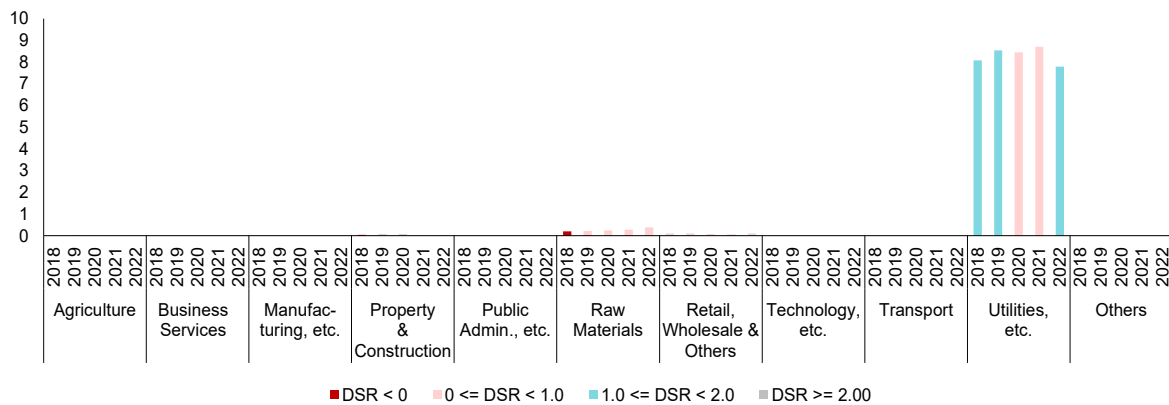
ICR



DSR (EBIT)



DSR (EBITDA)

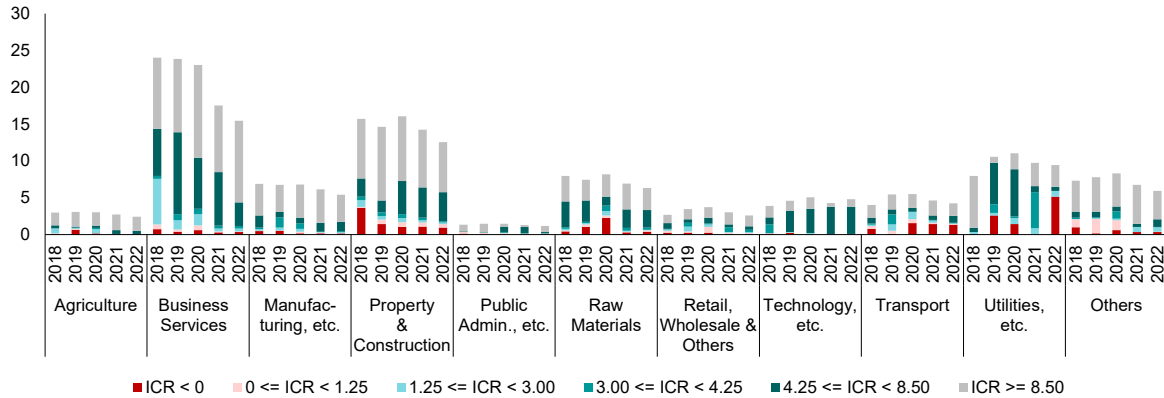


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

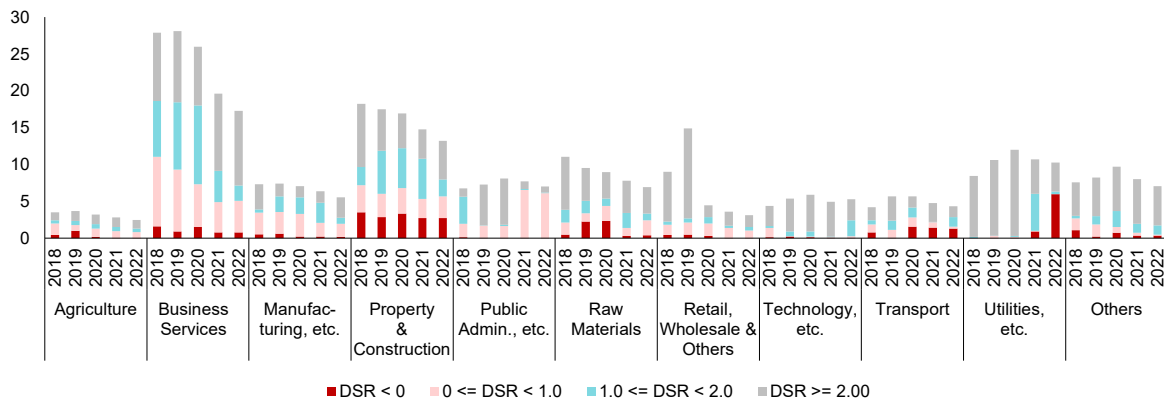
**Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Malaysia

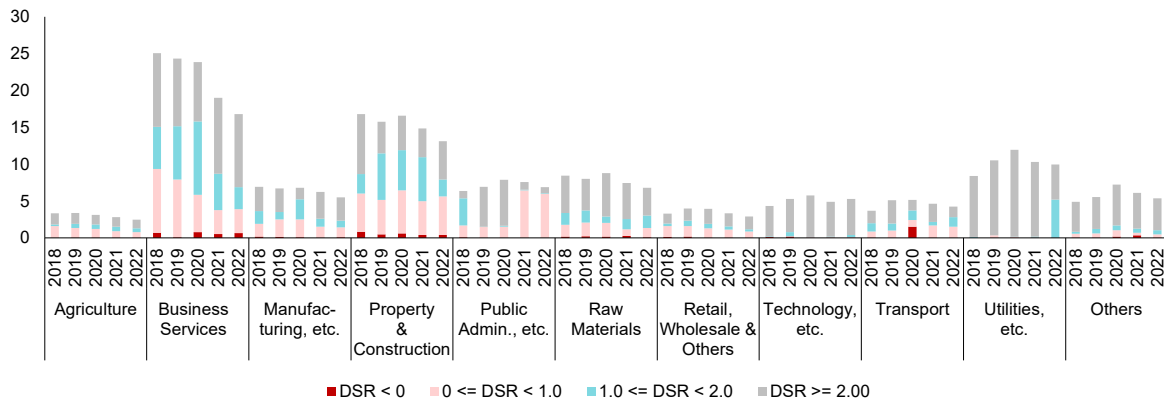
ICR



DSR (EBIT)



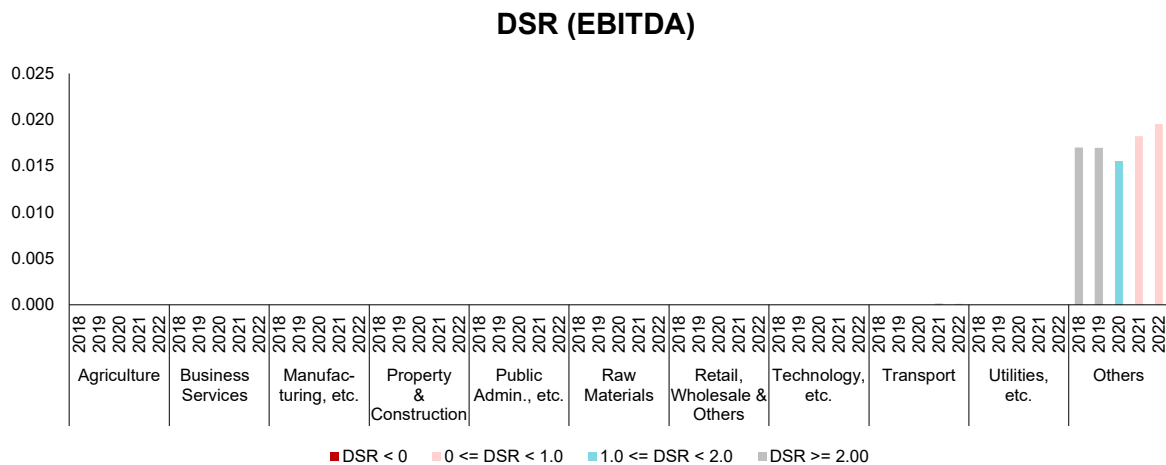
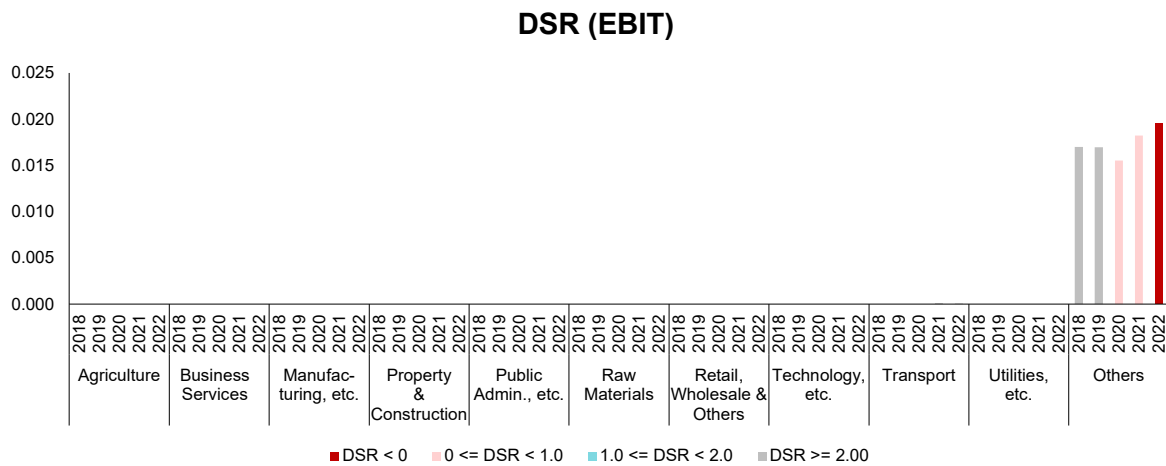
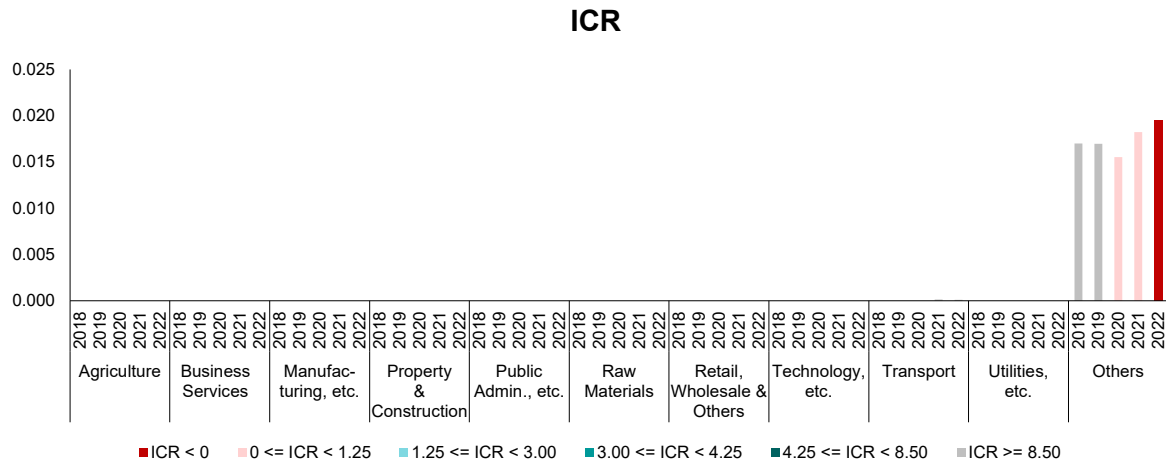
DSR (EBITDA)



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

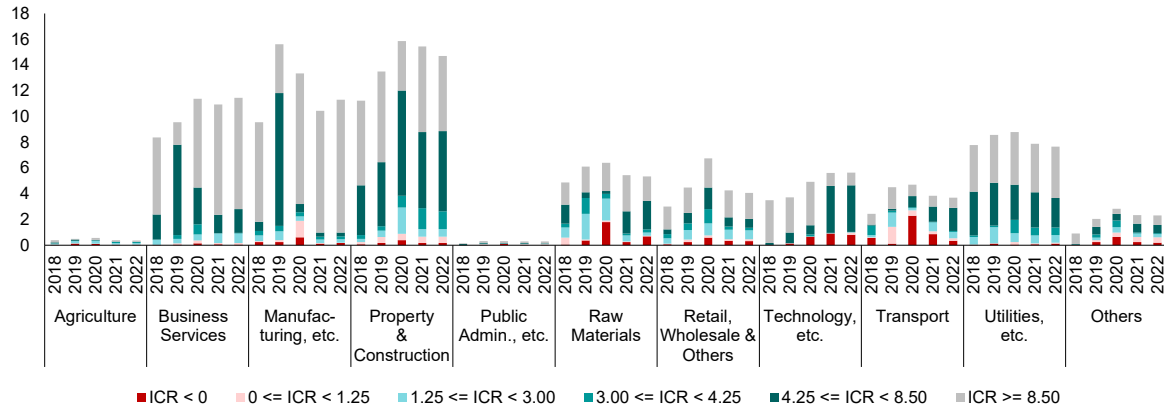


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

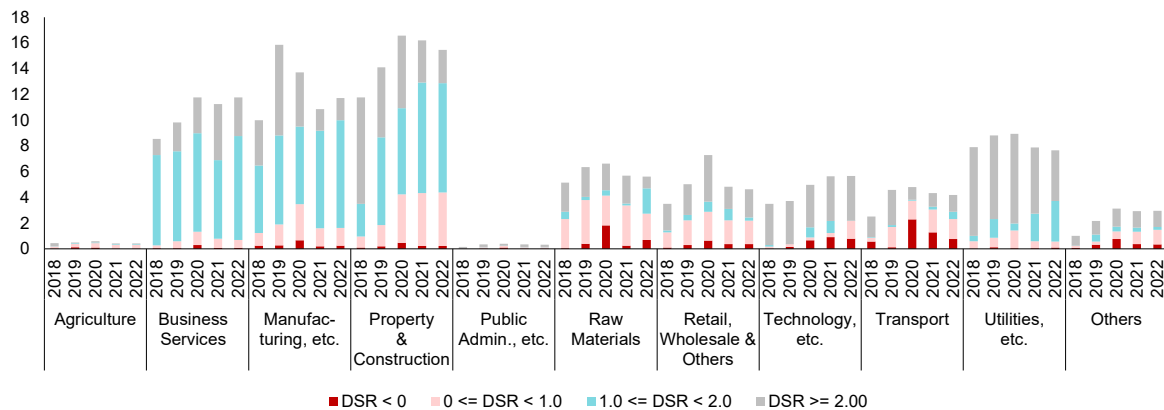
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Philippines

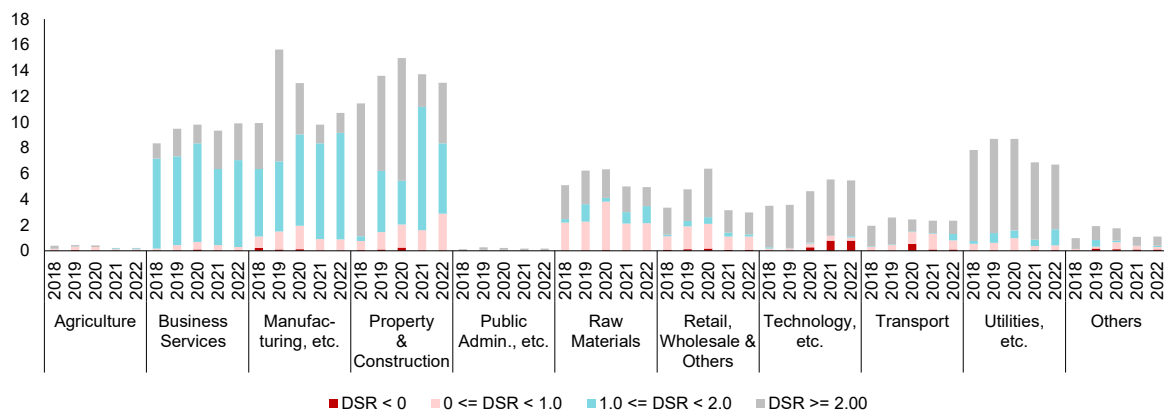
ICR



DSR (EBIT)



DSR (EBITDA)

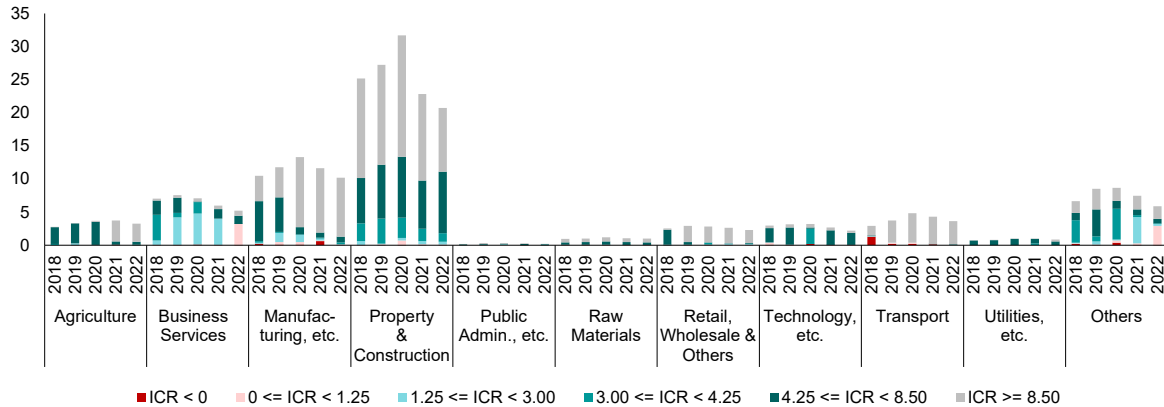


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

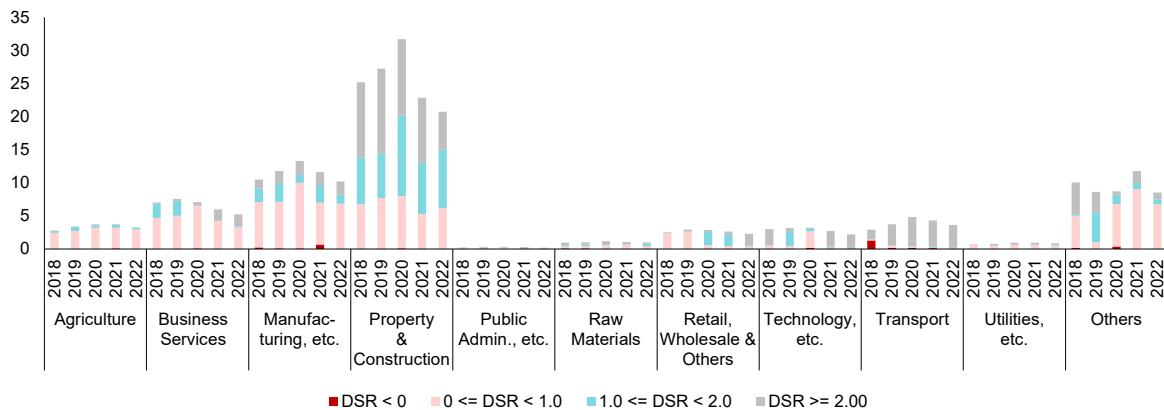
**Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy,
Taking into Account Highly Liquid Assets, 2018–22**
(Percent of GDP)
(Continued)

Singapore

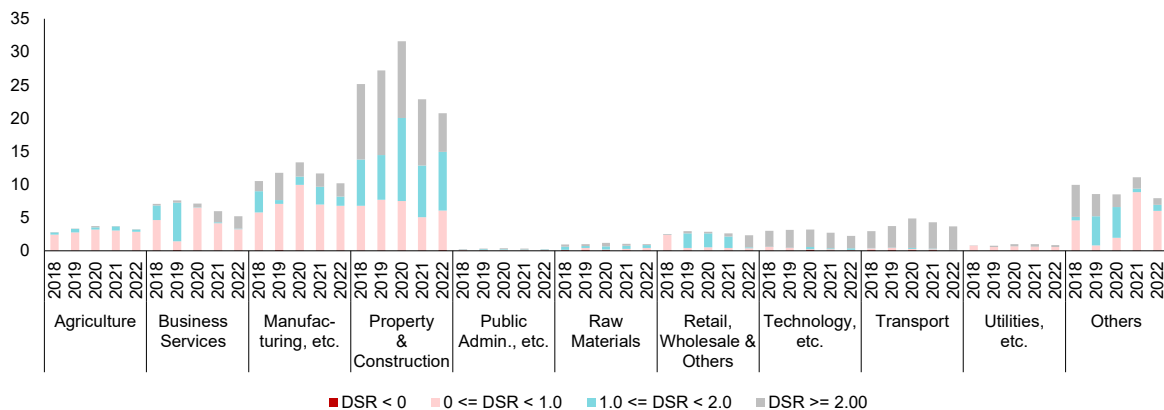
ICR



DSR (EBIT)



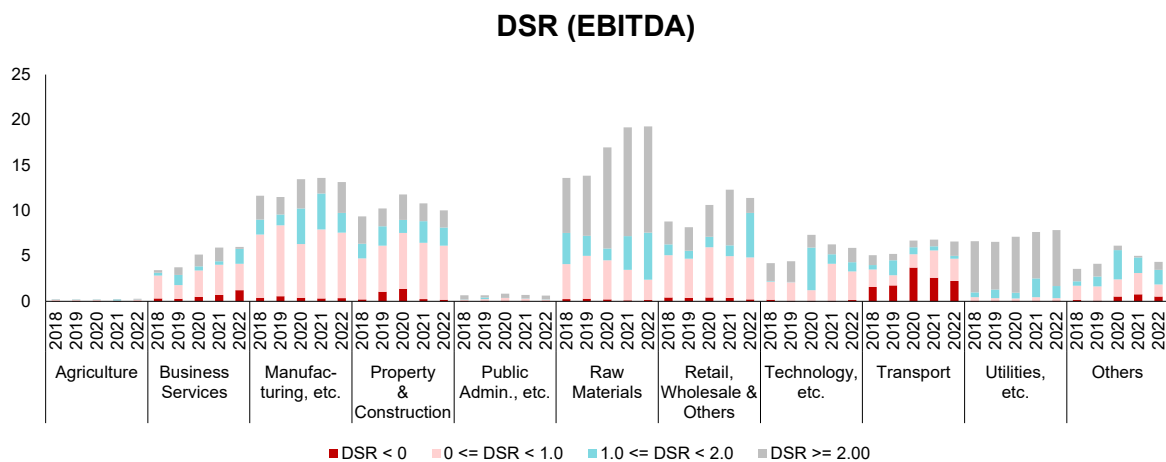
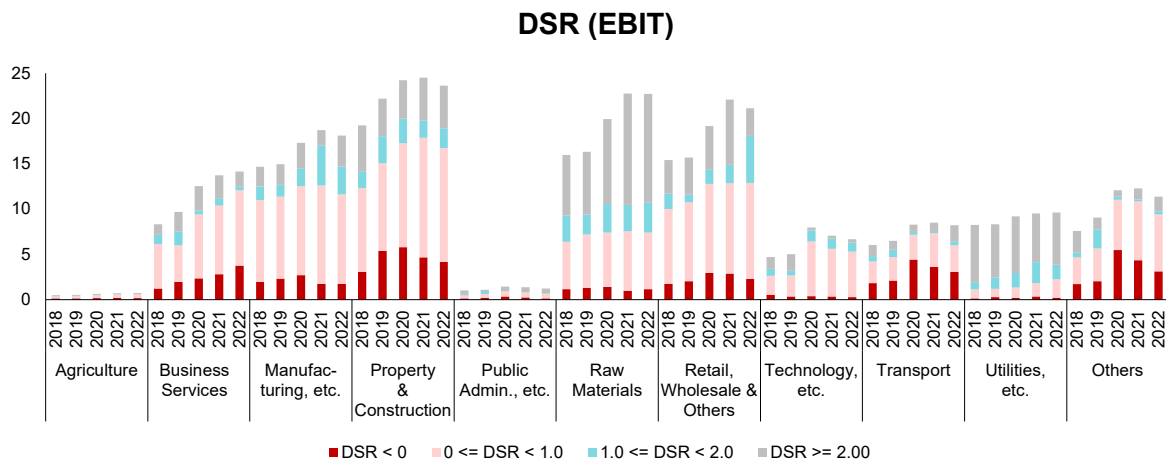
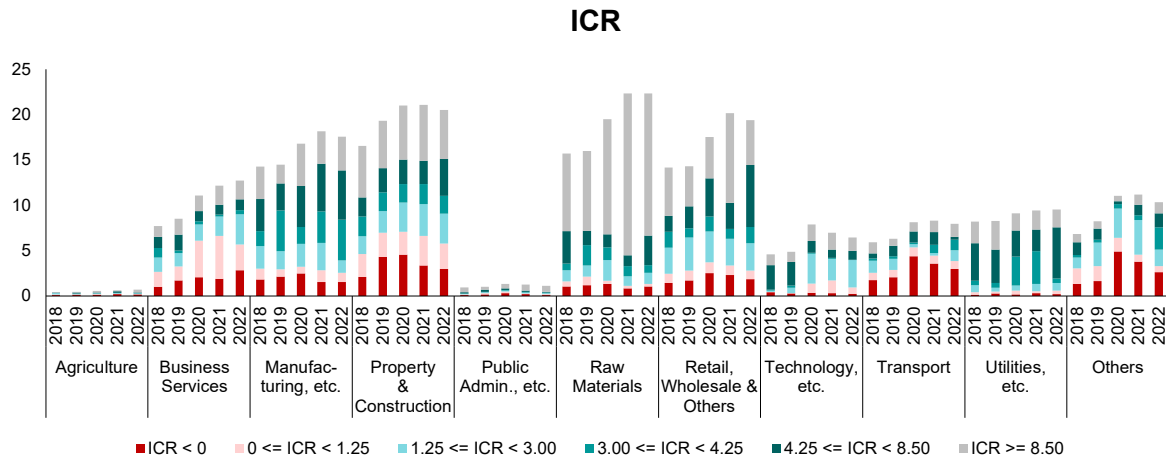
DSR (EBITDA)



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

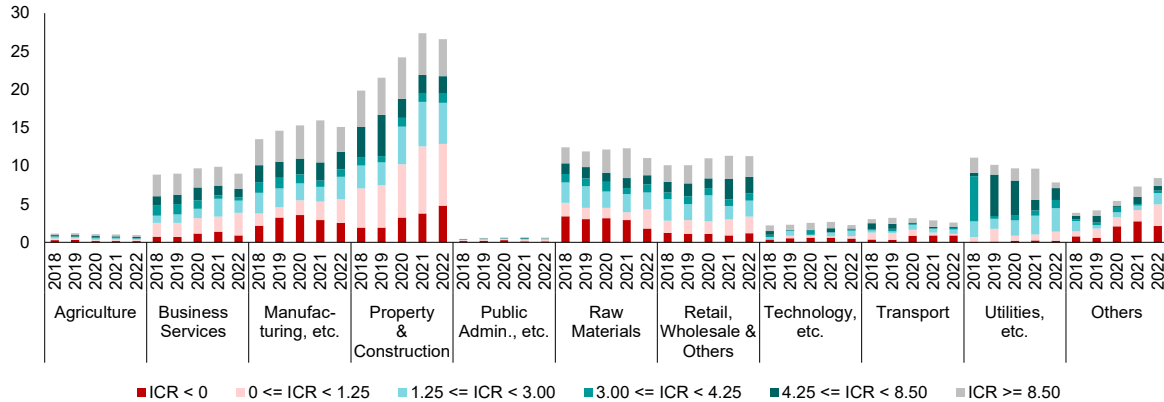


Sources: Orbis; national authorities via Haver Analytics; and AMRO staff estimates.

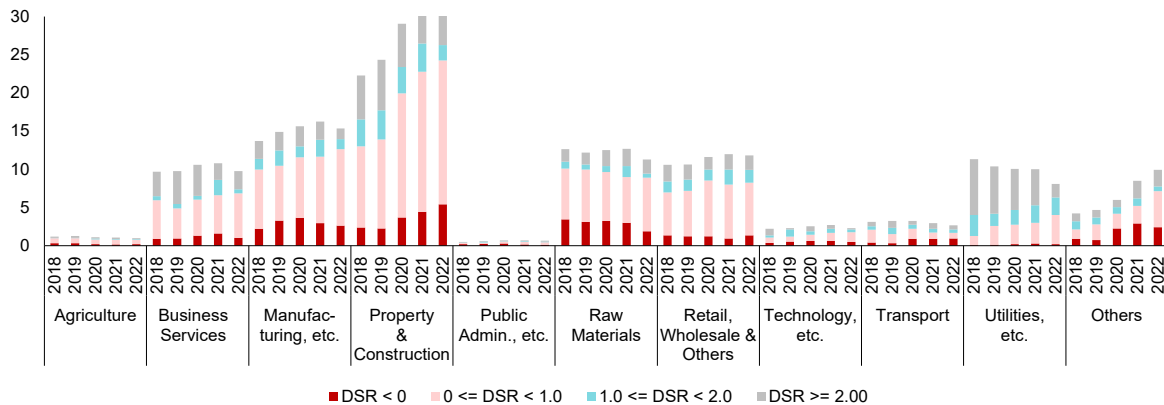
Appendix Figure 9. ASEAN+3: Firm Debt-at-Risk across Industries by Economy, Taking into Account Highly Liquid Assets, 2018–22
(Percent of GDP)
(Continued)

Vietnam

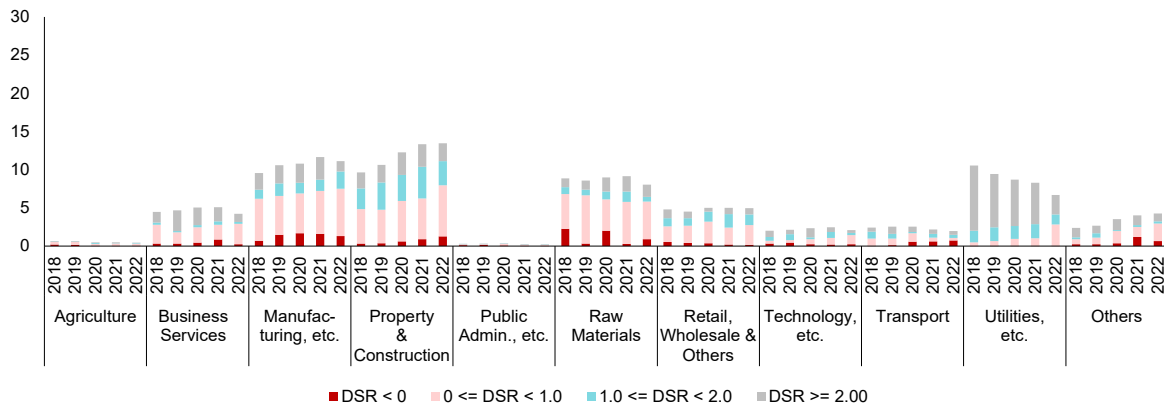
ICR



DSR (EBIT)



DSR (EBITDA)



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

References

- ASEAN+3 Macroeconomic Research Office (AMRO). 2024. "ASEAN+3 Corporate and MSME Debt-at-Risk in a High Interest Rate Environment: From Pandemic to Pandemonium?" AMRO Policy Position Paper 23–01, Singapore. Forthcoming.
- . 2023a. *ASEAN+3 Regional Economic Outlook: On the Road to Net Zero*. Singapore, April.
<https://amro-asia.org/asean3-regional-economic-outlook-areo-2023/>.
- . 2023b. "Quarterly Update of the ASEAN+3 Regional Economic Outlook—October 2023." Singapore, October.
<https://amro-asia.org/quarterly-update-of-the-asean3-regional-economic-outlook-areo-october-2023/>.
- Barajas, Adolfo, Woon Gyu Choi, Ken Zhi Gan, Pierre Guérin, Samuel Mann, Manchun Wang, and Yizhi Xu. 2021. "Loose Financial Conditions, Rising Leverage, and Risks to Macro-Financial Stability." IMF Working Paper 21/222, International Monetary Fund, Washington, DC.
<https://www.imf.org/en/Publications/WP/Issues/2021/08/20/Loose-Financial-Conditions-Rising-Leverage-and-Risks-to-Macro-Financial-Stability-464336>.
- Borio, Claudio, and Mathias Drehmann. 2009. "Assessing the Risk of Banking Crises—Revisited." BIS Quarterly Review, Bank for International Settlements, Basel, March.
https://www.bis.org/publ/qtrpdf/r_qt0903e.htm.
- Choo, Edmond Chiang Yong, and Anne Oeking. 2021. "Helping Asian Workforce Emerge Stronger from the Pandemic." AMRO Blog, ASEAN+3 Macroeconomic Research Office, Singapore.
<https://amro-asia.org/helping-asian-workforce-emerge-stronger-from-the-pandemic/>.
- Damodaran, Aswath. 2016. "Podcast Valsession7." Stern School of Business, New York University, New York.
https://pages.stern.nyu.edu/~adamodar/New_Home_Page/valquestions/syntrating.htm.
- Drehmann, Mathias, Claudio Borio, Leonardo Gambacorta, Gabriel Jiménez, and Carlos Trucharte. 2010. "Countercyclical Capital Buffers: Exploring Options." BIS Working Paper No. 317, Bank for International Settlements, Basel.
<https://www.bis.org/publ/work317.htm>.
- , ———, and Kostas Tsatsaronis. 2012. "Characterising the Financial Cycle: Don't Lose Sight of the Medium Term!" BIS Working Paper No. 380, Bank for International Settlements, Basel.
<https://www.bis.org/publ/work380.htm>.
- , and Kostas Tsatsaronis. 2014. "The Credit-to-GDP Gap and Countercyclical Capital Buffers: Questions and Answers." *BIS Quarterly Review*, Bank for International Settlements, Basel, March.
https://www.bis.org/publ/qtrpdf/r_qt1403g.htm.

- , and James Yetman. 2021. "Which Credit Gap is Better at Predicting Financial Crises? A Comparison of Univariate Filters." *International Journal of Central Banking* 17 (70): 225–55.
<https://www.ijcb.org/journal/ijcb21q4a6.htm>.
- European Central Bank (ECB). 2007. "Box 5: The Relationship between Listed Companies' Earnings Growth and Output Growth in the Economy as a Whole." ECB Monthly Bulletin, Frankfurt, September.
<https://www.ecb.europa.eu/pub/economic-bulletin/mb/html/index.en.html>.
- Foley, Stephen. 2023. "Silicon Valley Bank Losses Embolden Calls for US Accounting Rule Reform." *Financial Times*, New York, March 21.
<https://www.ft.com/content/10cfba27-a63c-4263-b958-61753b32f151>.
- Ho, Yin Fai, and Li Lian Ong. 2022. "The COVID-19 Pandemic and ASEAN+3 Corporate Debt-at-Risk." AMRO Working Paper 22-04, ASEAN+3 Macroeconomic Research Office, Singapore.
<https://amro-asia.org/the-covid-19-pandemic-and-asean3-corporate-debt-at-risk/>.
- International Finance Corporation. 2009. *The SME Banking Knowledge Guide*. Washington, DC.
<https://openknowledge.worldbank.org/entities/publication/a6a3fa0a-000b-54f4-92d9-210ca569a083>.
- Konchitchki, Yaniv, and Panos N. Patatoukas. 2014. "Accounting Earnings and Gross Domestic Product." *Journal of Accounting and Economics* 57 (1): 76–88.
<https://www.sciencedirect.com/science/article/pii/S016541011300058X>.
- NASDAQ. 2015. "What is the Relationship between Corporate Profits and GDP?" Markets, New York, October 30.
<https://www.nasdaq.com/articles/what-relationship-between-corporate-profits-and-gdp-2015-10-30>.
- Page, Helene. 2016. "Seven Key Challenges in Assessing SME Credit Risk." Whitepaper, Moody's Analytics, July.
- Sahay, Ratna, Martin Čihák, Papa N'Diaye, Adolfo Barajas, Ran Bi, Diana Ayala, Yuan Gao, Annette Kyobe, Lam Nguyen, Christian Saborowski, Katsiaryna Svirydzenka, and Seyed Reza Yousefi. 2015. "Rethinking Financial Deepening: Stability and Growth in Emerging Markets." IMF Staff Discussion Note 15/08, International Monetary Fund, Washington, DC.
<https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2016/12/31/Rethinking-Financial-Deepening-Stability-and-Growth-in-Emerging-Markets-42868>.
- van der Vaart, H.J., and Tom Gibson. 2008. "Defining SMEs: A Less Imperfect Way of Defining Small and Medium Enterprises in Developing Countries." Brookings, Washington, DC, September 1.
<https://www.brookings.edu/articles/defining-smes-a-less-imperfect-way-of-defining-small-and-medium-enterprises-in-developing-countries/>.



Address: 10 Shenton Way, #15-08

MAS Building, Singapore 079117

Website: www.amro-asia.org

Tel: +65 6323 9844

Email: enquiry@amro-asia.org

[LinkedIn](#) | [Twitter](#) | [Facebook](#) | [YouTube](#)