AMRO
ASEAN +3 MACROECONOMIC RESEARCH OFFICE

ASEAN+3 REGIONAL ECONOMIC OUTLOOK 2023

On the Road to Net Zero

The factual information covers data for the period up to 28 February 2023, except when stated otherwise.

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Table of Contents

Boxes

Figures

Tables

Foreword

2022 could have been a bad year for the ASEAN+3 region but it turned out to be relatively good. The year started with two major shocks: a massive wave of COVID-19 infection and the Russia-Ukraine conflict which escalated into a crisis and sent commodity prices skyrocketing across the world. The Omicron variant threatened to shut down the region's economies once again and derail their nascent economic recovery, just like the Delta variant did in 2021. However, it did not because Omicron, although highly infectious, turned out to be quite mild and the population was well protected against severe illnesses by the high vaccination rates in most countries. As a result, the authorities initially imposed some mild restrictions to contain the spread of the virus. By Q2, most containment measures had been removed, including border controls, and the economies were fully opened.

The Ukraine crisis resulted in supply disruptions that caused fuel, grain, and other commodity prices to spike, leading to rising inflation across the world. This led the Federal Reserve and other major central banks to raise their policy rates sharply to contain the rapid rise in inflation. The higher interest rates led to a massive sell-off in financial markets, a strong US dollar, and large capital outflows from emerging markets. The tightening financial condition was a major threat to recovery in the region. However, thanks to strong economic fundamentals and skillful macroeconomic management, the region was relatively resilient and the economies grew robustly during the year.

An exception to the robust recovery of the regional economies was China which pursued a dynamic zero COVID-19 policy and imposed strict containment measures in response to the sporadic outbreaks across the country during the year, causing the economy to stall. In early December, however, the virus was reclassified as a mild disease and the authorities lifted almost all restrictions. Infections spiked across the country immediately but has since subsided and the economy is expected to rebound strongly this year.

Chapter 1 of the AREO report is devoted to analyzing the risks and vulnerabilities facing the region and assessing the outlook. Although the region performed well in 2022, it began 2023 with strong headwinds and uncertainties. The Ukraine crisis is ongoing and could escalate further with spillovers to the rest of the world. Inflation has come off its peak but it remains elevated and sticky. This has become a major challenge for central banks, especially those committed to bringing down inflation to the 2 percent target level. The Fed and the ECB may be forced to raise their policy rates much higher and keep it higher for longer, causing their economies to weaken sharply, reducing their demand for imports. This would be a major drag on the open economies of the region which are highly dependent on exports.

Fortunately, the expected strong rebound of China will provide a much-needed boost to the rest of the region and cushion the downside risk. Even in the region, the battle against inflation is not over yet. Some economies are still struggling with high and sticky inflation and policymakers must decide on what course of action to take. Should they continue to tighten policies to bring inflation under control or should they ease policies now to support their economies against the strong headwinds? The trade-off between inflation and growth has never been more acute.

Chapter 2 of the AREO report is, as usual, devoted to some longer-term structural issues that are of macro-critical importance. This year, in light of COP26, we have decided to focus on the topic of climate change, an existential issue for the region and the world. This is a very broad topic so we have decided to focus on the issue of climate change mitigation, taking stock of the commitments by the regional economies under the Paris Agreement to cap global warming to 2 percent or less. We analyze the challenges as well as the opportunities of transitioning to net zero emission and the implications for finance in making the transition.

Today's complex and rapidly evolving global landscape has made the work of AMRO more important and urgent, and AMRO has recently formulated our new long-term institutional strategy toward 2030—SD2030—to guide our journey into the future. AMRO will continue to make surveillance a cornerstone and AMRO must enhance our analytical and surveillance capacity to come up with ideas and strategies to address the challenges ahead.

We are living in precarious times. There are both short-term conjunctural risks as well as long-term existential challenges to the global economy; yet the world has never been more divided. The region must stay united and pull together to secure its macroeconomic and financial resilience and stability.

Hoe Ee Khor
Chief Economist

Acknowledgments

This report provides AMRO staff's assessment of conjunctural and structural issues facing the ASEAN+3 region. It covers the short-term risks, vulnerabilities, and challenges facing member economies, as well as the policies taken by or policy options available to their authorities. It also presents staff studies on the longer-term issues pertinent to sustained economic growth in the region. The report has been reviewed by the Executive Committee of AMRO.

The analysis in this report was coordinated by the Regional Surveillance team led by Ling Hui Tan; it also draws on the surveillance work of the AMRO country teams. The report was reviewed and cleared by Chief Economist, Hoe Ee Khor. It has also benefited from the guidance of AMRO Director Kouqing Li and other members of the Senior Management team. Contributors to the report are Andriansyah, Jinho Choi, Megan Wen Xi Chong, Chiang Yong (Edmond) Choo, Diana del Rosario, Thanh Thi Do, Aziz Durrani, Tanyasorn Ekapirak, Suan Yong Foo, Laura Grace Gabriela, Paolo Hernando, Marthe M. Hinojales, Xu (Kimi) Jiang, Catharine Tjing Yiing Kho, Wee Chian Koh, Vanne Khut, Ming Han (Justin) Lim, Byunghoon Nam, Thi Kim Cuc Nguyen, Yoki Okawa, Prashant Pande, Toàn Long Quách, Anthony Chia Kiat Tan, Ling Hui Tan, Liyang (Alex) Tang, Heung Chun (Andrew) Tsang, Jade Vichyanond, Wanwisa May Vorranikulkij, Trung Thanh Vu, Siang Leng Wong, Fan Zhai, and Hongyan Zhao; with input from Kevin Chun Chau Cheng, Seung Hyun (Luke) Hong, Sumio Ishikawa, Jae Young Lee, Li Lian Ong, and Runchana Pongsaparn. Megan Wen Xi Chong provided research support.

Chiang Yong (Edmond) Choo coordinated production of the publication, with editorial assistance from James Unwin; Jie Qin, Karen Wilkinson, John Cramer, Andrea Abellon, and Hui Shan Seah coordinated communications and outreach; Karen Chua provided liaison support with member authorities.

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Finally, the views expressed in this report are those of AMRO staff and do not, in any way, implicate ASEAN+3 members.

Abbreviations

A6.4ER	Article 6, paragraph 4, emission reduction
ADB	Asian Development Bank
ACX	AirCarbon Exchange (Singapore)
AREO	ASEAN+3 Regional Economic Outlook
ASEAN	Association of Southeast Asian Nations
ASEAN-4	Indonesia, Malaysia, the Philippines, and Thailand
ASEAN-5	Indonesia, Malaysia, the Philippines, Thailand, and Singapore
ASEAN-6	Indonesia, Malaysia, the Philippines, Thailand, Singapore, and Vietnam
BCA	border carbon adjustment
BEV	battery electric vehicle
CAR	capital adequacy ratio
CBAM	Carbon Border Adjustment Mechanism (European Union)
CBI	Climate Bonds Initiative
CCS	carbon capture and storage
CCUS	carbon capture, utilization, and storage
CDM	Clean Development Mechanism
CER	certified emissions reduction
CEV	clean energy vehicle
CfaR	capital flows at risk
CHIPS	Creating Helpful Incentives to Produce Semiconductors (United States)
CIX	Climate Impact X (Singapore)
CNY	Chinese yuan
COP	United Nations Climate Change Conference of the Parties
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
COVID-19	2019 coronavirus disease
EEC	Eastern Economic Corridor (Thailand)
EGAT	Electricity Generating Authority of Thailand
EITE	energy-intensive, trade-exposed sector
EOR	enhanced oil recovery
ESG	environmental, social, and governance
ETS	emissions trading scheme/system
EU	European Union
EV	electric vehicle
FCEV	fuel cell electric vehicle
FCPF	Forest Carbon Partnership Facility
FDI	foreign direct investment
FIT	feed-in tariff
FSS	short-term fiscal sustainability
FY	fiscal year
GDP	gross domestic product
GEM	Global Economic Model
GHG	greenhouse gas
GW	gigawatt
GWh	gigawatt-hour
HEV	hybrid electric vehicle
HKMA	Hong Kong Monetary Authority
IAEA	International Atomic Energy Agency
IBC	Indonesia Battery Corporation
ICAO	International Civil Aviation Organization
ICE	internal combustion engine
ICMA	International Capital Market Association
ICT	information and communications technology
IEA	International Energy Agency
IFC	International Finance Corporation
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
ITMO	internationally transferred mitigation outcome
JPY	Japanese yen

KRW	Korean won
kWh	kilowatt-hour
MAS	Monetary Authority of Singapore
METI	Ministry of Economy, Trade, and Industry (Japan)
MICE	meetings, incentives, conventions and exhibitions
$MtCO_2e$	million (metric) ton of carbon dioxide equivalent
MWh	megawatt-hour
MYR	Malaysian ringgit
NDC	Nationally Determined Contribution
NEER	nominal effective exchange rate
NEV	new energy vehicle
NGFS	Network for the Greening of the Financial System
NPL	non-performing loan
OECD	Organisation for Economic Co-operation and Development
PBC	People's Bank of China
PHEV	plug-in hybrid electric vehicle
Plus-3	China (including Hong Kong), Japan, Korea
PMI	Purchasing Managers' Index
PPP	purchasing power parity
R&D	research and development
REDD+	Reducing Emissions from Deforestation and Forest Degradation
REER	real effective exchange rate
REE	rare earth element
ROSATOM	State Atomic Energy Corporation (Russia)
S&P	Standard and Poor's
SMIC	Semiconductor Manufacturing International Corporation (China)
SRI	Sustainable and Responsible Investment (Malaysia)
tCO_2	(metric) ton of carbon dioxide
tCO_2e	(metric) ton of carbon dioxide equivalent
TSMC	Taiwan Semiconductor Manufacturing Company
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USD	US dollar
VRE	variable renewable energy
ZEV	zero-emission vehicle

For brevity, Brunei Darussalam is referred to as "Brunei," and Hong Kong, China is referred to as "Hong Kong" in the text.

Chapter 1.

Macroeconomic Prospects and Challenges

Highlights

- The post-pandemic "recovery" year of 2022 was beset by new challenges as the region was buffeted by multiple external shocks. In early 2022, when most economies were battling the highly transmissible Omicron variant of COVID-19, the Russia-Ukraine conflict escalated into a crisis and sent global commodity prices soaring to multiyear highs. Record high inflation and the release of pent-up consumer demand forced faster and sharper monetary policy tightening in the United States. By the second half of the year, tighter financial market conditions had significantly slowed the growth momentum in advanced economies. Geopolitical tensions intensified throughout the year, while relentless waves of COVID-19 infections disrupted economic reopening efforts in some economies, especially China.

- Overall, the ASEAN+3 region grew at 3.2 percent in 2022. The lifting of COVID-19 containment measures led to a surge in consumer spending and investment, helping to offset the drag on exports in the second half of the year. Meanwhile, inflation in the region rose to 6.5 percent in 2022, due mainly to supply disruptions caused by the Ukraine crisis, the release of pent-up demand in advanced economies, and the lingering impact of supply chain bottlenecks. Timely administrative and policy measures helped to prevent inflation in the ASEAN+3 region from spiraling higher. In financial markets, the US Federal Reserve's aggressive rate hikes led to a sharp spike in risk aversion, currency depreciations, and large portfolio capital outflows from the region in the first three quarters of 2022. By October, the outlook for portfolio capital flows in the region had improved on market expectations that the US Federal Reserve would slow the pace of rate increases in 2023.

- Looking ahead, growth in ASEAN+3 is expected to be anchored by domestic demand as economic recovery gains traction. The region's goods export growth is projected to weaken as global demand slows. However, this will be counterbalanced to some extent by the strengthening of services exports (notably tourism) as border restrictions are lifted throughout the region. AMRO staff forecast the region to grow at a faster pace of 4.6 percent in 2023, driven by strong recovery in the Plus-3 economies, especially China. Headline inflation is forecast at 4.5 percent in 2023, lower than in 2022. In 2024, growth is expected to be sustained at 4.5 percent, and inflation to moderate to 3.0 percent.

- The growth outlook for ASEAN+3 is fraught with uncertainties. The most immediate risk is the possibility of another shock to global energy prices should the ongoing Ukraine crisis escalate. At the same time, if tightening financial conditions trigger a much sharper US economic slowdown than currently envisaged, spillovers to the rest of the world would be significant. A global energy shock in conjunction with a global economic slowdown would be a major blow to the region. In China, prolonged weakness in the real estate sector would weigh on consumer and investor confidence and could hinder the economy's recovery, dragging down regional growth. The possible emergence of more virulent COVID-19 variants is still a risk. In the medium term, further deepening of the strategic rivalry between the United States and China could fragment the global economy into ideological blocs and undermine the region's growth prospects.

- Policymakers in the region are largely ending the extraordinary stimulus measures introduced during the pandemic and shifting to restoring policy buffers. Rising inflation and a less supportive global economic landscape have compelled monetary policy tightening in some economies, while maintaining targeted fiscal support to safeguard growth. ASEAN+3 authorities will continue to face sharp policy tradeoffs and difficult policy decisions in the year ahead. A calibrated policy mix, drawing on a range of policy tools, will be essential to navigate the challenges of 2023.

I. Recent Developments and Outlook

A Bumpy Transition to the "New Normal"

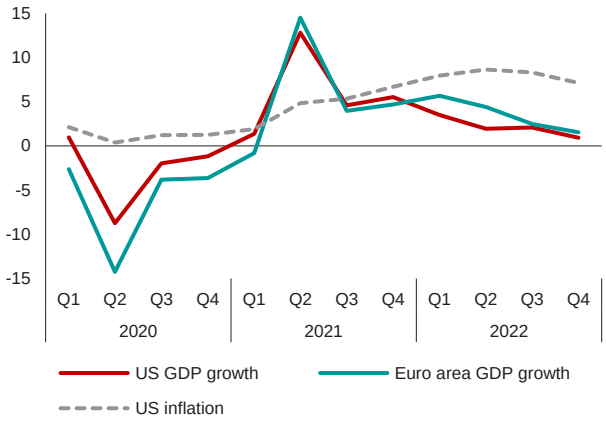
The post-pandemic "recovery" year of 2022 was fraught with challenges. The year began with most regions battling the highly contagious Omicron variant of COVID-19. Then, the Russia-Ukraine conflict broke out in February and escalated into a crisis, sending global commodity prices to multiyear highs. The confluence of record high inflation rates and the release of pent-up consumer demand forced faster and sharper monetary policy tightening in the United States, rattling global financial markets. By the second half of the year, tighter financial market conditions amid stubbornly high inflation slowed growth momentum in advanced economies (Figure 1.1). Geopolitical tensions intensified throughout the year, aggravating financial market volatility and deepening investor uncertainty. On top of these new challenges, relentless waves of COVID-19 infections continued to disrupt economic reopening efforts of some economies, notably China.

Growth in the Plus-3 economies in 2022 was impacted by recurring COVID-19 outbreaks, high inflation, and idiosyncratic domestic factors (Figure 1.2).

- Plus-3 economies faced three large waves of infections in 2022 (Figure 1.3). Economic activities in China and Hong Kong were constrained by stringent pandemic containment measures which lasted until early December. COVID-19 cases surged in both economies when the strict containment measures were lifted. Japan removed most domestic containment policies in March and Korea did so in April, despite both having high caseloads. However, border restrictions in Japan remained in place for most of the year (Box 1.1).
- The spike in global energy prices resulted in high inflation and weaker terms of trade for the net energy-importing Plus-3 economies. Fiscal support to dampen the passthrough of high energy prices to households and businesses weighed on government budgets that were already strained by more than two years of pandemic support.
- Growth in China was further weakened by a prolonged slowdown in the property sector and financial stability concerns. The Hong Kong economy was heavily affected by the continued border closure with mainland China and the resulting loss of goods and services export revenue. Meanwhile, Japan and Korea were confronted with sharp currency depreciations, in part due to the aggressive interest rate hikes by the US Federal Reserve and strengthening of the US dollar.

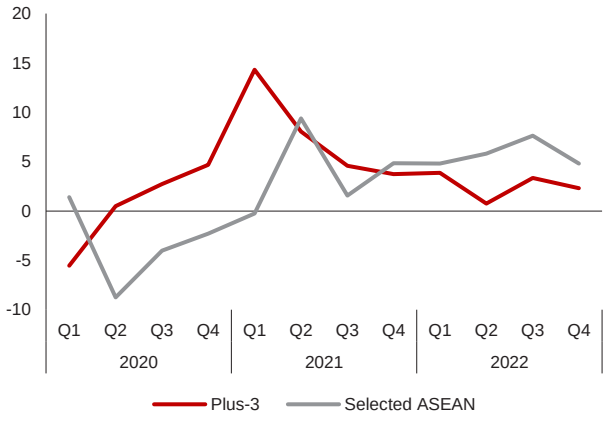
The ASEAN region grew more firmly than the Plus-3 in 2022, thanks to a strong rebound in domestic demand and net exports. High COVID-19 vaccination coverage (for both primary and booster doses) allowed ASEAN economies to stay on a reopening course despite the large wave of Omicron infections at the beginning of the year. COVID-19 infections declined significantly in the middle of the year (except in Singapore), with economies like Cambodia, Lao PDR, and Myanmar reporting fewer than 25 daily cases by the end of the year. The reopening of borders to international tourists also helped to boost growth in tourism-dependent economies.

Figure 1.1. United States and Euro Area: Real GDP Growth and Headline Inflation
(Percent, year-on-year)



Source: National authorities via Haver Analytics.
Note: US inflation refers to annual change in the personal consumption expenditure price index.

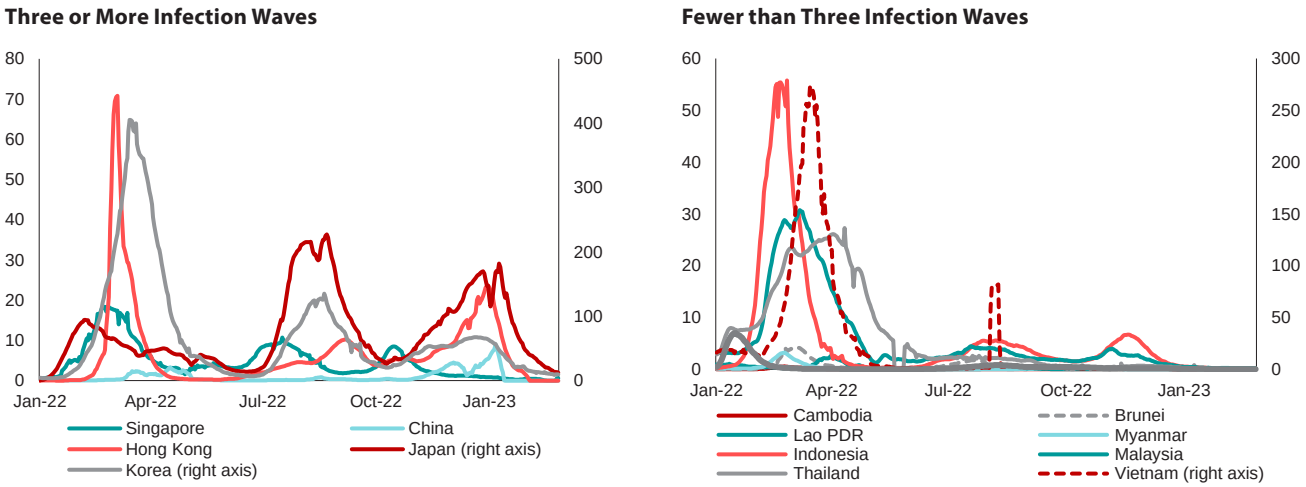
Figure 1.2. Selected ASEAN+3: Real GDP Growth
(Percent, year-on-year)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Aggregate GDP is calculated using purchasing power parity (PPP) weighted average. Selected ASEAN refers to Brunei, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. Cambodia, Lao PDR, and Myanmar are excluded due to data unavailability.

This chapter was written by Anthony Chia Kiat Tan and Catharine Tjing Yiing Kho (co-anchors), Chiang Yong (Edmond) Choo, Megan Wen Xi Chong, Diana del Rosario, Laura Grace Gabriela, Marthe M. Hinojales, Byunghoon Nam, Prashant Pande, Toàn Long Quách, Liyang (Alex) Tang, Siang Leng Wong, and Hongyan Zhao, with input from AMRO country desk economists.

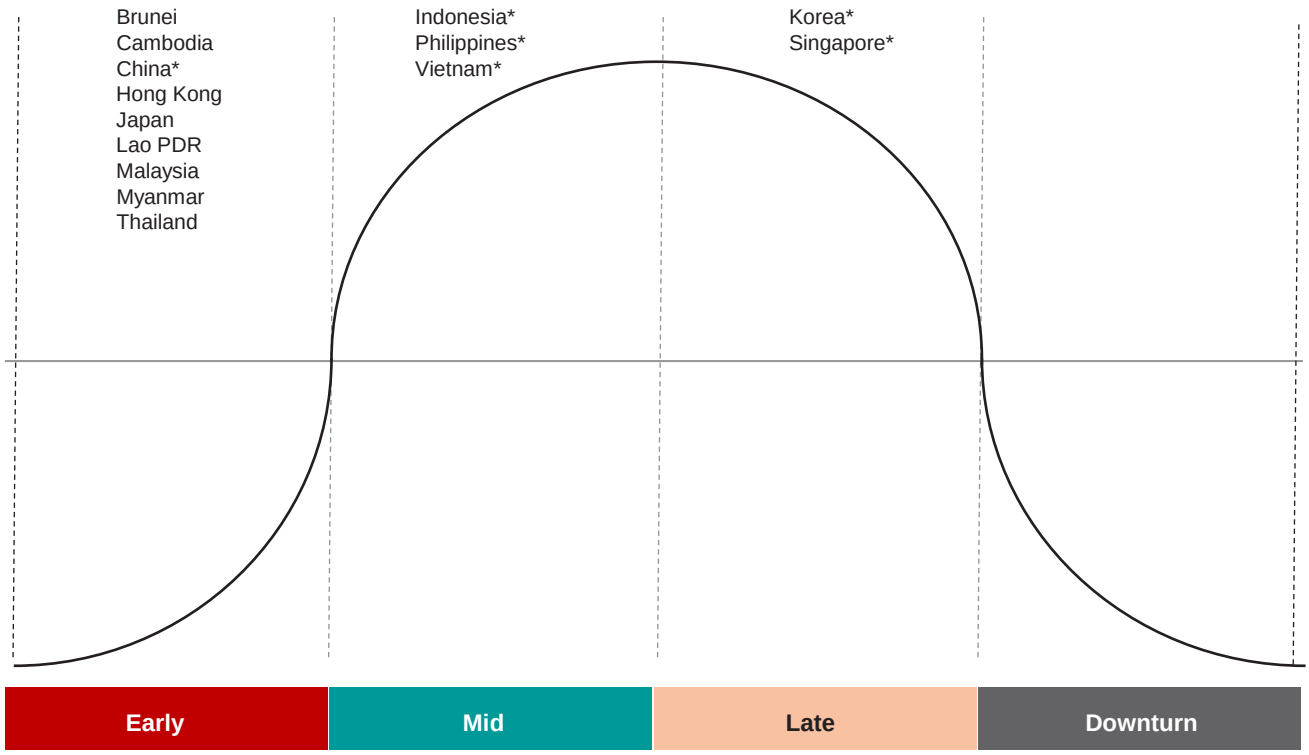
Figure 1.3. ASEAN+3: Daily COVID-19 Cases
(Thousand persons, seven-day average)



Source: Johns Hopkins University via Haver Analytics; AMRO staff calculations.
Note: Data as of 28 February 2023.

Most of ASEAN+3 is currently in the early phase of the business cycle. The negative output gap is narrowing in most of the region's economies, but real GDP remains below trend levels, reflecting some economic scarring from the pandemic. China is back in the early cycle position with a negative but narrowing output gap due to disruption caused by COVID-19 outbreaks and stresses in the property market. Indonesia and Vietnam transitioned from early cycle to mid-cycle on widening positive output gaps and tightening labor markets, supported by robust growth momentum continuing into 2023. The Philippines is assessed to be in mid-cycle with a widening positive output gap following continued growth on multiple fronts, including manufacturing and domestic tourism. Meanwhile, export-oriented Korea and Singapore, which rebounded strongly in 2021, have moved from mid-cycle in 2022 to late cycle as external demand slows down (Figure 1.4).

Figure 1.4. ASEAN+3: Business Cycle Positions, 2023



Source: AMRO staff estimates.
Note: "Early cycle" indicates that GDP growth is below trend and the output gap is negative and narrowing. "Mid-cycle" indicates that growth is around trend and the output gap is positive and widening. "Late cycle" indicates that growth is above trend and the output gap is positive and narrowing. "Downturn" indicates that growth is below trend and the output gap is negative and widening. Asterisk (*) indicate changes in position relative to 2022. China, Korea, and Singapore were assessed to be in mid-cycle in 2022; Indonesia, the Philippines, and Vietnam were assessed to be in early cycle in 2022.

Box 1.1:

Living with COVID-19: The Long and Winding Road for the Plus-3 Economies

Plus-3 economies transitioned to living with COVID-19 in different ways. The emergence of new subvariants led to two large new surges of Omicron-variant infections in 2022 after the initial wave of infections subsided in the previous year (Figure 1.1.1, top panel). Daily new cases in the Plus-3 in the second half of the year far surpassed those in ASEAN, even after adjusting for population size (Figure 1.1.1, bottom panel). Yet, Japan and Korea reopened earlier than China and Hong Kong despite having reported significantly higher numbers of cases and lower vaccination coverage (Figure 1.1.2).

Accelerated administration of booster doses was key to Japan's reopening. The spike in infections led to the declaration of a quasi-state of emergency in 34 of Japan's 47 prefectures in the first quarter of 2022. In response, the government accelerated its roll-out of booster doses, which began in December 2021. Within 100 days, 32.5 percent of the population had received a booster, compared to only 10.9 percent when the primary dose was rolled out (Figure 1.1.3). Japan's booster dose coverage is higher than elsewhere in the region (Figure 1.1.4). With the high vaccination rate, authorities were able to gradually relax containment measures, and all quasi-emergency measures were lifted by the end of the first quarter of 2022. Borders were opened to international travelers—first to a limited number of guided tour groups in June 2022, then to all travelers in October 2022.

Korea relied on its high vaccination rate and strong health care system in reopening. New cases surpassed 600,000 per day in March 2022—the highest in the world at the time—but death rates remained among the lowest globally, thanks in part to the country's high vaccine coverage: more than 80 percent of the population was vaccinated and more than half had received their booster doses by then (Cha 2022) (Figure 1.1.5). The health care system was reinforced in January 2022 with the addition of small hospitals to manage an expected surge in cases (CNA 2022). Korea scaled back social distancing measures in April 2022, allowing private gatherings, lengthening business hours of restaurants and cafes, and resuming public events. Outdoor mask mandates were lifted in September 2022 and an end to indoor ones followed in January 2023. Travel restrictions were also eased, with quarantine rules for international arrivals removed on 8 June and pre-departure test requirements for most inbound travelers lifted on 3 September.

China's COVID-19 cases were contained by stringent controls that remained in place until early December 2022. The dynamic zero-COVID approach in China was characterized by mass testing and city-wide lockdowns. Numerous cities, such as Chengdu, Guangzhou, Shanghai, and Zhengzhou, were placed under lockdown after cases were reported. With steadily rising testing and vaccination capacity, quarantine durations for close contacts and international travelers were shortened in November and removed completely the following month (Xinhua 2022). After the reopening of the economy on 7 December, there was an uptick in cases. However, the number of infections and COVID-related hospitalizations declined throughout January 2023, auguring well for the transition to a COVID-19 endemic state (The Straits Times 2023).

The same applied in Hong Kong. Hospitals were reportedly overwhelmed in the first quarter of 2022 as COVID-19 cases spiked (Agence France-Presse 2022). Vaccine hesitancy among the elderly—only a quarter of the population aged 80 and above were vaccinated as of January 2022—contributed to the high fatality ratio for this age group. Hong Kong authorities tightened border controls and increased mass community testing, sewage surveillance, and contact tracing in response. By September, more than 90 percent of the population was fully vaccinated—up from

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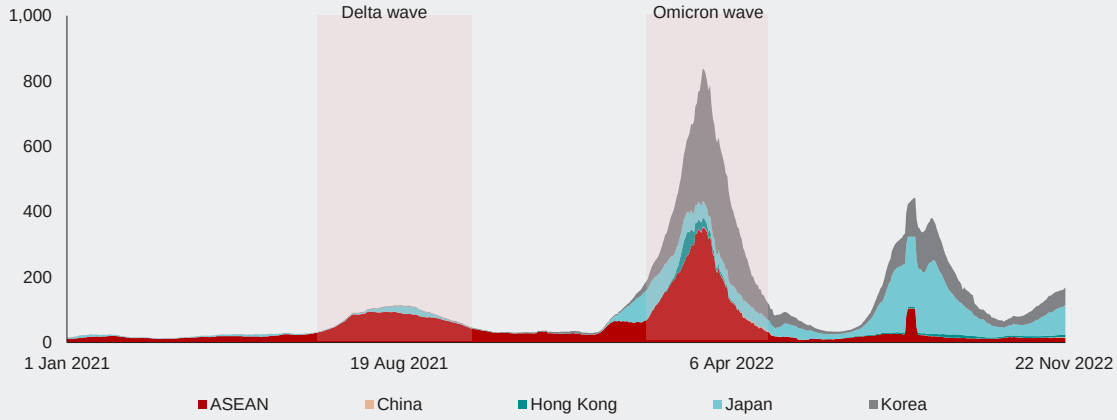
This box was written by Megan Wen Xi Chong and Catharine Tjing Yiing Kho.

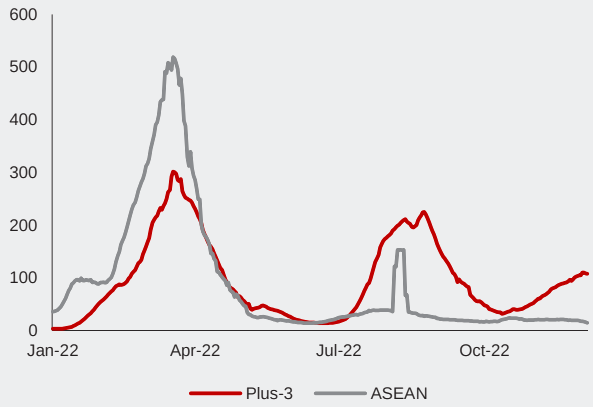
70 percent in March—and the health care system was no longer overstrained. On 14 December, Hong Kong relaxed its COVID-19 measures, including scrapping the use of its LeaveHomeSafe tracking app and removing social distancing requirements for restaurants and public gatherings. On- and post-arrival COVID-19 testing of international visitors was abolished on 29 December.

While all Plus-3 economies have now reopened, the challenge is to stay open. A negative pre-departure test remains necessary for entry to China and Hong Kong. Inbound visitors to Japan have to show proof of having received at least three vaccine doses, or a negative COVID-19 test within 72 hours of departure. Korea removed its indoor mask mandate on 30 January 2023, but maintains a seven-day isolation rule for those who have tested positive for COVID-19. High vaccination coverage and resilient health care systems should help the Plus-3 economies stay on the economic reopening path.

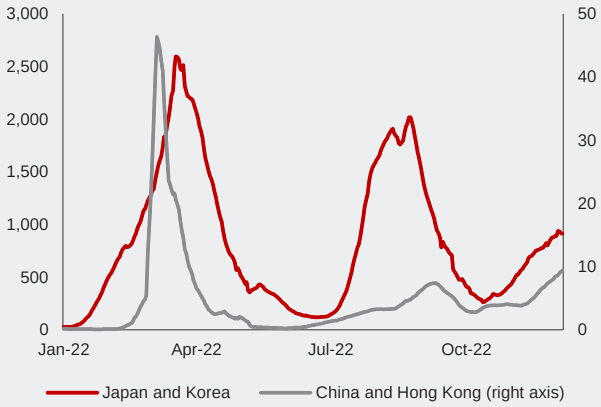
Figure 1.1.1. ASEAN+3: Daily COVID-19 Cases
(Thousand cases, seven-day average)



ASEAN+3
(New cases per million persons, seven-day average)

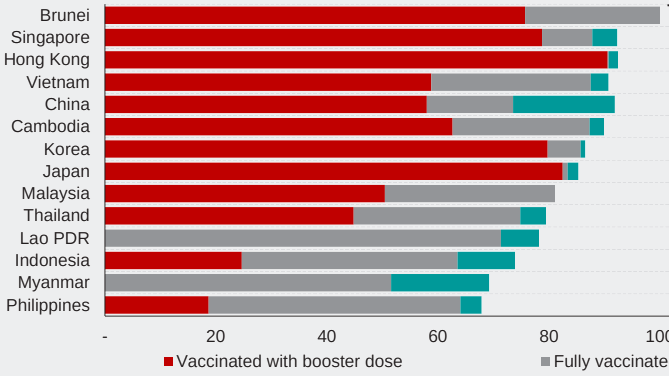


Plus-3
(New cases per million persons, seven-day average)



Source: Johns Hopkins University via Haver Analytics; AMRO staff calculations.
Note: ASEAN = Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam; Plus-3 = China, Hong Kong, Japan, and Korea.

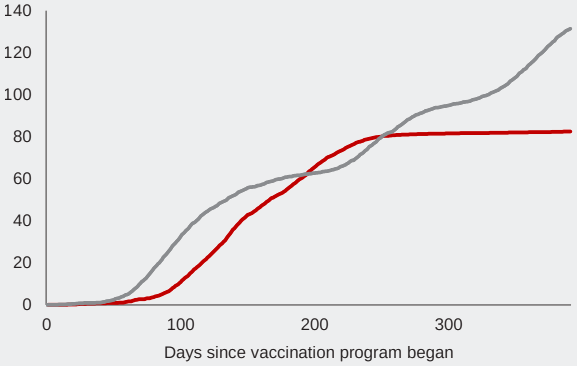
Figure 1.1.2. ASEAN+3: Vaccination Coverage Status
(Percent of population)



	Percentage of population: With booster doses	Fully vaccinated	With at least one dose
Brunei	75.7	100.0	100.0
Singapore	82.5	87.8	92.4
Hong Kong	90.6	90.8	92.3
Vietnam	58.8	87.5	92.1
China	58.0	73.5	91.9
Cambodia	62.6	87.3	91.1
Korea	79.8	85.7	86.5
Japan	82.5	83.4	84.4
Malaysia	50.4	81.2	82.9
Thailand	44.8	74.8	79.5
Lao PDR	-	71.4	78.2
Indonesia	24.7	63.5	73.9
Myanmar	-	51.6	69.3
Philippines	18.7	64.1	67.9

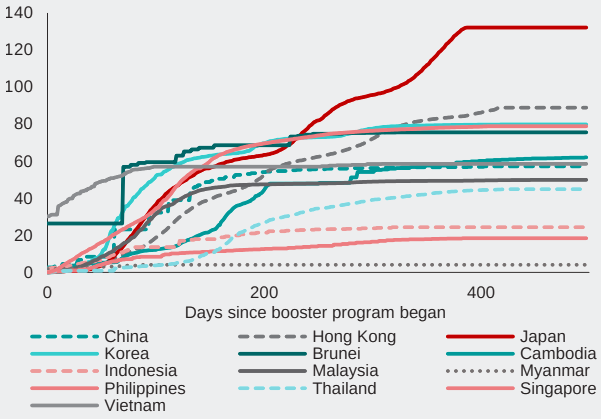
Source: Our World in Data via Haver Analytics; AMRO staff calculations.
Note: Data are up to 28 February 2023. Percent of fully vaccinated population shows the number of people who received all doses prescribed by the vaccination protocol (e.g., one dose of a single-dose vaccine, or two doses of a two-dose vaccine). In the event of discrepancy between data from Our World in Data and national authorities, data from national authorities take precedence.

Figure 1.1.3. Japan: COVID-19 Vaccination Coverage
(Cumulative doses per 100 persons)



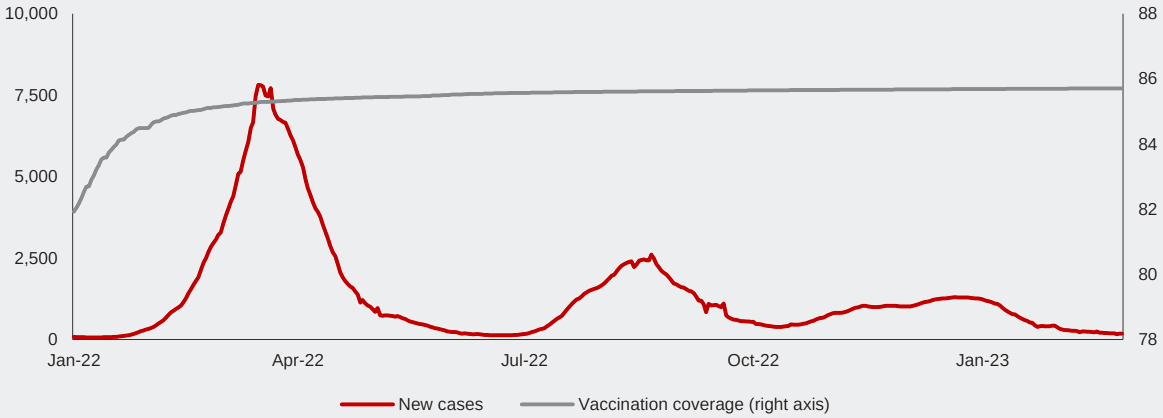
Source: Our World in Data via Haver Analytics; AMRO staff calculations.

Figure 1.1.4. ASEAN+3: COVID-19 Booster Dose Administration
(Cumulative doses per 100 persons)



Source: Our World in Data via Haver Analytics; AMRO staff calculations.
Note: Data for Lao PDR are unavailable.

Figure 1.1.5. Korea: COVID-19 Daily Cases and Vaccination Coverage
(New cases per million persons, seven-day average; cumulative doses per 100 persons)

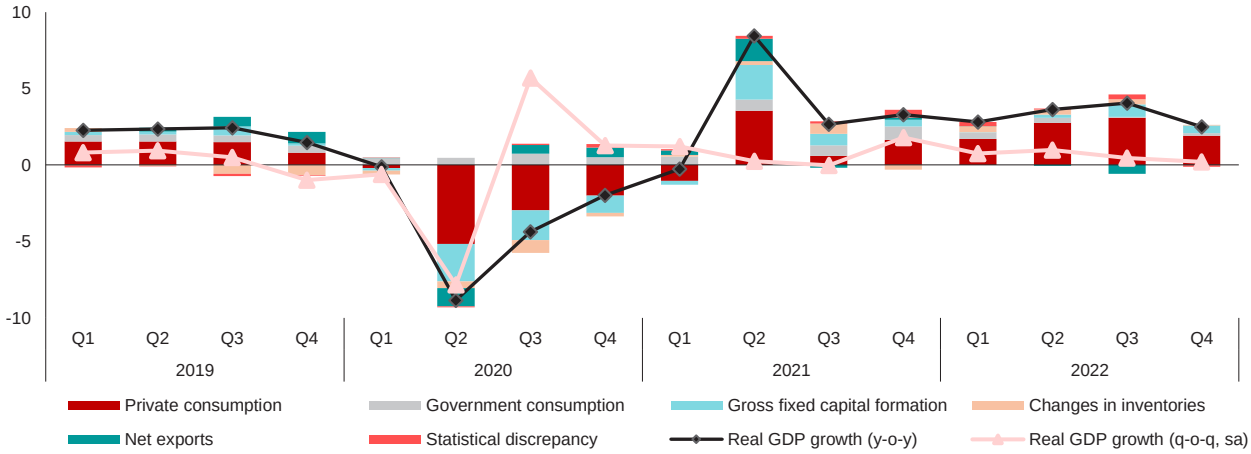


Source: Johns Hopkins University via Haver Analytics; AMRO staff calculations.

Domestic Demand Leads the Way

Domestic demand anchored the region's recovery in 2022. The lifting of COVID-19 containment measures released pent-up demand, which led to a surge in consumer spending and investment. Private sector spending was robust throughout 2022, offsetting the drag from net exports in the second half of the year (Figure 1.5). Growth momentum, measured by quarter-on-quarter growth of seasonally adjusted GDP growth, weakened toward the second half of the year, weighed down by the slowdown in external demand. The pace of recovery was also held back by recurring virus outbreaks, increased costs of living, and higher borrowing costs. Extension of policy measures such as cash vouchers and price subsidies for households and credit support for firms was crucial to maintaining consumer and investor confidence, supporting domestic demand.

Figure 1.5. Selected ASEAN+3: Aggregate Real GDP Growth, by Expenditure Category
(Percentage points, year-on-year)



Source: National authorities via Haver Analytics; AMRO staff estimates and calculation.
Note: Selected ASEAN+3 includes Brunei, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, and Thailand. Data are unavailable for Cambodia, China, Lao PDR, Myanmar, and Vietnam. q-o-q, sa = quarter-on-quarter, seasonally adjusted; y-o-y = year-on-year. Q4 2022 data for Brunei are estimated by AMRO staff.

Private consumption has been the key driver of growth. ASEAN economies benefited from rapid progress in mass vaccinations which protected the population against severe illnesses, enabling authorities to loosen mobility restrictions and reopen borders (Figure 1.6). Mobility outside the residence—i.e., movements to groceries and pharmacies, retail and recreation facilities, transit stations, and workplaces—surpassed pre-pandemic levels in the region as retailers welcomed the return of consumer spending (Figure 1.7 and Figure 1.8). Hong Kong, Japan, and Korea allowed mobility to return close to pre-pandemic levels in 2022, even as they faced recurrent waves of infections throughout the year. Spending on services, which were heavily restricted during the pandemic, picked up too (Figure 1.9). Policy measures to stimulate the domestic economy—such as consumption vouchers in Hong Kong and domestic tourism subsidies in Japan and Thailand—also supported private consumption.

In China, private consumption is expected to recover with the economy having moved on from its dynamic zero-COVID policy and as its labor market improves. Consumption was subdued in the last three quarters of 2022 due to a slump in consumer confidence amid recurring COVID-19 outbreaks and the property market downturn. In early December, China reclassified COVID-19 as a mild disease and lifted some of its most stringent containment measures, such as mass testing and quarantine for those infected, contact tracing, differentiating high and low infection risk areas, and requiring asymptomatic and mild cases to isolate in medical facilities. A massive surge in infections across the country followed that relaxation and led to a sharp drop in consumer spending as people stayed home to avoid becoming infected. However, with the surge in cases having largely subsided, private consumption will likely rebound strongly in the second quarter in 2023. Robust holiday spending during this year's Spring Festival bodes well for the strength of the recovery.[1] An improvement in labor market conditions—purchasing managers' index (PMI) employment subindices picked up in December 2022 and January 2023—could further reinforce consumer confidence and contribute toward the revival of consumption domestically.

1/ According to figures from China's Ministry of Culture and Tourism, domestic tourism revenue for 21–27 January 2023 reached CNY 375.8 billion, almost three-quarters of the spending during the Spring Festival in 2019 (China Daily 2023).

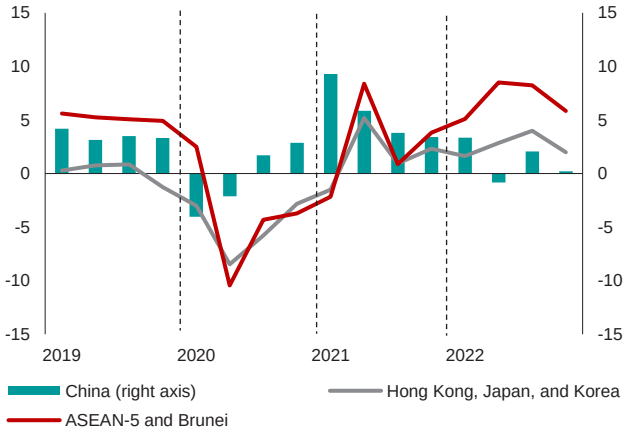
For the rest of the region, private consumption is expected to remain firm although inflation and household debt could weigh on consumer sentiment. The sharp rise in fuel and food prices has raised the cost of living in the rest of ASEAN+3. While price subsidies and import tariff cuts have partially contained rising prices, purchasing power continues to be eroded as wages have not kept up with inflation (Figure 1.10). Monetary policy normalization has also raised borrowing costs and increased the debt burden of households. The confluence of these headwinds could dampen consumer sentiment and reduce discretionary spending (Figure 1.11).

Domestic investment has continued to improve across most of the region, although at a slower pace. The resumption of economic activities and the easing of supply-side constraints have supported gross fixed capital formation, especially for ASEAN economies (Figure 1.12). While interest rates have increased in response to the US Federal Reserve's rate hikes and rising inflation pressures, credit conditions remain generally supportive (Figure 1.13). However, downcycles in the global semiconductor sector and global trade have cooled investment prospects for the region's electronics industry as pandemic-propelled demand for consumer electronics has wound down (Blanchard and Wu 2022) (Figure 1.14).

The exception is China, where real estate fixed asset investments contracted sharply in 2022 after regulatory measures were introduced to curb excessive leverage in the sector. The suspension of projects by distressed property developers has led to a decline in real estate investment (Figure 1.15). Uncertainty over the extent and severity of spillovers from the property sector to the broader economy also weighed on investor sentiment. However, the adjustment in the policy stance late last year should provide some relief to vulnerable developers and restore homebuyers' confidence and stability in the market. While real estate investment will likely take time to recover, the government is determined to increase spending on infrastructure and manufacturing assets in the next few years, especially in growth areas such as digital-economy infrastructure, renewable energy, and electric vehicles (Chapter 2). In addition, the reopening of China's borders could see more direct investment from overseas returning to the economy.

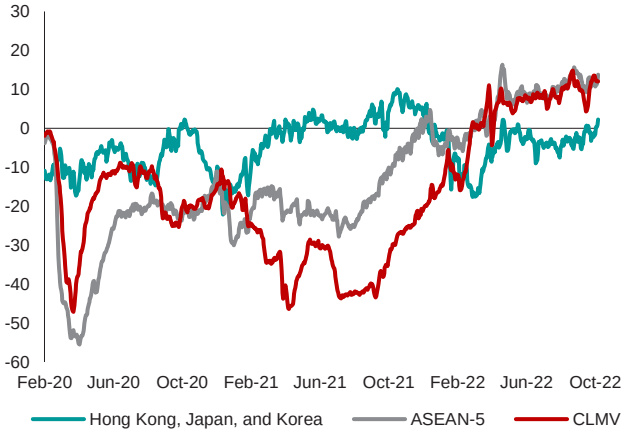
Looking ahead, a weaker global economy with higher borrowing costs could hinder investment recovery. Business confidence in the region deteriorated toward the second half of 2022 in tandem with increased concerns over recession in advanced economies (Figure 1.16). While investor sentiments in China improved significantly at the start of 2023, additional interest rate hikes in the region could exacerbate firms' already rising debt burdens and reduce credit demand. Slower credit growth and worsening debt servicing capacity for businesses could consequently limit the recovery in capital expenditure in the region.

Figure 1.6. Selected ASEAN+3: Real Private Consumption Growth and Contribution to GDP Growth
(Percent, year-on-year; percentage points, year-on-year)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Data for China refer to consumption's contribution to year-on-year GDP growth. Data are unavailable for Cambodia, Lao PDR, Myanmar, and Vietnam. ASEAN-5 = Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

Figure 1.7. Selected ASEAN+3: Mobility Outside the Residence
(Percentage change from baseline, five-day moving average)



Source: Google COVID-19 Community Mobility reports via Haver Analytics; AMRO staff calculations.
Note: Baseline refers to the median value of the corresponding day in the period 3 January to 6 February 2020. Mobility outside the residence refers to aggregated mobility data for places such as groceries and pharmacies, retail and recreation facilities, transit stations, and workplaces. Google discontinued the data after 15 October 2022. ASEAN-5 = Indonesia, Malaysia, the Philippines, Singapore and Thailand; CLMV = Cambodia, Lao PDR, Myanmar, and Vietnam.

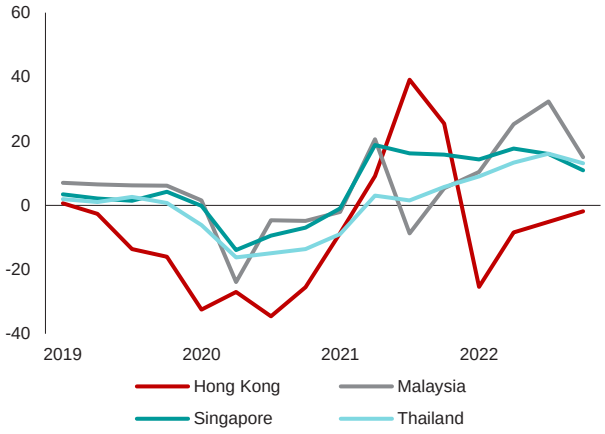
Figure 1.8. Selected ASEAN+3: Retail Sales Growth
(Percent, year-on-year, three-month moving average)

Economy	2020 Jan to Dec	2021 Jan to Dec	2022 Jan to Dec	2023 Jan to Feb	Latest monthly change from previous year
China					–2.7
Hong Kong					0.4
Indonesia					1.2
Japan					4.1
Korea					3.9
Malaysia					23.8
Philippines					21.4
Singapore					8.0
Thailand					1.2
Vietnam					16.7

<=–30 –20 –10 0 10 20 >=30

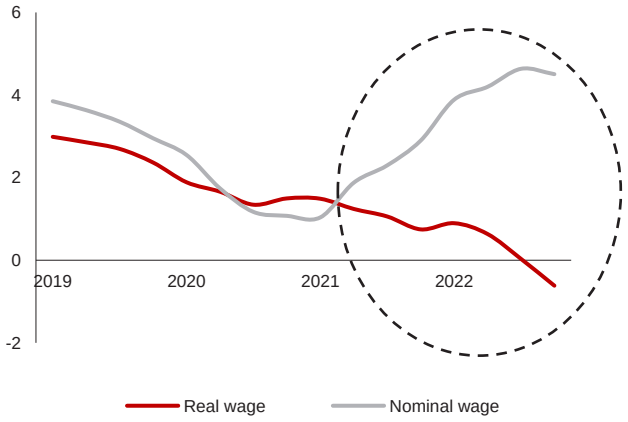
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Calculated based on local currency values for all economies except Indonesia and Thailand (volume). Colors indicate the size and direction of change: the deeper the shade of red, the larger the negative change, with the darkest shade indicating a decrease of more than 30 percent year-on-year; the deeper the shade of green, the larger the positive change, with the darkest shade indicating an increase of more than 30 percent year-on-year.

Figure 1.9. Selected ASEAN+3: Services Sales Growth
(Percent, year-on-year)



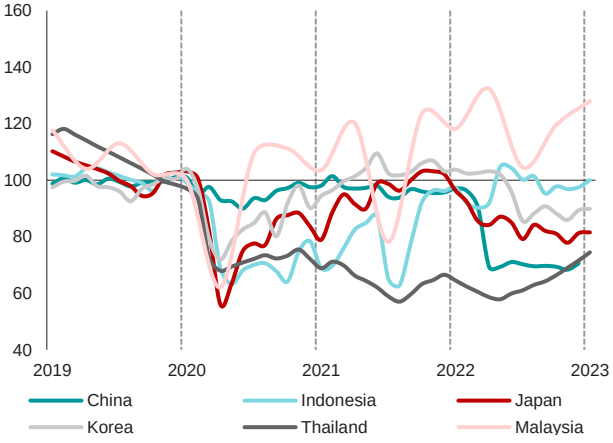
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Calculations are based on the volume of restaurant receipts (Hong Kong); services sector revenues (Malaysia); business receipts index for services (Singapore); and services production index (Thailand).

Figure 1.10. Selected ASEAN+3: Real and Nominal Wages
(Percent, year-on-year, four-quarter moving average)



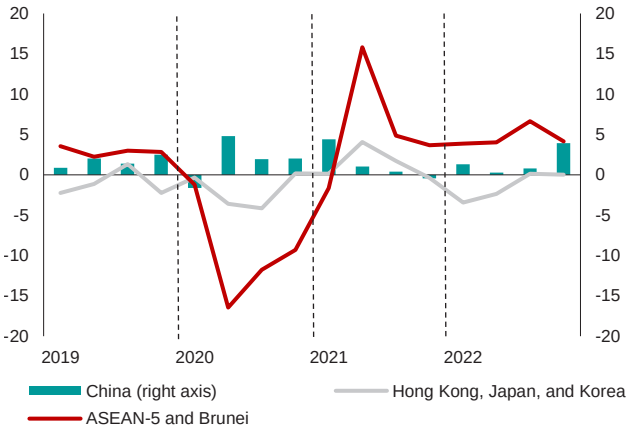
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Data refer to the average of wage growth in local currency terms for Korea, Malaysia, Singapore, and Thailand. Wages for Malaysia refer to those in the manufacturing sector only.

Figure 1.11. Selected ASEAN+3: Consumer Confidence
(Index, October–December 2019 = 100)



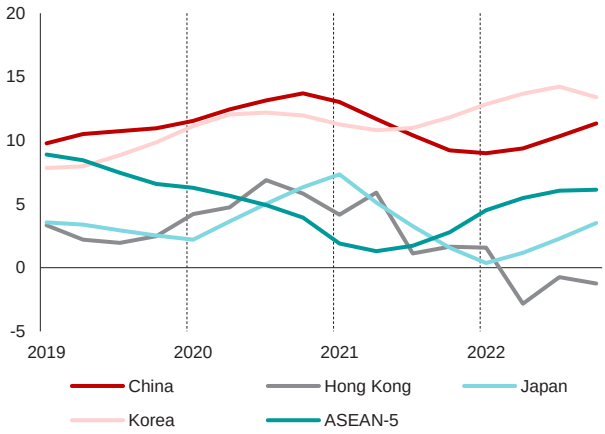
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Data are monthly for all economies except Malaysia (quarterly). Data for Malaysia are indexed to Q4 2019 = 100.

Figure 1.12. Selected ASEAN+3: Real Gross Fixed Capital Formation and Contribution to GDP Growth
(Percent, year-on-year; percentage points, year-on-year)



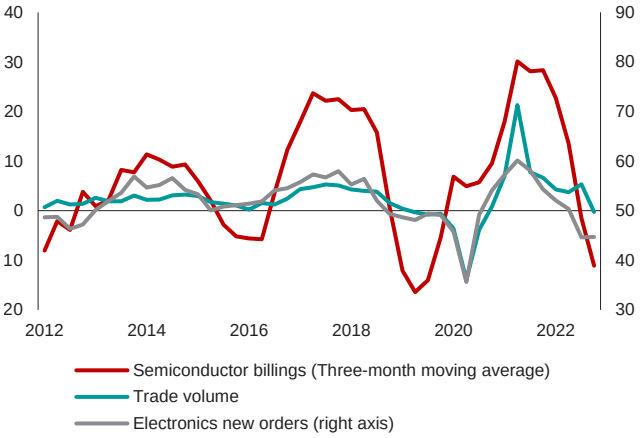
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Data for China refer to the contribution of gross fixed capital formation to year-on-year GDP growth. Data are unavailable for Cambodia, Lao PDR, Myanmar, and Vietnam. ASEAN-5 = Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

Figure 1.13. Selected ASEAN+3: Growth of Credit to Private Nonfinancial Corporations
(Percent, year-on-year, four-quarter moving average)



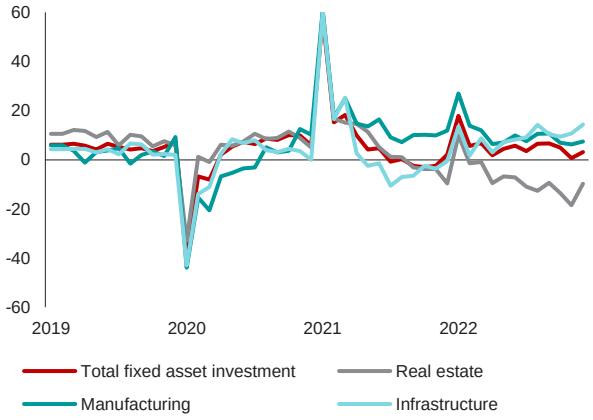
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Credit growth is calculated based on local currency terms. ASEAN-5 growth is calculated by taking the simple average of growth in individual economies. Data refer to claims on nonfinancial institutions by depository corporations other than the central bank (China); loans and advances by authorized institutions to nonfinancial sectors except household sector (Hong Kong); loans to corporations by domestic banks (Japan); claims on nonfinancial corporations by depository corporations other than the central bank (Korea); loans to private nonfinancial corporations by commercial and rural banks (Indonesia); loans by the banking system less household sector (Malaysia); all bank loans to nonfinancial production less household sector (the Philippines); credit to nonfinancial corporations (Singapore); and claims on private nonfinancial corporations by depository corporations other than the central bank (Thailand). ASEAN-5 = Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

Figure 1.14. World: Semiconductor Billings, Trade Volume, and Electronics New Orders
(Percent, year-on-year; index)



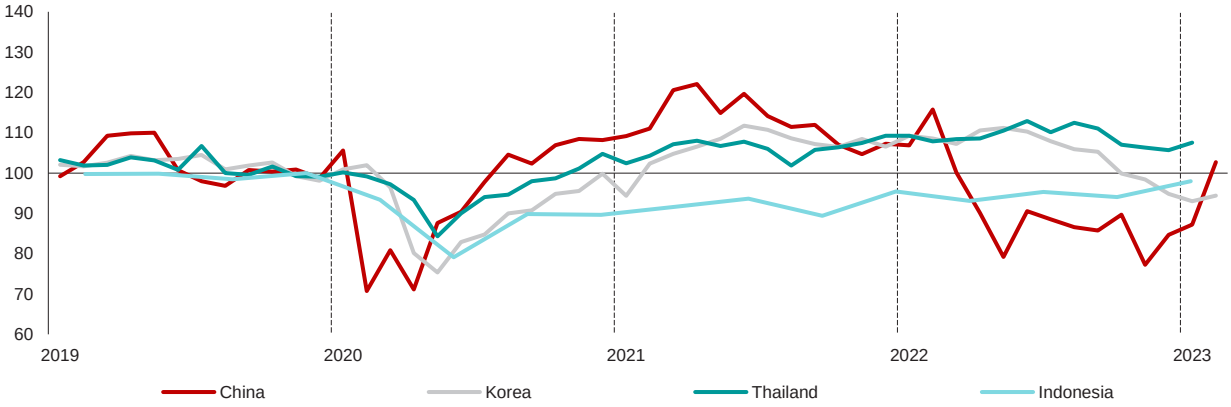
Source: World Semiconductor Trade Statistics, Inc.; Netherlands Bureau for Economic Policy Analysis ; S&P Global via Haver Analytics; AMRO staff calculations.
Note: Data are up to Q4 2022. Data on electronics new orders are seasonally adjusted and derived from the S&P Global Electronics Purchasing Managers' Index which indicate expansion if above 50 and contraction if below 50.

Figure 1.15. China: Fixed Asset Investment, by Sector
(Percent, year-on-year)



Source: China National Bureau of Statistics via Haver Analytics.

Figure 1.16. Selected ASEAN+3: Business Investment Prospects
(Index, October–December 2019 = 100, seasonally adjusted)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Data refer to the investment subindicator of the CKGSB Business Conditions Index (China); investment prospects in the Federation of Korean Industries' Business Survey Index (Korea); Bank of Thailand's Private Investment Index (Thailand); and investment realization in Bank Indonesia's Business Survey (Indonesia). Data are monthly for all economies except Indonesia (quarterly). Data for Indonesia are indexed to Q4 2019 = 100.

Exports Face Headwinds

ASEAN+3 exports grew moderately in 2022, amid softening global demand. Exports of the Plus-3 and ASEAN-6 started to contract in October as economic activity slowed in major trading partners—e.g., the United States and the euro area (Figure 1.17). For 2022 as a whole, exports of these economies grew by 6 percent in value, significantly less than in 2021 when the growth rate was 26 percent (Figure 1.18).

Exports were also beset by production challenges during the year. In early 2022, businesses in the region—particularly China and Hong Kong—were hampered by strict containment measures aimed at limiting the spread of COVID-19 infections (Omicron). Factories struggled through the year with recurring waves of infections and associated labor shortages, although they were able to manage capacity and production better than in 2021. Supply disruptions caused by the Ukraine crisis and lockdowns in China drove up raw material costs and impeded production in economies such as Japan and Korea. However, cost pressures likely peaked in the second half of 2022 and are expected to continue to ease in 2023 (Figure 1.19).

The region's export growth is projected to weaken in 2023 as global demand slows further. GDP growth in the euro area is expected to be subdued due to ongoing geopolitical tensions and monetary policy tightening (European Commission 2022). The US economy is also expected to grow at a slower pace in 2023, as continued monetary policy tightening keeps a lid on economic activity. All this will translate into softer external demand

for ASEAN+3 exports. In addition, export controls that the United States imposed on semiconductor firms in China in October 2022 could significantly weaken global trade in semiconductors because China is the largest importer in the sector (Box 1.2).

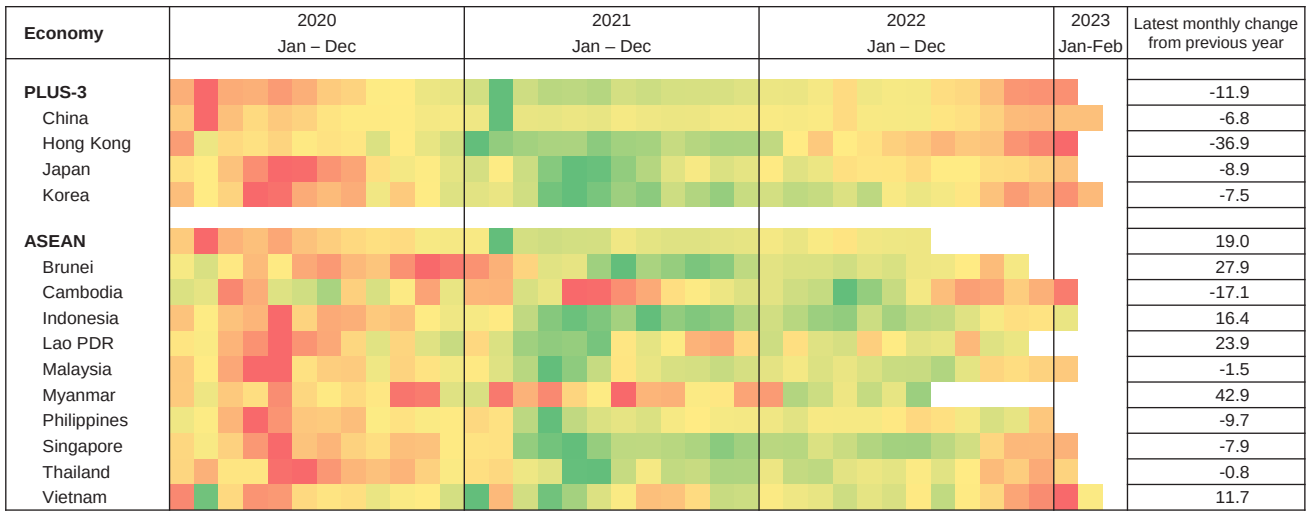
Leading indicators are already showing deteriorating business conditions in the region's manufacturing sector. The dimmer global outlook, which coincided with the semiconductor downcycle, has been reflected in weaker order books for firms in the region since the second half of 2022. Some firms have reportedly started curtailing production to reduce unsold inventories that were stockpiled during the global supply chain disruption in the middle of 2022 (Markit 2022). High-frequency manufacturing PMI data show a softening of activity in most economies in the three months ending February 2023, compared to the preceding three months (Figure 1.20 and Figure 1.21). PMI readings for China, Hong Kong, Korea, and Thailand improved slightly at the start of 2023 following the resumption of economic activities in China.

Services trade remained strong in 2022, thanks to borders reopening throughout the region, and is expected to strengthen further in 2023. Services exports grew by an average of 14 percent (year-on-year) in the first three quarters of 2022, higher than before the pandemic (Figure 1.22). Transport services growth was helped by the easing of shipping disruptions caused by COVID-19 containment measures. Meanwhile, travel services posted the strongest expansion, especially in Indonesia, Malaysia, Singapore, and Thailand as a result of border reopening (Box 1.3). Services trade is expected to strengthen in 2023 with China having reopened its borders in January after nearly three years of lockdown. The region's travel sector is poised to rebound strongly, with many economies benefitting from increased outbound tourism from China. This should help to offset the expected slower growth in transport services due to slower global trade.

Foreign direct investment (FDI) flows into the ASEAN+3 region remained robust in the first three quarters of 2022. Realized inward FDI flows amounted to USD 510 billion, slightly less than in the first three quarters of 2021 but more than in the same period in earlier years (Figure 1.23). China was the largest recipient, accounting for almost half of FDI inflows in the region. FDI inflows into China's manufacturing sector grew while FDI inflows into its services sector fell relative to the previous year due to the recurring outbreaks of and strict measures against COVID-19. FDI inflows in the other Plus-3 economies and ASEAN-5 remained strong, especially in Hong Kong and Malaysia (Figure 1.24).

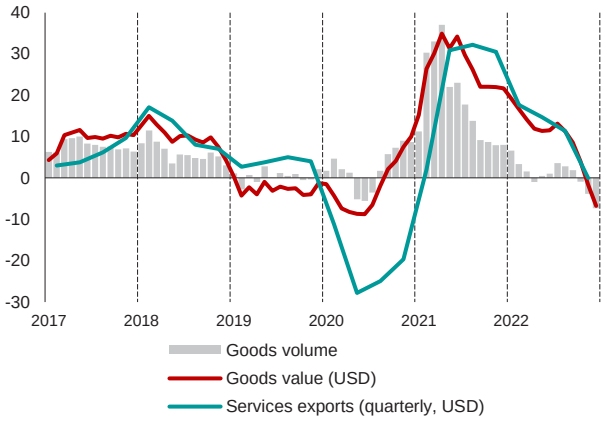
Data on announced projects present a mixed picture of the FDI outlook in the region. The number of announced FDI projects continued to hold up in 2022, although the capital expenditure of announced projects paled in comparison with pre-pandemic amounts, suggesting greater caution from foreign investors (Figure 1.25). After declining in early 2022, announced FDI projects in China picked up during the year, driven largely by retail-related investments in anticipation of a consumer spending rebound on the reopening of the economy (Xinhua 2023). In contrast, announced FDI projects destined for ASEAN have moderated since last July as rising interest rates and weakening global demand dampened investor interest in the region's manufacturing (Figure 1.26). In terms of sectors, retail continued to draw the most interest from overseas investors—accounting for the highest number of project announcements in China, Indonesia, Japan, and Malaysia in 2022—while investor interest for other sectors has yet to recover to pre-pandemic levels (Figure 1.27).

Figure 1.17. ASEAN+3: Goods Export Growth
(Percent, year-on-year, three-month moving average)



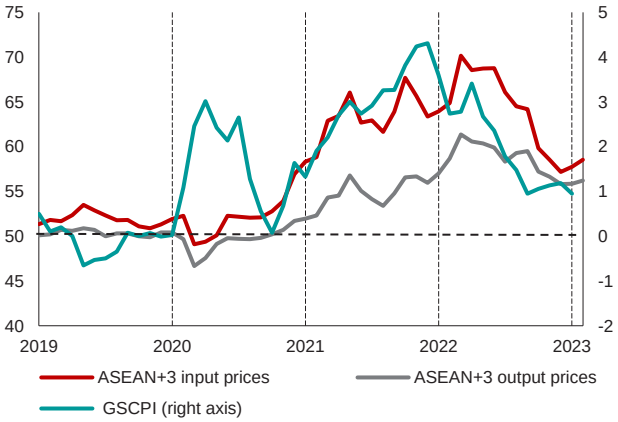
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Calculated based on merchandise exports in US dollars for all economies. Colors indicate the size and direction of change: the deeper the shade of red, the larger the negative change, with the darkest shade indicating a decrease of more than 30 percent year-on-year; the deeper the shade of green, the larger the positive change, with the darkest shade indicating an increase of more than 30 percent year-on-year.

Figure 1.18. Selected ASEAN+3: Goods and Services Export Growth
(Percent, year-on-year, three-month moving average)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Goods exports data are not available for Brunei, Cambodia, Lao PDR, and Myanmar. Services exports data are not available for Brunei and Myanmar.

Figure 1.19. World and Selected ASEAN+3: Global Supply Chain Pressure and Manufacturing Price Indices
(Index, seasonally adjusted; number of standard deviations)



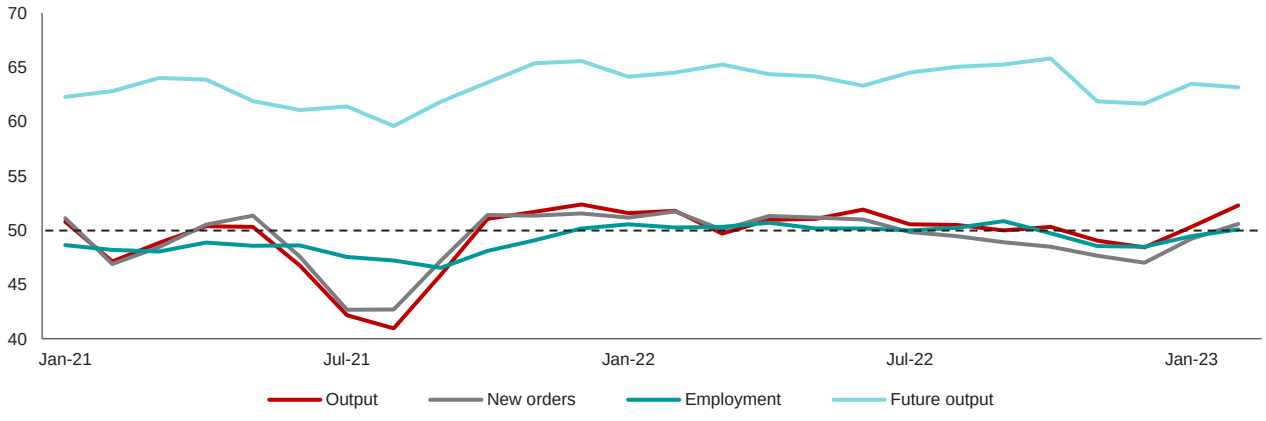
Source: S&P Global via Haver Analytics; Federal Reserve of New York; AMRO staff calculations.
Note: ASEAN+3 manufacturing prices are sourced from individual purchasing managers' index (PMI) surveys for China, Indonesia, Japan, Korea, Malaysia, Myanmar, the Philippines, Thailand, and Vietnam, and aggregated by simple averaging. A reading above 50 denotes an increase in price over the previous month, and a reading below 50 denotes otherwise. Global supply chain pressure index (GSCPI) data refer to standard deviations from the average value, where a higher deviation denotes higher supply chain pressure.

Figure 1.20. Selected ASEAN+3: Manufacturing Purchasing Managers' Index
(Seasonally adjusted)

Economy	2020 Jan to Dec	2021 Jan to Dec	2022 Jan to Dec	2023 Jan to Feb	Change in latest 3 months from preceding 3 months
PLUS-3					**0.2**
China					**1.1**
Hong Kong					**2.9**
Japan					**-1.6**
Korea					**0.3**
ASEAN					**-1.0**
Indonesia					**-0.8**
Malaysia					**-1.0**
Philippines					**0.4**
Singapore					**-7.2**
Thailand					**1.1**
Myanmar					**3.1**
Vietnam					**-1.9**

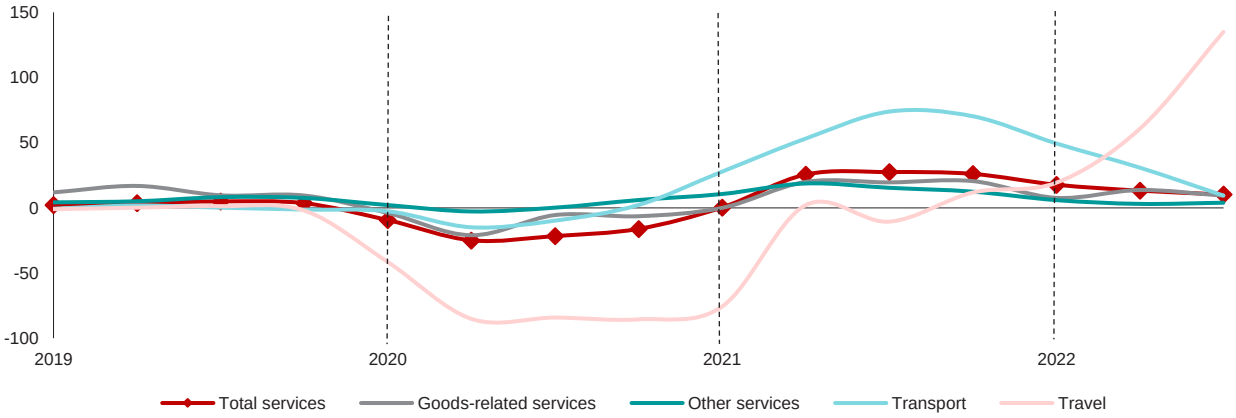
Source: S&P Global via Haver Analytics; AMRO staff calculations.
Note: The Purchasing Managers' Index (PMI) readings are coded by colors: the redder the shade, the lower the value from the diffusion level of 50; the greener the shade, the higher the value from 50. A PMI reading of above 50 denotes an increase in activity over the previous month, and a reading below 50 denotes otherwise. The PMIs of Hong Kong and Singapore denote private sector PMIs. Data in the last column are calculated by subtracting the average PMI of the latest three months from the average PMI of the preceding three months.

Figure 1.21. Selected ASEAN+3: Manufacturing Purchasing Managers' Indices, by Component
(Index, seasonally adjusted)



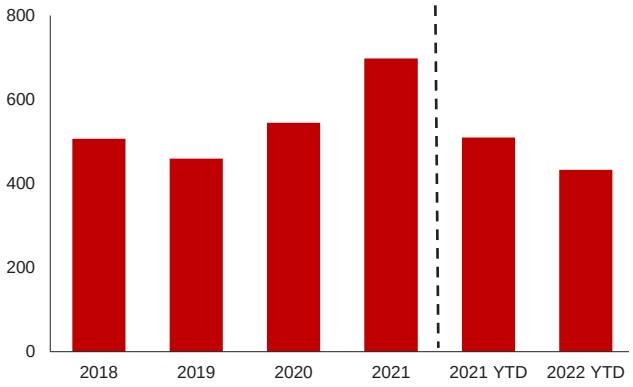
Source: S&P Global via Haver Analytics; AMRO staff calculations.
Note: A Purchasing Managers' Index (PMI) reading of above 50 denotes an increase in activity over the previous month, and a reading below 50 denotes a decrease. Data are calculated by taking a simple average of manufacturing PMI subindices for China, Indonesia, Japan, Korea, Malaysia, Myanmar, the Philippines, Thailand, and Vietnam.

Figure 1.22. ASEAN+3: Growth in Exports of Services, by Category
(Percent, year-on-year)



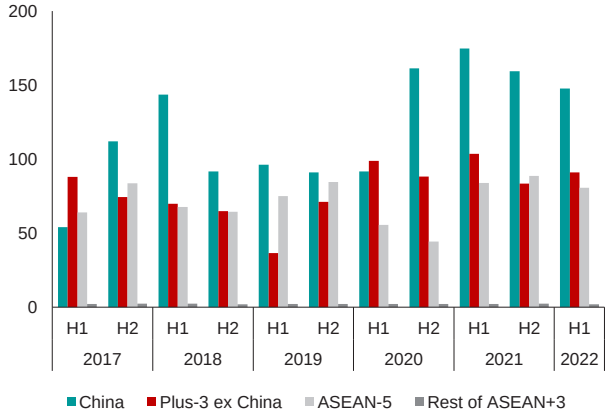
Source: UNCTADstat; AMRO staff calculations.
Note: Transport services comprise sea transport, air transport, other modes of transport, and postal and courier services. Exports of travel services cover goods and services (excluding transport services) that are acquired from an economy by nonresidents during visits to that economy. Data for Brunei, Cambodia, Myanmar, and Vietnam are not available.

Figure 1.23. Selected ASEAN+3: Foreign Direct Investment
(Millions of US dollars)



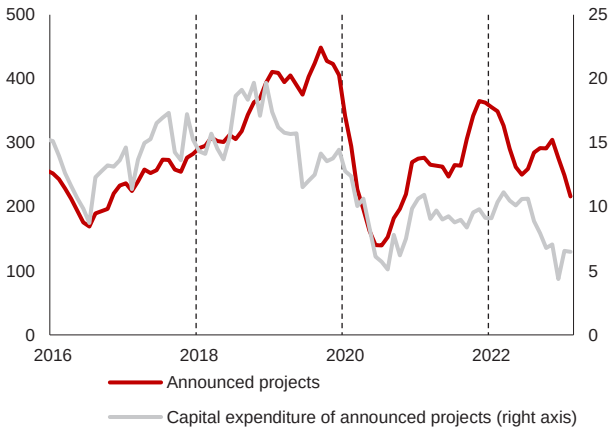
Source: Balance of Payments and International Investment Position Statistics database, IMF; AMRO staff calculations.
Note: Data refer to the direct investment liabilities item in the balance of payments. Data are up to Q3 2022, except for Lao PDR and Malaysia (up to Q2 2022). Brunei, Myanmar, and Vietnam are excluded due to unavailability of data. YTD = year-to-date.

Figure 1.24. Selected ASEAN+3: Foreign Direct Investment, by Regional Grouping
(Millions of US dollars)



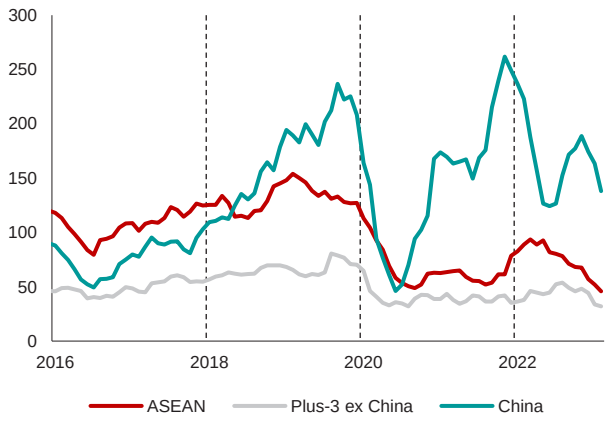
Source: International Financial Statistics database, IMF; AMRO staff calculations.
Note: Data refer to the direct investment liabilities item in the balance of payments. ASEAN-5 = Indonesia, Malaysia, the Philippines, Singapore, and Thailand; H = half; Plus-3 ex China = Hong Kong, Japan, and Korea.

Figure 1.25. ASEAN+3: Aggregate Inward FDI Announcements
(Number of projects; billions of US dollars)



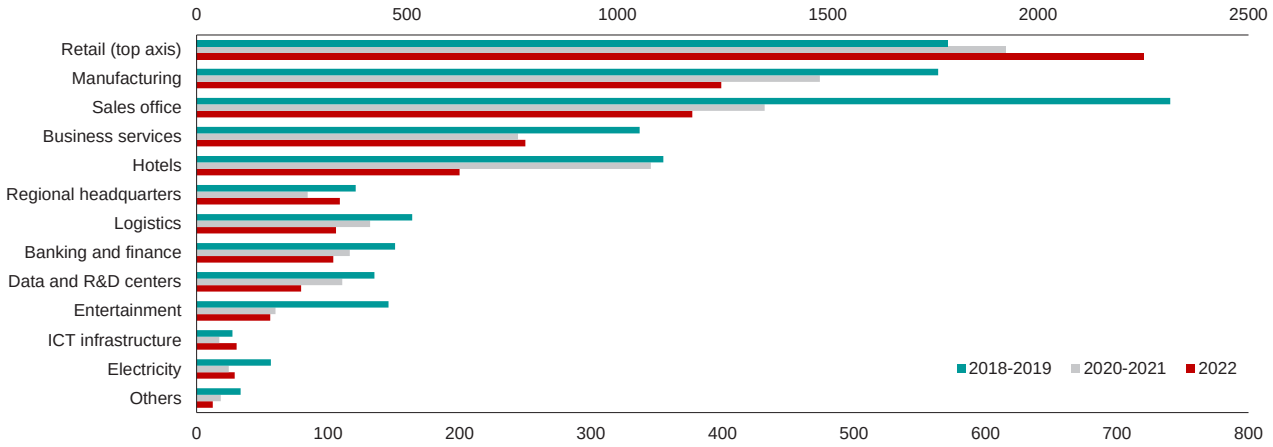
Source Orbis Crossborder; AMRO staff calculations.
Note: Data refer to the six-month moving average of the number and capital expenditure of announced projects for each month. There are four types of FDI project announcements: new projects, expansion projects, relocated projects and co-located projects (i.e., those that are moved to a location where the investor already has an existing business). An FDI project announced in a given year can start in that same year or in future years; in some instances, an announced project could be subsequently canceled.

Figure 1.26. ASEAN+3: Aggregate Inward FDI Announcements, by Regional Grouping
(Number of projects)



Source Orbis Crossborder; AMRO staff calculations.
Note: Data refer to the six-month moving average of the number and capital expenditure of announced projects for each month. There are four types of FDI project announcements: new projects, expansion projects, relocated projects and co-located projects (i.e., those that are moved to a location where the investor already has an existing business). An FDI project announced in a given year can start in that year or in future years; in some instances, an announced project could be subsequently canceled. Plus-3 ex China = Hong Kong, Japan, and Korea.

Figure 1.27. ASEAN+3: Aggregate Inward FDI Announcements, by Sector
(Average number of projects)



Source Orbis Crossborder; AMRO staff calculations.
Note: There are four types of FDI project announcements: new projects, expansion projects, relocated projects and co-located projects (i.e., those that are moved to a location where the investor already has an existing business). An FDI project announced in a given year can start in that same year or in future years; in some instances, an announced project could be subsequently canceled. ICT = information and communication technology; R&D = research and development. Others include agriculture, commercial real estate, construction, education and training, health, mining, recycling, resident real estate, technical support, testing center(s) and utilities.

Box 1.2:

Chipping Away at China's Advance: How Will US Trade Restrictions Affect ASEAN+3's Semiconductor Sector?

The United States in the past two and a half years has implemented various policy measures aimed at slowing China's ability to produce advanced semiconductors. In September 2020, the Trump administration notified some US firms that they would need a license to export to Semiconductor Manufacturing International Corporation (SMIC), China's largest chip manufacturer (Whalen 2020). Three months later, the US Commerce Department placed SMIC and 10 of its subsidiaries, together with dozens of other Chinese firms, on the so-called entity list, which blocks US firms from exporting technology to them without a government license (Whalen and Nakashima 2020). In August 2022, US President Biden signed into law the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act of 2022 which, among other things, aims to "counter China" by providing USD 52.7 billion in federal subsidies to bolster domestic chip manufacturing and prohibiting funding recipients from expanding chip manufacturing in China (The White House 2022).

The United States stepped up export controls on Chinese semiconductor firms late last year. In October 2022, the Biden administration prohibited US firms from exporting to China the technology, software, and equipment used in producing advanced (14-nanometer process) computing chips and supercomputers, and barred US citizens and green-card holders from activities that wholly or partly support the development or production of certain advanced chips without a license from the US government. The measures, some taking immediate effect, built on notifications sent earlier in the year to top US toolmakers, effectively requiring them to halt shipments of equipment to wholly Chinese-owned factories producing advanced (10-nanometer process) logic chips (Nellis, Freifeld, and Alper 2022). In December 2022, the US Department of Commerce added 35 Chinese firms, including chipmaker Yangtze Memory Technologies and other major Chinese players in the artificial intelligence chip sector, to the entity list, bringing the number of Chinese firms restricted from acquiring advanced US technology to more than 65 (Reuters 2022).

The export controls—if effective—are likely to slow down China's rapid advances in high-end technologies in the short term. China is a net importer of semiconductors and semiconductor manufacturing equipment. The United States is a key trading partner for semiconductor manufacturing equipment (Figure 1.2.1). Of the top five semiconductor capital equipment ("semicap") vendors, which take nearly 70 percent of the global market, three—Applied Materials, KLA, and Lam Research—are from the United States. At least 80 percent of SMIC's equipment comes from US vendors (Kharpal 2021). Some key Chinese semiconductor firms have begun asking core US employees to leave in order to comply with this latest round of restrictions (McMorrow, Liu, and Liu 2022). Moreover, many of the new US export controls also aim at preventing *third-country* firms from selling advanced chips to China or supplying Chinese firms with tools to make their own advanced chips. Those that use US equipment or employ US persons to produce specific high-end chips will need a license from the US government to sell to China. For example, Taiwan Province of China's TSMC and Korea's Samsung Electronics—the world's biggest foundries—rely heavily on equipment from US manufacturers, and would be barred from exporting certain chips to China (Kharpal 2021). If other economies join the United States in its export controls, China will lose access to high-end semiconductor manufacturing machines; without new or replacement supplies, its existing production cannot expand. Japan and the Netherlands, which have two of the world's top five semicap manufacturers—Tokyo Electron and ASML—have reportedly agreed to join the US in tightening controls on the export of advanced chipmaking machinery to China (Koc and Leonard 2023).

The export controls will have repercussions on global semiconductor trade. China is the single-largest importer of semiconductors, accounting for over a third of global imports in 2021, making it a key driver of global semiconductor trade patterns (Figure 1.2.2). China's semiconductor imports have declined since January 2022, reflecting weak domestic demand and the ongoing downturn in the global semiconductor market (Figure 1.2.3). This decline could continue, especially as Applied Materials, KLA, and Lam Research have already suspended sales and services to Chinese chipmakers.

This box was written by Marthe M. Hinojales and Hongyan Zhao.

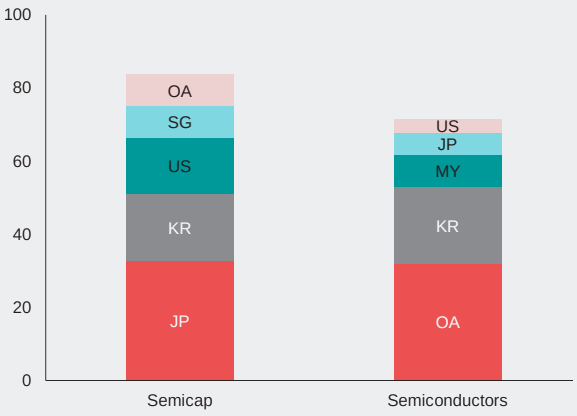
The export controls are anticipated to have negative repercussions on the revenue of US suppliers at a time when their profits are falling and input prices are high—China comprises about 31 percent of Lam Research's sales and 33 percent of Applied Materials' sales (Hufbauer and Hogan 2022). The United States' intention to widen its regulatory influence over the global semiconductor industry and its willingness to apply provisions with extraterritorial impact is also causing concern among its allies. In the European Union, for example, governments are still analyzing how their own semiconductor firms could be affected by US sanctions on China—some may need to fence off operations serving China from those that serve the United States, adding to costs and complexity in global semiconductor supply chains.

For the rest of ASEAN+3, the impact will vary but is hard to pin down. Semiconductor supply chains are highly complex and globalized. Many semiconductor firms operating in the region have manufacturing processes and products that rely on US technology, and thus may be subject to export controls imposed by the US government (Figure 1.2.4). Although the United States has framed the export controls as an attempt to curb Chinese military use of high-end chips, the dual-use nature and ubiquity of chips in daily life means the implications of its actions could run wider. A full-on, widespread decoupling between the United States and China could increase semiconductor prices by as much as 65 percent (Varas and others 2021), which would significantly affect demand, capital investment, as well as future economic growth in the ASEAN+3 region.

- Japan and Korea, which excel in certain high-end segments of the semiconductor industry—only Korea and Taiwan Province of China have the capacity to make the most cutting-edge 5-nanometer chips—are under pressure to join the US-proposed Chip 4 Alliance, a "democratic semiconductor supply chain" (EIU 2022). While Japan has signaled an alliance with the United States, Korea's chipmakers and assemblers would be hit hard as China remains a significant client and production base for them.

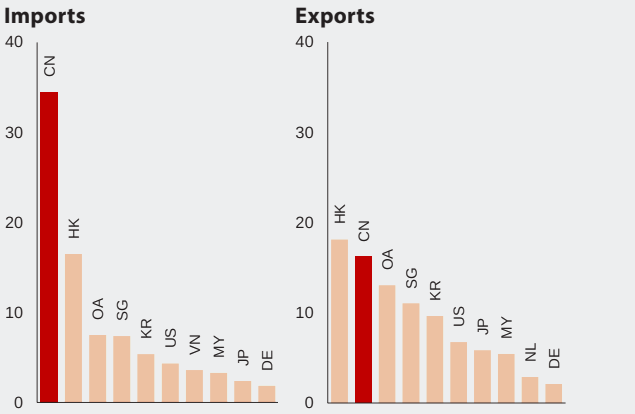
- Other economies in the region, which produce and export lower-end chips that are not the primary target of the US export controls, are unlikely to be severely impacted in the short term. These older-generation chips are used in a wide range of applications, including transport, communications, and medical equipment, among others, and demand for them remains large. Opportunities could even open up for established and emerging players in the region (e.g., Malaysia and Vietnam) to fill the void in supply caused by US efforts to isolate China from the market. In the long term, the US trade restrictions are likely to accelerate China's drive to achieve self-sufficiency in the advanced chip segment. This would have positive implications for the development of emerging growth drivers in the ASEAN region, like electric vehicles, green technologies, and renewable energy systems (Chapter 2).

Figure 1.2.1. China: Top Partners for Semiconductor Imports, 2017–21
(Percent of total semiconductor imports)



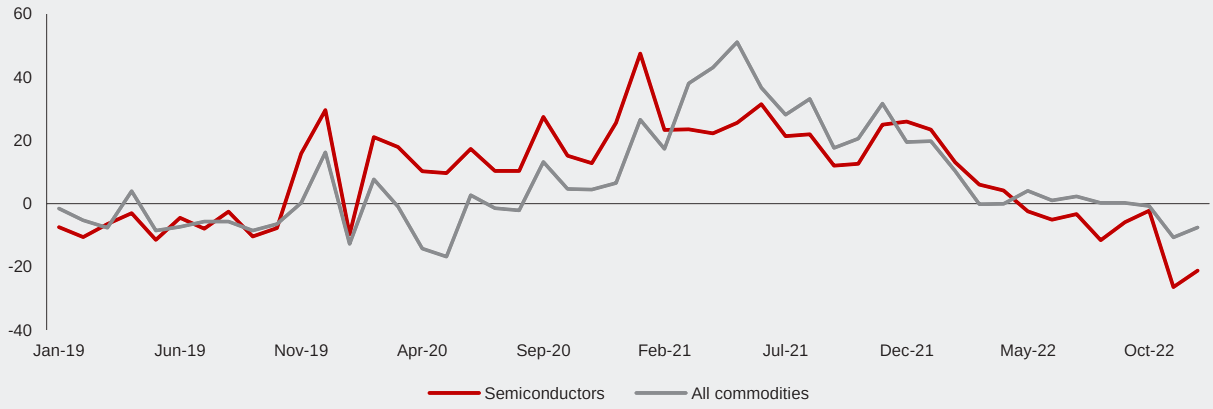
Source: UNComtrade; AMRO staff calculations.
Note: Shares are calculated using trade data in US dollars. Semiconductors refer to HS codes 8541-42. Semicap (semiconductor capital equipment) refers to HS code 8486. JP = Japan; KR = Korea; MY = Malaysia; OA = Other Asia (includes Taiwan Province of China); SG = Singapore; US = United States.

Figure 1.2.2. World: Top 10 Semiconductor Importers and Exporters, 2017–21
(Percent of global trade)



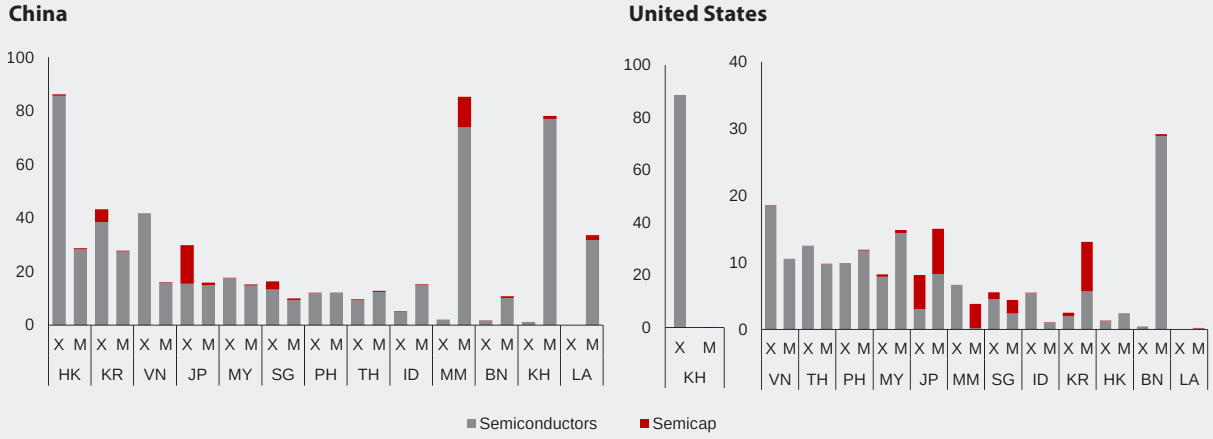
Source: UNComtrade; AMRO staff calculations.
Note: Data refer to HS codes 8541–2 (which includes diodes, transistors, similar semiconductor devices, photovoltaic cells assembled or not in modules or panels, light-emitting diodes, mounted piezo-electric crystals, and electronic integrated circuits) and 8486 (semiconductor capital equipment). Shares are calculated using trade data in US dollars. CN = China; DE = Germany; HK = Hong Kong; JP = Japan; KR = Korea; MY = Malaysia; OA = Other Asia (includes Taiwan Province of China); SG = Singapore; US = United States; VN = Vietnam.

Figure 1.2.3. China: Import Growth
(Percent, year-on-year)



Source: IHS Markit; CEIC; AMRO staff calculations.
Note: Growth rates are calculated using trade data in US dollars.

Figure 1.2.4. ASEAN, Hong Kong, Japan, and Korea: Semiconductor Trade with China and the United States, 2017–21
(Percent of each economy's total semiconductor and semicap exports, imports)



Source: UNComtrade; AMRO staff calculations.
Note: Data refer to HS codes 8541–2 (which includes diodes, transistors, similar semiconductor devices, photovoltaic cells assembled or not in modules or panels, light-emitting diodes, mounted piezo-electric crystals, and electronic integrated circuits) and 8486 (semiconductor capital equipment). Shares are calculated using trade data in US dollars. BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; M = imports; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam; X = exports.

Box 1.3:

The Return of Travel and Tourism

International travel has begun to recover in the region after more than two years of border closures. Borders in the region were progressively reopened throughout 2022 as vaccination rates increased and COVID infection rates declined. By the end of 2022, almost half of the region's 14 economies had fully removed all entry restrictions, including pre-departure and on-arrival COVID-19 testing and post-arrival quarantine and monitoring (Figure 1.3.1). International flights have resumed, with airports in Indonesia, Korea, the Philippines, Singapore, and Thailand seeing a resurgence to more than half of their pre-pandemic traffic (Figure 1.3.2).

The recovery in travel and tourism has been more pronounced in ASEAN than in the Plus-3. ASEAN economies saw more international tourist arrivals in 2022 than the Plus-3 economies, although arrivals were well below pre-pandemic numbers as the hoped-for resumption of outbound tourism from China did not materialize (Figure 1.3.3, left panel). ASEAN's travel receipts in the first three quarters of 2022 were higher than annual receipts in 2020 and 2021, and higher than the Plus-3's in the same period (Figure 1.3.4).

Monthly tourist arrivals have recovered to more than half their pre-pandemic levels in Cambodia, Indonesia, Malaysia, Singapore, the Philippines, Thailand and Vietnam (Figure 1.3.3, center panel).

- Cambodia—the most tourism-reliant economy in the region—saw tourist arrivals increase when it removed quarantine requirements in November 2021. Tourist arrivals to Cambodia in 2022 surpassed the government's target, as tourists from other ASEAN economies partially made up for the absence of Chinese visitors (Figure 1.3.5 and Figure 1.3.6).

- Indonesia's tourist arrivals and tourism receipts in the first 10 months of 2022 surpassed the government's targets for the full year, thanks to visitors from Malaysia, Australia, Singapore, Timor-Leste, and India (Antara News 2022).

- The sharp rebound in tourist arrivals in Malaysia and Singapore began in April 2022 when the land border crossing was reopened. Singapore accounted for 56 percent of tourists to Malaysia from April through October 2022. Singapore's visitor numbers were boosted by the resumption of so-called MICE events: meetings, incentives, conventions, and exhibitions (STB 2022).

- Thailand achieved its target of receiving at least 10 million foreign visitors in 2022, mainly due to tourists from other ASEAN economies, particularly Malaysia (Tanakasempipat 2022). Russian tourists—the second largest group of visitors to Thailand before the pandemic—also made a return after a six-month absence caused by the suspension of flights and financial transactions following the outbreak of the Ukraine crisis (Sangwongwanich 2022).

- The Philippines surpassed its (relatively modest) target of 2.4 million visitors before the end of 2022, although in the pace of tourism recovery lagged its ASEAN-5 peers because it removed travel restrictions later (Strangio 2022). As in the rest of ASEAN, the absence of Chinese tourists was deeply felt—the bulk of tourists in 2022 were from the United States, Korea, and Australia (Koumelis 2022).

- Vietnam was the first in the region to remove all travel restrictions in May 2022. Tourist arrivals were boosted by visitors from the rest of ASEAN, Korea, and the Americas.

In the Plus-3 economies, entry for foreign visitors remained restricted through most, if not all, of 2022. Only Korea had fully removed all entry restrictions by October. Japan took a phased approach and reopened its borders to small tour groups of vaccinated travelers from selected countries beginning in May; vaccinated travelers from all regions were allowed entry without mandatory quarantine in October, which facilitated a strong inflow of visitors. The number of tourist arrivals

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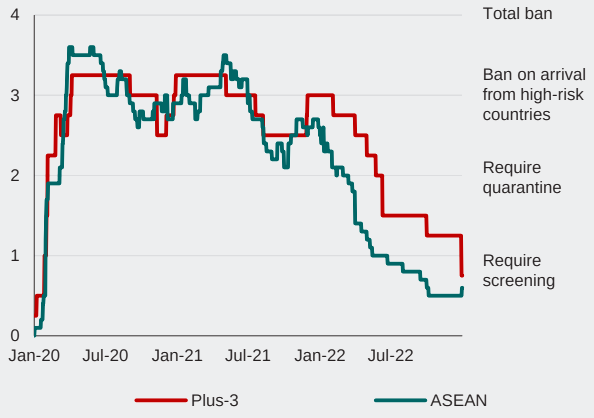
This box was written by Edmond Chiang Yong Choo and Catharine Tjing Yiing Kho.

surpassed 50 percent of the pre-pandemic level by December 2022 (Figure 1.3.3, right panel). China and Hong Kong began to relax domestic COVID-19 containment measures in December, but foreign visitors continue to face the need for pre-departure testing. Quarantine requirements were removed on 8 January 2023.

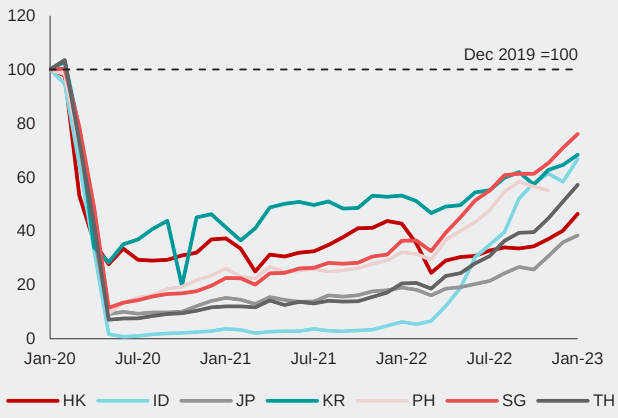
Tourism is expected to recover further in 2023 and return to pre-pandemic levels by 2024. "Revenge travel"—the urge to travel to compensate for lost time due to the pandemic—will be one of the key drivers of tourism demand in the near-term (Tan, M. 2022). The adoption of technology, such as digital travel portals to verify health entry requirements and digital payments across the region will also facilitate travel in the post-pandemic world. In addition, the region's advantages in hosting MICE events and promoting ecotourism could further improve its attractiveness as the world reopens further. The recovery in tourism receipts will be crucial in supporting current account balances and buttressing economic growth in the region as global demand for goods weakens. China holds the key as the largest source of tourists for most of the region's economies—a full regional tourism recovery will be highly dependent on the rate of resumption of outbound travel from China.

Figure 1.3.1. ASEAN+3: International Travel Restrictions
(Index)



Source: Oxford COVID-19 Government Response Tracker, Our World in Data via Haver Analytics; AMRO staff calculations.
Note: The Oxford COVID-19 Government Response Tracker has stopped publishing real-time updates for most jurisdictions on 31 December 2022. Of the ASEAN+3 economies covered, only data for China ends on 8 January 2023. Index ranges from 0 (no restrictions) to 4 (most stringent). ASEAN = Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam; Plus-3 = China, Hong Kong, Japan, and Korea.

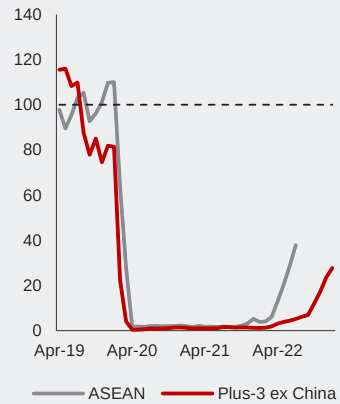
Figure 1.3.2. Selected ASEAN+3: International Flight Arrivals
(Index, December 2019 = 100)



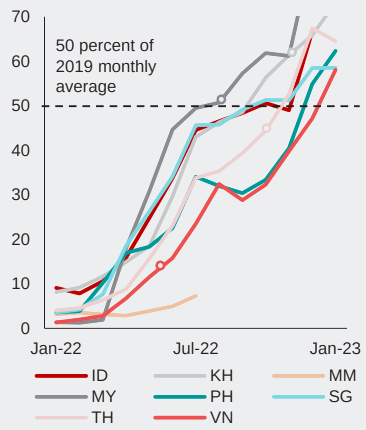
Source: National authorities via Haver Analytics, AMRO staff calculations.
Note: Brunei, Cambodia, China, Lao PDR, Malaysia, Myanmar, and Vietnam are excluded due to data unavailability. Data for Japan include both arrivals and departures. Data for Indonesia refer to departures only. HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; PH = Philippines; SG = Singapore; TH = Thailand.

Figure 1.3.3. Selected ASEAN+3: Tourist Arrivals
(Index, monthly average of 2019 = 100)

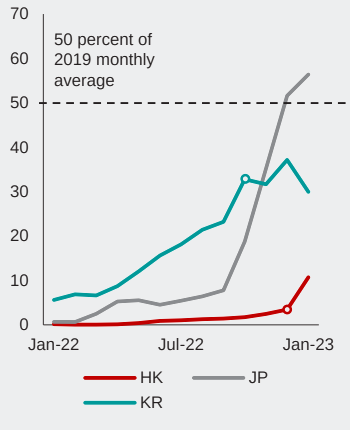
ASEAN+3 ex China



ASEAN

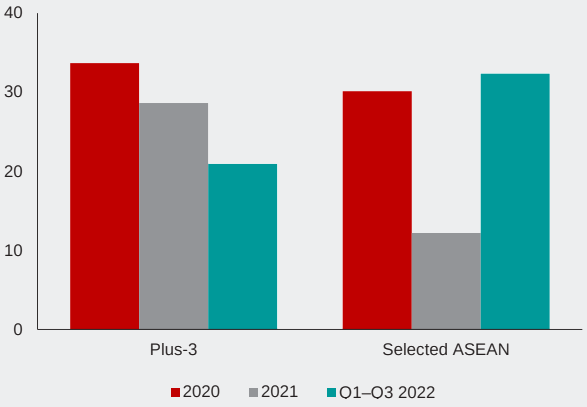


Plus-3 ex China



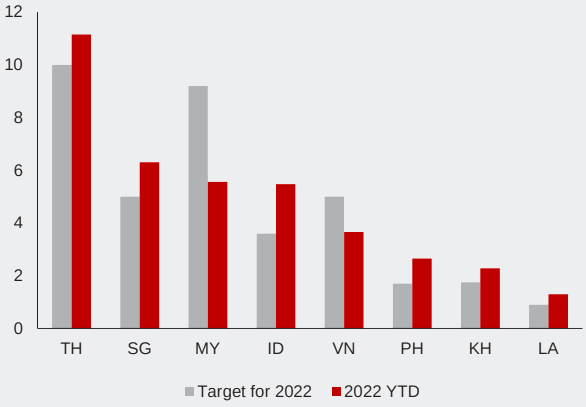
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Brunei, China, and Lao PDR are excluded due to data unavailability. Circle marker denotes the month of full removal of international travel restrictions for that economy. HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 1.3.4. Selected ASEAN+3: Tourist Receipts
(Billions of US dollars)



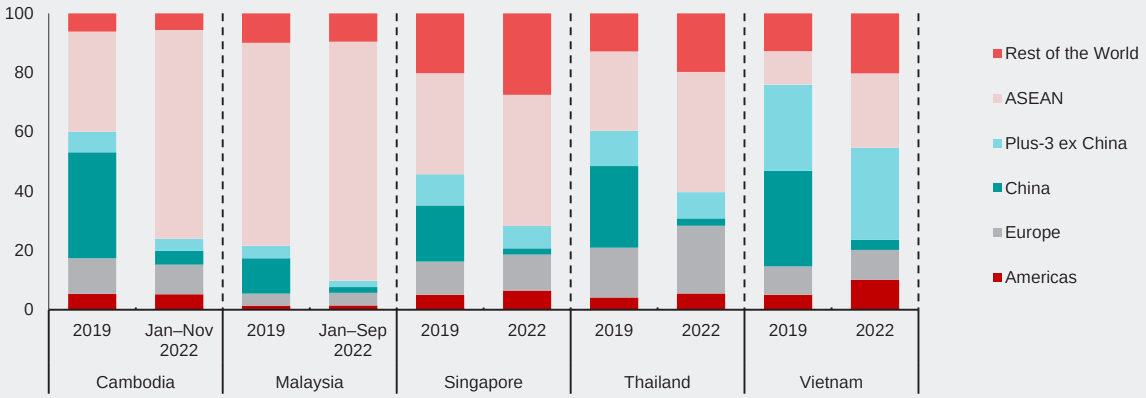
Source: National authorities via Haver Analytics, AMRO staff calculations.
Note: Selected ASEAN refers to Cambodia, Lao PDR, Malaysia, the Philippines, Singapore, Thailand, and Vietnam; Brunei, Lao PDR, and Myanmar are excluded due to data unavailability. Plus-3 = China, Hong Kong, Japan, and Korea.

Figure 1.3.5. Selected ASEAN: Target and Actual Tourist Arrivals
(Millions of inbound tourists)



Source: National authorities.
Note: Data on targets obtained through news flows. The average is used if the target is announced as a range. ID = Indonesia; KH = Cambodia; LA = Lao PDR; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam. YTD = year-to-date. Data are as of December 2022 except for Malaysia (September).

Figure 1.3.6. Selected ASEAN: Share of Tourist Arrivals, by Source Economy
(Percent of total arrivals)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: ASEAN = Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. Plus-3 (ex China) = Hong Kong, Japan, and Korea.

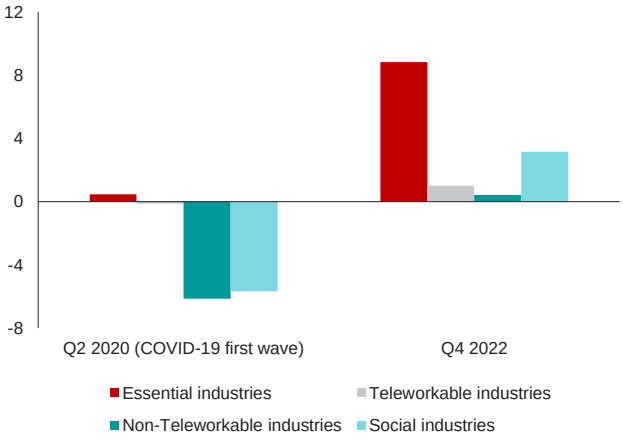
A Partial Labor Market Recovery

Labor market conditions in the region have generally improved, thanks to fuller economic reopening. With the lifting of containment measures and the resumption of cross-border travel, employment in so-called social (high-contact) industries such as travel and tourism—which were hit hardest by the pandemic—turned the corner in the fourth quarter of 2022, registering positive growth. Employment growth in essential industries such as utilities, health, and information and communication technology has continued to be robust (Figure 1.28). Nominal wage growth strengthened in 2022, supported by the resumption of hiring by businesses (Figure 1.29). Targeted fiscal support and active labor market policies such as retraining programs have helped support the jobs recovery. Labor force participation rates in the region have mostly recovered to, and even exceeded, precrisis levels in most economies (Figure 1.30).

However, total employment remains lower than pre-pandemic, particularly in industries where remote working is not possible, such as mining and construction (Figure 1.31). The "employment gap" is estimated to be about 12 million jobs (or 3.5 percent of total employment in the counterfactual situation where the pandemic did not occur). Part of this gap reflects jobs that had been filled by foreign workers who returned home during the pandemic and have not (yet) returned to the host economy. With employment growth still nascent, headline unemployment remains above pre-pandemic rates in some economies, even though sharply down from pandemic peaks in 2020. Korea and Singapore are notable exceptions where the labor market seems to have fully recovered (Figure 1.32).

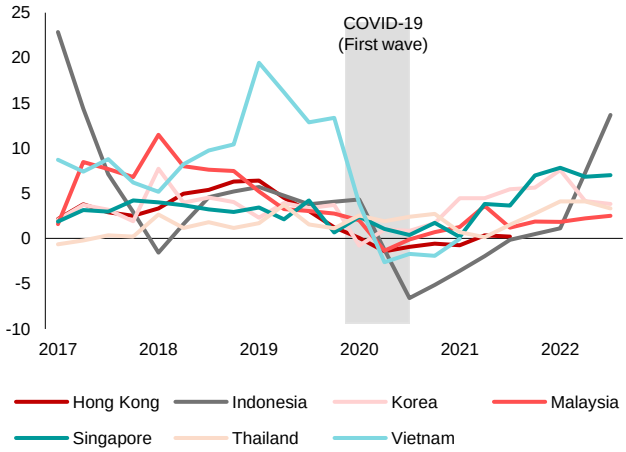
The outlook for the region's labor markets remains challenging. Although employment trends are positive, prospects are uneven across industries. Slowing global trade could dampen manufacturing employment prospects as businesses turn more cautious. But the lifting of cross-border travel restrictions in 2022 should facilitate a fuller return of foreign workers this year. In the medium term, labor market scarring from prolonged unemployment during the pandemic remains a significant risk, particularly for low-skilled and informal sector workers, who are unable to take advantage of policies for upskilling and reskilling (Silva, Weber, and Pela 2022).

Figure 1.28. Selected ASEAN+3: Change in Employment from Q4 2019, by Industry
(Percentage points)



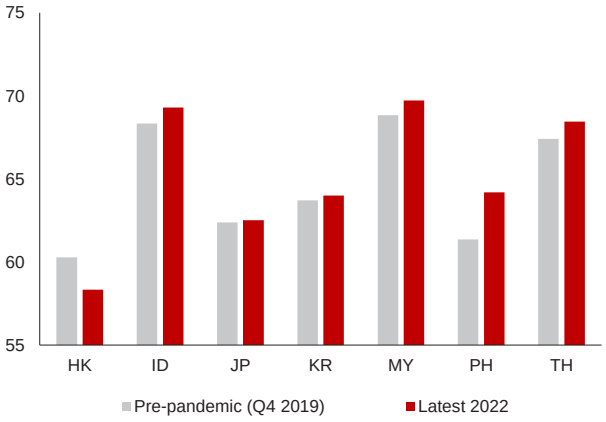
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN+3 refers to Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. Calculations are based on seasonally adjusted employment data by industry, with series starting from Q1 2005 to Q4 2022. Essential industries refer to utilities, transport, information and communication technology, and health and public administration. Social industries refer to wholesale and retail, hotels and restaurants, and arts and entertainment. Industries where remote working arrangement is possible (i.e., teleworkable) refer to finance, professional services and education. Nonteleworkable industries refer to mining, manufacturing, and construction. Given the volatile nature of agricultural employment data, agriculture is excluded from the analysis.

Figure 1.29. Selected ASEAN+3: Nominal Wages, by Economy
(Percent, year-on-year)



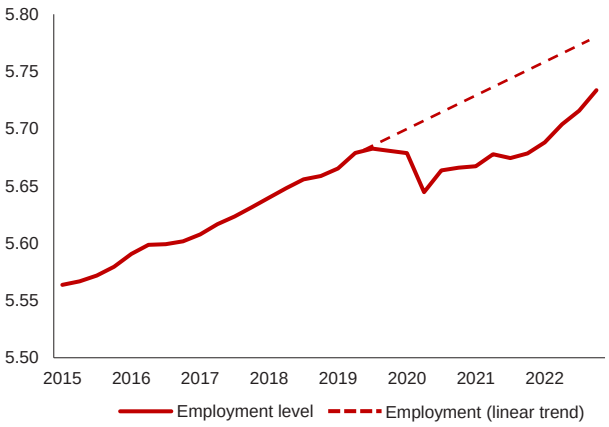
Source: National authorities via Haver Analytics.
Note: Data for Malaysia refer only to manufacturing wages. Data are up to Q3 2022 for Hong Kong, Indonesia and Singapore, and up to Q1 2021 for Vietnam.

Figure 1.30. Selected ASEAN+3: Labor Force Participation Rate
(Percent of working-age population, seasonally adjusted)



Source: National authorities via Haver Analytics.
Note: Latest 2022 data are for Q4, except Indonesia (up to Q3 2022). HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; TH = Thailand.

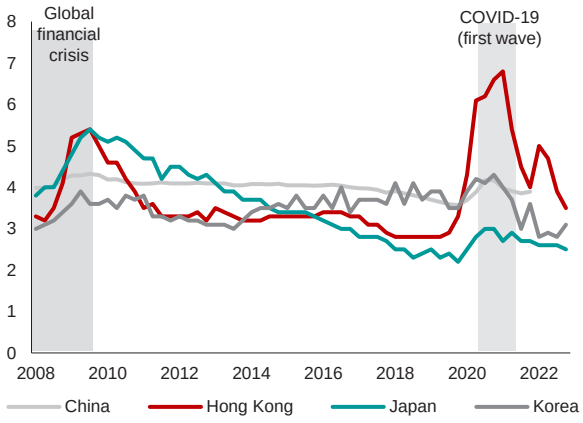
Figure 1.31. Selected ASEAN+3: Employment Level
(Log of employment, seasonally adjusted)



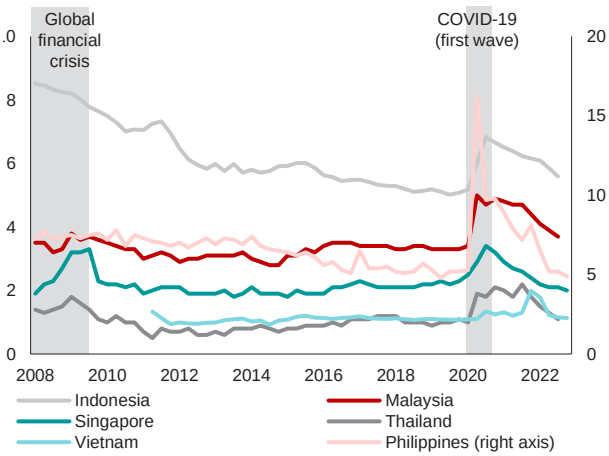
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Selected ASEAN+3 refers to Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. Data are up to Q4 2022.

Figure 1.32. Selected ASEAN+3: Unemployment Rate
(Percent of labor force, seasonally adjusted)

Plus-3



ASEAN-6



Source: National authorities via Haver Analytics.
Note: Data are up to Q4 2022, except for China (Q4 2021) and Indonesia (Q3 2022).

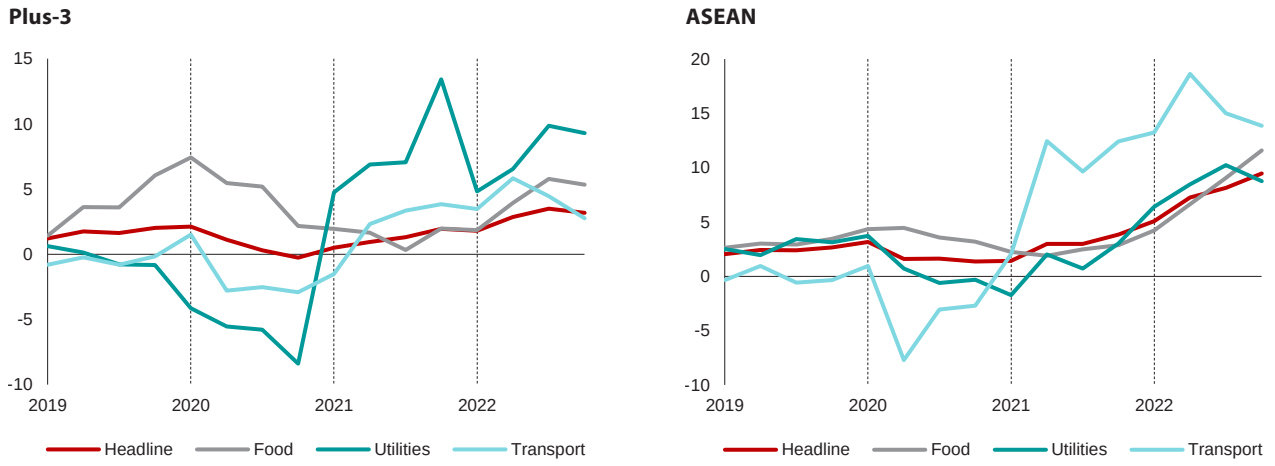
High(er) Inflation—Here to Stay?

Global and regional inflation reached historical highs in 2022. Inflation surged globally in early 2022 due to disruptions in supplies of fuel, grains, and other commodities caused by the Ukraine crisis, the release of pent-up demand in advanced economies, and the lingering impact of supply chain bottlenecks. Headline inflation in ASEAN+3 rose to a nine-year high as the price of food, utilities, and transport goods and services climbed (Figure 1.33). The depreciation of most currencies in the region, following aggressive monetary policy tightening in advanced economies, compounded the increase in domestic prices.

Timely administrative and policy measures prevented inflation in the ASEAN+3 region from spiraling up. Energy importers Japan and Korea reduced fuel import taxes and subsidized fuel products for consumers and businesses. Korea also tightened monetary policy to temper demand-pull inflation. Fuel subsidies were extended in almost all ASEAN economies as well (Kho and Zhao 2022). Indonesia and Malaysia temporarily banned the export of key food products such as crude palm oil, cooking oil, and poultry to ensure sufficient supply for the domestic market in an effort to contain increases in food prices (Tan, Choo, and Chong 2022). In China, high agricultural production kept food prices low and inflation in check.

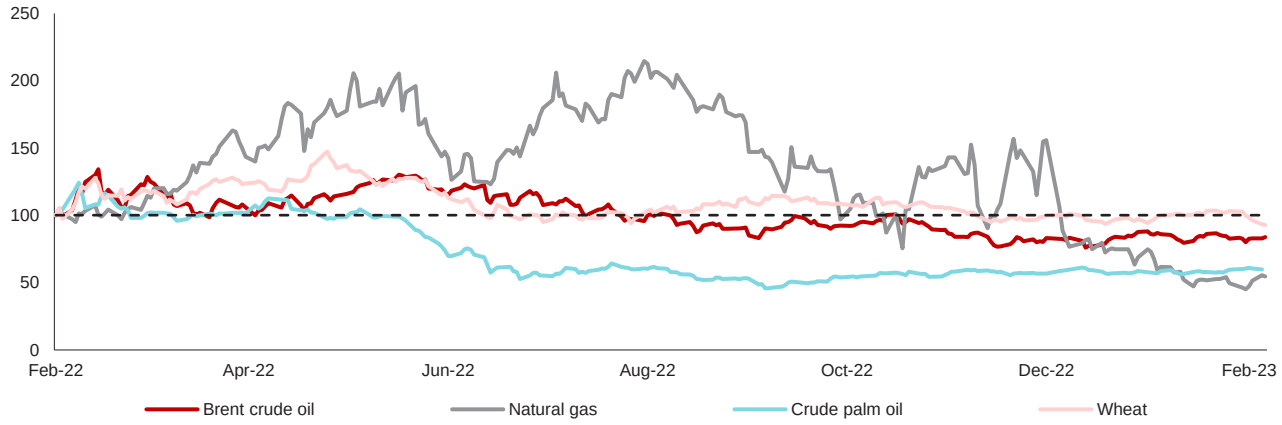
Headline inflation is expected to moderate but remain elevated. Since the third quarter of 2022, commodity prices have declined to levels before the Ukraine crisis because of weaker demand from major importers like China and Europe and some resumption in grain shipments from Ukraine (Figure 1.34). Imported inflation is likely to be lower going forward as global commodity prices are expected to decline further, led by weakening global demand. In the region, strengthening demand from the recovering economies could contribute to inflation pressure.

Figure 1.33. ASEAN+3: Consumer Price Inflation
(Percent, year-on-year)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Aggregate consumer price inflation is calculated as a simple average of individual economies' data series. Data for ASEAN are up to Q4 2022, except for Cambodia (Q3 2022) and Myanmar (Q2 2022).

Figure 1.34. World: Commodity Prices
(Index, 23 February 2022 = 100)



Source: Energy Information Administration; Wall Street Journal; Malaysian Palm Oil Board via Haver Analytics; AMRO staff calculations.
Note: Wheat prices refer to the cash price of wheat quoted in the Kansas City Board of Trade. Prices are indexed to 23 February 2022, a day before the Ukraine crisis began.

Credit Growth Slows

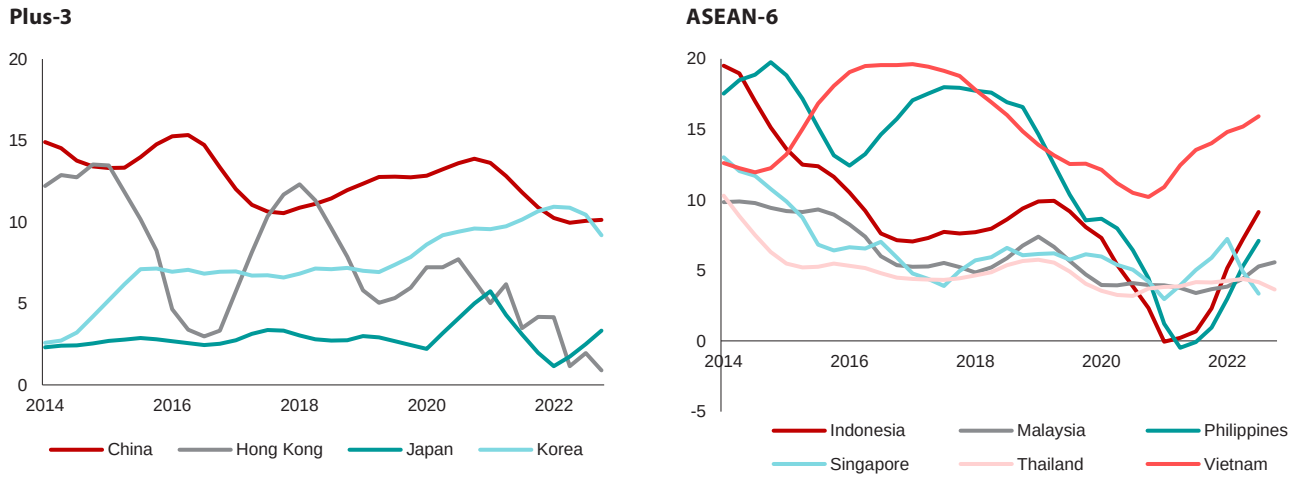
Bank lending activities in ASEAN+3 presented a mixed picture in 2022. Credit growth remained largely subdued in China and Hong Kong, as the stringent pandemic containment measures significantly curtailed loan demand due to deteriorating businesses earnings. On the supply side, banks have also been wary of extending credit to businesses, particularly in sectors hard hit by the pandemic and containment measures, as well as property developers and businesses exposed to the real estate market. In Japan, credit growth is returning to pre-pandemic levels, as the government's zero-interest rate policy helped support the recovery. In Korea, rapid credit growth reflects strong demand for credit from nonfinancial firms. In ASEAN, demand for bank credit not only recovered but strengthened going into the third quarter of 2022—notably in Indonesia, Malaysia, the Philippines, and Vietnam (Figure 1.35).

Credit growth is generally expected to slow in 2023, mainly on account of the softer economic outlook. In the Plus-3, the relatively weaker growth outlook in Japan and Korea could weigh on demand for bank financing in these two economies, whereas in China and Hong Kong, economic reopening should support a recovery in credit demand. In ASEAN-6, the rate of credit expansion is expected to come down from its strong pace in 2022, reflecting moderating domestic demand alongside concerns about the potential weakening of credit fundamentals and higher borrowing costs.

The tightening of the regional interest rate cycle over 2022–23 could weaken asset quality in some ASEAN+3 banking systems. In ASEAN-6, nonperforming loans (NPLs) could increase as businesses (mainly small and medium-sized enterprises) are hurt by slowing economic activity, while expiration of pandemic-era loan

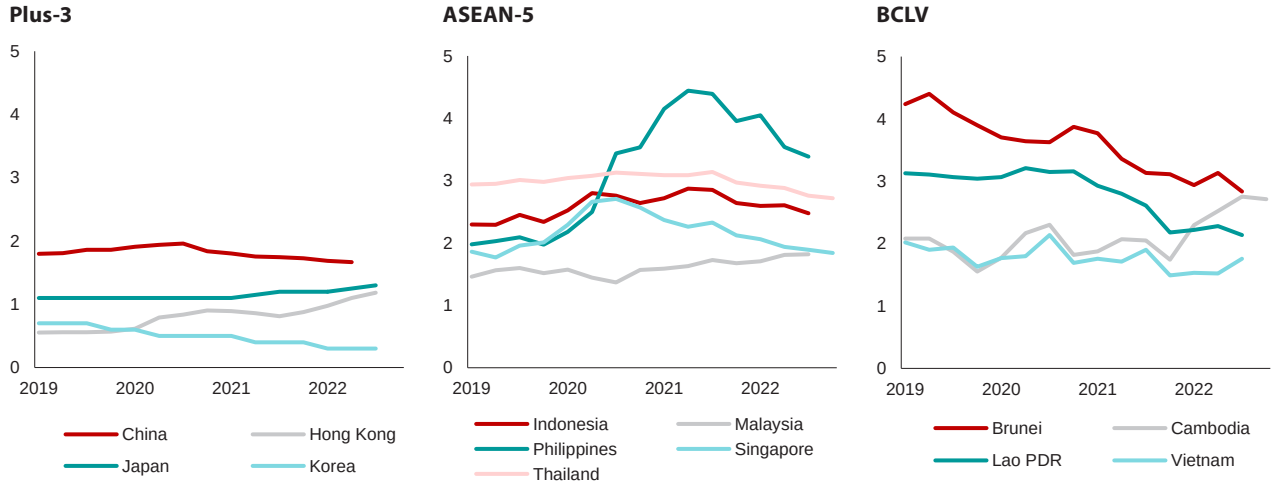
moratoriums would further weigh on asset quality metrics at a time when the lagged effects of policy rate hikes are being felt. In China, continuing property sector weakness could be a drag on the debt servicing capacity of real estate developers (particularly the highly leveraged ones), despite multiple interest rate cuts and other policy measures to ease their (re)financing strains. This could dampen banking sector loan soundness. So far, banks' asset quality remains sound, as reflected in relatively low NPL ratios (Figure 1.36). However, the low NPL ratios do not include NPLs which are suppressed ("hidden") by forbearance measures introduced during the pandemic. Based on estimates from the AMRO Global Macro-Financial Model, "hidden" NPLs could increase reported ratios in the region by up to 5 percentage points for firms and 7.5 percentage points for households (Figure 1.37).

Figure 1.35. Selected ASEAN+3: Growth in Credit to Private Nonfinancial Sector
(Percent, year-on-year, 4-quarter moving average)



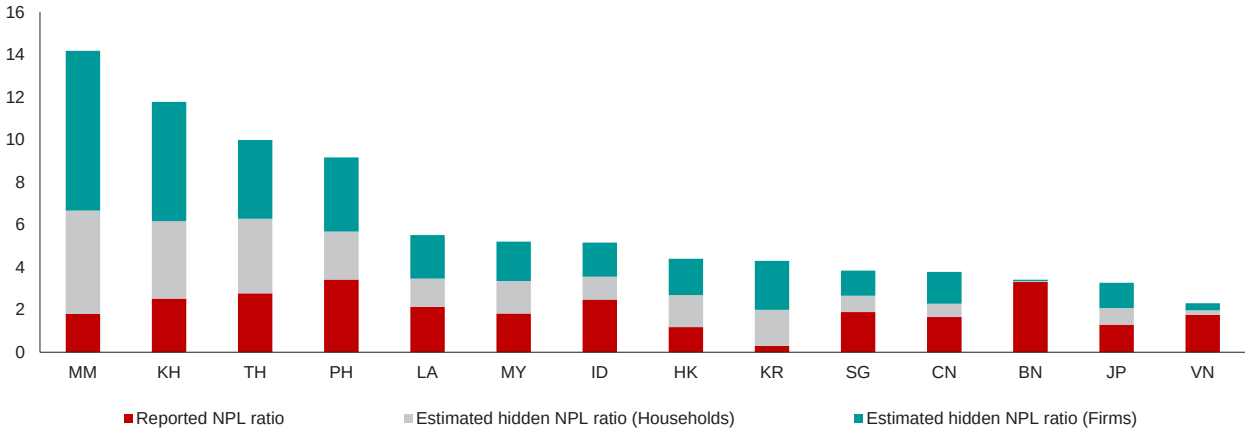
Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: The private nonfinancial sector includes nonfinancial firms and households. Data refer to: claims on nonfinancial institutions and other resident sectors by depository corporations other than the central bank (China); loans and advances by authorized institutions to nonfinancial sectors (Hong Kong); loans to corporations and households by domestic banks (Japan); claims on nonfinancial corporations and households by depository corporations other than the central bank (Korea); claims on the private sector by commercial and rural banks (Indonesia); loans by the banking system (Malaysia); claims on private sector by depository corporations other than the central bank (the Philippines); the sum of household liabilities and credit to nonfinancial corporations (Singapore); and claims on private nonfinancial corporations and other resident sectors by depository corporations other than the central bank (Thailand). Credit growth is calculated based on local currency terms.

Figure 1.36. Selected ASEAN+3: Banking Sector Nonperforming Loan Ratios
(Percent)



Source: National authorities via CEIC.
Note: Data are up to Q4 2022, except for Brunei, Hong Kong, Japan, Korea, Lao PDR, Malaysia, Philippines, Vietnam (Q3 2022), and China (Q2 2022). Data for Myanmar are not publicly available.

Figure 1.37. ASEAN+3: Reported and Estimated "Hidden" Corporate and Household Nonperforming Loan Ratios, as of Q3 2022
(Percent)



Source: National authorities via Haver Analytics; AMRO staff estimates.
Note: The estimates are based on the AMRO Global Macro-Financial Model (Tang 2022). Estimates are based on information as of Q3 2022, except for Japan (Q1 2022) and Myanmar (Q4 2020).
BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; NPL = nonperforming loan;
PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

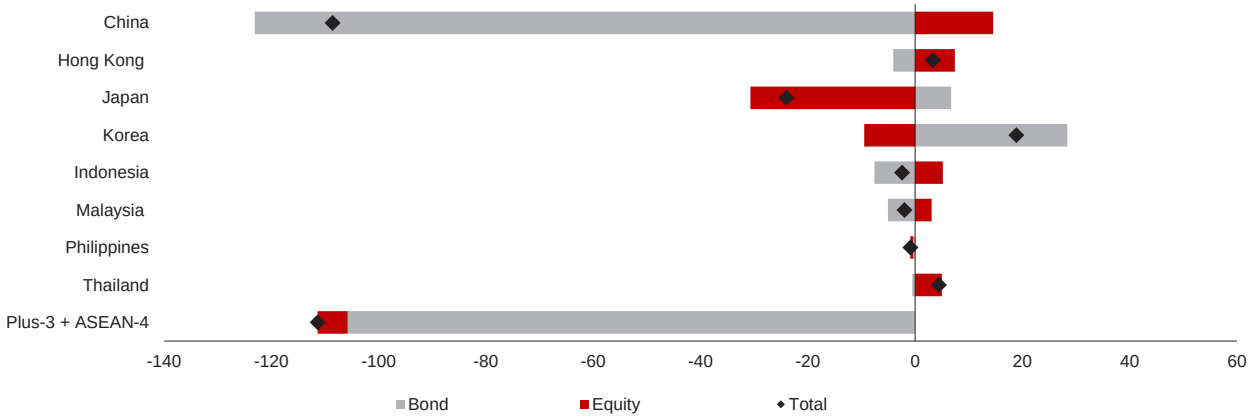
Financial Markets Seesaw

Global financial conditions have tightened since the first half of 2022, reflecting policy rate hikes to bring inflation under control in the United States and the euro area. Since March 2022, the US Federal Reserve has raised its policy rate by 450 basis points (as of February 2023), with markets pricing in further rate hikes in the first half of 2023.

The aggressive monetary tightening in the United States led to a sharp spike in risk aversion and large portfolio outflows from the region during 2022, although risk sentiments improved by the end of the year. The Plus-3 and ASEAN-4 economies posted a total of USD 112 billion in net nonresident portfolio investment outflows in the first three quarters of 2022—predominantly from China's bond market and Japan's equity market (Figure 1.38). While substantial, these gross outflows represented only 0.7 percent of China's outstanding bonds and 0.5 percent of Japan's equity market capitalization at the end of 2021. By October, the outlook for portfolio capital flows in the region had improved on market expectations that the US Federal Reserve would ease the pace of rate increases in 2023. Indonesia, Korea, the Philippines, and Thailand recorded net nonresident purchases in their local equity and bond markets in October and November 2022.

The US monetary policy stance put considerable depreciation pressure on most ASEAN+3 currencies against the US dollar in 2022. Plus-3 and ASEAN-5 currencies reached multiyear lows against the US dollar in the third quarter of 2022 as markets priced in higher terminal rates for the Federal Reserve's tightening cycle. However, regional currencies rebounded and appreciated against the US dollar in the fourth quarter of 2022 on expectations of a slower pace of rate hikes following indications that inflation in the United States had peaked and started to trend down. Trade-weighted nominal and real exchange rates were largely unchanged in 2022, except for Singapore and Thailand, which recorded notable appreciations in 2022 (Figure 1.39).

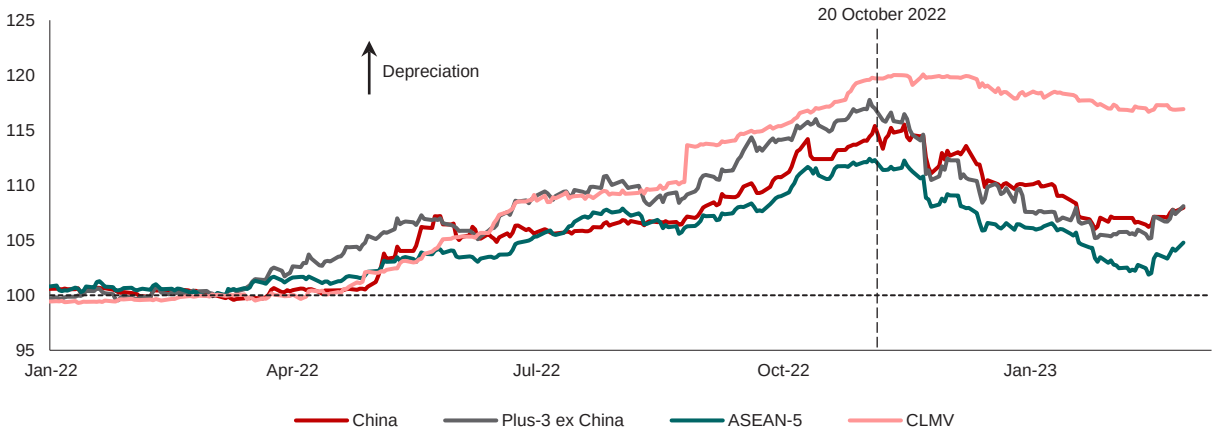
Figure 1.38. Selected ASEAN+3: Nonresident Portfolio Investment, Q1–Q3 2022
(Billions of US dollars)



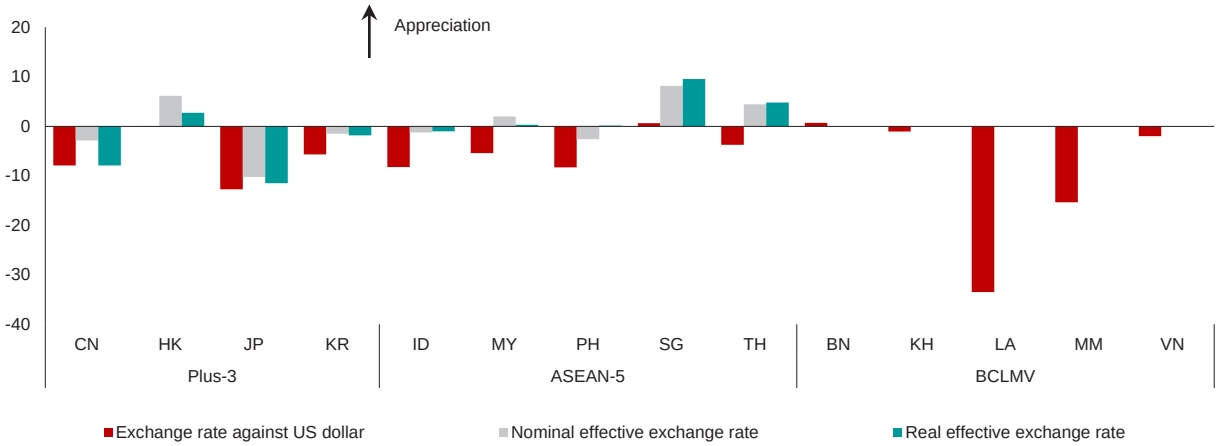
Source: Balance of Payments and International Investment Position Statistics database, IMF; national authorities via Haver Analytics; AMRO staff calculations.

Figure 1.39. ASEAN+3: Exchange Rates

Exchange Rate against US Dollar
(Index, 31 December 2021 = 100)



Currency Performance, 2022
(Percent)



Source: Haver Analytics; Bloomberg L.P; Bank for International Settlements via Haver Analytics; AMRO staff calculations.
Note: Exchange rate data are up to 28 February 2023. For both nominal effective exchange rate and real effective exchange rate, data refer to the changes from the end of December 2021 to the end of December 2022. For bilateral exchange rates against the US dollar, data refer to changes from 2 January to 31 December 2022. Effective exchange rate data are not available for Brunei, Cambodia, Lao PDR, Myanmar, and Vietnam (BCLMV). BN = Brunei; CLMV = Cambodia, Lao PDR, Myanmar, and Vietnam; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

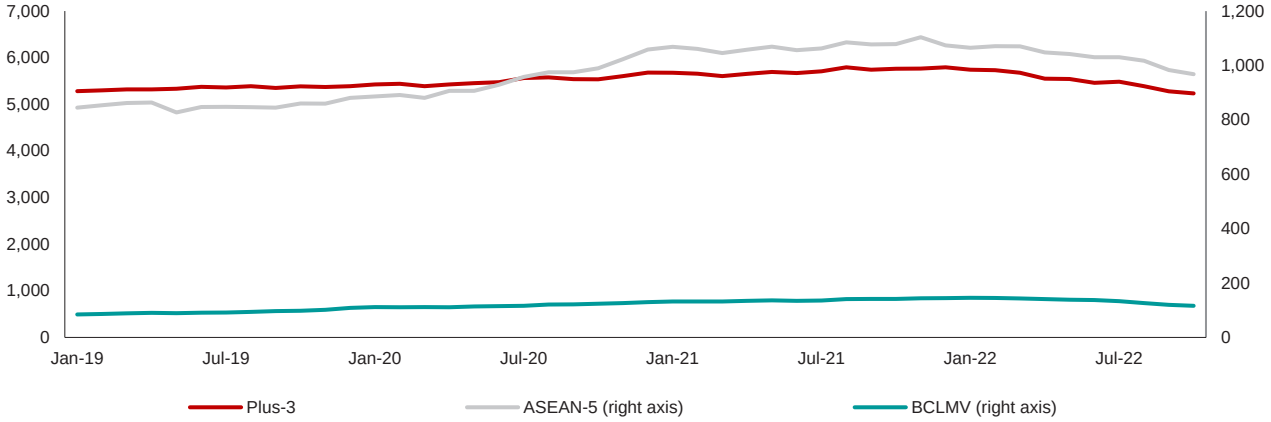
ASEAN+3 central bank reserves have fallen sharply as a result of foreign currency interventions and valuation effects. The region's foreign exchange reserves declined by USD 710 billion (or 10 percent) in 2022 (Figure 1.40). About half of the decline can be attributed to interventions by the authorities in foreign exchange markets to stem sharp currency depreciation pressures against the US dollar. Currency valuation effects—given the considerable proportion of reserves held in other major currencies such as the euro, the pound, and the Japanese yen—also contributed to the drop in the value of foreign currency reserves held by ASEAN+3 central banks.[2]

Despite the decline, foreign currency reserves generally remain ample, exceeding 100 percent of short-term external debt and three months of imports (Figure 1.41). Hong Kong, Japan, Malaysia, and Singapore have substantially larger short-term external debt than foreign currency reserves, but these economies also have a larger proportion of external assets held by public institutions and private business that could be used to cover their foreign currency liabilities without making a claim on central bank reserves (Figure 1.42).

Absent new shocks, the outlook for capital flows in the region is sanguine. The short-term (six months ahead) outlook for nonresident portfolio capital flows has improved, based on the capital flows at risk (CfaR) methodology outlined in Tan, A. (2022) (Figure 1.43). Economic reopening in China is also helping to bolster confidence in the region's outlook. However, a sharper slowdown in the US economy than currently expected and/or a weaker economic recovery in China could heighten global risk aversion and result in a sharp re-pricing of risk assets in emerging-market economies, including in the ASEAN+3 region. A larger divergence from US monetary policy, reflected in interest rate differentials, could translate into weaker currencies and possibly fuel capital outflows from the region. Stagflation in the region would hurt investor confidence and likely lead to capital outflows.

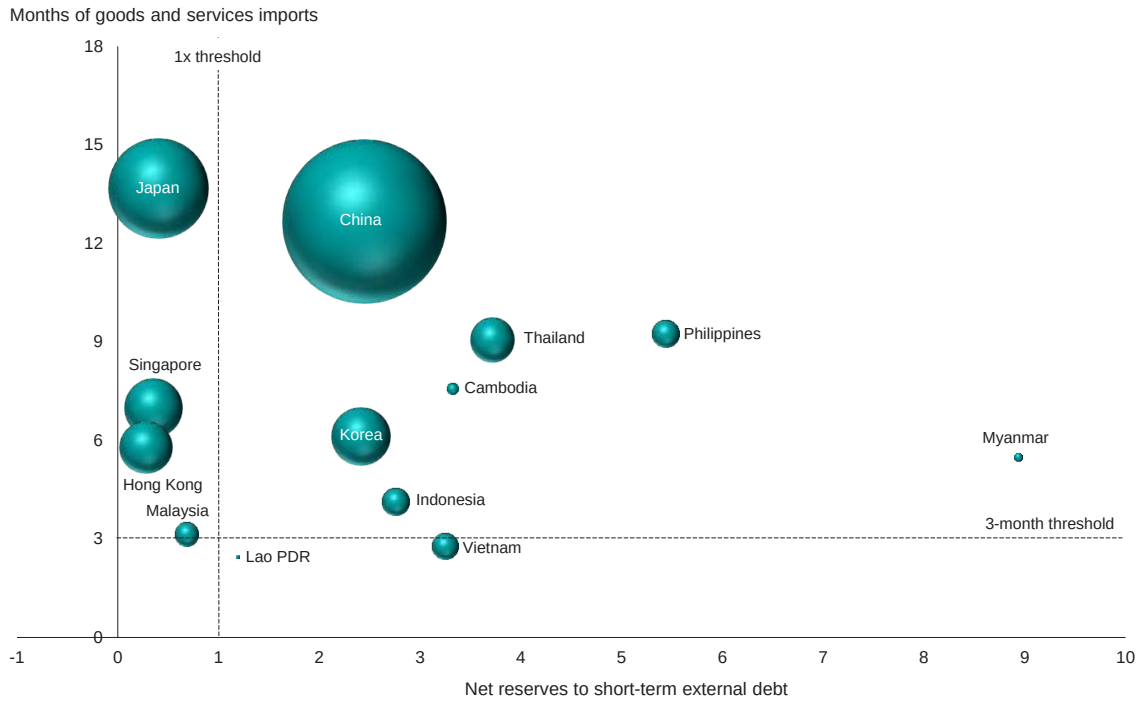
2/ Based on aggregate data in the IMF's Currency Composition of Official Foreign Exchange Reserves database, the estimated fall in foreign exchange reserves after stripping out currency valuation effects is USD 338 billion in 2022. The actual fall in the value of foreign exchange reserves could be smaller since the calculations do not take into account the decline in asset price valuations.

Figure 1.40. ASEAN+3: Net International Reserves
(Billions of US dollars)



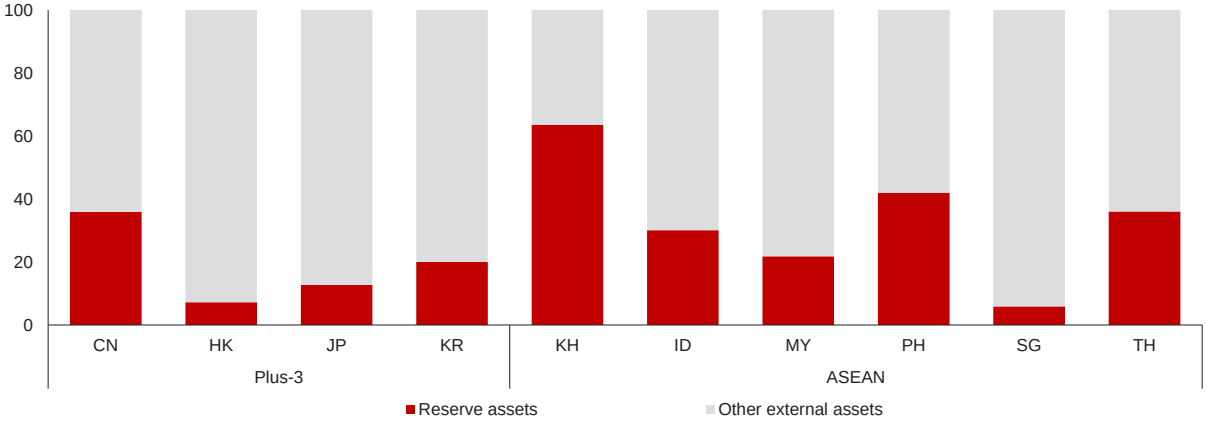
Source: IMF via Haver Analytics; AMRO staff calculations.
Note: Data exclude scheduled contractual commitments in foreign currencies. Data are up to December 2022 except for Vietnam (October 2022), Lao PDR (September 2022), Brunei and Cambodia (November 2022), and Myanmar (March 2021). Singapore's foreign exchange reserves have been adjusted for transfers to its sovereign wealth fund. ASEAN-5 = Indonesia, Malaysia, the Philippines, Singapore, and Thailand; BCLMV = Brunei, Cambodia, Lao PDR, Myanmar, and Vietnam; Plus-3 = China, Hong Kong, Japan, and Korea.

Figure 1.41. ASEAN+3: Adequacy of Net International Reserves



Source: IMF; national authorities; World Bank; AMRO staff calculations.
Note: Data are as of December 2022 for reserves. For short-term external debt, data are as of Q3 2022, except for China (Q2 2022). The size of the bubble denotes the relative amount of each economy's net international reserves in US dollars.

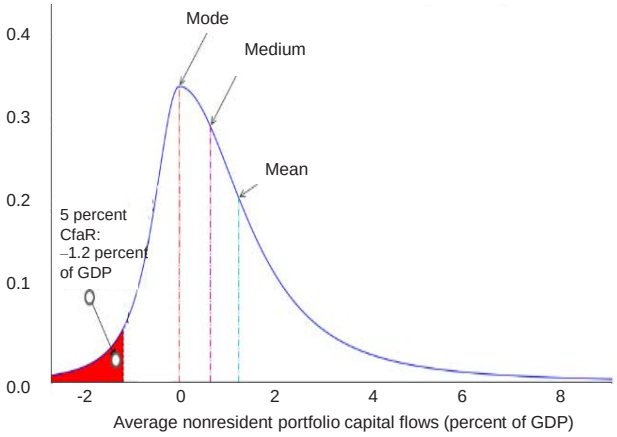
Figure 1.42. ASEAN+3: Reserve Assets
(Percent of total external assets)



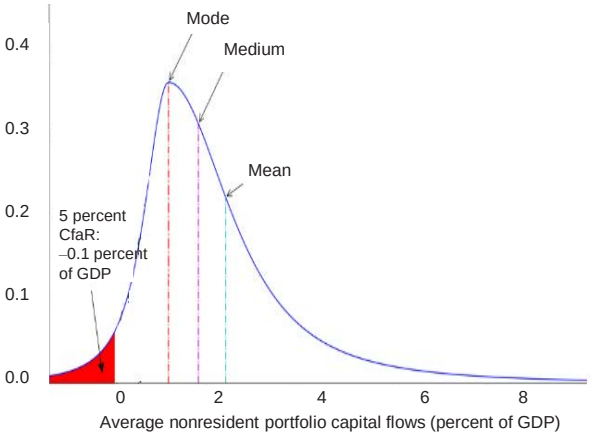
Source: IMF via Haver Analytics.
Note: Data are up to Q3 2022 except for Myanmar (Q3 2020). Data for Brunei, Lao PDR, and Vietnam are not available. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand.

Figure 1.43. ASEAN-4 and Korea: Capital Flows at Risk
(Probability density)

As of June 2022



As of December 2022



Source: AMRO staff estimates.
Note: The predicted probability density of capital flows six months forward (based on information up to the end of December 2022) suggests an average volume of capital inflows in ASEAN-4 and Korea of 2.4 percent of GDP. Using the 5 percent capital flows at risk (CfaR) threshold, the average volume of capital outflows in ASEAN-4 and Korea is forecast to be at least 0.1 percent of GDP (down from the forecast based on information up to the end of June 2022 of 1.2 percent of GDP).

II. Risks to the Outlook

The outlook for the ASEAN+3 region is beset by uncertainty. The key risk factors confronting the region are summarized in AMRO's Regional Risk Map (Figure 1.44).

Fallout from the Ukraine crisis on global energy prices poses the most immediate risk to the outlook for ASEAN+3 growth. In particular, there could be temporary supply shortages which could trigger another global energy price shock. Although ASEAN+3 generally fared better than other regions during the energy price shock in early 2022, another shock to global energy prices—in conjunction with a global economic slowdown—would be a major blow. As most economies in the region are net energy importers, a sustained hike in energy prices would exacerbate the current cost-of-living crisis and drag down private consumption, which is an important domestic growth engine.

The US economy could experience a hard(er) landing. With inflation in the United States still well above its 2 percent target, the US Federal Reserve is committed to maintaining a tight(er) monetary policy stance for as long as is necessary to bring inflation down—which may induce a recession in the process. Sustained high borrowing costs and tighter financial conditions could trigger a much sharper US slowdown than currently envisaged. Should this come to pass, spillovers to the global economy will be significant. ASEAN+3 would face much lower external demand and higher asset price/capital flow volatility due to increased uncertainty about the US monetary policy stance.

New and more virulent COVID-19 variants could emerge in the short term. New virus variants or subvariants are continuously being discovered, such as the fast-spreading Omicron subvariants XBB1.5 (Kraken) and BQ.1.1 (Cerberus), which account for most of current COVID-19 cases in the United States. While available COVID-19 vaccines have remained effective at preventing severe illnesses, hospitalizations, and death, a wave of new vaccine-resistant infections could prompt a reintroduction of containment measures, strain the region's health care capacity, and derail its prospects for full economic recovery.

The pace of recovery in China will also bear close attention. While the infection surge following the lifting of COVID-19 restrictions at the end of last year has largely subsided, voluntary mobility restrictions to avoid contracting the virus could constrain the recovery in domestic demand, particularly private consumption. An extended period of weakness in the real estate sector would weigh on consumer and investor confidence and potentially hinder the economy's recovery, dragging down regional growth.

The increasingly acrimonious strategic rivalry between the United States and China is the biggest threat to the region's growth over the medium term. As the United States has set out to contain China's rise and technological development, regional—especially ASEAN—economies are caught in between the two global superpowers and are under pressure to choose sides. If tensions boil over,

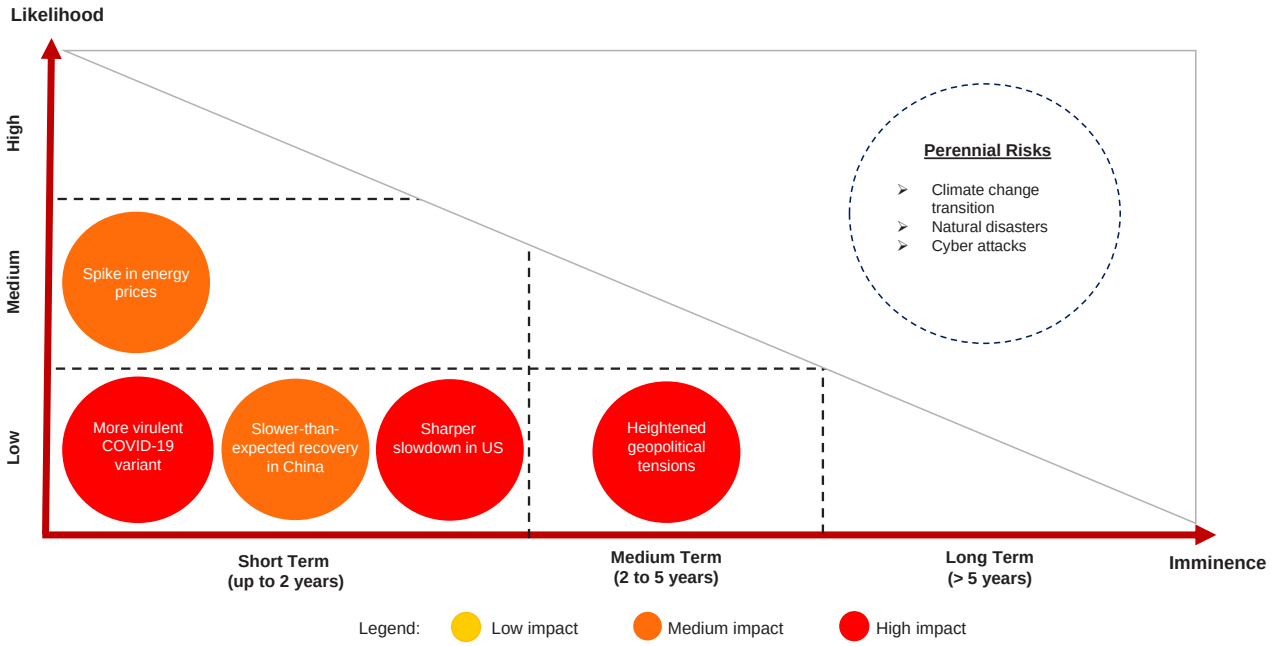
the result could be global fragmentation into ideological blocs, which will have ramifications for regional trade and investment. There could be further segmentation of trade, with far-reaching consequences for global supply chains. This could hurt the region's long-term growth prospects (Box 1.4).

Climate change, natural disasters and cyberattacks are perennial risks:

- Like the rest of the world, the region faces the risk of more frequent and/or extreme weather events due to climate change. Responding to climate-related (and non-climate related) natural disasters entails a direct fiscal burden. National commitments to adapt to and mitigate climate change will also have huge economic impacts and long-lasting, multigenerational consequences (Chapter 2).

- As the region is increasingly interconnected through digital platforms, risks of cyberattacks on critical infrastructure such as health systems, government agencies, and educational institutions, are increasing in frequency and severity. According to Check Point (2023), the global volume of cyberattacks increased by almost 40 percent in 2022 relative to the previous year, with the Asia-Pacific region experiencing almost 1,700 weekly attacks per organization. Absent sufficient safeguards, a backlash against digitalization could occur, with negative implications for productivity gains and longer term growth.

Figure 1.44. Regional Risk Map, March 2023



Source: AMRO staff.
Note: The Regional Risk Map characterizes the key risk factors facing the ASEAN+3 region in three dimensions: (1) the likelihood of the risk materializing—low, medium, or high—along the vertical axis; (2) the imminence of the risk—short term (up to two years), medium term (two to five years), or long term (more than five years)—along the horizontal axis; and (3) the growth impact should the risk materialize—low, medium, or high—denoted by the color of the circle. Perennial risks—i.e., recurring risks, the impact of which are not easily gauged—are identified in the dotted circle on the top right corner.

Box 1.4:

Tug of War: Rising Geopolitical Risks and ASEAN+3

The Ukraine crisis has highlighted the significant role of geopolitical risks in shaping economic growth. While the main impact of the conflict has centered on Europe, its consequences have rippled around the world—in the form of rising commodity prices, supply chain bottlenecks, and disruption to people movement, financial flows, and cross-border investment. Although ASEAN+3 has relatively few direct trade and investment links with Russia and Ukraine, and the conflict's initial impacts on global inflation and supply chains appear to have eased somewhat (Figure 1.19), a prolonged conflict lasting well beyond this year could shave about 1 percentage point off the region's GDP growth in 2023 (AMRO 2022a).

Geopolitical risks are higher now than in the last decade and will increasingly be a factor in the region's growth outlook (Figure 1.4.1). ASEAN+3 economies, with their deep cross-border linkages, are particularly exposed to geopolitical tensions that disrupt global trade and supply chains. The repeated escalation in the US-China trade conflict during the Trump administration, which saw tariffs imposed on over USD 500 billion worth of goods in both economies, is one example (AMRO 2020). Between September 2018 and December 2019—before the so-called Phase One deal was announced—total exports from the region contracted significantly in value, after growing at an average rate of 10 percent (year-on-year) in the previous eight months. Recent policies by the US Biden administration—including the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act and the Inflation Reduction Act, both passed last year, as well as expanded export controls on Chinese high-tech firms—have ratcheted up tensions, creating negative spillovers to other ASEAN+3 exporters and forcing "like-minded allies" to announce similar policies.[1] Intensifying tensions in the Middle East, or an escalation of the Ukraine crisis that involves more parties could cause prices of key commodities to spike once again. Increased or threatened military action elsewhere could also upend ASEAN+3 cross-border trade and economic activity, especially if they lead to prolonged or severe disruptions to major shipping lanes or airspaces (Figure 1.4.2).

Geopolitical tensions lead to economic fragmentation and heightened policy uncertainty, which erodes market confidence, lowers investment, and hurts the region's long-term growth prospects. While silver linings could emerge from the Ukraine crisis and US-China strategic rivalry in the long-term—in the form of reinvigorating the global shift away from fossil fuel dependence and fast-tracking China's climb toward self-sufficiency in critical technologies—the costs of geopolitical tensions far outweigh any perceived benefits, especially for the ASEAN+3 region. Reconfiguration of existing supply chains is complex, costly, and time-consuming, and it increases trade and logistics costs for all parties involved (AMRO 2021). Uncertainty about trade policy induces a "wait-and-see" approach that postpones new investment or expansion plans, leading to lower FDI flows and employment creation that can stagnate for years, as shown in Figure 1.4.3 and Figure 1.4.4 (Cerdeiro, Kothari, and Redl 2022). Geopolitical tensions and their attendant uncertainty also stifle innovation, reducing knowledge exchange and productivity (Astvansh, Deng, and Habib 2022). The 2022 US export controls have already slowed down the pace of new semiconductor plant construction and expansions in China, and are impeding access to a deep pool of highly skilled Chinese-American researchers, engineers, and scientists, with advanced expertise obtained from years of working in the United States (Box 1.2) (Bloomberg News 2022).

In the current geopolitical context, ASEAN+3 needs to remain committed to free trade and closer regional integration now more than ever. Economic resilience for the ASEAN+3 means strengthening—rather than shying away from—linkages with one

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This box was written by Marthe M. Hinojales and Hongyan Zhao.

1/ The Inflation Reduction Act includes an electric vehicle (EV) tax credit of up to USD 7,500 per purchase, provided final assembly is done in North America—which weakens the competitiveness of EV makers in other countries, notably Korea. The Act also places restrictions on sourcing minerals used in batteries from China and other "foreign entities of concern" and requires qualifying EV batteries to have 100 percent North American content by 2028 (Forbes 2022).

another and the rest of the world. The threat of climate change requires a coordinated global and regional approach (Chapter 2), while increased regional cooperation and coordination is needed to make the most of many of the ASEAN+3's post-pandemic growth drivers and opportunities: digitalization, modern services, cross-border payments and settlements, as well as regional supply chain security (AMRO 2022b). Strong policy signals that reaffirm the region's deep and long-standing commitment to free trade and openness will help decrease market uncertainty, reduce new sources of tension, and ensure that all—especially emerging and developing economies—can continue to reap the economic and social benefits of globalization.

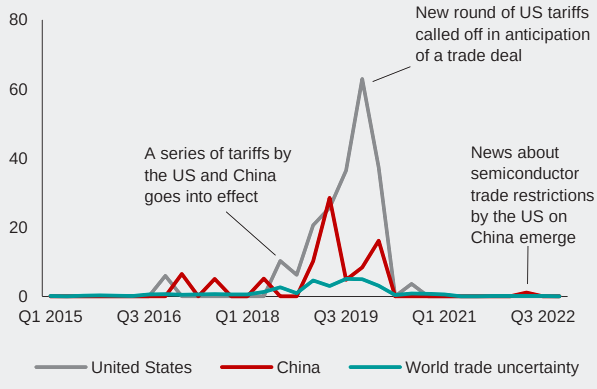
Figure 1.4.1. World: Geopolitical Risk
(Index, 100 = 1985–2019)

Source: Caldara and Iacoviello (2022).
Note: Data refer to the three-month moving average of the index, which is based on a count of newspaper articles that discuss geopolitical tensions. The higher the index, the higher the measure of geopolitical risk.

Figure 1.4.2. ASEAN+3: Sources of Geopolitical Risks and Key Channels of Impact to Growth

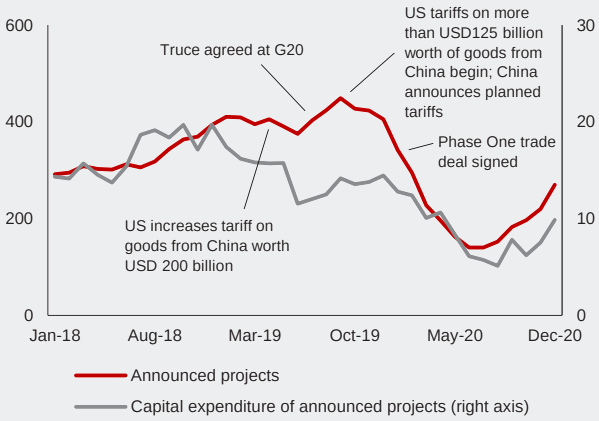
Source: AMRO staff.

Figure 1.4.3. World: Trade Uncertainty
(Index)



Source: Ahir, Bloom, and Furceri (2022).
Note: Q = quarter. The world trade uncertainty index is constructed by counting the number of times "uncertainty" is mentioned in proximity to a word related to trade in Economist Intelligence Unit (EIU) country reports. It is equally weighted average and scaled by total number of words in the EIU country reports, multiplied by 100,000.

Figure 1.4.4. ASEAN+3: Monthly FDI Announcements
(Number; billions of US dollars)



Source: Orbis Crossborder; AMRO staff calculations.
Note: Data refer to six-month moving averages.

III. AMRO Staff Macroeconomic Forecasts for 2023–24

The global economy is projected to expand at a more moderate pace in 2023 as growth slows in the United States and the euro area. Tighter financial conditions following successive monetary policy tightening rounds in 2022 will weigh on consumption and investment in the advanced economies. While global food and commodity prices have peaked, inflation remains high. The US Federal Reserve is therefore likely to continue raising the federal funds rate in 2023, albeit by smaller amounts and at a slower pace. The Ukraine crisis is expected to persist. On the positive side, global supply chain pressures eased considerably in the second half of 2022 and are likely to improve in 2023.

The relaxation of COVID-19 containment policies, including the removal of cross-border travel restrictions by China in January 2023, should stimulate regional travel and tourism activity. However, outbound tourism from China will not recover immediately as cautious tourists may opt not to leave the country for now. The pace of recovery will also be affected by capacity constraints in international air travel and in the hospitality and tourism sectors of receiving economies. Travel and tourism activity is consequently projected to remain below pre-pandemic levels until 2024.

AMRO staff expect the ASEAN+3 region to grow at a faster pace of 4.6 percent in 2023, despite the challenging global environment. The improvement in the region's growth mainly reflects the expected economic recovery in the Plus-3 economies, where growth is forecast to pick up from 2.6 percent in 2022 to 4.5 percent in 2023. Growth in the ASEAN region is expected to moderate from 5.6 percent in 2022 to 4.9 percent in 2023 (Table 1.1).

- **Plus-3**. China and Hong Kong are expected to lead the rebound with the removal of COVID-19 containment measures and the full reopening of their economies. The surge in infections across China following the removal of containment measures will subside and the economy is expected to rebound strongly by the second quarter. The reopening of the land border between mainland China and Hong Kong will provide a strong boost to Hong Kong's exports of goods and services. GDP growth in Japan is expected to improve slightly, while GDP growth in Korea is expected to come down, mainly due to weaker external demand.

- **ASEAN**. GDP in Indonesia, Malaysia, the Philippines, Singapore, and Vietnam is forecast to grow at a slower pace due to weaker external demand as a result of the economic slowdown in the United States and Europe. The negative outlook for merchandise exports will be partially counterbalanced by the recovery of travel and tourism. The return of Chinese tourists is expected to give regional tourism a major boost in 2023, particularly in Cambodia and Thailand. Growth in Brunei and Myanmar will be driven mainly by domestic consumption and a revival of investment spending.

The region's GDP growth is forecast to be sustained at 4.5 percent in 2024. Growth in the Plus-3 economies is likely to be slower than in 2023, at 4.3 percent, mainly on account of the normalization of growth in China and Hong Kong. However, ASEAN is projected to expand at a faster rate of 5.2 percent, compared to 4.9 percent in 2023, as continued strengthening of domestic demand is supplemented by an expected recovery in external demand, which should provide a boost to the region's manufacturing exports and tourism earnings.

To complement the baseline forecast, AMRO staff simulated adverse and upside scenarios to illustrate the potential impact of the risk factors presented in the Regional Risk Map (Figure 1.44). The simulations were run using Oxford Economics' Global Economic Model (GEM), which covers all ASEAN+3 economies with an underlying data set that is updated every month.[3]

AMRO staff's adverse scenario puts the region's GDP growth at 3.9 percent in 2023 and 3.6 percent in 2024 (Figure 1.45 and Figure 1.46). This is premised on a rise in global inflation, a sharp growth slowdown in the United States and weaker-than-expected recovery in China, and the emergence of a more virulent COVID-19 strain in the region. If the Ukraine crisis escalates, global energy prices could surge in the second half of 2023. The rise in energy prices would spill over to other commodities through increased transportation and production costs, leading to higher inflation globally. In the United States, an inflation

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3/ The model consists of a system of equations with macroeconomic variables that include GDP and its components, prices, exchange rates, and interest rates. The GEM is essentially an error-correction model that estimates how quickly a variable returns to its equilibrium state after a shock; hence, it estimates both the short-term and long-term effects of the shock on the variable. In the short term, the model assumes sticky factor prices and aggregate demand-determined output. In the long term, the model assumes that prices adjust fully, and the equilibrium is determined by supply factors such as productivity, labor, and capital. For this exercise, only the short-term estimates are presented.

spike could prompt the Federal Reserve to hike interest rates further, causing an even sharper slowdown in the economy and further depressing export demand for ASEAN+3 goods and services. The emergence of a more virulent COVID-19 variant in the region would lead to greater caution among households and businesses and discourage private sector spending. This could also impact outbound tourism from China, an important source of revenue for the rest of the ASEAN+3 region.

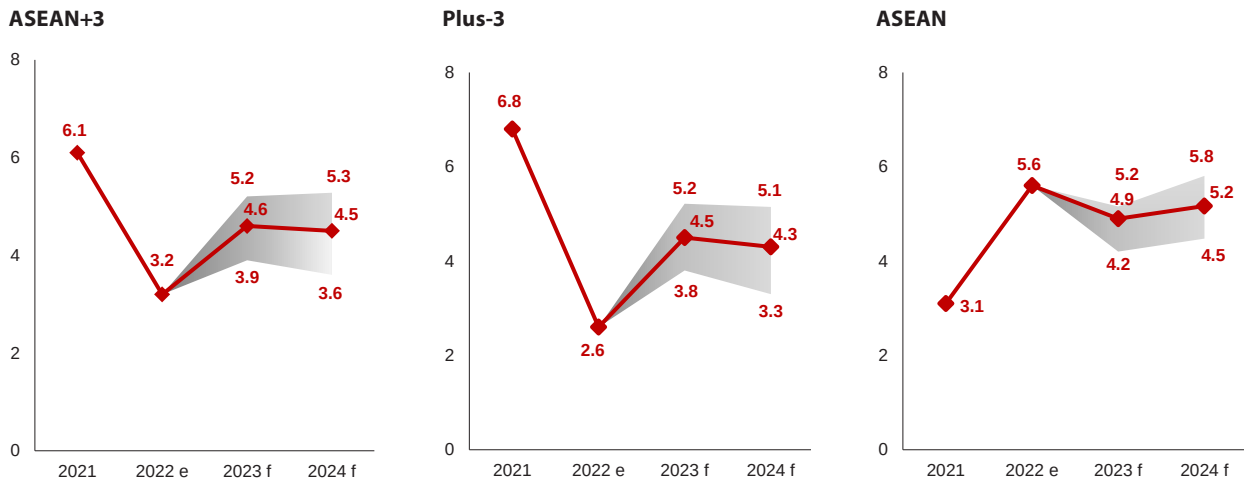
AMRO staff's upside scenario puts the region's GDP growth at 5.2 percent in 2023 and 5.3 percent in 2024. In this scenario, global inflation continues to moderate. Dissipating inflation pressure, alongside firm wage growth and a still-high stock of savings, allows US consumers to increase spending, providing a boost to exports of goods and services from ASEAN+3. Existing vaccines remain effective against new subvariants of COVID-19, supporting a stable resumption of economic activities within the region.

Table 1.1. ASEAN+3: AMRO Staff Growth and Inflation Estimates and Forecasts, 2023–24
(Percent, year-on-year)

Economy	GDP Growth			Inflation		
	2022e	2023f	2024f	2022e	2023f	2024f
ASEAN+3	**3.2**	**4.6**	**4.5**	**6.5**	**4.7**	**3.0**
Plus-3	**2.6**	**4.5**	**4.3**	**2.9**	**2.3**	**2.1**
China	3.0	5.5	5.2	2.0	2.0	2.5
Hong Kong	-3.5	4.3	3.0	1.9	2.3	2.5
Japan	1.0	1.2	1.1	2.5	1.5	1.1
Korea	2.6	1.7	2.3	5.1	3.3	2.2
ASEAN	**5.6**	**4.9**	**5.2**	**7.9**	**5.7**	**3.4**
Brunei	-1.2	2.8	2.6	3.7	2.5	1.7
Cambodia	5.0	5.9	6.7	5.4	3.3	3.1
Indonesia	5.3	5.0	5.3	4.2	4.6	3.0
Lao PDR	4.0	4.1	5.0	23.0	11.4	4.2
Malaysia	8.7	4.2	5.2	3.3	3.2	1.9
Myanmar	1.2	2.2	2.8	18.2	14.0	8.0
Philippines	7.6	6.2	6.5	5.8	5.9	3.8
Singapore	3.6	2.0	2.6	6.1	5.8	3.7
Thailand	2.6	4.1	4.3	6.1	2.8	2.1
Vietnam	8.0	6.8	7.1	3.2	3.0	2.5

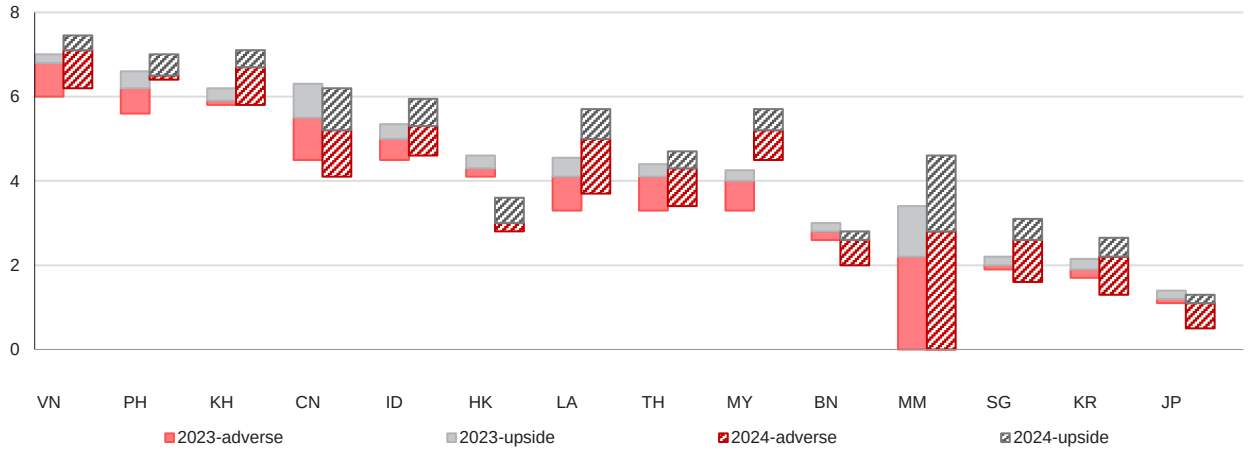
Source: National authorities via CEIC and Haver Analytics; and AMRO staff estimates and forecasts.
Note: Myanmar's growth numbers are based on its fiscal year, which runs from 1 October to 30 September. e = estimates; f = forecast.

Figure 1.45. ASEAN+3: GDP Growth Forecasts under AMRO Staff Scenarios
(Percent, year-on-year)



Source: National authorities via Haver Analytics; Oxford Economics Global Model; AMRO staff estimates.
Note: e = estimates; f = forecast.

Figure 1.46. ASEAN+3: Projected GDP Growth Ranges, 2023–24
(Percent, year-on-year)



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

Headline inflation in ASEAN+3 is projected to be 4.7 percent in 2023, lower than in 2022. Excluding Lao PDR and Myanmar—which are likely to continue experiencing high inflation on account of currency depreciation—inflation in the rest of the region is expected to be a more moderate 3.4 percent in 2023 (Table 1.1). Most economies in the region should see lower inflation compared to last year, as global commodity and food prices come down with softer global demand. Only Hong Kong, Indonesia, and Myanmar are expected to see higher inflation in 2023, due to stronger demand pressures (Hong Kong); price increases for several types of subsidized fuel (Indonesia); and sustained currency depreciation (Myanmar).

Inflation is expected to normalize toward its long-term trend in 2024 given that global energy and food prices are projected to stabilize. Supply bottlenecks are likely to ease as production activity resumes following the full reopening of economies. Cost-push inflation pressures are therefore likely to dissipate by 2024. Looking ahead, climate change mitigation commitments, such as carbon pricing and efforts to shift away from fossil fuels, may place more upward pressure on inflation in the medium term (Chapter 2).

IV. Policy Considerations

As economic recovery in ASEAN+3 gains traction, the region's policymakers have largely ended the extraordinary stimulus measures introduced during the pandemic and are shifting to restoring policy buffers. Rising inflation and a less supportive global economic landscape have compelled the authorities in some economies to tighten monetary policy while maintaining targeted fiscal support to safeguard growth. ASEAN+3 authorities will continue to face sharp policy tradeoffs and difficult policy decisions in the year ahead. A calibrated policy mix drawing on a range of policy tools will be essential to fulfill multiple policy objectives.

Policy Space

Fiscal space in ASEAN+3 has generally narrowed. Public debt-to-GDP ratios have risen across the region, as authorities in some economies raised the public debt ceiling (Malaysia and Thailand) or temporarily suspended the budget deficit ceiling (Indonesia) in order to accommodate additional fiscal outlays in 2020–22. Although growth improved in 2022, the higher debt burden—reflecting higher interest payments and amortization—translated into higher gross financing needs (Box 1.5). AMRO staff's assessment is that fiscal space remains moderate to ample in most ASEAN+3 economies, but continues to be limited in Japan, Lao PDR, and Myanmar (Table 1.2).

In light of rising inflation, most central banks in the region started to rebuild monetary policy space by raising policy interest rates in 2022. Some central banks (Korea and the Philippines) went further to tighten monetary policy—raising the policy rate above its neutral level—to rein in inflation and anchor inflation expectations. In other economies (Indonesia, Malaysia, and Thailand), policy interest rates have been raised but overall monetary conditions remain accommodative, given existing economic slack. AMRO staff's assessment is that at the end of 2022, monetary policy space was moderate in most ASEAN+3 economies and limited in Cambodia, Japan, Lao PDR, and Myanmar (Box 1.6).

Table 1.2. ASEAN+3: Assessment of Policy Space, 2023

Policy space		Fiscal		
		Ample	Moderate	Limited
Monetary	Ample			
	Moderate	Singapore	China Indonesia Korea Malaysia Philippines Thailand Vietnam	
	Limited	Brunei Hong Kong	Cambodia	Japan Lao PDR Myanmar

Source: AMRO staff, based on Poonpatpibul and others (2020).
Note: This framework does not take into account the ability and capacity of monetary authorities to undertake unconventional monetary policy.

Box 1.5:

Fiscal Stress in ASEAN+3

Government debt-to-GDP ratios jumped during the pandemic and have continued to rise in most of the region's economies (Figure 1.5.1). Debt accumulation over the past three years was driven mainly by sizeable primary deficits. Off-budget stimulus spending also contributed to increasing government debt in Thailand, while exchange rate depreciation inflated the debt ratio in local currency terms in economies with high external debt exposure such as Lao PDR (Figure 1.5.2). In some economies, substantial fiscal adjustments would be needed to stabilize the debt ratio (Figure 1.5.3).

Gross financing needs have correspondingly increased. The sum of budget deficits and funds required to roll over debt maturing in 2023 have risen (Figure 1.5.4 and Figure 1.5.5). Interest rate increases would further add to existing debt burdens (Figure 1.5.6), while depreciation against creditor currencies such as the US dollar would increase the cost burden for economies with large external obligations.

These developments have brought to the fore the importance of assessing fiscal sustainability risks across the region. Various factors can affect fiscal sustainability risks, including:

- Fiscal vulnerabilities. Large fiscal deficits and high government debt may raise concerns about fiscal sustainability. Sizeable financing needs may cause financing stress, especially when market conditions are not favorable. Suboptimal debt structure (e.g., a high share of external debt and short-term debt) would increase vulnerability to rollover, exchange rate, and interest rate risks.

- External sector vulnerabilities. External shocks could propagate to fiscal sustainability risks in economies with weak current accounts, high external debt, and narrow external buffers.

- Domestic macroeconomic and financial conditions. Economic recession may widen the real interest rate-growth rate differential and jeopardize debt sustainability. A sharp depreciation of the local currency would inflate the nominal value of external debt and increase the debt service burden for economies with high external debt obligations.

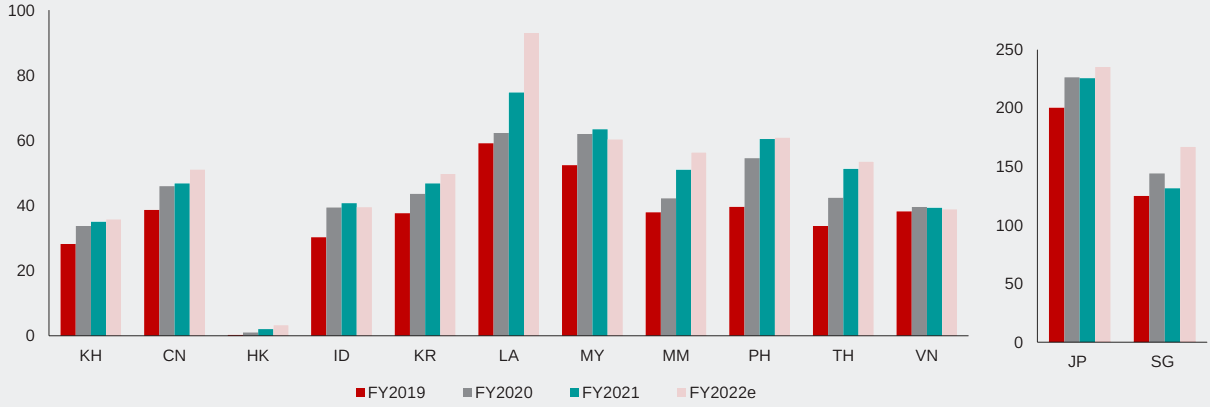
- Global economic situation. Global economic and financial market developments could trigger fiscal sustainability risks in economies that are exposed to the global economy through real and financial channels.

The degree of fiscal stress in ASEAN+3 economies can be assessed using the short-term fiscal sustainability (FSS) indicator. Following Baldacci and others (2011), fiscal crisis events are defined as episodes of outright fiscal distress (e.g., public debt default or restructuring, need for large-scale IMF support, hyperinflation) and extreme financing problems (e.g., spikes in sovereign bond spreads). In these cases, fiscal solvency is endangered and the government is forced to alter its policies to regain fiscal sustainability. The FSS indicator is based on a set of 27 indicators that have been proven to perform well in detecting upcoming situations of fiscal stress, including the fiscal balance, government debt, gross financing needs, external debt, real GDP growth, inflation, exchange rate depreciation, commodity price index, and the Chicago Board Options Exchange volatility index (AMRO, forthcoming).

AMRO staff assessment using the FSS indicator suggests that fiscal stress has risen in more than half of ASEAN+3 economies since the onset of the pandemic. The FSS indicators for Brunei, Cambodia, China, Hong Kong, Japan, Korea, Lao PDR, and Singapore rose above the threshold in 2022. This does not necessarily mean that a fiscal stress event is imminent, only that close monitoring and careful macro-fiscal management are required to reduce the risk of one in 2023 (Figure 1.5.7). Reasons for the increase in fiscal stress can be traced to unfavorable global conditions in 2022, which included economic slowdown, commodity price hikes, and volatile financial market conditions (Hong Kong, Japan, Korea, and Singapore); large fiscal deficits (China); domestic macroeconomic weakness (Brunei); and weak external positions (Cambodia and Lao PDR).

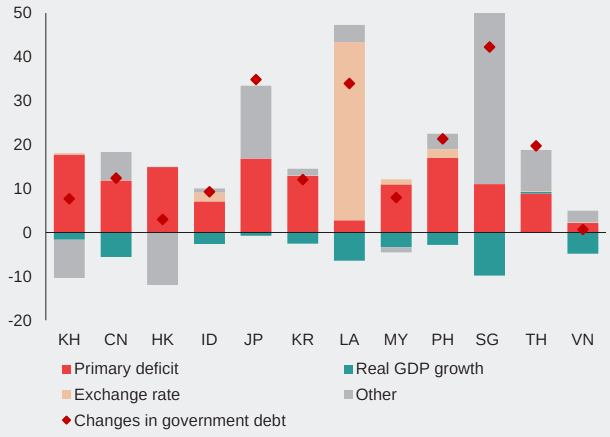
This box was written by Byunghoon Nam.

Figure 1.5.1. ASEAN+3: Government Debt
(Percent of GDP)



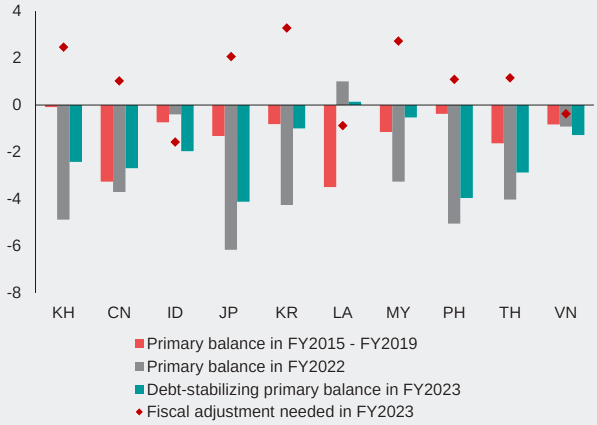
Source: National Authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: Brunei is not shown as it has virtually zero government debt. CN = China; e = estimate; FY = fiscal year; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 1.5.2. ASEAN+3: Contribution to Change in Government Debt Ratio, FY2019–22
(Percent of GDP)



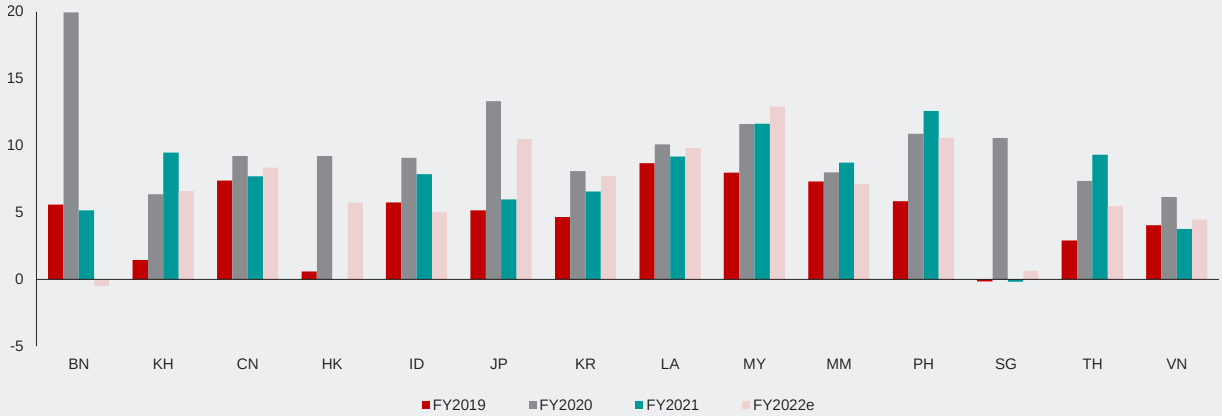
Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: Brunei is excluded as there is virtually zero government debt. CN = China; FY = fiscal year; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 1.5.3. Selected ASEAN+3: Primary Balance and Needed Fiscal Adjustment
(Percent of GDP)



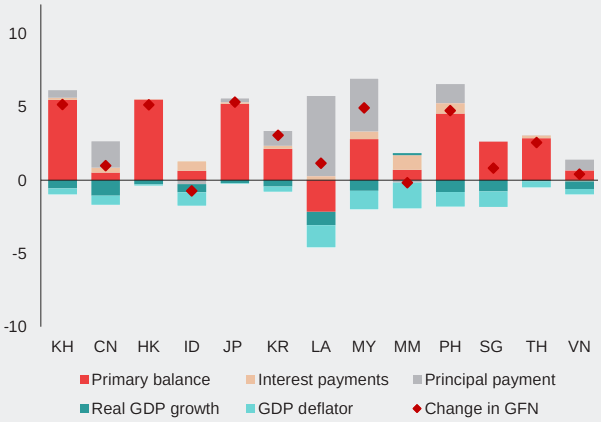
Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: The debt-stabilizing primary balance in FY2023 is the primary balance that would maintain the debt ratio at the end of FY2022. The fiscal adjustment needed in FY2023 is defined as the difference between the actual primary balance in FY2022 and the debt-stabilizing primary balance in FY2023, which captures how much the primary balance should change in FY2023 compared to FY2022 to stabilize the debt ratio. CN = China; FY = fiscal year; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MY = Malaysia; PH = Philippines; TH = Thailand; VN = Vietnam.

Figure 1.5.4. ASEAN+3: Gross Financing Needs
(Percent of GDP)



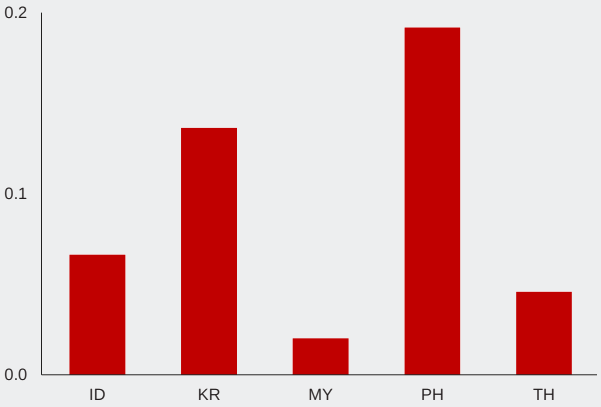
Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: Gross financing needs for Lao PDR (LA) include its original debt service amount without debt restructuring (the government has been in debt restructuring negotiations with bilateral creditors since 2021). BN = Brunei; CN = China; e= estimate; FY = fiscal year; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR: MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 1.5.5. ASEAN+3: Contribution to Change in Gross Financing Needs from FY2019–22
(Percent of GDP)



Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates
Note: For Brunei, there is no issuance of debt to finance fiscal needs; CN = China; GFN = gross financing needs; HK = Hong Kong; FY = fiscal year; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

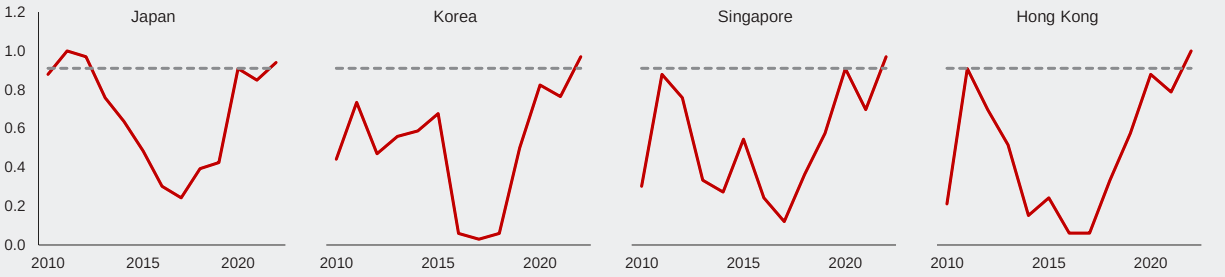
Figure 1.5.6. Selected ASEAN+3: Additional Interest Payments due to 2022 Policy Rate Hikes, FY2023
(Percent of GDP)



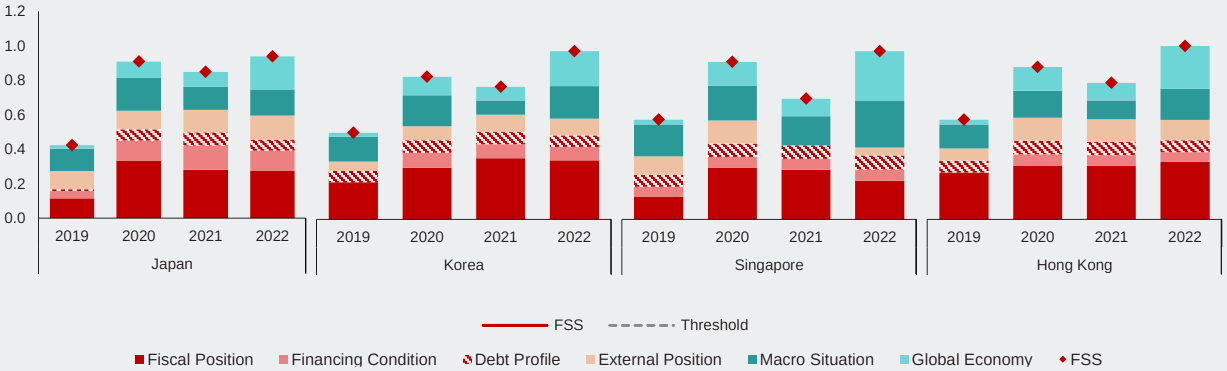
Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: For simulation purposes, the policy rates in 2023 are assumed to remain the same as in January 2023. Bond coupon rates are assumed to move in parallel with the policy rates. FY = fiscal year; ID = Indonesia; KR = Korea; MY = Malaysia; PH = Philippines; TH = Thailand.

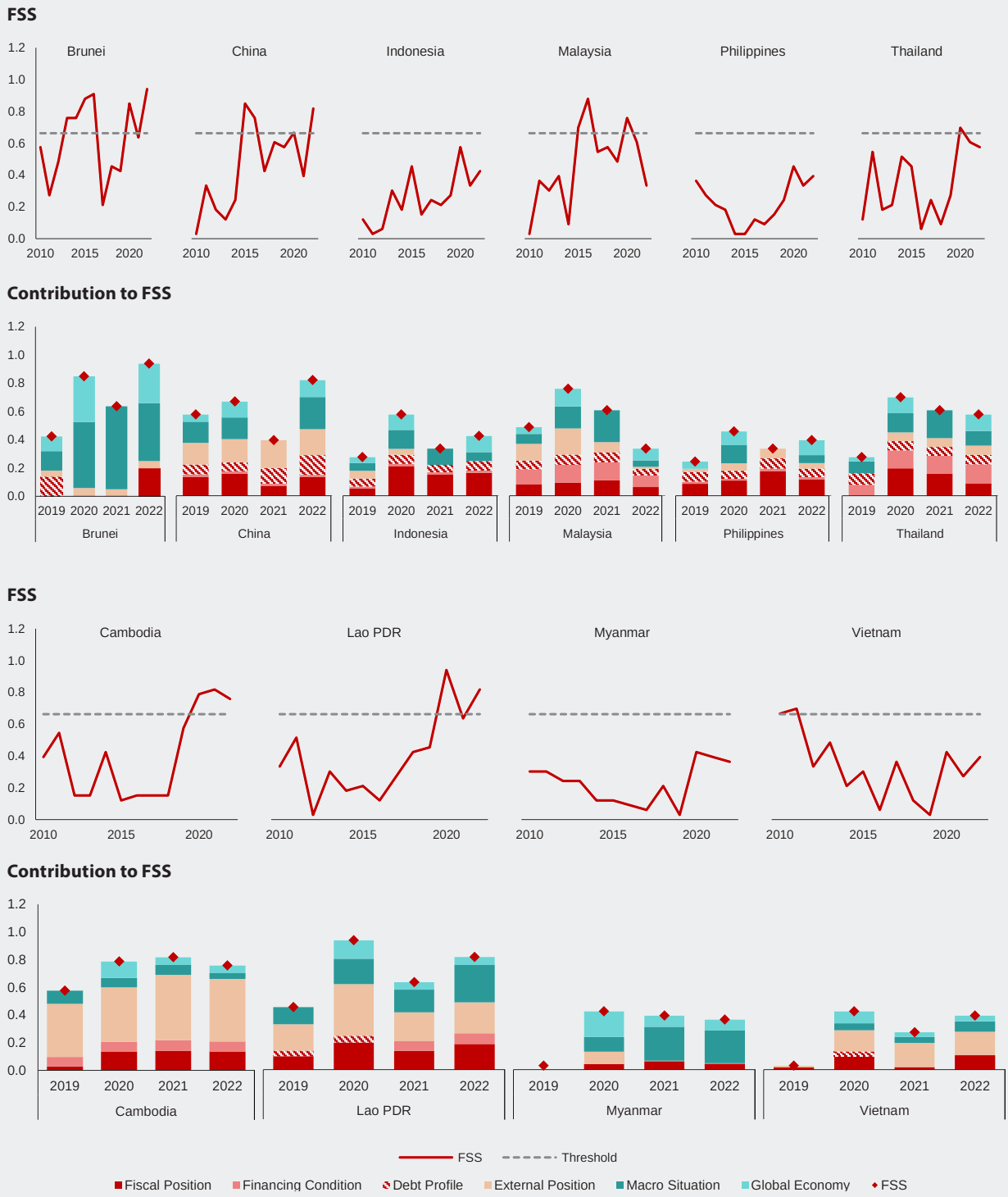
Figure 1.5.7. ASEAN+3: Short-Term Fiscal Sustainability Indicator

FSS



Contribution to FSS





Source: National authorities, IMF, World Bank via Haver Analytics; AMRO staff estimates.
Note: The short-term fiscal sustainability indicator (FSS) is a composite indicator based on 27 indicators reflecting the fiscal position, external position, macroeconomic and financial market conditions, as well as global economic conditions. The optimal thresholds are indicated by the horizontal dotted lines. A higher (lower) value of FSS (relative to the threshold) implies higher (lower) short-term risk of a fiscal stress event. BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Box 1.6:

Monetary Policy Frameworks in ASEAN+3

ASEAN+3 economies have adopted a wide range of monetary policy frameworks to achieve their price, financial, and external stability objectives (Table 1.6.1). Brunei and Hong Kong have a hard exchange rate peg similar to a currency board system; hence, they have no monetary policy autonomy. Cambodia, China, Lao PDR, and Vietnam have de facto soft exchange rate pegs, with an explicit or implicit exchange rate anchor for monetary policy. Singapore centers its monetary policy on the Singapore dollar nominal effective exchange rate. Cambodia and Lao PDR are highly dollarized economies. Five economies—Indonesia, Japan, Korea, the Philippines, and Thailand—have an inflation-targeting framework for monetary policy, while Malaysia has no explicitly stated nominal anchor and monitors various indicators in conducting monetary policy.

Monetary policy space is assessed by AMRO staff based on a four-block approach that accounts for: (1) the degree of monetary policy autonomy; (2) the distance of the prevailing monetary policy rate from the zero lower bound; (3) external sustainability and reserve buffers to deal with shocks; and (4) financial imbalances and the ability to address them using macroprudential tools (Poonpatpibul and others 2020). For Cambodia, Lao PDR, Myanmar, and Vietnam, the assessment of monetary policy space also takes into account the level of dollarization and data limitations in key financial stability indicators.

Table 1.6.1. ASEAN+3: Monetary Policy Frameworks

Economy	De Facto Exchange Rate Classification	Monetary Policy Framework	Policy Interest Rate(s)
Brunei	Currency board	Exchange rate anchor against the Singapore dollar	n.a.
Hong Kong	Currency board	Exchange rate anchor against the US dollar	n.a.
Cambodia	Stabilized arrangement	Exchange rate anchor against the US dollar	n.a.
Singapore	Stabilized arrangement	Exchange rate anchor against a basket of currencies	n.a.
Vietnam	Crawl-like arrangement	Exchange rate anchor against the US dollar	State Bank of Vietnam refinancing rate, discount rate, overnight lending interest rate in interbank electronic payment.
Lao PDR	Crawl-like arrangement	Other monetary framework (de facto exchange rate anchor against the US dollar)	
Philippines	Floating	Inflation targeting	Bangko Sentral ng Pilipinas overnight reverse repurchase rate
China	Other managed arrangement	Monetary aggregate target (de facto exchange rate anchor against a basket of currencies)	People's Bank of China repo rate, reverse repo rate, loan prime rate, standing lending facility, and medium-term lending facility rates.
Myanmar	Other managed arrangement	Monetary aggregate target (reserve money)	
Indonesia	Floating	Flexible inflation targeting	Bank Indonesia seven-day reverse repo rate
Korea	Floating	Inflation targeting	Bank of Korea base rate
Malaysia	Floating	Other monetary framework	Bank Negara Malaysia overnight policy rate
Thailand	Floating	Flexible inflation targeting	Bank of Thailand one-day bilateral repurchase transaction rate
Japan	Free floating	Inflation targeting	Bank of Japan short-term policy interest rate and 10-year Japan Government Bond yield

Source: IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) database; Poonpatpibul and others (2020); AMRO staff compilation.
Note: n.a. = not applicable. "Other managed arrangement" (Myanmar) refers to an exchange rate arrangement that does not meet the criteria for any of the AREAR categories; arrangements characterized by frequent shifts in policies may fall into this category.

This box was written by Anthony Chia Kiat Tan.

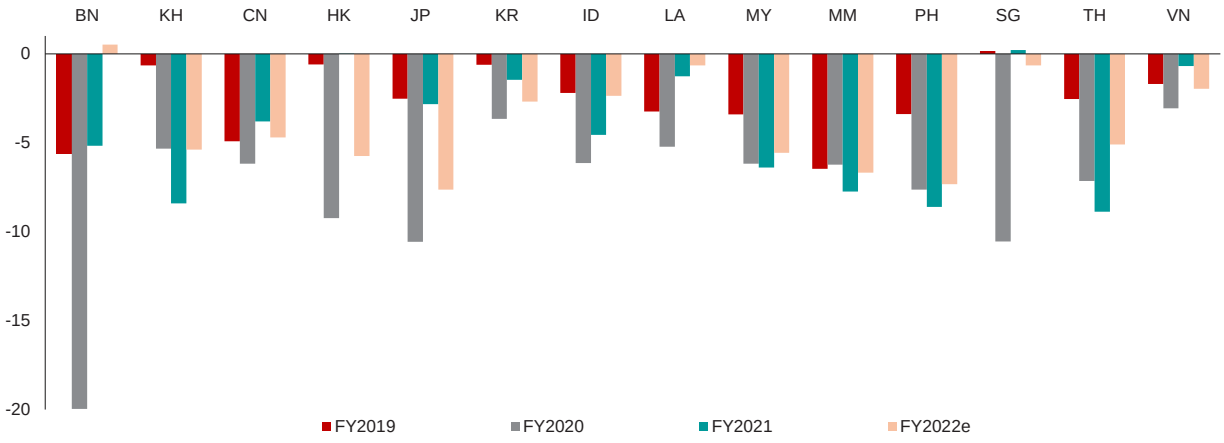
Policy Positions

Table 1.3 summarizes AMRO staff assessments and recommendations regarding the policy stance in ASEAN+3 economies.

Fiscal policy

With fiscal space significantly smaller, most authorities in the region are planning to shift toward fiscal consolidation in 2023. Fiscal deficits widened in half of the region's economies in 2022 and narrowed in the other half (Figure 1.47). The variation largely reflected differences in the speed of economic recovery, unwinding of spending on pandemic support, and restructuring of spending programs, as well as idiosyncratic factors such as commodity price windfalls (Brunei and Indonesia). Fiscal balances are budgeted to improve in most economies in 2023, in anticipation of robust revenue growth and withdrawal of pandemic-related spending (Figure 1.48). As a result, the fiscal stance in 2023 is assessed to be contractionary in half of the region's economies. (Figure 1.49).

Figure 1.47. ASEAN+3: Fiscal Balances

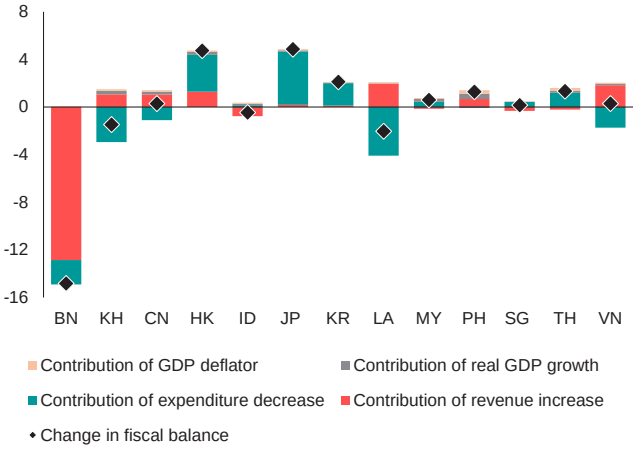


Source: National Authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: Fiscal year (FY) is April to March for Brunei, Hong Kong, Japan, and Singapore; October to September for Thailand and Myanmar; January to December for the other economies. BN = Brunei; CN = China; e = estimate; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

The speed and magnitude of fiscal consolidation would depend on country-specific economic circumstances, policy priorities, and constraints. In the near term, some economies still need continued fiscal support, especially where rising inflation has substantially increased the cost of living or where there has been a resurgence of COVID-19 and economic recovery has not fully taken hold. Economic recovery is often uneven, and vulnerable groups and sectors may still require support. At the same time, although some fiscal policy space remains in most economies, it is crucial to rebuild fiscal buffers to prepare for future shocks and to address medium- and longer-term challenges (Box 1.7). For non-reserve currency economies heavily reliant on external financing, a sound fiscal position is especially critical for their sovereign credit rating, which affects financing costs of not only the government but also the private sector.

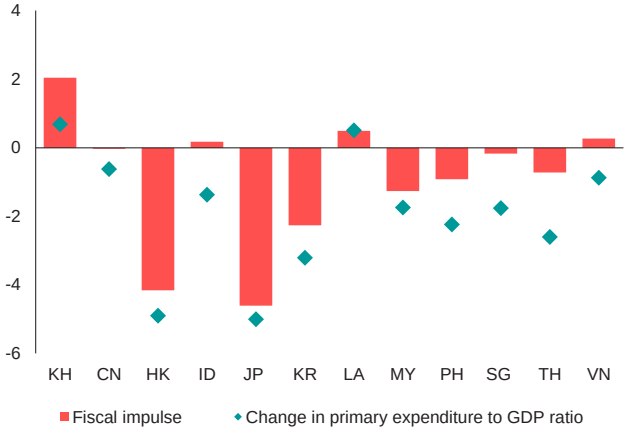
Fiscal consolidation should be addressed first through resource reallocation and supported by fiscal reform. Fiscal adjustment should start by tapering broad-based emergency measures based on the strength of the economic recovery and the abatement of the pandemic. Expanded social safety nets should provide continued support to vulnerable groups and sectors lagging in the recovery, while time-bound, targeted support could be employed to fill gaps in social protection coverage. Fiscal policy should stand ready to take the lead in dealing with economic difficulties if downside risks materialize, especially where limitations on monetary policy apply. In any case, the support should be temporary and selective, and efforts to rebuild the fiscal buffer should be resumed once the risk factors subside.

Figure 1.48. Selected ASEAN+3: Contribution to the Change in Fiscal Balance, FY2023
(Percent of GDP)



Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: Budget data are unavailable for Myanmar. The fiscal balance for Singapore is based on the overall budget surplus/deficit, excluding capitalization and depreciation of nationally significant infrastructure from the overall fiscal position. BN = Brunei; CN = China; FY = fiscal year; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR, MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 1.49. Selected ASEAN+3: Fiscal Impulse, FY2023
(Percent of GDP)



Source: National authorities via CEIC and Haver Analytics; AMRO staff estimate.
Note: AMRO defines fiscal impulse as the estimated change in the structural primary balance. A negative fiscal impulse implies a contractionary fiscal stance. The change in primary expenditure is defined as the annual difference in expenditure excluding interest payments, as a percentage of GDP. A negative sign implies that primary expenditure grows slower than nominal GDP. Budget data are unavailable for Myanmar. BN = Brunei; CN = China; FY = fiscal year; HK = Hong Kong; JP = Japan; KH = Cambodia; KR = Korea; ID = Indonesia; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Box 1.7:

Fiscal Policy in the Medium Term

Across the region, fiscal deficits are envisaged to gradually return to pre-pandemic levels in the medium term (Figure 1.7.1). Government debt-to-GDP ratios will plateau or slightly decline over time (Figure 1.7.2). The planned restoration of fiscal space will enable fiscal policy to play a bigger role in supporting growth against shocks, minimizing the scarring effects of the pandemic, and addressing existing and emerging structural challenges—e.g., population aging, infrastructure gaps, climate change, and digitalization.

- In the next 10 years, several ASEAN+3 economies are projected to become so-called post-aged (or super-aged) societies, with more than 20 percent of the population above the age of 65 (Figure 1.7.3). The additional fiscal costs for health care spending in 2032 compared to 2022 are estimated to range from under 1 percent of GDP (in China, Japan, and Thailand) to over 2 percent of GDP (in Hong Kong, Korea, and Singapore).

- As noted in the thematic chapter of the *ASEAN+3 Regional Economic Outlook 2022,* the region's emerging and developing economies face sizeable investment needs for both traditional and new infrastructure (AMRO 2022b). The infrastructure gap is estimated to be 0.3–0.9 percent of GDP in emerging-market economies, and 1.1–4.2 percent of GDP in low-income economies, on average, in 2023–40 (Figure 1.7.4).

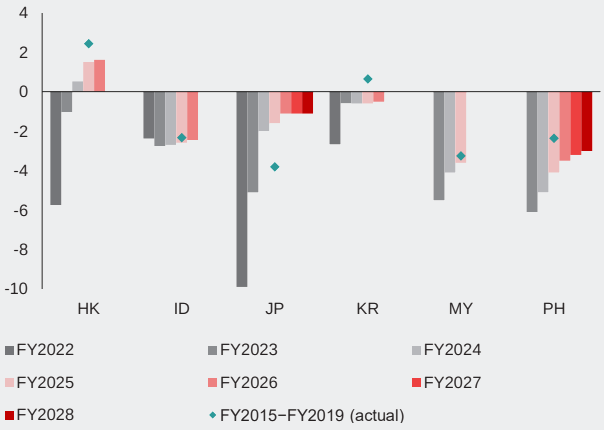
ASEAN+3 authorities should prepare clear medium-term fiscal consolidation plans. For accountability and credibility, specific targets—for the fiscal deficit and/or the government debt ratio—should be presented together with realistic macroeconomic projections and feasible policy measures to achieve them. The targets and measures should be aligned with country-specific economic and fiscal circumstances. For example, economies with low tax-to-GDP ratios may put more emphasis on improving revenue collection in their medium-term consolidation plan. To safeguard growth momentum, revenue-enhancing measures should prioritize strengthening tax administration and compliance before introducing new taxes or raising tax rates. Expenditure measures, such as rationalizing distortionary subsidies and improving the efficiency of spending programs, would also be important aspects of fiscal adjustment (Andriansyah and Hong 2022). Governments should also consider reinstating fiscal rules relaxed during the pandemic or introducing new fiscal rules to guide the fiscal consolidation targets.[1]

Post-pandemic fiscal policy normalization will provide the opportunity to revisit overall resource allocation across diverse policy priorities. Restructuring of spending programs should be based on rigorous assessment of existing and new programs, which would help redirect resources toward high-priority programs while strengthening role-sharing between the public and private sectors to better mobilize available resources.

This box was written by Byunghoon Nam.

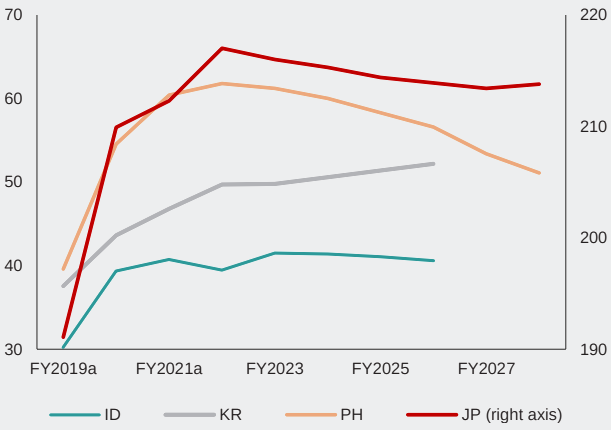
1/ Indonesia has reinstated its budget deficit ceiling of 3 percent of GDP after relaxing it for three years from 2020 to 2022. Thailand increased its public debt ceiling from 60 percent of GDP to 70 percent in 2021. Malaysia increased its public debt ceiling from 55 percent of GDP to 60 percent in 2020, and 65 percent in 2021; in addition, the Malaysian government has created a special account for the COVID-19 fund, which allows it to bypass the golden rule of government spending and borrow for this account. Meanwhile, Korea has proposed a fiscal rule limiting the fiscal deficit excluding social security funds to below 3 percent of GDP.

Figure 1.7.1. Selected ASEAN+3: Medium-Term Fiscal Balance Projections
(Percent of GDP)



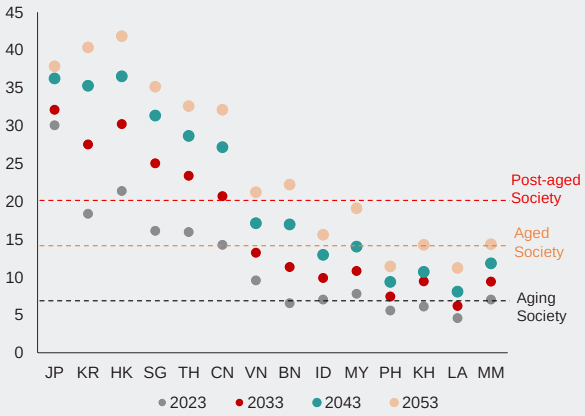
Source: National authorities; AMRO staff estimates.
Note: Fiscal balance projections are as announced by authorities. FY = fiscal year; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines. Data for FY2022–28 are AMRO staff estimates.

Figure 1.7.2. Selected ASEAN+3: Medium-Term Government Debt Projections
(Percent of GDP)



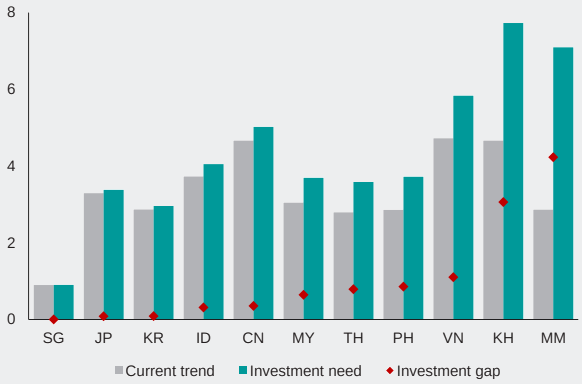
Source: National authorities; AMRO staff estimates.
Note: Debt ratio projections are as announced by authorities. a = actual; FY = fiscal year; ID = Indonesia; JP = Japan; KR = Korea; PH = Philippines.

Figure 1.7.3. ASEAN+3: Old-age Population
(Percent of total population)



Source: United Nations; AMRO staff estimates.
Note: Old-age population refers to those of ages 65 years and above. An economy is classified as an aging society if the share of old-age population in the total population is 7 percent to 14 percent, an aged society if the share is 15 percent to 19 percent, and a post-aged society if the share is 20 percent and above.
BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 1.7.4. Selected ASEAN+3: Infrastructure Investment Gap, 2023–40
(Percent of GDP)



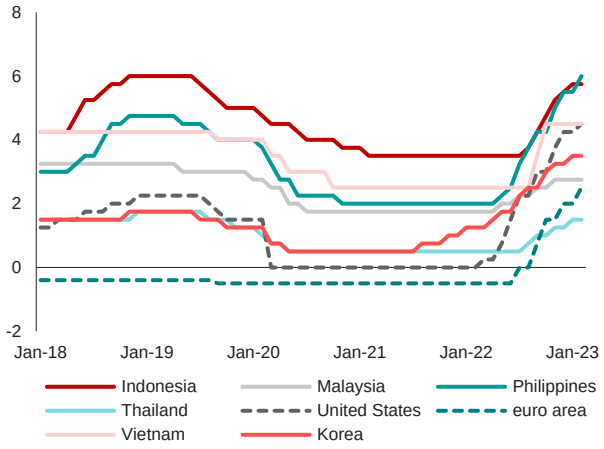
Source: Global Infrastructure Outlook; AMRO staff calculations.
Note: The investment gap is defined as the difference between the infrastructure investment projected for 2023–40, based on current trends and the infrastructure investment needed to match the performance of the best-performing peers.
CN = China; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Monetary policy

Monetary policy should remain tight in economies where inflation is above-target. In Korea and Singapore, a rapidly narrowing output gap and firming labor market prompted more preemptive monetary policy tightening to rein in inflation pressures in 2022. The Bank of Korea tightened policy at a more aggressive pace, raising its policy ("base") rate well above pre-pandemic levels (Figure 1.50). The Monetary Authority of Singapore acted preemptively and has progressively recentered the mid-point and raised the slope of the Singapore dollar nominal effective exchange rate policy band since October 2021. While inflation pressures have largely eased, headline inflation remains higher than the pre-pandemic average in these two economies (Figure 1.51). In the Philippines, the central bank raised its policy rate to curb rising inflation and the emergence of second-round effects. Given these three economies' mid- and late-cycle positions (as shown in Section I), AMRO staff recommends that their central banks maintain a tight monetary policy stance until inflation pressures subside.

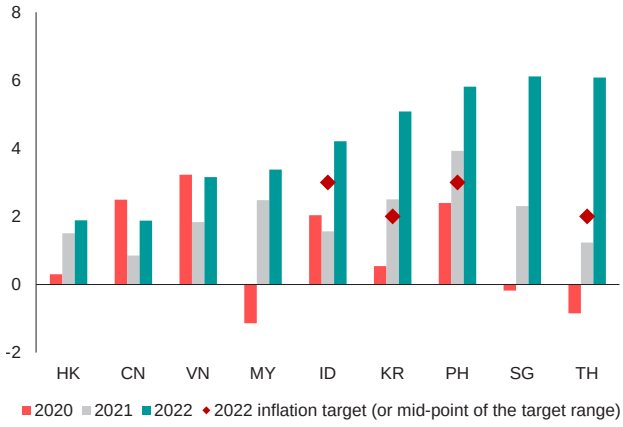
Monetary conditions can remain accommodative in economies with negative output gaps. As noted earlier, Indonesia, Malaysia, and Thailand have raised their policy interest rates, but with inflation generally under control and in light of the slack in their economies, the authorities have been able to keep monetary conditions supportive of growth, i.e., the policy interest rate is below the neutral rate. AMRO staff recommends that the authorities stand ready to further normalize monetary policy in tandem with the improvement in the growth trajectory and/or if upside risks to inflation materialize.

Figure 1.50. Selected ASEAN+3, United States and Euro Area: Policy Interest Rates
(Percent)



Source: National authorities via Haver Analytics.
Note: Data are up to February 2023. Policy rates refer to seven-day reverse repo rate (Indonesia); base rate (Korea); overnight policy rate (Malaysia); overnight reverse repo rate (the Philippines); one-day repurchase rate (Thailand); refinancing rate (Vietnam); federal funds rate (upper range) (United States); and deposit facility rate (euro area).

Figure 1.51. Selected ASEAN+3: Headline Consumer Price Inflation
(Percent, year-on-year)



Source: National authorities via Haver Analytics.
Note: China, Malaysia, Singapore, and Vietnam are not inflation-targeting economies. CN = China; HK = Hong Kong; ID = Indonesia; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Macroprudential and credit policies

Macroprudential policies remain largely neutral—which is appropriate to support growth. As the pandemic recedes and economic activities resume, most economies have begun to taper macroprudential accommodation, but not to the extent of tightening policies. Measures aimed at increasing the space for banks to support borrowers—such as temporary suspension of minimum liquidity coverage ratios (Malaysia) and temporary reduction in reserve requirement ratios (Indonesia)—are being allowed to expire. Korea and Singapore, which both saw a robust property market recovery, tightened rules for housing loans to ensure prudent borrowing amid rising interest rates (although Korea subsequently lifted property-related regulations in December 2022 amid falling home prices).

Credit policies should continue to be normalized. Emergency debt moratoriums, which were rolled out to give struggling households and businesses a reprieve from meeting their debt obligations during the pandemic, are gradually being lifted in many economies. Banks in the region have also been closely monitoring their loan quality and building up provisions in anticipation of the unwinding of regulatory forbearance. Given sectoral disparities in the economic recovery, however, targeted support for hard-hit but viable businesses in lagging sectors should remain, alongside careful monitoring.

Table 1.3. ASEAN+3 Policy Matrix: AMRO Staff Assessment of Current Policy Stance and Recommendations

Legend:

AMRO's assessment of current policy stance

- Expansionary/Accommodative
- Neutral
- Contractionary/Tight

AMRO's recommendation

Expand

- Expand more/ more accomodative
- Expand less/ less accomodative
- Maintain current expansion

Tighten

- Tighten more
- Tighten less
- Maintain tightening

Neutral

- Easing bias
- Tightening bias
- Maintain neutral

Source: AMRO staff estimates.
Note: Asterisk (*) denotes fiscal year from 1 April to 31 March. Fiscal policy stance is assessed by the fiscal impulse based on structural primary balance. The fiscal policy stance in 2022 is based on 2022 estimates, while the fiscal stance in 2023 is based on the 2023 budget. For Brunei and Hong Kong, which have a currency board arrangement, the current monetary stance refers to current monetary conditions. "Credit policy" refers to policies relating to credit extended to the real and property sectors, as well as to regulatory forbearance for banks.

Appendix: Selected Key Macroeconomic and Financial Indicators

	2021	2022e	2023f	2024f
Brunei Darussalam				
Real GDP growth (percent, year-on-year)	–1.6	–1.2	2.8	2.6
Headline inflation (period average, percent, year-on-year)	1.7	3.7	2.5	1.7
Current account balance (percent of GDP)	11.2	12.8	9.9	7.1
Government fiscal balance (percent of GDP)	–5.2	0.5	–1.3	–1.6
Cambodia				
Real GDP growth (percent, year-on-year)	3.0	5.0	5.9	6.7
Headline inflation (period average, percent, year-on-year)	2.9	5.4	3.3	3.1
Current account balance (percent of GDP)	–45.7	–32.7	–18.2	–11.0
Government fiscal balance (percent of GDP)	–8.5	–5.4	–5.2	–3.4
China				
Real GDP growth (percent, year-on-year)	8.4	3.0	5.5	5.2
Headline inflation (period average, percent, year-on-year)	0.9	2.0	2.0	2.5
Current account balance (percent of GDP)	1.8	2.3	1.2	0.8
Government fiscal balance (percent of GDP)	–3.8	–4.9	–5.2	–4.5
Hong Kong, China				
Real GDP growth (percent, year-on-year)	6.4	–3.5	4.3	3.0
Headline inflation (period average, percent, year-on-year)	1.6	1.9	2.3	2.5
Current account balance (percent of GDP)	11.8	6.6	6.0	5.2
Government fiscal balance (percent of GDP)	0.0	–7.3	–3.9	–1.0
Indonesia				
Real GDP growth (percent, year-on-year)	3.7	5.3	5.0	5.3
Headline inflation (period average, percent, year-on-year)	1.6	4.2	4.6	3.0
Current account balance (percent of GDP)	0.3	1.0	–0.5	–1.3
Government fiscal balance (percent of GDP)	–4.7	–2.4	–2.2	–3.0
Japan				
Real GDP growth (percent, year-on-year)	2.1	1.0	1.2	1.1
Headline inflation (period average, percent, year-on-year)	–0.3	2.5	1.5	1.1
Current account balance (percent of GDP)	3.9	2.1	1.8	2.0
Government fiscal balance (percent of GDP)	–5.9	–9.4	–4.7	–4.4
Korea				
Real GDP growth (percent, year-on-year)	4.1	2.6	1.7	2.3
Headline inflation (period average, percent, year-on-year)	2.5	5.1	3.3	2.2
Current account balance (percent of GDP)	4.7	1.5	1.8	2.0
Government fiscal balance (percent of GDP)	–4.4	–5.1	–2.6	–2.6

Appendix: Selected Key Macroeconomic and Financial Indicators

	2021	2022e	2023f	2024f
Lao PDR				
Real GDP growth (percent, year-on-year)	3.5	4.0	4.1	5.0
Headline inflation (period average, percent, year-on-year)	3.8	23.0	11.4	4.2
Current account balance (percent of GDP)	2.7	–0.3	–0.8	1.3
Government fiscal balance (percent of GDP)	–1.3	–1.0	–2.2	–1.8
Malaysia				
Real GDP growth (percent, year-on-year)	3.1	8.7	4.2	5.2
Headline inflation (period average, percent, year-on-year)	2.5	3.3	3.2	1.9
Current account balance (percent of GDP)	3.8	2.6	3.6	4.4
Government fiscal balance (percent of GDP)	–6.4	–5.6	–5.1	–4.2
Myanmar				
Real GDP growth (percent, year-on-year)	–18.7	1.2	2.2	2.8
Headline inflation (period average, percent, year-on-year)	3.6	18.2	14.0	8.0
Current account balance (percent of GDP)	–0.2	–4.3	–2.3	–1.2
Government fiscal balance (percent of GDP)	–7.7	–6.7	–6.2	–5.8
Philippines				
Real GDP growth (percent, year-on-year)	5.7	7.6	6.2	6.5
Headline inflation (period average, percent, year-on-year)	3.9	5.8	5.9	3.8
Current account balance (percent of GDP)	–1.5	–5.3	–3.8	–2.5
Government fiscal balance (percent of GDP)	–8.6	–7.3	–6.1	–5.5
Singapore				
Real GDP growth (percent, year-on-year)	8.9	3.6	2.0	2.6
Headline inflation (period average, percent, year-on-year)	2.3	6.1	5.8	3.7
Current account balance (percent of GDP)	18.0	19.3	15.5	15.7
Government fiscal balance (percent of GDP)	0.3	–0.3	–0.1	0.2
Thailand				
Real GDP growth (percent, year-on-year)	1.5	2.6	4.1	4.3
Headline inflation (period average, percent, year-on-year)	1.2	6.1	2.8	2.1
Current account balance (percent of GDP)	–2.1	–3.4	0.2	2.0
Government fiscal balance (percent of GDP)	–5.2	–3.6	–3.1	–2.9
Vietnam				
Real GDP growth (percent, year-on-year)	2.6	8.0	6.8	7.1
Headline inflation (period average, percent, year-on-year)	1.8	3.2	3.0	2.5
Current account balance (percent of GDP)	–1.1	0.3	2.9	4.0
Government fiscal balance (percent of GDP)	–3.4	–4.4	–2.6	–2.3

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: Numbers in red are AMRO staff estimates and forecasts. Data refer to calendar year, except for government fiscal balances, and Myanmar. Data for 2022 refer to AMRO staff estimates, for data releases that are not yet available. Government fiscal balance refers to balance of the central and local governments for Cambodia; general government for Japan; and central government for all other economies. e = estimates; f = forecasts.

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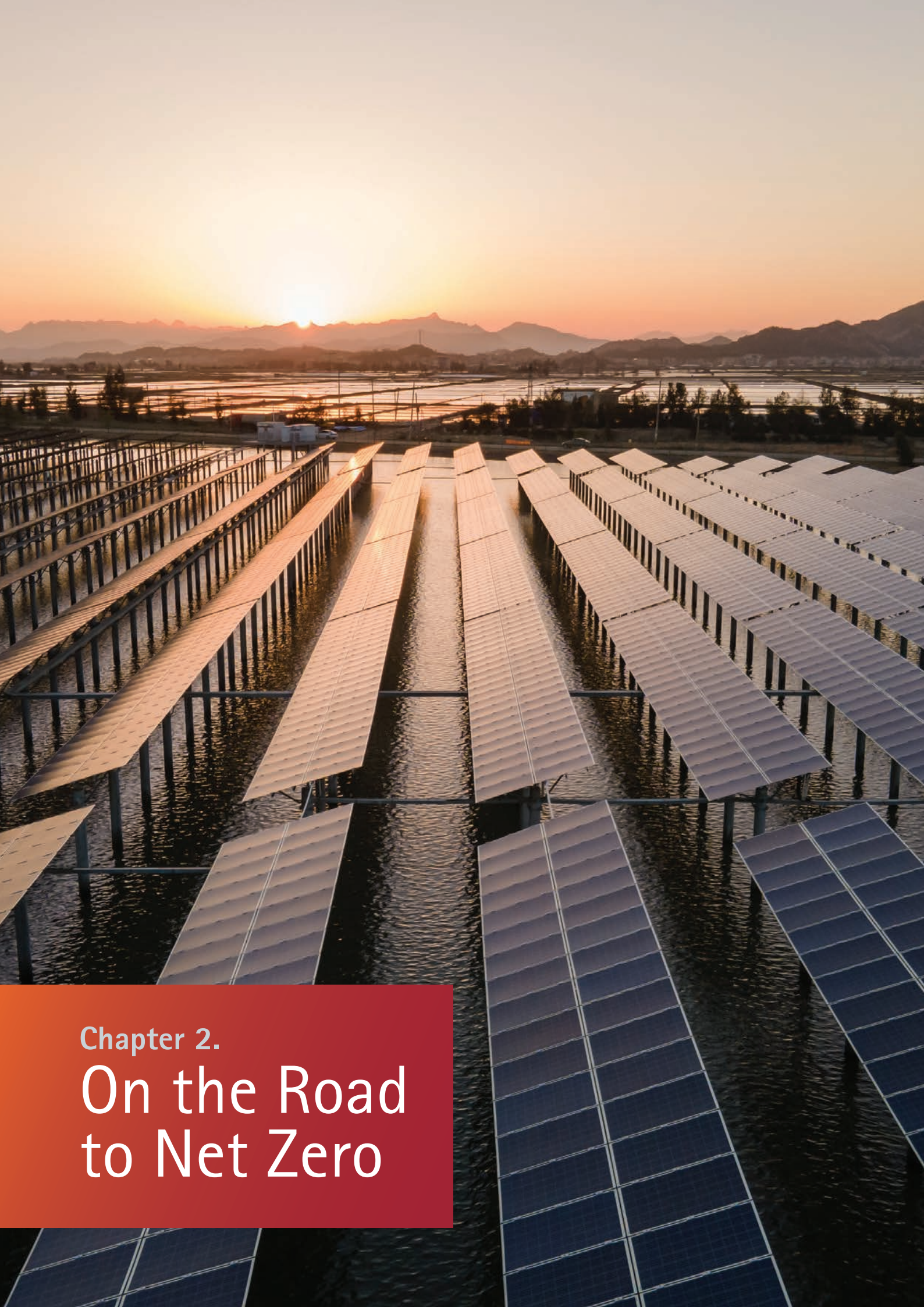


Chapter 2.

On the Road to Net Zero

Highlights

- Climate change mitigation—avoiding and curtailing greenhouse gas emissions to prevent global warming—is among the most critical issues to confront policymakers around the world. The global commitment under the Paris Agreement of 2015 to reduce the Earth's temperature increase to well below 2 degrees Celsius carries significant long-term growth consequences for the ASEAN+3 region, which itself is home to some of the world's largest emitters of greenhouse gases.

- The transition to net zero—where the amount of carbon dioxide (the main greenhouse gas) produced is balanced by the amount removed from the atmosphere—by the 2050 goal set by the Paris Agreement implies a complete transformation of how the ASEAN+3 region produces, consumes, and allocates existing resources. Shifting from fossil fuel use will demand an unprecedented public and private investment and impact economies' macroeconomic fundamentals.

- The key to climate change mitigation is to put an appropriate price on carbon emissions. However, with ASEAN+3 economies relying mainly on fossil fuels for energy, doing so would see sustained pressure on medium- to long-term inflation if alternative energy supplies are not available at affordable prices. Yet, not doing so could reduce the region's competitiveness if major trading partners with more stringent carbon pricing policies impose border adjustments to equalize the price of carbon embedded in their domestic products and imports. Deep and rapid adjustments away from use of fossil fuels also mean that some economies in the region face substantial risks to financial stability if policy actions to promote the net zero transition spark a sudden and disorderly adjustment in market expectations.

- The sooner that scalable, reliable, and affordable low-carbon alternatives become available for ASEAN+3, the less painful and costly the shift from fossil fuels will be. Indeed, the road to net zero is rich in opportunity. Abundant renewable energy resources, carbon storage potential, and critical minerals provide ASEAN+3 economies an enormous advantage in meeting growing global demand for clean energy, low-emission products, carbon-removal technologies, and carbon offsets, among others. Many of region's economies are already well-placed to leverage their comparative advantage in technology, manufacturing, natural resources, and financial services to reap economic benefits from the transition.

- Mobilizing private capital will be key for the ASEAN+3 region to realize the economic gains from the transition to net zero while minimizing its negative impact on growth. Financial markets are increasingly adopting new instruments and practices to accelerate green and transition finance activity, but the region remains confronted by a huge funding gap. Development of comparable standards, frameworks, and taxonomies across the region for sustainable finance instruments will be crucial in accessing much-needed financing.

- The region must employ well-designed fiscal, financial, and monetary policy tools to bring about an orderly transition while managing climate-related risks effectively. More important, regionally coordinated action will achieve a greater impact than economies acting alone. Enhanced cooperation and exchange among the ASEAN+3 economies—especially in cross-border energy trade, innovation and new technology, and green financial networks—would expedite and smoothen the region's journey toward net zero.

I. Introduction

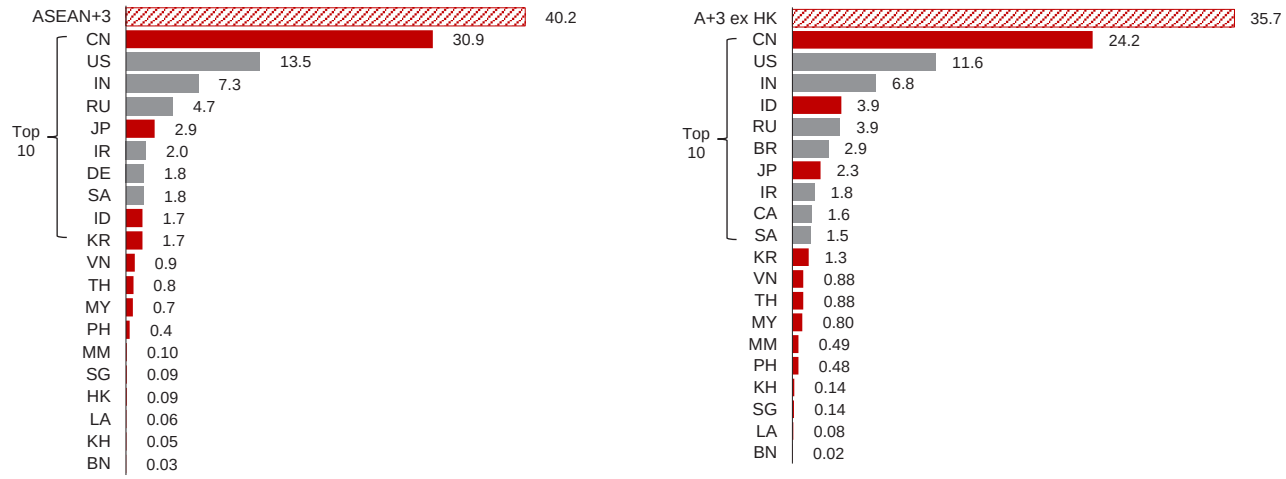
Climate change has emerged as one of the foremost macro-critical issues for policymakers around the world in the coming years and decades. Climate scientists attribute the increase in global temperature over the past few decades to the greenhouse gases (GHGs) that humans have been adding to the atmosphere since the Industrial Revolution of the 1700s. Continued warming has potential to cause significant physical damage and economic harm by disrupting oceanic patterns and accelerating glacial melting, causing radical changes to weather systems, extreme heat and humidity, more wildfires, more destructive storms, rising sea levels and flooding, ocean acidification—and the list goes on.

The ASEAN+3 region is home to three of the 10 largest GHG emitters in the world (China, Indonesia, and Japan) and accounts for over one-third of global GHG emissions. On a per-capita basis, the region's annual GHG emissions are above the world average, although there is substantial variance across economies (Figure 2.1 and Figure 2.2). The most important GHG from the standpoint of climate change is carbon dioxide. That is because carbon dioxide remains longer in the atmosphere than other GHGs and is a major part of emissions from human activities (mainly the burning of carbon-rich fossil fuels like coal and oil). Other important GHGs are methane (the main part of natural gas), nitrous oxide (from the use of nitrogen-based fertilizers), and halocarbons (chemicals used in solvents, fire-fighting agents, refrigerants, and the like).

All ASEAN+3 economies have committed to contributing to climate action under the Paris Agreement of 2015 (Box 2.1). The central goal of the 2015 Paris Agreement is to limit global warming to well below 2 degrees Celsius—preferably to 1.5 degrees—by 2050, compared to pre-industrial global average temperatures. To achieve this long-term temperature goal, countries would need to reach global peaking of GHG emissions as soon as possible (before 2030) to realize a climate-neutral world by the Agreement's 2050 goal. Approaches for dealing with climate change fall into two complementary categories: (1) mitigation—curtailing the emissions of GHGs and/or taking GHGs out of the atmosphere; and (2) adaptation—learning to live with the consequences of climate change.[1]

Almost all ASEAN+3 economies have set or are considering a target of reducing GHG emissions to net zero around mid-century (Figure 2.3). Net zero means cutting GHG emissions to as close to zero as possible, with any remaining emissions reabsorbed from the atmosphere by oceans and forests, for instance. Carbon neutrality refers to net zero carbon dioxide emissions. Since carbon dioxide is the main GHG causing climate change, the terms "net zero" and "carbon neutrality" are often used interchangeably. Transitioning to a net zero emissions world will require a complete transformation of how the region produces, consumes, and moves about. Transition policies will impact economies' fiscal positions, trade flows, and asset prices, among other aspects. While the transmission mechanisms and expected impacts will differ across individual economies, there will be implications for the long-term macroeconomic and financial development of the ASEAN+3 region as a whole.

Figure 2.1. ASEAN+3 and Selected Economies: Greenhouse Gas and Carbon Dioxide Emissions

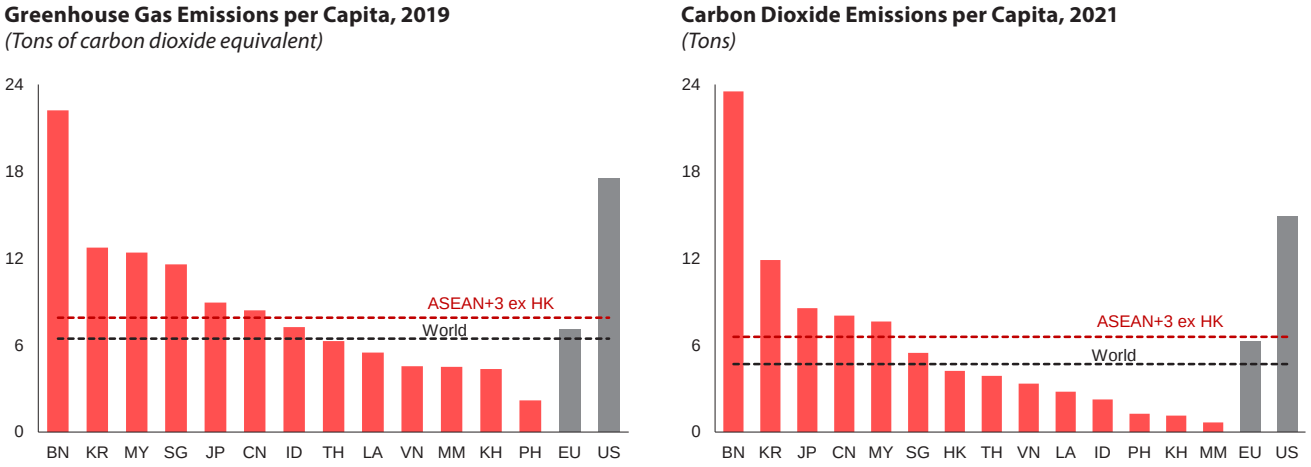


Source: Ritchie, Roser, and Rosado (2020); AMRO staff estimates.
Note: Total greenhouse gas emissions are the sum of emissions of various gases: carbon dioxide, methane, nitrous oxide, and smaller trace gases such as hydrofluorocarbons and sulfur hexafluoride; emissions from land use change (which can be positive or negative) are taken into account. Carbon dioxide emissions include all emissions from energy production (from coal, oil, gas, and flaring) plus direct industrial emissions from cement and steel production; and exclude emissions from land use change. A+3 ex HK = ASEAN+3 excluding Hong Kong. BN = Brunei; BR = Brazil; CA = Canada; CN = China; DE = Germany; HK = Hong Kong; ID = Indonesia; IN = India; IR = Iran; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; RU = Russia; SA = Saudi Arabia; SG = Singapore; TH = Thailand; US = United States; VN = Vietnam.

This chapter was written by Marthe M. Hinojales and Ling Hui Tan (co-anchors), with contributions from Andriansyah, Diana del Rosario, Thanh Thi Do, Aziz Durrani, Suan Yong Foo, Seung Hyun (Luke) Hong, Vanne Khut, Jade Vichyanond, and Fan Zhai.

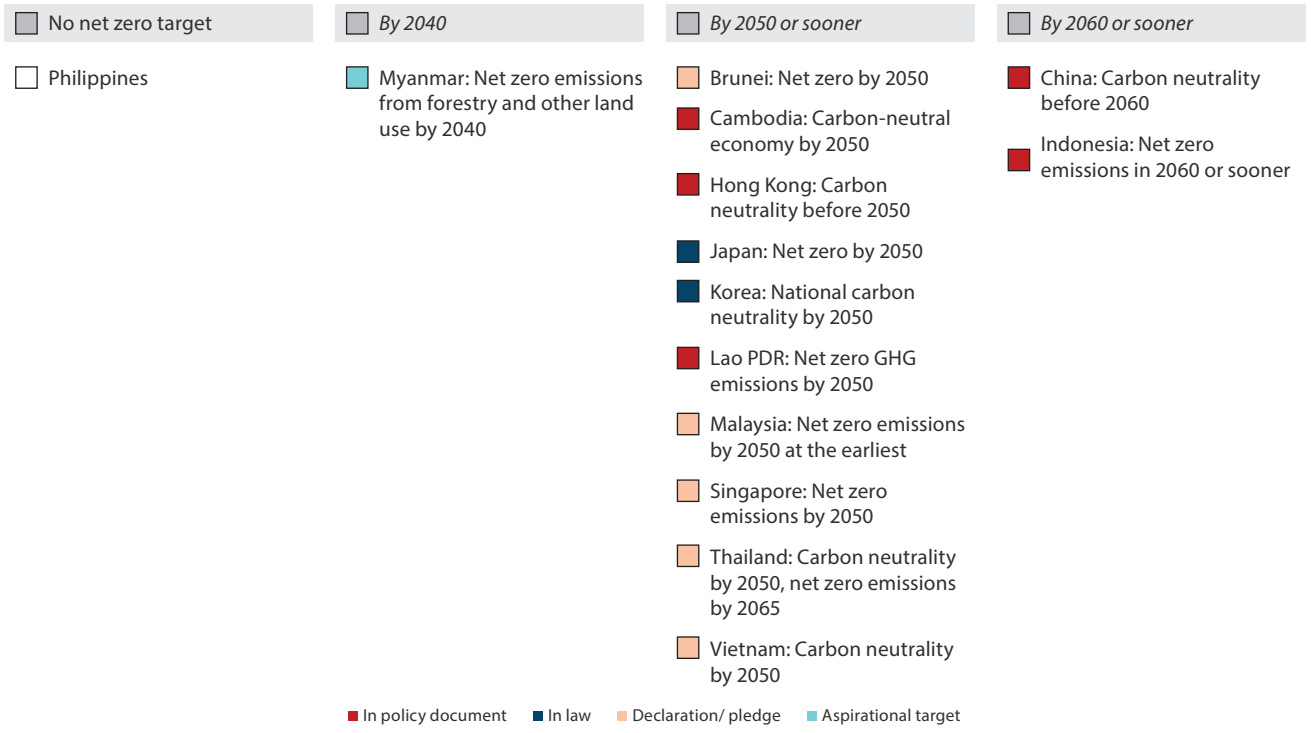
1/ A third approach seeks to actively counter GHG-induced warming. Solar radiation modification/management—sometimes referred to as geoengineering—aims to bring down temperatures by managing the net amount of solar radiation absorbed by the Earth (IPCC 2021). However, this approach is controversial (Rohling 2022).

Figure 2.2. ASEAN+3 and Selected Economies: Greenhouse Gas and Carbon Dioxide Emissions per Capita



Source: Ritchie, Roser, and Rosado (2020); AMRO staff estimates.
Note: Total greenhouse gas emissions are the sum of emissions of various gases: carbon dioxide, methane, nitrous oxide, and smaller trace gases such as hydrofluorocarbons and sulfur hexafluoride; emissions from land use change (which can be positive or negative) are taken into account. Carbon dioxide emissions include all emissions from energy production (from coal, oil, gas, and flaring) plus direct industrial emissions from cement and steel production; and exclude emissions from land use change. BN = Brunei; CN = China; EU = European Union; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States; VN = Vietnam.

Figure 2.3. ASEAN+3: Net Zero Targets



Source: Lang and others (2022); AMRO staff compilation.

Past issues of the ASEAN+3 Regional Economic Outlook (AREO) have consistently identified climate change as a "perennial risk" to the region's macroeconomic outlook.

- AMRO (2018) highlighted the impact of natural disasters in the ASEAN+3 region, including on economic growth and fiscal positions, and stressed the importance of building sufficient economic buffers in anticipation of these shocks.

- AMRO (2020) noted that the risk of climate change and natural disasters could spill over to the financial system, magnifying its impact on the real economy. With more frequent, intense, and widespread disasters, the balance sheets of insurers and reinsurers would become increasingly exposed, and banks would face rising credit defaults as collateral values are eroded. In addition to physical risks, ASEAN+3 financial sectors would also need to prepare against transition risks, including stranded assets (i.e., assets that have suffered from unanticipated or premature write-downs, devaluation, or conversion to liabilities) and rebalancing of their lending operations away from carbon-emitting projects toward clean and green investments.

- AMRO (2022a) pointed to a number of medium- and long-term regional- and country-specific actions and policies in the ASEAN region to adapt to climate change. However, many initiatives to mitigate the risks from climate change remain conceptual—yet to be translated into policies and action plans.

This thematic chapter focuses on the transition to net zero in the context of structural transformation and growth in ASEAN+3 economies. It discusses three broad questions from the perspective of long-term growth in ASEAN+3 economies:

- What are the macro-financial implications of transitioning out of a high-carbon economy?
- What are the opportunities for transitioning into a carbon-neutral economy?
- (How) Can finance facilitate the transition?

Box 2.1:

ASEAN+3 Mitigation Targets under the Paris Agreement

All ASEAN+3 economies have signed on to the Paris Agreement of 2015, the framework governing international efforts to reduce carbon emissions. The Paris Agreement recognizes two objectives: (1) keeping temperature increases to well below 2 degrees Celsius; and (2) enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change.

At the heart of the agreement are the Nationally Determined Contributions (NDCs) under which all economies contribute targets for emissions in 5 or 10 years (Table 2.1.1). These are unilateral and voluntary, as is the metric on which they are based: some economies make pledges in terms of absolute emissions, some in terms of reductions, some for emissions relative to GDP, and so on. Some developing economies have both conditional and unconditional pledges, with the more ambitious targets being conditioned on receiving needed climate funding from advanced economies. Economies are expected to raise their ambitions by submitting revised NDCs every five years. The NDCs are also aligned with national adaptation plans, which set out how economies intend to improve their climate resilience.

Table 2.1.1. ASEAN+3: Nationally Determined Contributions

Economy	Latest Submission	Target(s) for 2030
Brunei	31 December 2020	Reduce greenhouse gas (GHG) emissions by 20 percent relative to projected business-as-usual level in 2030.
Cambodia	31 December 2020	Reduce GHG emissions by 41.7 percent relative to projected business-as-usual level in 2030 (target is mostly conditional on international support).
China	28 October 2021	Reduce carbon intensity (carbon dioxide emissions per unit of GDP) by over 65 percent from 2005 level and achieve peak carbon dioxide emissions before 2030.
Hong Kong	28 October 2021 (Annex I in China's NDC submission)	Reduce carbon intensity by 65 percent to 70 percent from its 2005 level (equivalent to an absolute carbon emission reduction of 26 percent to 36 percent).
Indonesia	23 September 2022	Reduce GHG emissions by 32 percent relative to projected business-as-usual level in 2030 (additional reduction of up to 11 percent conditional on international support).
Japan	22 October 2021	Reduce GHG emissions by 46 percent from level in FY2013 (ending 31 March 2014) to 760 $MtCO_2e$.
Korea	23 December 2021	Reduce GHG emissions by 40 percent from 2018 level to 727.6 $MtCO_2e$.
Lao PDR	11 May 2021	Reduce GHG emissions by 60 percent relative to projected baseline level in 2030 (additional reductions conditional on increased financial support from advanced economies).
Malaysia	30 July 2021	Reduce GHG emissions per unit of GDP (emission intensity) by 45 percent from 2005 level.
Myanmar	3 August 2021	Reduce/avoid carbon dioxide emissions totaling 244.5 $MtCO_2e$ over 2021–30 (total reduction of 414.8 $MtCO_2e$ conditional on international financial and technical support).
Philippines	15 April 2021	Reduce cumulative GHG emissions by 2.7 percent compared to projected cumulative business-as-usual emissions over 2020–30 (additional reduction of 72.3 percent conditional on support or the means of implementation under the Paris Agreement).
Singapore	4 November 2022	Reduce GHG emissions to about 60 $MtCO_2e$ in 2030 after peaking emissions earlier.
Thailand	2 November 2022	Reduce GHG emissions by 30 percent compared to projected business-as-usual level in 2030 (additional reduction of 10 percent conditional on adequate and enhanced access to technology development and transfer, financial resources, and capacity-building support).
Vietnam	8 November 2022	Reduce GHG emissions by 16 percent relative to projected business-as-usual level in 2030 (additional reduction of 27 percent conditional on international support).

Source: United Nations Framework Convention on Climate Change (UNFCCC) Nationally Determined Contributions Registry.
Note: Greenhouse gases targeted in countries' Nationally Determined Contributions vary. They may include, in addition to carbon dioxide, hydrofluorocarbons, methane, nitrogen trifluoride, nitrous oxide, perfluorocarbons, and sulfur hexafluoride. FY = fiscal year; MtCO2e = million tons of carbon dioxide equivalent.

This box was written by Marthe M. Hinojales and Ling Hui Tan.

II. Out with the Old: Macroeconomic Implications of Moving Away from Fossil Fuels

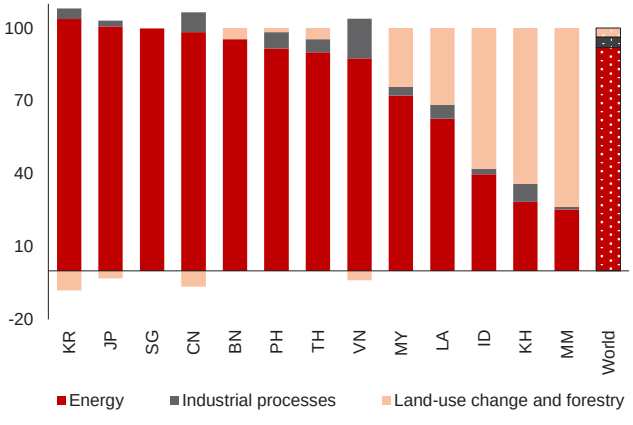
The key to climate change mitigation—limiting global warming—is a substantial reduction in fossil fuel use. According to the Intergovernmental Panel on Climate Change (IPCC), carbon dioxide emissions are the dominant cause of global warming (IPCC 2021). Over 90 percent of global carbon dioxide emissions come from the energy sector (Figure 2.4), and electricity and heat generation is its largest emitting subsector. Transportation and manufacturing follow as emitters (Figure 2.5). Fossil fuels—coal, oil, and natural gas—supply over 80 percent of the world's energy (Figure 2.6). Coal—the "dirtiest" fossil fuel—puts out the most carbon dioxide per unit of energy and is the single largest source of the global temperature rise. Oil is next, followed by natural gas, which is considered the cleanest-burning fossil fuel of the three.

ASEAN+3 economies rely mainly on fossil fuels for energy—though to varying degrees, given their diverse economic and geographic size and structure. The energy sector is the main source of carbon emissions for most ASEAN+3 economies except Cambodia, Indonesia, and Myanmar where forestry and land-use dominate (Figure 2.4). The carbon intensity of the energy mix (measured by carbon dioxide emissions per unit of primary energy) also varies, with China, Lao PDR, and Vietnam at the high end of the scale and well above the world average, and Brunei, Cambodia, Myanmar, and Singapore at the low end and well below the world average (Figure 2.7). This diversity is correlated with the share of fossil fuels, particularly coal, in energy consumption (Figure 2.6).

Like the rest of the world, ASEAN+3 economies have committed to reducing their reliance on fossil fuels to achieve their emission targets.[2] Almost all the economies of the region have set targets or pledged to reduce the use of coal power (Table 2.1). Brunei, Indonesia, Korea, the Philippines, Singapore, and Vietnam were among the 44 countries that fully or partially endorsed the Global Coal to Clean Power Transition Statement at the 26th United Nations Climate Change Conference of the Parties (COP26) in November 2021.

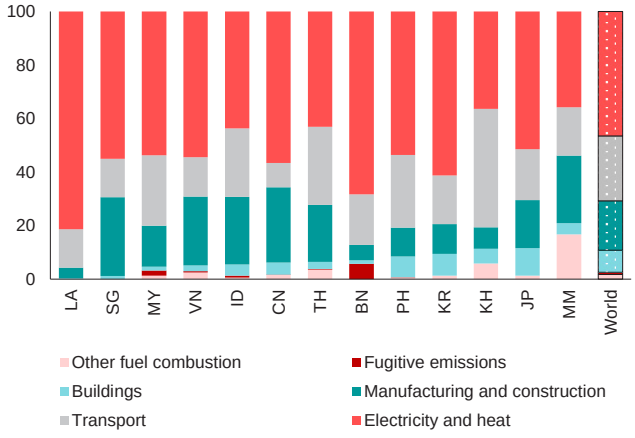
What are the implications of reducing fossil fuel use for medium- and long-term growth and stability in ASEAN+3 economies? The following subsections discuss four key questions: (1) What will happen to prices and inflation as fossil fuels are phased out? (2) Will the region's export growth be affected by asymmetric regional and global carbon pricing policies? (3) Will stranded assets cause huge financial losses and financial instability? And most importantly: (4) Will economic development and growth be stunted due to insufficient reliable energy supply?

Figure 2.4. ASEAN+3 and World: Carbon Dioxide Emissions, by Sector, 2019
(Percent of total carbon dioxide emissions)



Source: Climate Watch (2022); AMRO staff calculations.
Note: Energy sector refers to emissions generated from the use of energy and includes electricity and heat generation, buildings, transportation, manufacturing, fugitive emissions, and other fuel combustion processes. BN = Brunei; CN = China; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

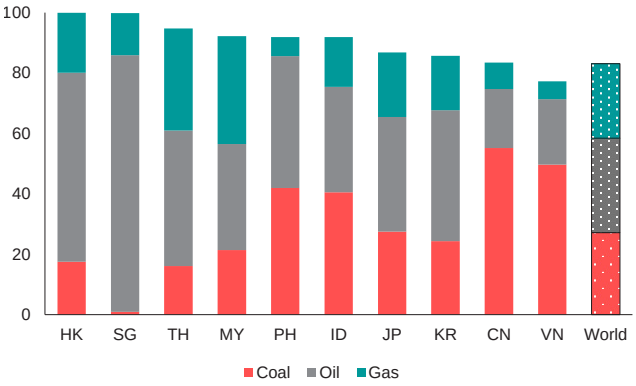
Figure 2.5. ASEAN+3 and World: Carbon Dioxide Emissions, by Energy Subsector, 2019
(Percent of total energy sector carbon dioxide emissions)



Source: Climate Watch (2022); AMRO staff calculations.
Note: Fugitive emissions are GHG emissions that are not produced intentionally by a stack or vent, e.g., leaks from industrial plants and pipelines. BN = Brunei; CN = China; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

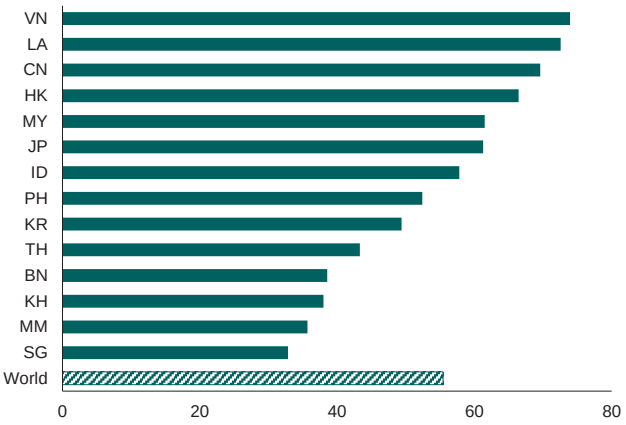
2/ The 2021–25 ASEAN Plan of Action for Energy Cooperation did not include a fossil fuel phaseout—instead, it envisaged "growing capacity additions from coal in the coming years"—but did aspire for renewable energy to reach 23 percent of the bloc's total primary energy supply and 35 percent of its installed power capacity by 2025 (ASEAN Centre for Energy 2020).

Figure 2.6. Selected ASEAN+3 and World: Share of Fossil Fuels in Primary Energy Consumption, 2021
(Percent of total primary energy consumption)



Source: BP Statistical Review of World Energy (2022); AMRO staff calculations.
Note: Primary energy consumption is measured in exajoules and includes international marine and aviation fuel consumption. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam. Data not available for Brunei, Cambodia, Lao PDR, and Myanmar.

Figure 2.7. ASEAN+3 and World: Carbon Intensity of Energy Mix, 2021
(Tons of carbon dioxide per terajoule)



Source: International Energy Agency (2022f); AMRO staff calculations.
Note: Carbon intensity of energy mix is defined as carbon dioxide emissions from fuel combustion per unit of total energy supply (including fossil and nonfuel forms of energy, biofuels, as well as heat and electricity). Total energy supply is calculated as: production + imports - exports - international marine bunkers - international aviation bunkers ± stock changes. BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Table 2.1. ASEAN+3: Commitments to Reduce Reliance on Coal

Economy	Commitment(s)
Brunei	• Transition from unabated coal power generation in the 2040s (or as soon as possible thereafter). Stop issuing new permits for new unabated coal-fired power generation projects, stop new construction of unabated coal-fired power generation projects, and end new direct government support for unabated international coal-fired power generation.
Cambodia	• No new coal generation capacity beyond already committed projects as of 2019.
China	• Accelerate the pace of coal reduction during the 14th Five-Year Plan period (2021–25). Promote clean end-use energy by replacing coal with natural gas, electricity, and renewable energy. Stop building new coal-fired power projects abroad.
Hong Kong	• Phase out coal as a power generation source by 2035.
Indonesia	• Transition from unabated coal power generation in the 2040s (or as soon as possible thereafter). Reduce the share of coal in the power generation mix to 38 percent by 2050 (from 59 percent in 2019).
Japan	• Reduce the share of coal in the power supply to 19 percent by 2030. End government support for unabated coal power projects overseas.
Korea	• Transition from unabated coal power generation by 2050. Stop issuing permits for new unabated coal-fired power generation projects. Lower reliance on fossil fuel imports to under 70 percent by 2030.
Lao PDR	• No stated targets or pledges.
Malaysia	• Stop building new coal power plants. Gradually retire existing plants with about 7 GW of coal-fired generation capacity by 2033 at the end of their respective 25-year power purchase agreements.
Myanmar	• Decrease the share of coal in the electricity generation mix to 20 percent by 2030 (11 percent conditional on international support).
Philippines	• Transition from unabated coal power generation in the 2040s (or as soon as possible thereafter). Moratorium on new coal-fired power plants in October 2020.
Singapore	• Phase out unabated coal power generation. Stop issuing permits for new unabated coal power stations by 2040.
Thailand	• No stated targets or pledges.
Vietnam	• Transition from unabated coal power generation in the 2040s (or as soon as possible thereafter). Stop issuing new permits for new unabated coal-fired power generation projects; stop new construction of unabated coal-fired power generation projects; and end new direct government support for unabated international coal-fired power generation. Restrict the development of coal-fired power plants and reduce the share of coal power to 13 percent by 2045.

Source: AMRO staff compilation.

Will Inflation Go Up?

"... [F]ossilflation, and its broader repercussions on other input and output prices, is likely to remain an important contributor to headline and underlying inflation in the foreseeable future."

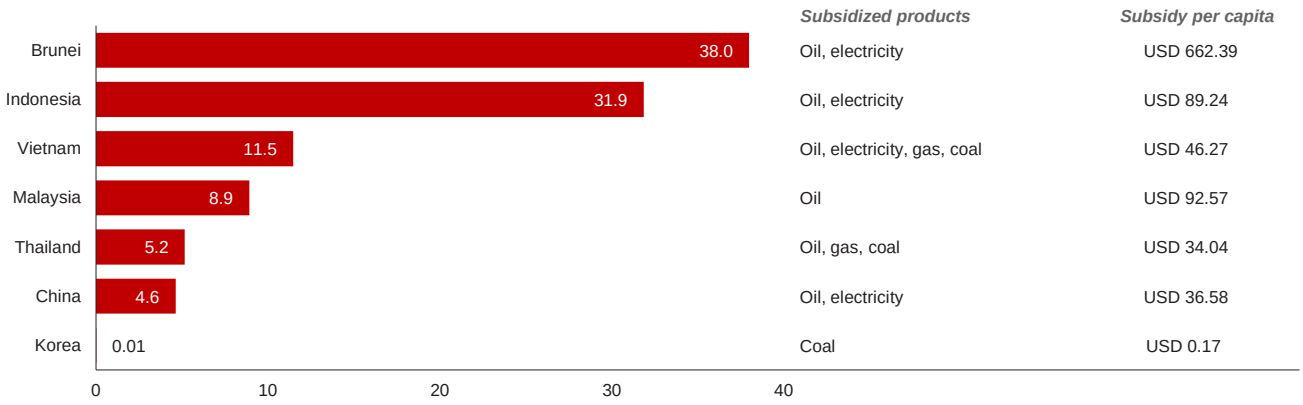
Isabel Schnabel
European Central Bank Executive Board Member
March 2022

The key to reducing fossil fuel use is carbon pricing—making those responsible for carbon emissions pay a price that reflects their external ("social") cost. When producers and consumers have to pay for each ton of carbon dioxide they directly or indirectly emit, they would have an explicit price incentive to shift away from fossil fuels. Thus, policies to disincentivize the use of fossil fuels usually involve raising energy and energy-related prices to reflect the damage done by emissions. According to the International Monetary Fund (IMF), increasing fuel prices to their "socially efficient" levels will reduce projected global carbon dioxide emissions by 36 percent below baseline levels in 2025 and put the world on track to contain global warming to the Paris Agreement goal of 1.5–2 degrees Celsius (Parry, Black, and Vernon 2021).

Fossil fuel subsidies can be considered negative carbon pricing, and ASEAN+3 economies will need to phase them out. The International Energy Agency (IEA) identifies seven ASEAN+3 economies that subsidize at least one fossil fuel (Figure 2.8). In Brunei, China, Indonesia, Malaysia, and Thailand, certain types of oil are sold at below-market retail prices. Coal prices remain subsidized in Korea and Vietnam. The average subsidization rate is highest in Brunei and Indonesia, at over 30 percent. These seven ASEAN+3 economies are among economies worldwide that adopted the 2021 Glasgow Climate Pact, calling for "accelerating efforts toward the … phase-out of inefficient fossil fuel subsidies" (UNFCCC 2021).

Phasing out fossil fuel subsidies will raise domestic (fossil fuel) energy prices but need not raise inflation. The direct impact of fuel subsidy reform is an increase in energy prices for households and firms—particularly low-income households and state-owned electricity companies, which tend to be the main beneficiaries of the subsidies. Indeed, some countries have had difficulty reforming fuel subsidies because the resulting price rises led to widespread public protests. The indirect impact of fuel subsidy reform is an increase in prices of other goods if firms pass on higher energy costs to consumers. But the effect on inflation should be temporary as long as appropriate macroeconomic policies are in place to forestall expectations of further increases in prices and wages.[3] Global experience suggests that a phased approach helps reduce the impact of subsidy reform on inflation as it gives households and enterprises time to adjust and gives the government time to establish supporting social safety nets and improve the efficiency of state-owned energy producers (Clements and others 2013).

Figure 2.8. Selected ASEAN+3: Fossil Fuel Subsidies, 2021
(Percent, average subsidization rate)



Source: IEA (2022i).
Note: The IEA uses the price-gap approach to estimate subsidies to fossil fuels that are consumed directly by end-users or consumed as inputs to electricity generation. This approach compares the average end-user price paid by consumers with a reference price that corresponds to the full cost of supply: Subsidy = (Reference price - End-user price) × Units consumed.

3/ The extent to which higher energy costs result in a persistently higher inflation will depend on the strength of second-round effects on wages and the prices of other inputs. This may especially be a concern for economies that have difficulty anchoring inflation expectations.

ASEAN+3 economies are presently at different stages of considering and implementing carbon pricing. Carbon pricing goes beyond eliminating fuel subsidies to positively taxing the carbon content of fossil fuels or their carbon dioxide emissions. The two main approaches to carbon pricing are a carbon tax and a cap-and-trade program or emissions trading scheme/system (ETS). A carbon tax works by directly setting a price for emissions.[4] An ETS works by restricting the volume of emissions and letting the market determine their price.[5] Table 2.2 summarizes the current state of carbon pricing in ASEAN+3 economies. Only Japan and Singapore have implemented a carbon tax (Box 2.2), and only China, Japan, and Korea have ETSs (Box 2.3). Carbon pricing can also be achieved implicitly, e.g., through regulatory limits on emissions. In this case, the implicit carbon price is based on how much a company spends to reduce emissions to comply with government regulations.

Table 2.2. Selected ASEAN+3: Status of Carbon Pricing Policies

Economy	Carbon Pricing Policy		Status
	Carbon tax	ETS	
Brunei	Under consideration	Under consideration	The National Carbon Climate Policy states that Brunei will introduce carbon pricing (either an ETS or a carbon tax) applicable to all industrial facilities and power utilities by 2025.
China		Regional ETSs implemented in 2013, 2014, and 2016. National ETS implemented in 2021	
Indonesia	Under development	Under development	Indonesia will has pledged to implement a carbon tax by 2025. Law No. 7/2021, passed in October 2021, introduced a so-called cap-and-trade-and-tax scheme (combining an ETS with a carbon tax) to be initially imposed on coal-fired power generation plants. The Indonesia Stock Exchange is setting up a carbon credit trading platform for domestic carbon trading.
Japan	Implemented in 2012	Regional ETSs implemented in 2010 and 2011. National ETS under consideration	
Korea		Implemented in 2015	
Lao PDR	Under consideration	Under consideration	As mandated by the National Green Growth Strategy, Lao PDR will utilize carbon pricing (either an ETS or a carbon tax) to stimulate efficient and economical energy usage.
Malaysia	Under consideration	Under development	As indicated in the Budget 2023 speech, the government intends to introduce a carbon tax regime and is studying the feasibility of a carbon pricing mechanism. Malaysia introduced voluntary carbon trading at the domestic level in December 2022 as a first step before transitioning to a domestic ETS.
Philippines	Under consideration	Under consideration	As mandated by the Low Carbon Economy Act, the Philippines will establish a cap-and-trade system for the industrial and commercial sectors. The Department of Finance is reportedly studying the viability of a carbon tax.
Singapore	Implemented in 2019		
Thailand	Under consideration	Under development	The Excise Department is studying a carbon tax for industrial sectors. Following a pilot voluntary ETS in 2015–20, Thailand is developing an ETS in the Eastern Economic Corridor region and drafting the ETS legal framework.
Vietnam		Under development	Decree No. 06/2022/ND-CP issued in January 2022 provides details for the establishment and development of a carbon market under the 2020 Law on Environmental Protection. A pilot system will start by 2025 and be fully implemented by 2028.

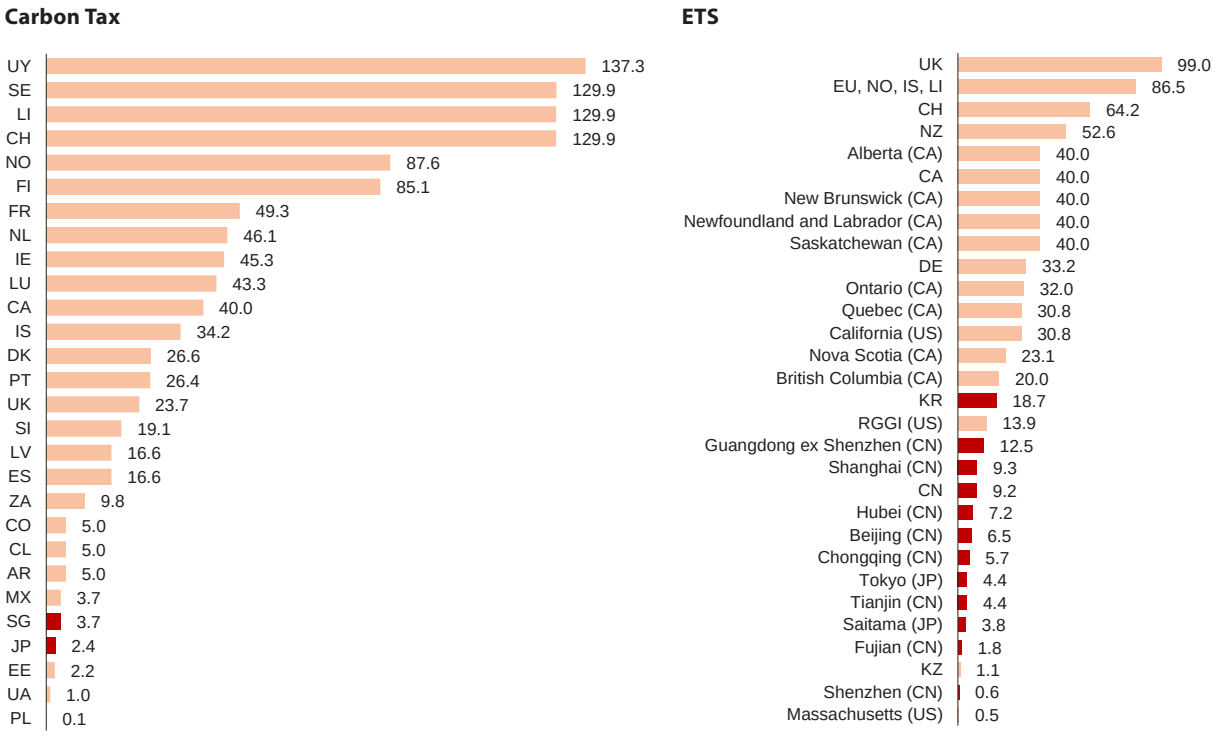
Source: Andriansyah and Hong (2022); World Bank (2022a); AMRO staff compilation.

4/ In addition to direct carbon taxes, which are based on carbon emissions, indirect carbon taxes include fuel excise taxes, which are levied on the source of GHG emissions rather than directly on the emissions.

5/ Under an ETS, the government places a limit on total emissions and allocates rights (allowances) to emit GHGs to regulated entities (firms), either free of charge or via auction. Firms must hold allowances sufficient to cover their emissions. To comply with their emission quotas, firms can either implement internal abatement measures or acquire allowances in the carbon market. By creating supply and demand for allowances, an ETS establishes a market price for (excess) GHG emissions.

Current (explicit) carbon prices in the ASEAN+3 region—where they exist—are lower than in other parts of the world and too low to be effective for mitigating climate change (Figure 2.9). The effectiveness of carbon pricing in reducing emissions depends to a large extent on the price of emissions (i.e., the carbon tax rate or the ETS market-clearing price). This must be high enough to incentivize firms to shift away from fossil fuels. According to the IMF, carbon prices need to rise from the current global average of USD 6 per ton of carbon dioxide (tCO_2) to USD 75 per tCO_2 by 2030 in order to limit global warming (Black, Parry, and Zhunussova 2022). Other models, however, suggest that a much higher carbon price—closer to USD 200 per ton of carbon dioxide equivalent (tCO_2e) in 2030—would be needed to incentivize a transition toward net zero by 2050 (NGFS 2022).[6]

Figure 2.9. Selected Economies: Carbon Prices, 2022
(US dollars per ton of carbon dioxide equivalent)



Source: World Bank (2022a).
Note: Subnational carbon tax rates are not shown. Nominal prices on 1 April 2022. Prices are not necessarily comparable between carbon pricing initiatives because of differences in the number of sectors covered and allocation methods applied, specific exemptions, and different compensation methods. AR = Argentina; CA = Canada; CH = Switzerland; CL = Chile; CN = China; CO = Colombia; DE = Germany; DK = Denmark; EE = Estonia; ES = Spain; FI = Finland; FR = France; IE = Ireland; IS = Iceland; JP = Japan; KR = Korea; KZ = Kazakhstan; MX = Mexico; LI = Lichtenstein; LU = Luxembourg; LV = Latvia; NL = the Netherlands; NO = Norway; NZ = New Zealand; PL = Poland; PT = Portugal; RGGI = Regional Greenhouse Gas Initiative; SE = Sweden; SG = Singapore; SI = Slovenia; UA = Ukraine; UK = United Kingdom; US = United States; UY = Uruguay; ZA = South Africa.

Large hikes in the price of carbon could increase inflation, especially if sudden or "disorderly." A large hike in carbon prices would increase costs, particularly in the energy sector which, as noted, still relies heavily on fossil fuels. Thus, it can be considered an adverse supply shock. The impact of a carbon price increase on energy price inflation would depend on the transition period of the policy (i.e., the time given for industries to adapt to carbon pricing and make the switch out of fossil fuels) and the availability of green technology and alternative fuel sources for industries to switch into. If power generation companies—which normally are the first to face a higher carbon price—are unable to adapt quickly by adopting decarbonization or new lower-emission technologies, they will pass on some of the burden through increased electricity tariffs. If low-emission power generation alternatives (such as solar, wind, or nuclear energy) are not yet widely available, energy prices could be significantly higher in the medium term until resources are reallocated and the transition to clean energy is complete.[7]

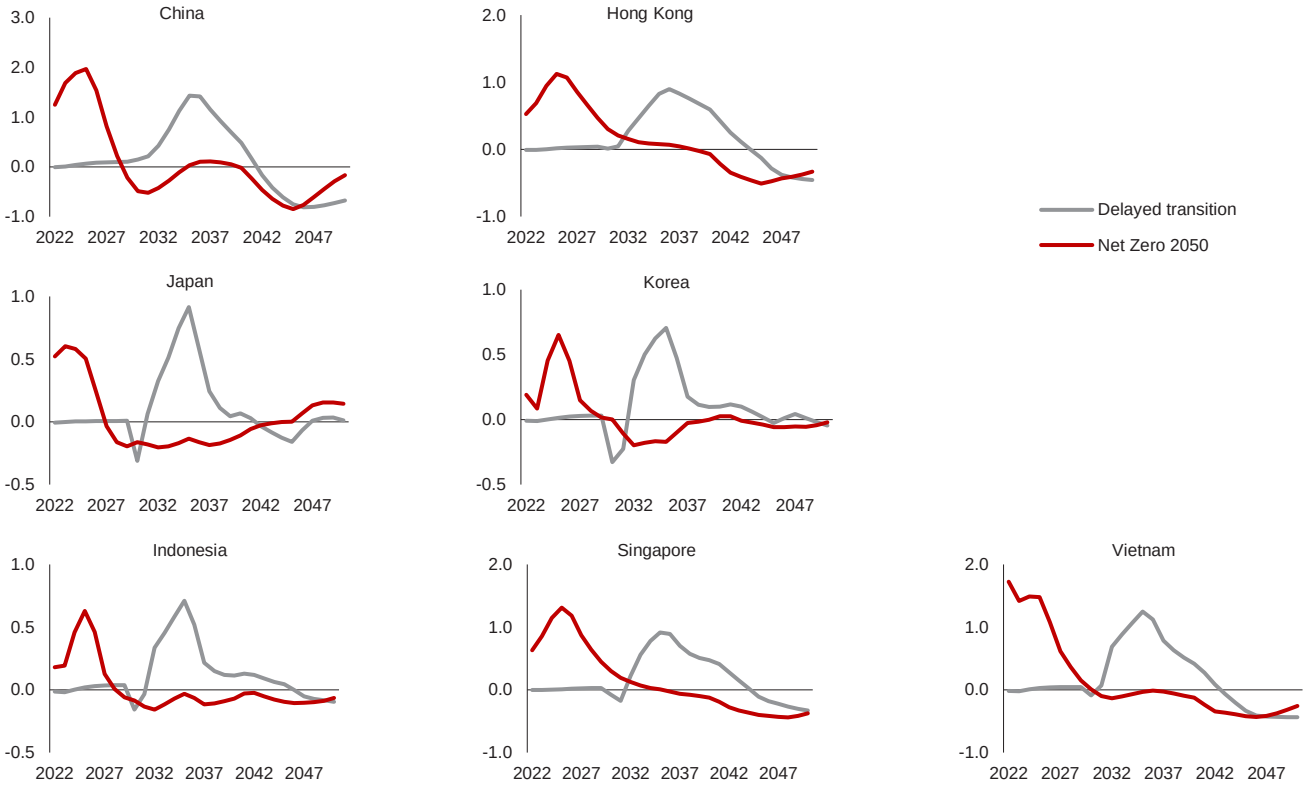
6/ NGFS (2022) estimates the carbon price as the marginal abatement cost necessary to reach a specific temperature increase. The estimated price reflects the stringency of policy as well as how technology costs will evolve—for example, it tends to be lower in economies where there are a greater number of low-cost abatement options available.

7/ Empirical studies of the historical effects of carbon pricing on inflation mainly focus on Europe, where these policies were first implemented. Känzig (2022) finds that restrictive carbon policy shocks in the EU ETS (2005–18) led to persistent increases in euro area headline inflation. McKibbin, Konradt, and Weder di Mauro (2021) find that carbon taxes implemented in the euro area (1985–2020) had positive effects on headline inflation especially in the first two years, but the effects were contained after three years. The effects on the producer price index were larger, suggesting that producers absorbed most of the carbon tax rather than passing it on to consumers. Konradt and Weder di Mauro (2022) find that the response of headline inflation seemed especially muted in economies with revenue recycling schemes and monetary policy regimes that could accommodate the carbon tax (i.e., those outside the euro area). Results for Canada (2000–19) even point to slightly deflationary responses associated with putting a price on carbon. Moessner (2022) finds that ETS allowance prices in 35 OECD economies (1995–2020) had a small positive effect on headline inflation but carbon taxes had no significant effects on headline, core, or energy inflation.

The same applies to implicit carbon pricing through regulations such as restrictions on coal use for power generation, energy intensity limits, and compulsory standards and technological performance requirements. In China, for example, where the regulatory approach is often used to target emission reductions at the sectoral and regional level, limitations on energy use contributed to power crunches in several regions that curbed production and drove up the producer price index in the fall of 2021 (AMRO 2022a). Indeed, a key consideration for China's carbon neutrality roadmap is how to allocate the carbon budget to smooth the adjustment costs frontier across the transitional period (Zhai and Foo 2022).

Achieving an "orderly" transition requires governments to communicate a clear and predictable path for future tightening of carbon emission policies and to accelerate structural changes toward affordable clean energy options. Early simulations by the Network for the Greening of the Financial System (NGFS) suggest that the implementation of carbon prices to achieve net zero targets will cause inflation to increase only mildly before returning to prior trends (Figure 2.10).[8] However, the global energy crisis triggered by the Ukraine crisis has provided an example of what could happen to inflation under a more disorderly transition than one modeled by the NGFS (Schnabel 2022; Kho and Zhao 2022). At the same time, the crisis could also provide added impetus for policies to drive an increase in clean energy investments in the region (Section III).

Figure 2.10. Selected ASEAN+3: Inflation Projections under Transition Scenarios
(Percent change from baseline)



Source: International Institute for Applied Systems Analysis (IIASA) NGFS Climate Scenarios Database (October 2022 vintage).
Note: The baseline is a hypothetical scenario with no physical or transition risks. The (orderly) "Net Zero 2050" transition scenario assumes that optimal carbon prices in line with economies' long-term targets are implemented immediately after 2020 and global net zero carbon dioxide emissions is achieved in 2050. The (disorderly) "delayed transition" scenario assumes that annual emissions do not decrease until 2030, and strong policies are then needed to keep global warming below 2 degrees Celsius in 2100.

8/ Energy price shocks are generally seen as reflecting shifts in relative prices within a basket of goods, rather than a sustained rise in inflation that requires monetary policy action. But when shocks feed through only slowly—for instance, as the carbon price is raised—inflation expectations may change, forcing central banks to react.

Box 2.2:

Carbon Taxes in Japan and Singapore

Japan

Japan was the first ASEAN+3 economy to introduce a carbon tax in October 2012. The so-called special tax for climate change mitigation is applied to crude oil and petroleum products, natural gas, and coal, on top of existing taxes on these products (Figure 2.2.1). The tax rate was increased gradually over three and a half years to reach JPY 289 (USD 2.60) per ton of carbon dioxide equivalent (tCO_2e). Revenue from the tax is used to support renewable energy projects and energy-saving measures, yielding a "budget effect" in the form of lower emissions.

The carbon tax was calibrated to avoid putting an excessive burden on households and businesses. The estimated price increases due to the tax range from JPY 0.76–0.78 per liter for gasoline, kerosene, and liquefied petroleum gas to JPY 0.11 per kilowatt-hour for electricity, although substantial regional variation exists in the extent of pass-through to electricity prices (Ding 2022). There are also several exemptions and refund measures for specific products used in certain industries, such as imported coal, light oil used for agriculture, forestry and fishing, and heavy and light oil used for domestic cargo and passenger ships and railways (Japan Ministry of the Environment 2012).

The tax alone was expected to achieve only modest emission reductions. At the time of introduction, its "price effect" was estimated to achieve a 0.2 percent emission reduction and the "budget effect" a 4.2 percent emission reduction between 2013 and 2030 (Japan Ministry of the Environment 2013).

Singapore

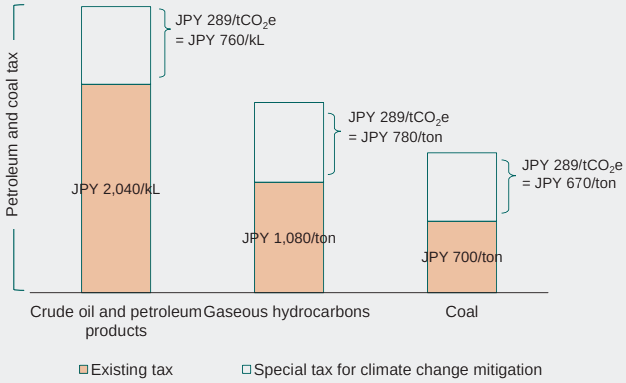
Singapore introduced a carbon tax in January 2019. It is applied on facilities that directly emit at least 25,000 tCO_2e of greenhouse gas (GHG) emissions annually—in all, about 50 facilities in the manufacturing, power, waste, and water sectors, accounting for 80 percent of the economy's total GHG emissions. The tax is set at a low initial rate of SGD 5 (USD 3.55) per tCO_2e until 2023 to provide an adjustment period for emitters.

The carbon tax will be raised over the next few years to reach SGD 50–80 per tCO_2e by 2030 (Singapore NCCS 2022) (Figure 2.2.2). The pre-announced carbon tax trajectory is meant to give businesses certainty and impetus to plan their transition, e.g., by investing in low-carbon technologies and carbon markets. The tax increase will be revenue-neutral in the sense that the revenue will be used to support decarbonization efforts and to cushion the impact on businesses and households. Companies will be allowed to offset up to 5 percent of their taxable emissions with high-quality international carbon credits starting in 2024. Companies in emission-intensive trade-exposed sectors will be given transitory allowances for part of their emissions based on internationally recognized efficiency benchmarks, where available, or on the facilities' decarbonization plans.

The tax is not expected to have a big impact on household utility bills (and consequently on consumer behavior) in the near term. The SGD 5 per tCO_2e tax is estimated to result in a 1 percent increase in total electricity and gas expenses for households, which is offset by rebates for eligible households (Tan and Toh 2018). The SGD 25 per tCO_2e tax in 2024–25 is estimated to lead to an increase of about SGD 4 per month in utility bills for an average household living in a four-room Housing and Development Board flat, but additional rebates will be provided to eligible households to cushion the impact (Tan 2022).

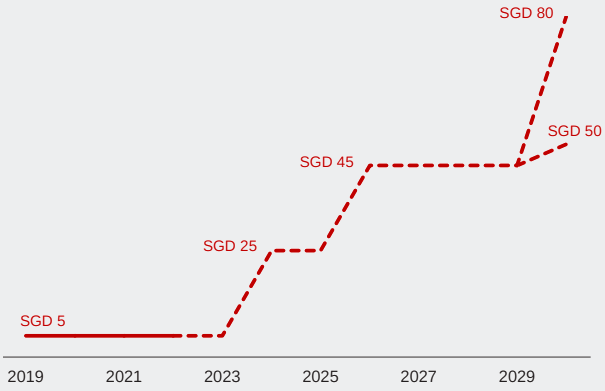
This box was written by Andriansyah.

Figure 2.2.1. Japan: Carbon Tax



Source: Japan Ministry of the Environment (2012).
Note: kL = kiloliter.

Figure 2.2.2. Singapore: Carbon Tax
(Singapore dollars per ton of carbon dioxide equivalent)



Source: Singapore NCCS (2022).

Box 2.3:

Emissions Trading Schemes in the Plus-3

Japan

Japan has two subnational emissions trading systems (ETSs): the Tokyo Cap-and-Trade Program (since 2010) and the Saitama Target Setting ETS (since 2011). Both ETSs cover energy use-related carbon dioxide emissions from the industry, power, and buildings sectors, for a combined total coverage of 21 million tons of carbon dioxide emissions. The Tokyo ETS covers about 1,200 facilities and the Saitama ETS about 600 facilities with an annual energy usage equivalent to 1,500 kiloliters or more of crude oil.

The ETSs are so-called baseline-and-credit systems that set mandatory emission-reduction targets for large buildings and factories. Each regulated ("covered") facility has its own cap, which serves as the baseline from which it must achieve its reduction target. The absolute emission baseline for each facility is determined by the historical emissions associated with their total energy consumption and an emission-reduction target ("compliance factor") based on the type of facility and factors such as expected energy efficiency gains and the extent to which they consume energy supplied by other facilities. Covered facilities that achieve emissions below their baseline earn "excess emission reduction credits." These can be sold to other covered facilities or be banked for future compliance (i.e., to pay for future emissions that exceed the baseline). Covered facilities can also use eligible offsets to meet their compliance obligations. Eligible offsets include credits generated from domestic renewable energy projects and emission reductions in certain noncovered facilities in or outside the two jurisdictions. The two ETSs are linked, meaning that Tokyo and Saitama credits are officially eligible for trade between the two jurisdictions.

Prices for excess emission reduction credits in the Tokyo ETS have been decreasing since 2011 (Figure 2.3.1). There has been little active trading in the market. According to Abe and Arimura (2022), some 85 to 90 percent of regulated facilities achieved their emission-reduction targets through internal abatement efforts without making use of emissions trading. This suggests that emission caps were not low enough to generate demand for emission credits or to bring about a significant reduction in energy-use in regulated facilities.

Korea

Korea was the first ASEAN+3 economy to launch a nationwide mandatory ETS in January 2015. Korea's ETS covers direct emissions of six greenhouse gases (GHGs) as well as indirect emissions from electricity consumption from 684 large emitters in the waste, domestic aviation, buildings, industry, and power sectors, accounting for 591 million tons of carbon dioxide equivalent ($MtCO_2e$) of GHG emissions.

The Korea ETS is a cap-and-trade system whereby a cap is set on the total amount of GHG emissions and regulated entities are issued emission allowances, each representing 1 ton of carbon dioxide equivalent (tCO_2e). Regulated entities must measure their annual emissions and surrender allowances to cover their responsibility; those that emit less than their allocation can sell their excess allowances, while those that do not have enough allowances to cover their annual emissions need to buy them. Annual GHG emission caps ranged from 540 $MtCO_2e$ to 593 $MtCO_2e$ in the first two phases of implementation (2015–20). For the third implementation phase, the caps are 589 $MtCO_2e$ for 2021–23 and 567 $MtCO_2e$ for 2024–25. Regulated entities can use carbon offset credits from eligible domestic and international projects to meet up to 5 percent of their compliance obligations.

Most sectors receive free allowances based on their historical average GHG emissions. Auctioning was introduced in the second implementation phase for 3 percent of the allocation to 26 subsectors such as electricity, domestic aviation, wooden products, and metal foundry; the auction share was increased to 10 percent and the number of subsectors increased to 41 in the third phase. The auction volume for 2022 was 22.8 $MtCO_2e$ (allowances). Auctions take place on the Korea Exchange, which also manages the platform for spot secondary market transactions in allowances and offset credits.

This box was written by Andriansyah.

The allowance price evolved as the market developed. The price started at about KRW 8,500 (about USD 6.5) per tCO_2e and rose more or less steadily for five years, reaching KRW 40,900 per tCO_2e at the end of 2019 (Figure 2.3.2). Price changes have been driven by revised climate targets and ETS rules, as well as demand from market participants and speculators. Allowance prices dipped in 2020 as COVID-19 reduced economic activity. Prices rose in the middle of 2021 when the government proposed a tightening of the country's 2030 emission target and at the end of 2021 when 20 financial institutions were allowed into the market to bolster liquidity (World Bank 2022b). Market stabilization measures are in place to deal with persistent supply-demand imbalances, including auctioning of allowances from the reserve, imposing banking limitations, changing the borrowing limits, changing the offset restrictions, and temporarily setting a price floor or ceiling.

China

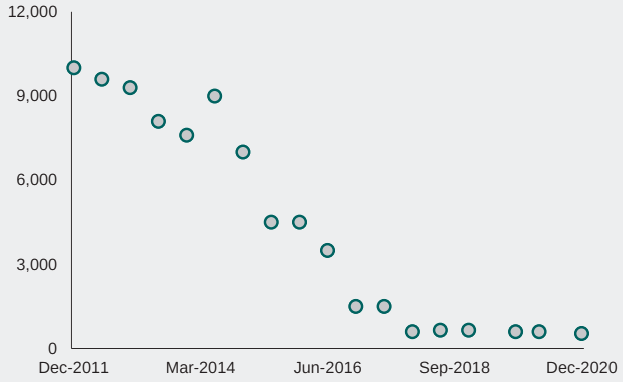
China implemented a national ETS in July 2021. Before that, eight subnational ETSs were piloted: in Beijing, Guangdong, Shanghai, Shenzhen, and Tianjin in 2013; Chongqing and Hubei in 2014; and Fujian in 2016. Sectoral coverage of the subnational ETSs varies but mainly comprises transport, buildings, industry, and domestic aviation. Emission coverage ranges from 13 $MtCO_2e$ (Shenzhen) to 259 $MtCO_2e$ (Guangdong). The national ETS currently covers only the power sector, but it is already the world's largest in terms of covered emissions—4,500 $MtCO_2$ from more than 2,100 regulated entities. Entities regulated under the national system do not face compliance obligations under the subnational ETSs.

Unlike ETSs elsewhere with a fixed cap on emissions that would decline over time, the cap on China's national ETS can go up or down from year to year. Each regulated entity receives a "verified allowance" equal to the amount of carbon dioxide it is allowed to emit, which is based on its historical output and the corresponding intensity benchmark. The flexible cap is the sum of verified allowances for all regulated sites. In the pilot subnational ETSs, the total emission allowance is determined through a top-down approach (e.g., in Beijing), a bottom-up approach based on reported emissions data (e.g., in Fujian), or a combination of both. All regulated entities in the national ETS and most existing entities in the subnational ETSs are given their allowances for free; a small portion of allowances are auctioned in some subnational ETSs (e.g., Beijing, Guangdong, and Shanghai). Regulated entities can then buy or sell permits (each permit representing 1 tCO_2e of emissions) as needed to meet their compliance obligations. They are also allowed to use eligible domestic project-based offsets to meet a portion of their compliance obligations: up to 5 percent in the national ETS, and ranging from 1 percent (Shanghai) to 10 percent (Guangdong, Hubei, Shenzhen, and Tianjin) in the subnational ETSs (Section III goes into more detail on carbon offsets).

Prices for emission allowances in the national and subnational ETSs vary widely. Trading on the national ETS has been limited so far—a total of 194 $MtCO_2e$ of allowances changed hands during the first 12 months of operation, and the emission allowances closed at CNY 58.24 per tCO_2e on 15 July 2022, compared to CNY 51.23 per tCO_2e on its first trading day a year earlier (Xue 2022). Allowance prices in the pilot subnational ETSs ranged from about CNY 30 per tCO_2e in Chongqing, Fujian, and Tianjin to about CNY 120 per tCO_2e in Beijing by the end of 2022 (Figure 2.3.3). The ETSs have contingency measures in place to ensure market stabilization, including market suspension, additional allowance auctions and buy-back options (although no market stabilization actions have reported to date).

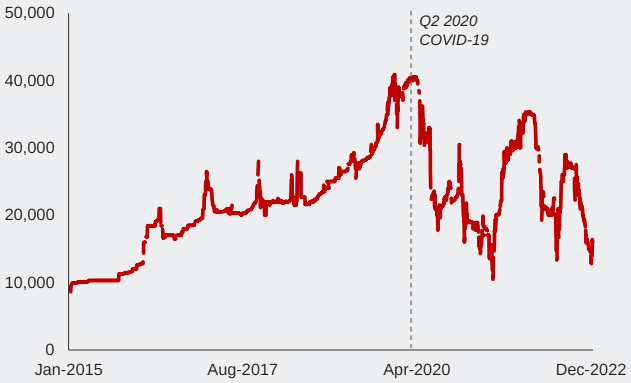
The subnational ETSs will gradually be integrated into the national ETS. Sectoral coverage of the national ETS will expand to include six additional industries: iron and steel, aluminum, cement, chemicals, papermaking, and civil aviation.

Figure 2.3.1. Japan: Tokyo ETS Excess Emission-Reduction Credit Prices
(Yen per ton of carbon dioxide equivalent)



Source: Fujitsu Research Institute (2020).

Figure 2.3.2. Korea: ETS Allowance Prices
(Won per ton of carbon dioxide equivalent)



Source: International Carbon Action Partnership (2022).

Figure 2.3.3. China: Daily Emission Allowance Prices
(Yuan per ton of carbon dioxide equivalent, 30-day moving average)

Source: International Carbon Action Partnership (2022).

Will Exports Suffer?

"There is no doubt that climate concerns will lead to restrictions on trade. The question is how and when."

Henrique Schneider
Chief Economist of the Swiss Federation of Small and Medium-sized Enterprises
November 2022

Carbon pricing could also have implications for export competitiveness. As noted, carbon pricing can increase production costs, directly (by requiring firms to pay a carbon tax or purchase emission allowances) and indirectly (by increasing the explicit or implicit cost of inputs such as fuels and electricity). By increasing production costs, carbon pricing can substantially reduce the relative competitiveness of an economy. Such concerns are particularly acute for so-called energy-intensive, trade-exposed sectors (EITEs)— aluminum, cement, chemicals, iron, and steel, plastics, and refined petroleum, to name a few—and in economies where these sectors contribute substantially to economic activity and employment (Parry and others 2021). Furthermore, exporters in high-carbon sectors could see their market shares shrink if a lower carbon price for foreign producers allows them to export at a lower cost—a problem referred to as "carbon leakage."[9] Changes in cross-country trade and capital flows arising from differentiated carbon prices could result in losses in export earnings, employment, and FDI for some economies, with implications for productivity and innovation in the longer term (Venmans, Ellis, and Nachtigall 2020).

The empirical literature finds very small or negligible effects of carbon pricing policies on competitiveness and carbon leakage. There could be various reasons for this, including still-low levels of carbon prices, a limited number of carbon pricing schemes that have been examined (given that most of them are still in the early stages of implementation), protection for at-risk sectors such as large (over-) allocations of emission allowances, or the ability of firms to pass on the additional cost to consumers (World Bank 2016; Dechezleprêtre and Sato 2017; Joltreau and Sommerfeld 2019). In addition, carbon pricing policies may not yet be as critical as other determinants of production and investment decisions, like the availability of skilled labor, infrastructure, quality of institutions, and market size (AMRO 2021). Studies of carbon leakage are also faced with methodological constraints.

Nonetheless, there has been increasing interest in the idea of border carbon adjustments (BCAs) to counter potential losses in competitiveness and carbon leakage due to asymmetric carbon prices. Conceptually, BCAs would accompany domestic carbon pricing policies and be imposed on the "embodied carbon" in an economy's imports—these imports would be subject to fees and other charges on their emissions content as if they were produced domestically, thus leveling the playing field between local and foreign producers.[10] A variation of a BCA can also be implemented on the export side, in the form of rebates for exporters for all or part of the domestic carbon price paid on their exports. Accordingly, BCAs would address the problem of competitiveness loss and carbon leakage by imposing a cost on imports from foreign producers facing no (or lower) carbon prices and/or providing offsetting payments (e.g., rebates) for exports of domestic producers that pay higher carbon prices.

In practice, BCAs are complex to design and implement. Details to be sorted out include the scope of application (e.g., which sectors and products to be included); the methodology for calculating embedded emissions; the rate of (import) charges or (export) rebates to set; assessing "equivalency" among existing carbon pricing systems, or between pricing and non-pricing systems; and alignment with international trade laws and agreements (Sawyer and Gignac 2022). No national or supranational jurisdiction has implemented a BCA yet. The most advanced is the European Union's Carbon Border Adjustment Mechanism (CBAM), which enters its preliminary stage in October 2023 (Box 2.4). BCAs are also being explored in Canada and the United Kingdom, where explicit carbon prices are relatively high, as well as in Japan and the United States, where explicit carbon prices are relatively low (Figure 2.9).

Widespread use of BCAs globally would have significant implications for ASEAN+3 trade and production. Based on the latest available data in 2018, ASEAN+3 accounts for nearly 38 percent of carbon emissions embedded in global trade, more than half of which is accounted for by China (Figure 2.11, left panel). Of the top 20 economies in the world with the highest carbon emissions embedded in trade, seven are from ASEAN+3 (Figure 2.11, right panel). Moreover, as noted, explicit carbon prices in the region are generally non-existent or much lower than in some of its major trading partners (Figure 2.12). BCAs on embodied

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9/ Carbon leakage refers to the shift in production from a jurisdiction with stringent carbon policies to a jurisdiction with less stringent policies. While the former reports reduced emissions as a consequence of its high carbon price, the increase in carbon-intensive activity in the latter offsets this reduction, leading to increased global emissions overall, i.e., "leakage."

10/ If accompanying a domestic carbon tax, a BCA would function as a value-added tax imposed at the border. If accompanying an ETS, a BCA would mirror the requirements for purchases for emission allowances by domestic producers (Cosbey 2021).

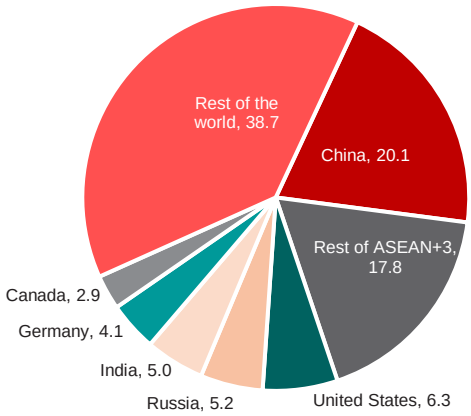
carbon will make the region's exports more expensive, which could reduce external demand and trade flows for the affected goods. For the CBAM, for example, this would be the case for producers with higher carbon footprints than their EU counterparts whereas those with lower emission intensities than EU producers might enjoy a cost advantage (Cosbey 2021). In the ASEAN+3 region, only Singapore appears to have a lower emission intensity than the European Union, although Japan is not far behind (Figure 2.13).

Minimizing the negative consequences of BCAs on ASEAN+3 exports will entail strong policy and regulatory adjustments at the domestic level. ASEAN+3 economies with no carbon pricing would need to adopt some form of it—either a carbon tax or an ETS—in order to reduce extra charges levied on their exports by BCAs.

A carbon tax would help to generate revenue that could be directed toward domestic "green" projects or other climate-related purposes, instead of being channeled to the BCA-implementing trading partner (Parry and others 2021). Adopting a carbon pricing policy would also provide a strong signal on policy direction, even if the carbon price is initially low (Venmans, Ellis, and Nachtigall 2020). Other targeted policies, especially for EITEs, could also help to lessen the impact of BCAs and alleviate business concerns about competitiveness, particularly policies that incentivize or assist domestic exporters to shift to or accelerate the use of low-carbon and more efficient products and technologies (Section IV). The degree of adjustment for each ASEAN+3 economy will depend on its reliance on carbon-intensive products, the carbon intensity of its trade, and its access to resources and means (i.e., technology and financing) to reduce carbon use.

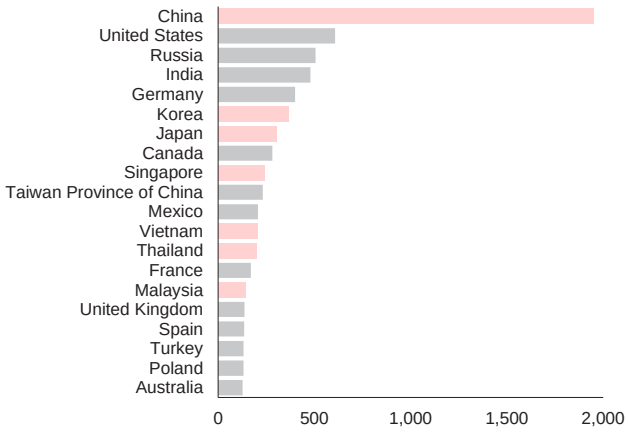
Figure 2.11. ASEAN+3 and Selected Economies: Carbon Dioxide Emissions Embodied in International Trade, 2018

(Percent of world total)



Source: OECD.Stat; AMRO staff calculations.

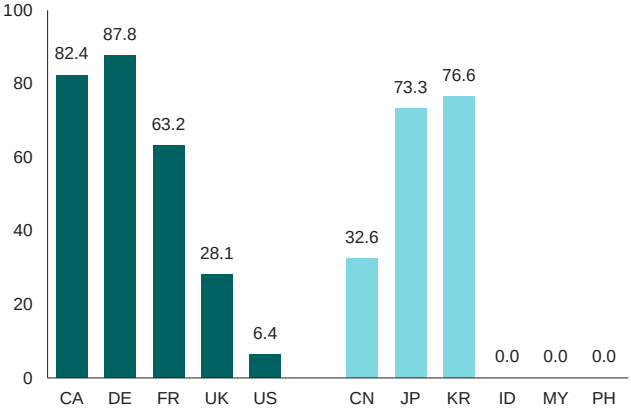
(Million tons of carbon dioxide, top 20 economies)



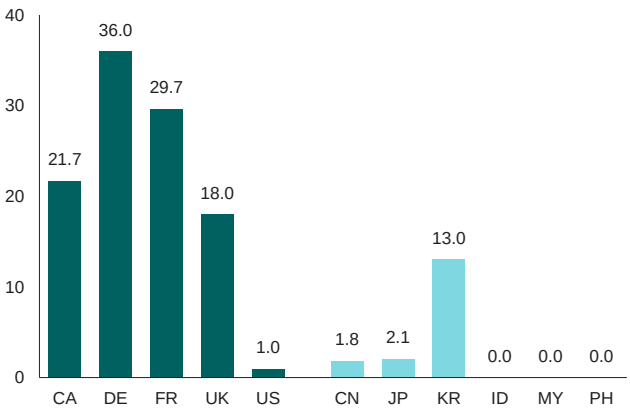
Source: OECD.Stat; AMRO staff calculations.

Figure 2.12. Selected Economies: Carbon Pricing, 2021

Share of GHGs Subject to Explicit Carbon Price
(Percent)

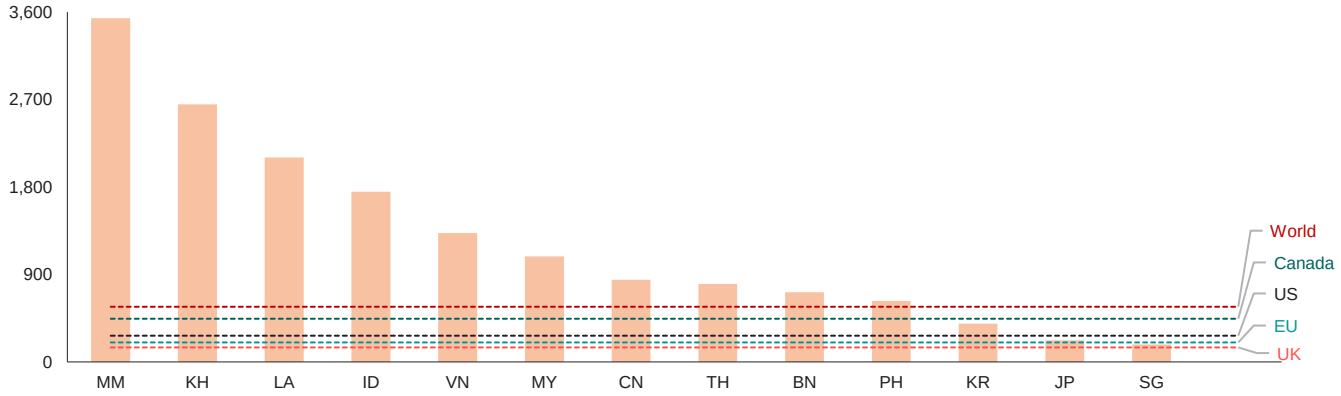


Average Explicit Carbon Price
(Real 2021 euros per ton of carbon dioxide equivalent)



Source: OECD (2022).
Note: Explicit carbon price consists of emissions trading system (ETS) permit prices and carbon taxes. CA = Canada; CN = China; DE = Germany; FR = France; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; UK = United Kingdom; US = United States.

Figure 2.13. ASEAN+3 and Selected Economies: Emission Intensity, 2019
(Tons of carbon dioxide equivalent per million dollars of GDP)



Source: Climate Watch (2022).
Note: Data not available for Hong Kong. BN = Brunei; CN = China; ID = Indonesia; KH = Cambodia; EU = European Union; JP = Japan; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; UK = United Kingdom; US = United States; VN = Vietnam.

Box 2.4:

What Will the European Union's Carbon Border Adjustment Mechanism Mean for ASEAN+3 Exports?

In July 2021, the European Union proposed a carbon border adjustment mechanism (CBAM) for imports from non-EU economies. The stated aim of the CBAM is to limit carbon leakage by equalizing the carbon price between EU and non-EU products and encouraging trading partners to adopt carbon pricing. The CBAM, which is not yet finalized, will initially cover five industrial sectors—aluminum, cement, electricity generation, fertilizers, and iron and steel—plus hydrogen, indirect emissions (under certain conditions), and certain precursors and downstream products of the targeted sectors. Under the CBAM, EU importers would be required to declare the total emissions associated with their annual imports of these products and purchase carbon certificates corresponding to the carbon price that would have been paid to produce the goods in the European Union—i.e., the average trading price of emission allowances on the EU Emissions Trading System (EU ETS). During the transition period starting from October 2023, only emission reporting will be required; no carbon charges will be levied. The CBAM will be phased in as early as 2027 and be fully operational after five to nine years. A determination will be made before the end of the transition period about whether to extend the CBAM's scope to other goods, including organic chemicals and polymers. The goal is to include all goods covered by the EU ETS by 2030 (European Parliament 2022).

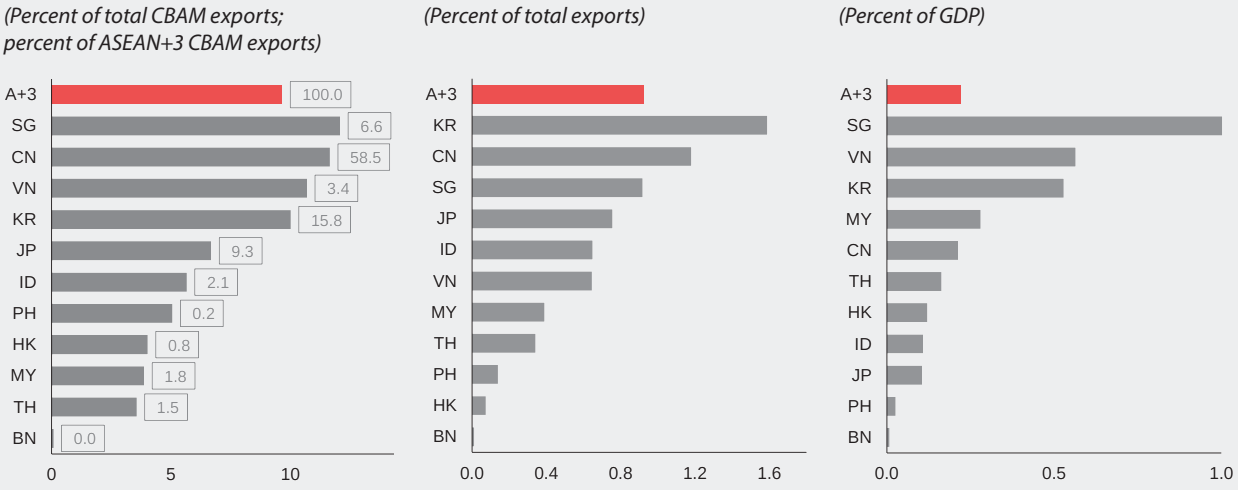
The CBAM—under its initial scope—is expected to have limited impact on ASEAN+3 exports. The European Union is ASEAN+3's second-largest export market of the CBAM-covered product categories, after the United States. China is the region's biggest exporter of CBAM products to the European Union, followed by Korea and Japan (Figure 2.4.1, left panel). However, given that the share of CBAM exports in ASEAN+3's total exports and GDP is relatively small—at 0.9 percent in 2019 and 0.22 percent in 2021—the trade impact of the CBAM under its current scope might not be severe (Figure 2.4.1, center and right panels). Simulations by AMRO staff using a global computable general equilibrium model, following He, Zhai, and Ma (2022), suggest that exports to the European Union could decline by about 0.1 percent for China, 0.2 percent for Japan, and 0.12 percent for ASEAN economies in 2030 relative to the counterfactual baseline (absent the CBAM). Within the region, Vietnam and Indonesia are likely to feel the greatest impact (Figure 2.4.2, top panel).

That noted, the CBAM could have a substantial negative impact on ASEAN+3 exports if its scope is extended to include all products and services and all indirect emissions from upstream value chains. The model simulations suggest that under such an "extreme case" scenario, the CBAM would result in a 11.4 percent decline in China's exports to the European Union and shave 0.12 percent off China's GDP in 2030 compared to the baseline. ASEAN exports to the European Union will be 9.7 percent lower, and GDP will be 0.2 percent lower (Figure 2.4.2, bottom panel). Japan and Korea will not be impacted as severely as the rest of the region, most likely due to their lower carbon intensity, higher energy efficiency (e.g., access to less polluting technologies), and existing domestic carbon prices.

The consequences for ASEAN+3 trade would be exacerbated if other major trading partners implement similar policies. The CBAM could set the tone for future border carbon adjustments (BCAs) in Canada, the United Kingdom, and the United States. ASEAN+3 exporters are likely to lose their cost advantage as their carbon footprints exceed those of these three trading partners (Figure 2.13). These markets account for an additional 12.5 percent of ASEAN+3 exports of CBAM-covered products, or about 1.2 percent of the region's total exports (Figure 2.4.3, left panel). If all other economies follow suit and impose BCAs on the same group of carbon-intensive goods, this will affect nearly 10 percent of the region's total exports, equivalent to about 2.2 percent of its GDP (Figure 2.4.3, right panel). Realistically, the implementation of BCAs is likely to be gradual. Carbon-intensive products tend to have complex value chains and as such, the initial impact is likely to be limited to raw materials and primary products rather than the overall supply chain (Darvell 2022). Gradual implementation would give the region's economies time to introduce or refine their own carbon pricing schemes (Table 2.2) and reduce the risk of a sudden shock to exports and economic activity.

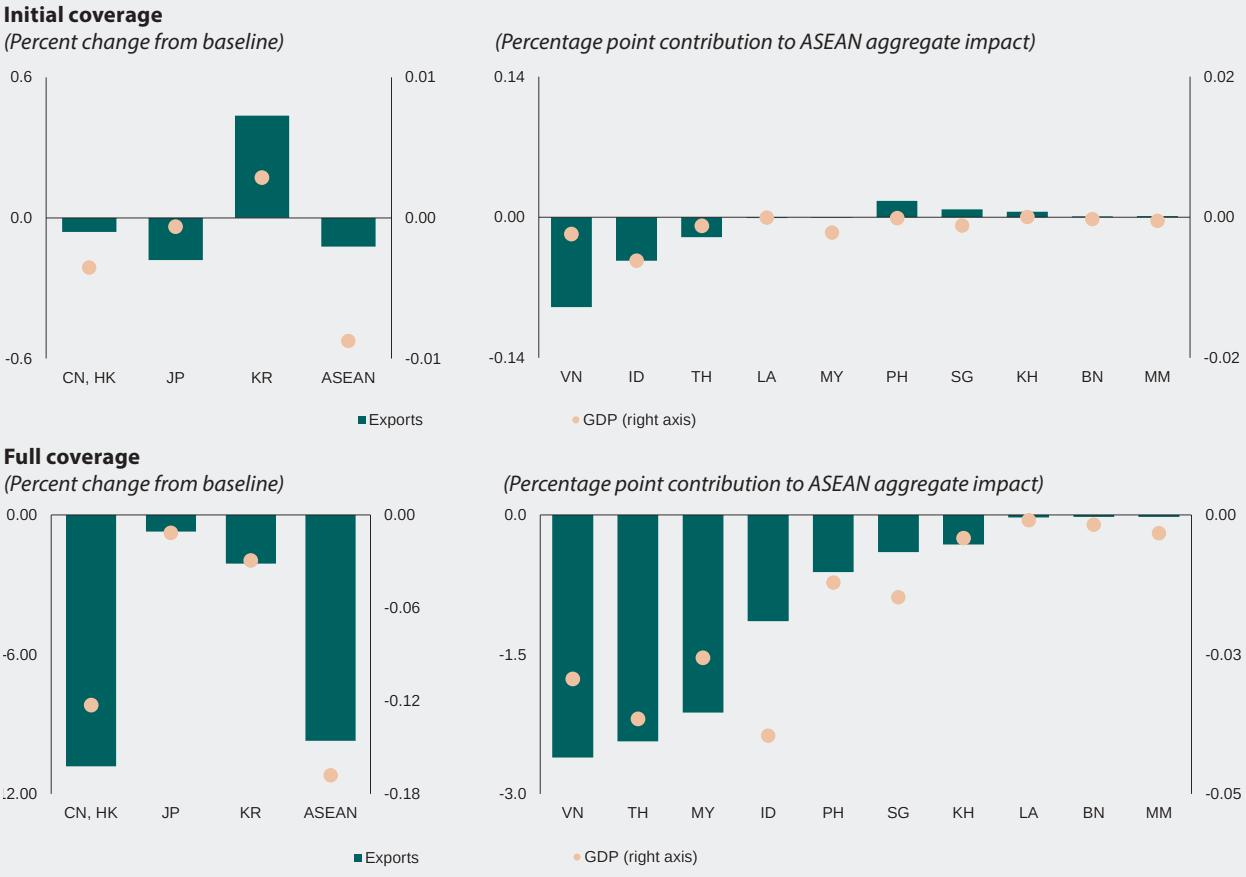
This box was written by Marthe M. Hinojales and Fan Zhai.

Figure 2.4.1 Selected ASEAN+3: Exports of CBAM Products to the European Union, 2019–22 Average



Source: IHS Markit; Haver Analytics; and AMRO staff calculations.
Note: Data for Cambodia, Lao PDR, and Myanmar not available. In the left panel, figures in boxes refer to each economy's share of total ASEAN+3 exports of Carbon Border Adjustment Mechanism (CBAM) products. BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; and VN = Vietnam.

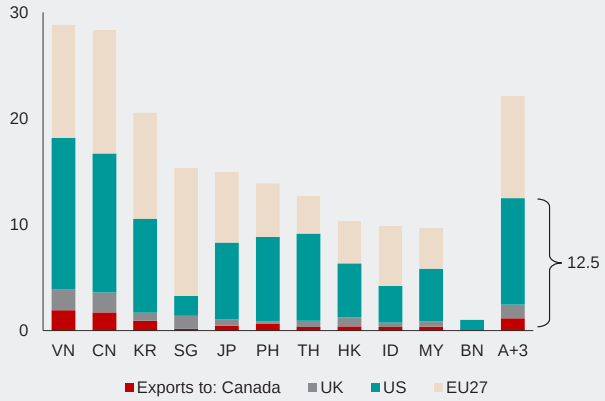
Figure 2.4.2. ASEAN+3: Estimated Impact of CBAM on GDP and Exports to the European Union, 2030



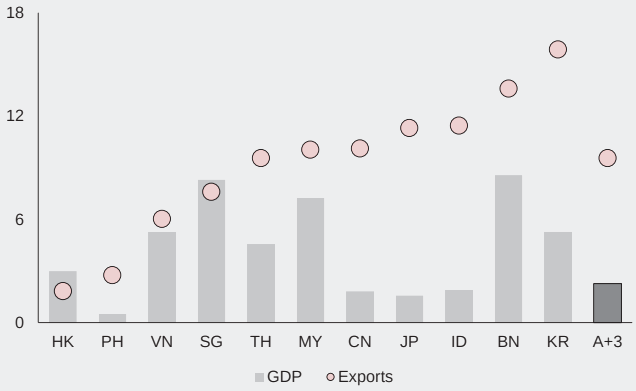
Source: AMRO staff.
Note: The baseline is the case without the Carbon Border Adjustment Mechanism (CBAM). "Initial coverage" refers to direct emissions from the covered sectors (represented in the model by chemicals, electricity, iron and steel, nonferrous metals, and nonmetallic minerals). "Full coverage" refers to all exports and both direct and indirect emissions. Both scenarios assume a carbon price of USD 75 per ton of carbon dioxide equivalent (tCO2e) embodied in imports of the European Union while the carbon price per ton for China is assumed to be USD 9.2; for Indonesia, USD 2.09; for Japan, USD 3.39; for Korea, USD 18.75; for Singapore, USD 3.7; and 0 for the rest of ASEAN. The CBAM, which adjusts for differences between the EU carbon price and carbon price in exporting economies, is assumed to be imposed from 2026. The simulation results show that the CBAM will lead to increases in import costs (measured in tariff-equivalents) of CBAM products from the EU perspective, but the estimated tariff-equivalents will vary across exporting economies. Thus, while most exporting economies are expected to experience a decline in exports, a few, such as Korea in the "initial coverage" scenario could see a small increase because their comparatively lower tariff-equivalents could produce some trade diversion in their favor. BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 2.4.3. ASEAN+3: Exports of CBAM Products, 2019–22

Exports to Selected Markets
(Percent of total CBAM exports)



Exports to All Markets
(Percent of total exports, GDP)



Source: IHS Markit; Haver Analytics; and AMRO staff calculations.
Note: Data for Cambodia, Lao PDR, and Myanmar not available. A+3 = ASEAN+3; BN = Brunei; CN = China; EU27 = 27 members of the European Union; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; UK = United Kingdom; US = United States; VN = Vietnam.

What about Stranded Assets?

"No energy company will be unaffected by clean energy transitions."

Fatih Birol
International Energy Agency Executive Director
January 2020

The transition to a low-carbon economy could result in stranded assets. Hitting the net zero goal by 2050 requires economies around the world to undergo deep and rapid structural adjustments (UNEP 2022). In this context, stranded assets would include natural resources (fossil fuel reserves left in the ground) and investments in infrastructure or properties that would never be fully utilized due to government regulation, technological change, or evolving societal norms and consumer behavior. In macroeconomic terms, when a price—explicit or implicit—is suddenly put on carbon emissions that used to be free, this will trigger an accelerated obsolescence of existing capital stock associated with high emissions, especially in the energy, transportation, manufacturing, and building sectors.[11] For example, oil and coal reserves might have to remain in the ground as "unburnable carbon" (stranded volumes); coal power stations could be prematurely closed due to pressure for fossil fuel divestment (stranded capital); and oil and gas companies—and the banks that finance them—could see their profitability plunge with changing consumer demand (stranded value).[12] Potential output could therefore decline in the short term.

ASEAN+3 economies that rely on export revenues from fossil fuels are likely to face risks from stranded assets. The risk is greatest for economies that currently depend on fossil fuel resources in the ground and/or carbon-intensive built capital, as well as those that are expected to rely on carbon-intensive rents and revenues as a result of large reserves and the young age of their carbon-intensive infrastructure (Peszko and others 2020). Brunei and Vietnam are among the top 10 countries most exposed to stranded-asset risk (Figure 2.14). China, Indonesia, and Malaysia are potentially vulnerable due to the significant contribution of the fuel extractive and/or carbon-intensive sectors to economic growth (Figure 2.15). Cambodia, like Vietnam, is vulnerable mainly because of the large share of young coal power plants in its power generation mix (Figure 2.16). The region's coal resources face the most immediate risk of being stranded, compared to oil and natural gas (Figure 2.17). Economies that rely on coal rents are also at risk of revenue shocks (Figure 2.18).

The creation of stranded assets could also have implications for the region's financial stability.[13] Most of the world's unburnable carbon—the excess of available fossil fuels beyond what can be burned if global warming is limited to below 2 degrees Celsius—is held by companies listed in global financial centers (Allen and Coffin 2022). This means that the fossil fuel assets of these companies are now overvalued. The so-called carbon bubble is estimated to reach between USD 1 trillion and USD 4 trillion by 2050 (IPCC 2022). Policy action to promote the transition toward a low-carbon economy could spark a fundamental reassessment of prospects and burst the carbon bubble. If the bubble bursts suddenly rather than gradually deflating over a span of decades, it could trigger a financial crisis—a climate Minsky moment. Sudden revaluations could trigger fire sales of carbon-intensive assets, which could potentially destabilize financial markets and spark a procyclical crystallization of losses and a persistent tightening of financial conditions (Carney 2015).

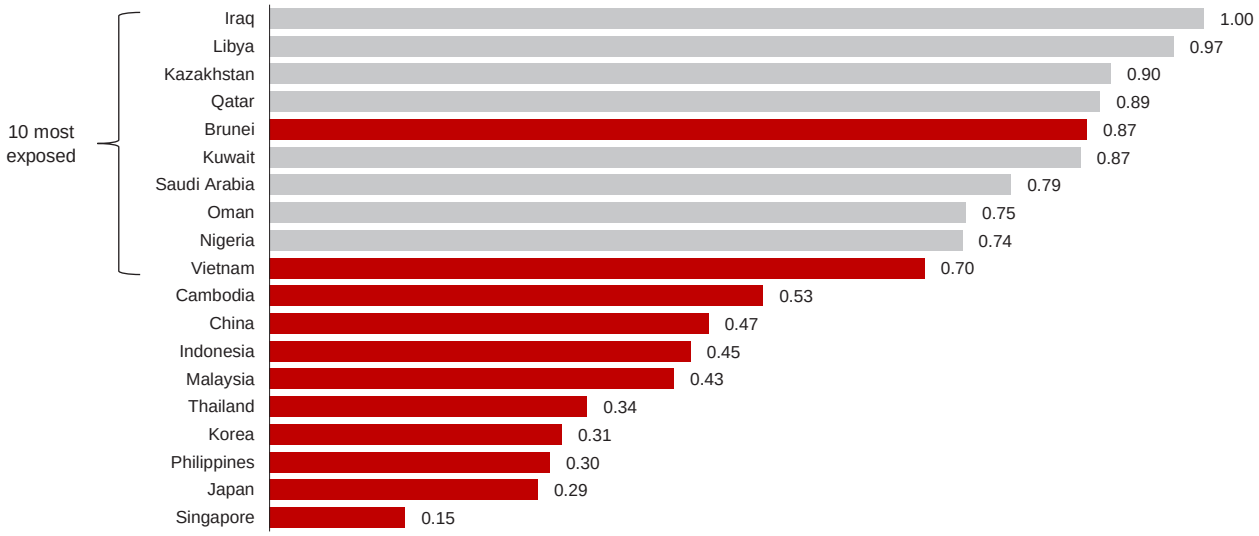
How serious is this transition risk for the region? According to Carbon Tracker, the majority of embedded emissions are listed on the stock exchanges of China (and Hong Kong), the United States, India, Russia, and Saudi Arabia (Figure 2.19). However, in the share of an exchange's market capitalization taken by companies with fossil fuel reserves, China's financial centers (Hong Kong, Shanghai, and Shenzhen) have comparatively low equity exposure to fossil fuel reserves—less than 10 percent—and the same is true for Bangkok, Jakarta, Seoul, and Tokyo (Allen and Coffin 2022). On the other hand, AMRO staff research suggests that a significant share of ASEAN+3 bank loans could be affected by transition risks (Figure 2.20) (Wong, Gabriella, and Durrani 2022). In fact, Chinese and Japanese banks are the largest funders-underwriters of global coal projects, accounting for 61 percent of total funding during 2019–21 (Urgewald 2022).

11/ Obsolescence of capital stock is a recurring and ordinarily seen feature of dynamic economic systems. Assets can become stranded through competition, innovation, and economic development (Bos and Gupta 2019; Semieniuk and others 2022). As old ("sunset") industries are replaced by new ("sunrise") industries as drivers of growth, even premature stranding of old assets is not necessarily detrimental. However, while asset stranding is a common economic phenomenon, the speed at which stranded assets accumulate can have negative repercussions on the real economy.

12/ Welsby and others (2021) estimate that by 2050, nearly 60 percent of oil and fossil methane gas and 90 percent of coal must remain unextracted to allow for a 50 percent probability of limiting global warming to 1.5 degrees Celsius. Furthermore, oil and gas production must decline globally by 3 percent each year until 2050.

13/ Transition risks are one channel through which climate change can affect financial stability. Other channels include physical risks, i.e., the impact on insurance liabilities and the value of financial assets that arise from climate- and weather-related events, such as floods and storms that damage property or disrupt trade; and liability risks, i.e., the impacts that could arise in the future if parties who have suffered loss or damage from the effects of climate change seek compensation from those they hold responsible, such as carbon extractors and emitters and their insurers (Carney 2015).

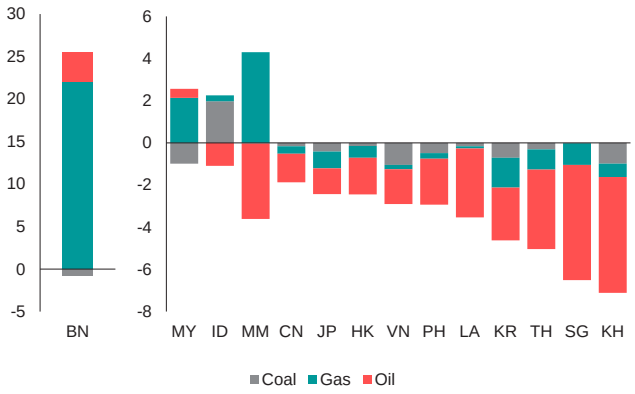
Figure 2.14. ASEAN+3 and Selected Economies: Degree of Exposure to Stranded-Asset Risk, 2019
(Index)



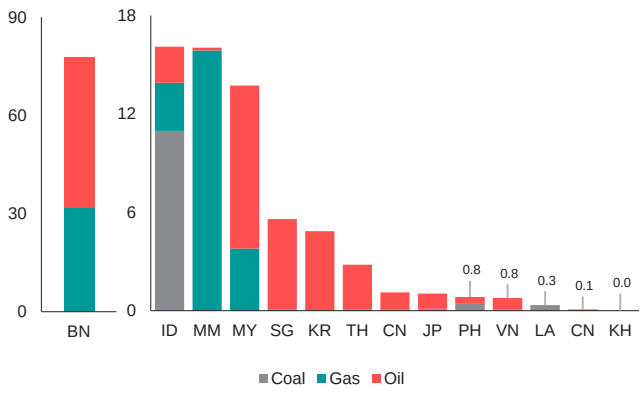
Source: Peszko and others (2020).
Note: The exposure index is based on four indicators: (1) current reliance on fossil fuel–export revenues as a percentage of GDP, an indicator of current dependency on commodity exports; (2) future reliance on expected resource rents from known fossil fuel reserves as a percentage of current gross national income, a forward-looking indicator of dependency on commodity rents; (3) current carbon intensity of manufactured exports, an indicator of current dependency on carbon-intensive manufactured goods and services; and (4) committed (future) emissions from built capital in the power sector divided by current annual power generation, a forward-looking indicator of dependency on carbon-intensive goods and services as a function of the age and emissions intensity of electricity generation. The indicator ranges from 0 to 1, where 0 is the lowest exposure and 1 is the highest exposure.

Figure 2.15. ASEAN+3: Fossil Fuel Exports, 2020–21

(Percent of GDP)

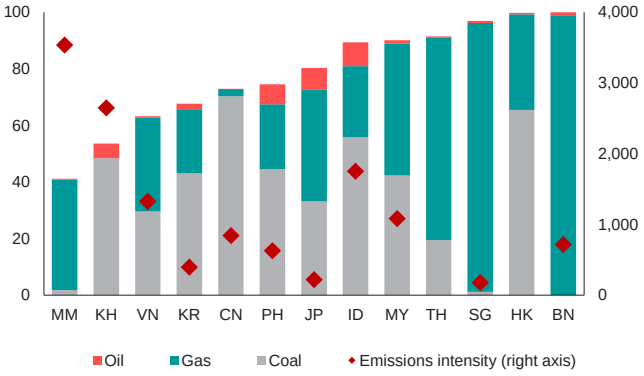


(Percent of export value)



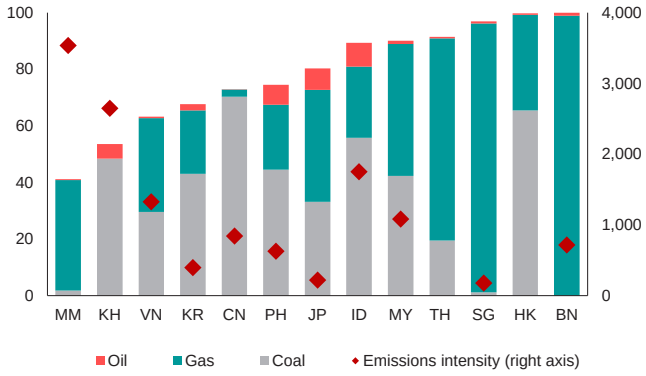
Source: UNComtrade; World Development Indicators, World Bank; AMRO staff calculations.
Note: Data in the left chart refer to net exports. Data in the right chart refer to total exports. BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR: MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 2.16. ASEAN+3: Power Generation from Fossil Fuels and Emission Intensity
(Percent of total generation; tCO_2e per dollar of GDP)



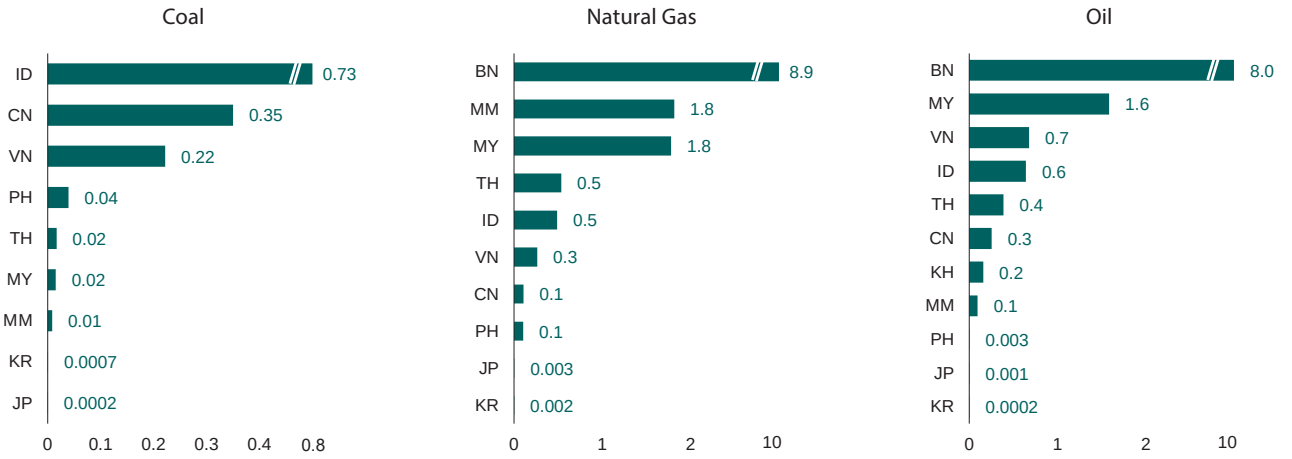
Source: Climate Watch; World Development Indicators, World Bank.
Note: BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; and VN = Vietnam. Electricity generation data as of 2015; data for Lao PDR are not available. Emission intensity data as of 2019; data for Hong Kong are not available.

Figure 2.17. World: Unextractable Fossil Fuel Reserves to Limit Global Warming by 2050
(Percent of total reserves)



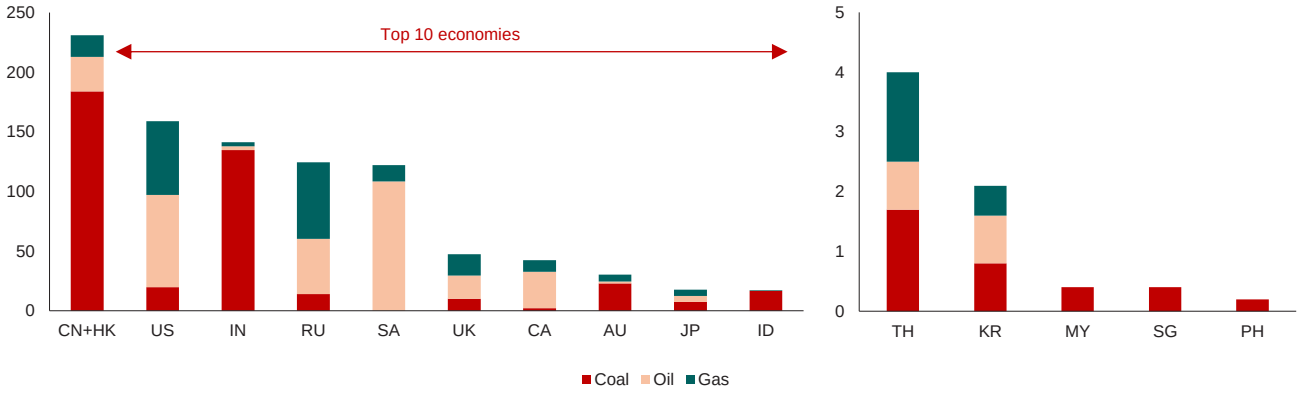
Source: Welsby and others (2021); BP Statistical Review of World Energy (2022); AMRO staff calculations.
Note: Unextractable reserves refers to the amount of fossil fuels that would need to be left in the ground, regionally and globally, to allow for a 50 percent probability of limiting global warming to 1.5 degrees Celsius by 2050.

Figure 2.18. Selected ASEAN+3: Fossil Fuel Rents, by Fuel Type, 2020
(Percent of GDP)



Source: World Development Indicators, World Bank.
Note: BN = Brunei; CN = China; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; MM = Myanmar; MY = Malaysia; PH = Philippines; TH = Thailand; VN = Vietnam.

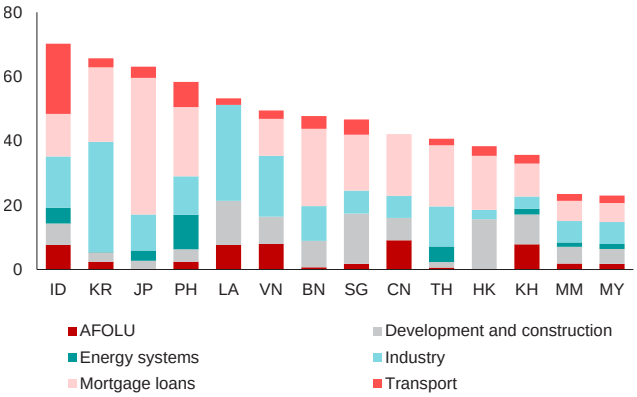
Figure 2.19. Selected Economies: Embedded Emissions in Fossil Fuel Reserves of Listed Companies, 2022
(Gigatons of carbon dioxide)



Source: Carbon Tracker (2022); AMRO staff calculations.
Note: Data are based on primary listing location and include listed and partially listed companies and all share types (restricted and freely tradeable). AU = Australia (Sydney); CA = Canada (Toronto); CN = China (Shanghai and Shenzhen); HK = Hong Kong; ID = Indonesia (Jakarta); IN = India (Mumbai); JP = Japan (Tokyo); KR = Korea (Seoul); MY = Malaysia (Kuala Lumpur); PH = Philippines (Manila); RU = Russia (Moscow); SA = Saudi Arabia (Riyadh); SG = Singapore; TH = Thailand (Bangkok); UK = United Kingdom (London); US = United States (New York).

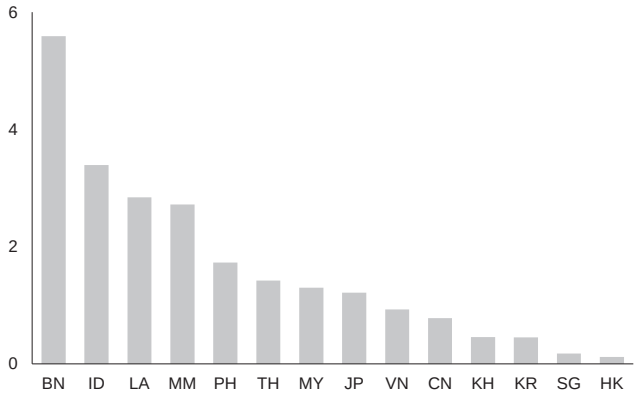
Figure 2.20. ASEAN+3: Bank Exposure to Transition Risks, 2021

Climate Change-Related Loans, by Economy
(Percent of total bank loans)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: Myanmar's loans are based on information reported in 2020. AFOLU = agriculture, forestry, and other land use; BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Emissions per Loan, by Economy
(Tons of carbon dioxide per billion US dollars)



Source: National authorities via Haver Analytics; AMRO staff calculations.
Note: The computed shares are weighted, derived using the loan amount in each economy and sector. Emissions are based on information reported in 2020. Myanmar's loans are also dependent on information reported in 2020. BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Pilot stress tests of climate risk conducted by ASEAN+3 central banks suggest that banks would be able to absorb the losses. The People's Bank of China's (PBC's) pilot test in 2021 showed rising default risks in the thermal power, steel, and cement sectors in the absence of a low carbon transformation; nonetheless, banks were able to maintain capital adequacy ratios (CARs) above the regulatory requirement under the different stress scenarios (Reuters 2022a; China Banking News 2022).[14] Results from the Hong Kong Monetary Authority's pilot climate risk stress test likewise showed that while CARs among systemically important banks would fall in a disorderly transition, strong capital buffers would mitigate the overall impact (HKMA 2021). A pilot climate risk scenario analysis by Japan's central bank and financial regulator concluded that the estimated increase in annual credit costs due to climate risks would not exceed the average annual net income of the six major banks and nonlife insurance companies assessed (Bank of Japan and Financial Services Agency 2022). However, none of the climate risk stress tests conducted anywhere in the world to date fully captures risks from an abrupt correction in the prices of assets on bank balance sheets (Financial Stability Board 2022).

Over the long term, several factors may mitigate the risk of stranded assets. Carbon price adjustments, or regulatory equivalents, need not be sudden and unexpected. The more gradual the rise in the price of carbon, the less capital will have to be discarded before it reaches the end of its economic life. Clear and well-communicated policy signals are therefore key. A change in relative prices and a tightening of emission standards should unleash a new wave of technological progress and the cost of decarbonization could fall dramatically once endogenous technological change is considered (Acemoglu and others 2012). New "sunrise" industries are already beginning to come up to replace and reform "sunset" fossil fuel-related industries, generating demand for new resources such as critical minerals and creating value for previously unpriced natural resources such as forests and wildlife that act as carbon sinks (Section III).

Will Economic Growth Be Stunted?

"No country in the world has been able to industrialize using renewable energy..."

Yemi Osinbajo
Vice President of Nigeria
May 2022

The transition to carbon neutrality will likely be challenging for growth, especially in developing economies.[15] The implications of the net zero transition for growth can be understood in terms of the Kaya identity, where carbon emissions are expressed as a product of population, per capita GDP, energy intensity of GDP, and carbon intensity of energy (Kaya 1990):

$$\text{Carbon emissions} = \text{Population} \times \frac{\text{GDP}}{\text{Population}} \times \frac{\text{Energy}}{\text{GDP}} \times \frac{\text{Carbon emissions}}{\text{Energy}}$$

The identity implies that a reduction in carbon emissions can be achieved by a reduction in energy demand (consumption), which is captured by the first three terms on the right-hand side, and/or a reduction in carbon intensity of energy (e.g., through the adoption of cleaner sources of energy). In other words, economies would need to consume less energy and/or change their energy mix in order to meet their emission targets. If a close positive relationship exists between energy demand and GDP, and if a substantial change in the energy mix is slow to materialize, then an economy may have to forfeit some GDP growth to reduce the consumption of primary energy—and thus, emissions.

The relationship between energy demand and GDP (income level) is thought to follow an S-shaped curve. Bogmans and others (2020) find that for low-income economies, the income elasticity of energy demand is low and increasing; for middle-income economies, the elasticity peaks at approximately unity; and for high-income economies, the elasticity is decreasing. This suggests that reducing energy consumption to lower emissions would imply a greater cost to growth for low- and middle-income economies than for high-income economies. Reflecting this, some economies, including China, Hong Kong, and Malaysia among the ASEAN+3, have committed to reduce their emissions intensity (i.e., the ratio of emissions to GDP) rather than their absolute level of emissions, while others, including Brunei, Cambodia, Indonesia, the Philippines, Thailand, and Vietnam, have set goals to reduce emissions off a business-as-usual growth scenario (Box 2.1).

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[14] The 2021 pilot test covered 23 major banks. In June 2022, the PBC announced plans to expand its climate stress test to assess the impact of climate risks in additional industries, including aviation, metals, and petrochemicals, on the financial sector.

[15] To be sure, achieving carbon neutrality will benefit everyone with a preserved climate in the long term but the transition to a decarbonized steady state could see declines in real income and the standard of living in some economies under certain scenarios.

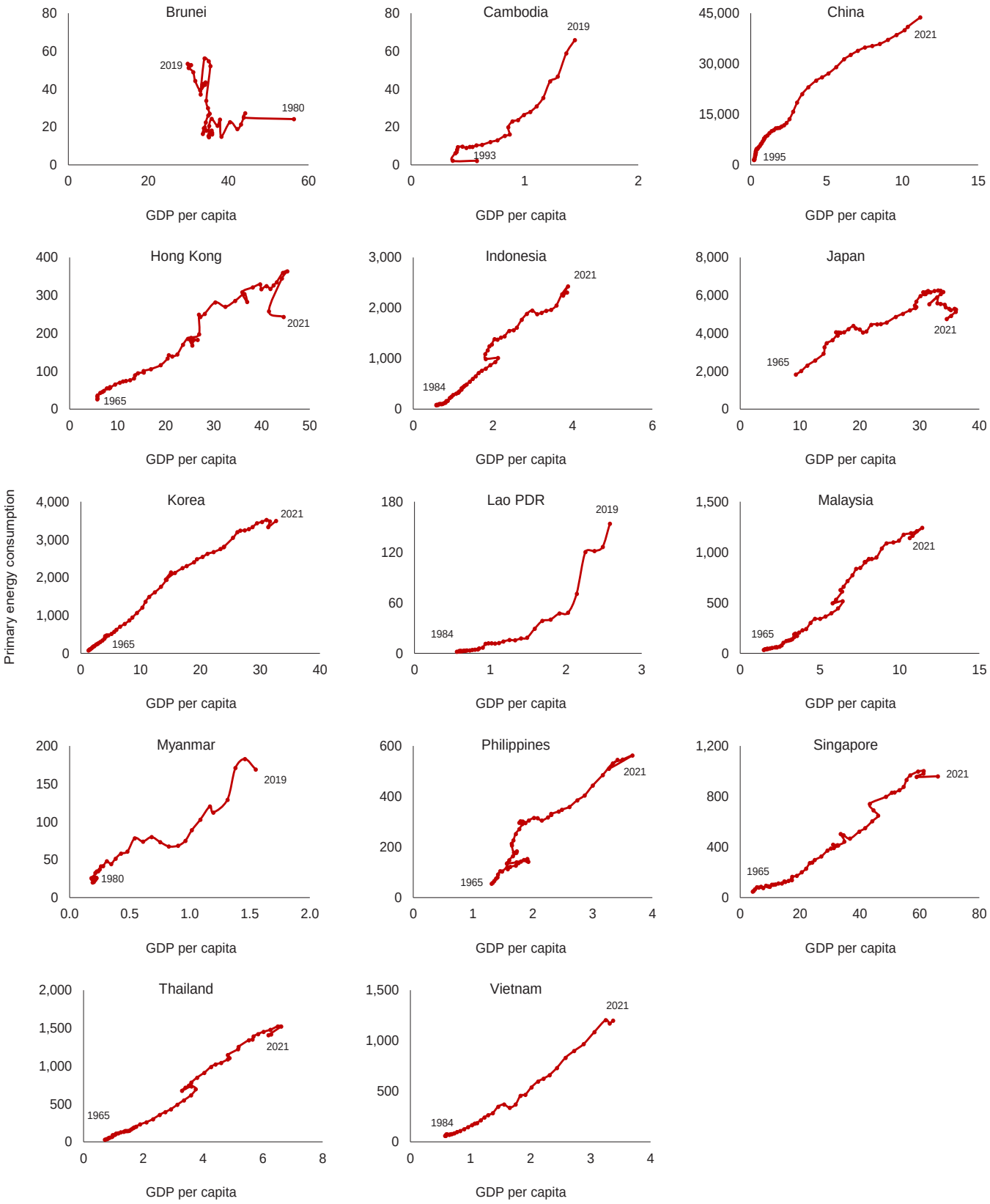
Energy demand in the region is generally expected to remain on an uptrend over the next few decades. The region's economies are in different stages of economic development, but almost all of them have more than doubled the size of their economies since 2000. Economic growth has been accompanied by urbanization and motorization, which have led to greater energy consumption (Figure 2.21). As the region's economies continue to develop, their energy demand will increase in tandem. On the other hand, energy demand is also a function of energy intensity, which can be lowered through more efficient energy consumption—as has been the case over the past two decades across the region (Figure 2.22). For energy demand to decline, future energy efficiency gains—e.g., from more stringent energy performance and fuel-economy standards, building energy codes and industry targets, and technological advances in energy management in the industrial and building sectors—will need to outpace the effect of income growth on energy consumption (Table 2.3). IEA projections indicate that this is not likely to happen in the region, except possibly in Japan (IEA 2022a; IEA 2021b).[16]

The implication of emission reduction for the region's long-term growth and development therefore hinges on changing the energy mix away from fossil fuels. As noted earlier, almost all ASEAN+3 economies have set targets or pledged to increase the share of clean or renewable energy in their energy mix and to reduce the use of coal power (Table 2.1). As ASEAN+3 economies progressively incorporate non-fossil fuel sources into their energy mix, their energy carbon intensity is projected to decline.

According to national authorities' policy roadmaps and IEA assessments, the decline in carbon intensity will likely be sufficient to bring down absolute GHG emissions by 2050 in the Plus-3, but not in ASEAN, where energy demand is expected to remain robust in the decades to come (IEA 2021b; Lee 2021). The key question, therefore, is whether the region's emerging market and developing economies will be able to meet their future energy needs without relying as much on coal and other fossil fuels; it is worth noting that even the world's advanced economies are not expected to switch substantially out of fossil fuels by 2050 (IEA 2022h) (Figure 2.23). The next section discusses the outlook for reducing carbon intensity in the region.

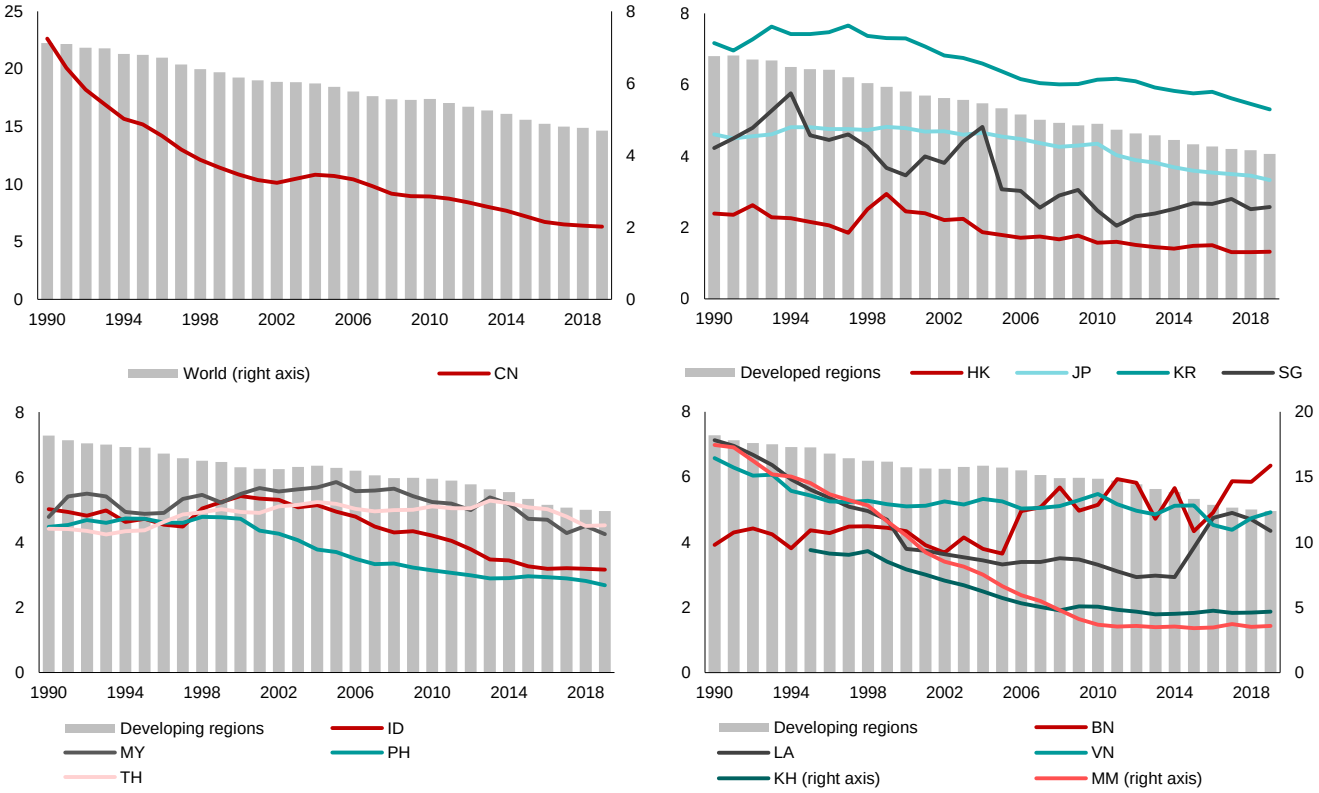
[16] Based on countries' stated policies, IEA (2022h) forecasts that energy demand in advanced economies will decline by about 0.5 percent a year whereas energy demand in emerging market and developing economies will increase by over 1.4 percent a year over the rest of this decade.

Figure 2.21. ASEAN+3: Primary Energy Consumption versus GDP Per Capita
(Terawatt-hours; Thousands of US dollars in constant 2015 prices)



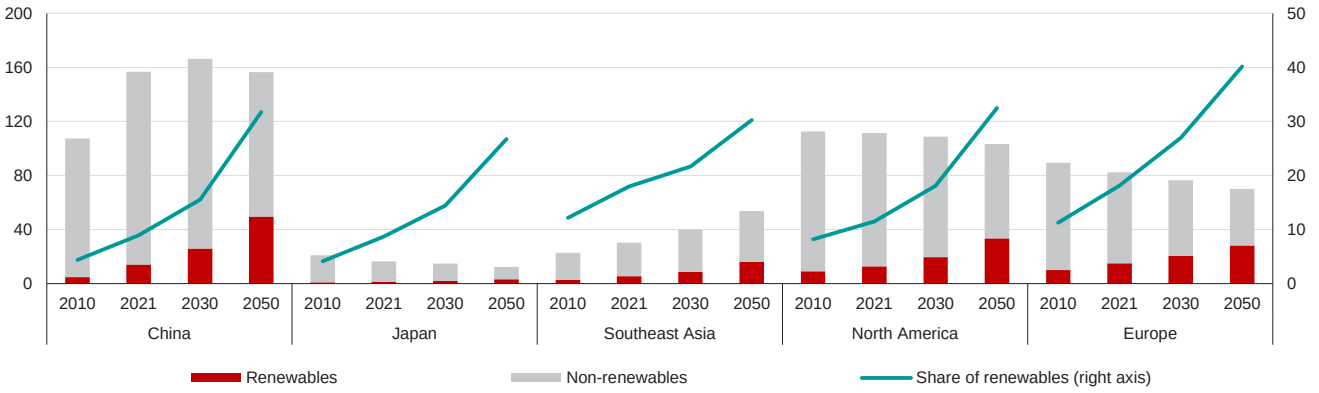
Source: Our World in Data (2022a); World Development Indicators, World Bank.
Note: Primary energy consumption refers to the total energy demand of an economy, including for the use of electricity, heating, and transport. Data includes only commercially traded fuels (coal, oil, and gas) as well as nuclear and modern renewables except traditional biomass.

Figure 2.22. ASEAN+3: Energy Intensity of GDP
(Megajoules per constant 2017 international dollars using purchasing power parity rates)



Source: International Energy Agency (IEA).
Note: BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 2.23. Selected Economies: Projected Energy Supply and Energy Mix
(Petajoules; percent)



Source: International Energy Agency (2022h); AMRO staff calculations.
Note: Projections are based on the IEA's "stated policies scenario," which accounts for policies and implementing measures affecting energy markets adopted as of the end of September 2022, together with relevant policy proposals even if specific measures needed to put them into effect have yet to be fully developed.

Table 2.3. ASEAN: Energy Access and Energy Efficiency Targets

Economy	Energy Access Policies and Targets	Energy Efficiency Policies and Targets
Brunei		• Reduce total energy consumption by 63 percent from business-as-usual (BAU) levels by 2035. • In June 2021, the Ministry of Energy announced new minimum energy performance standards for air conditioning systems and other electrical appliances. This plan is expected to reduce energy intensity by 45 percent from 2005 levels by 2035.
Cambodia	• Achieve near-universal electrification by 2030.	• Cut energy consumption by 20 percent relative to BAU by 2035.
Indonesia	• Achieve 100 percent electrification by the end of 2024.	• Reduce energy intensity by 1 percent a year to 2025.
Lao PDR	• Achieve electrification rate of 98 percent by 2025.	• Reduce final energy consumption by 10 percent from the BAU level by 2040.
Malaysia	• Achieve (rural) electrification rate of 99 percent by 2025.	• Promote energy efficiency in the industry and buildings sectors and reduce overall energy intensity by 2040 through mandatory minimum efficiency performance standards.
Myanmar	• Achieve electrification rate of 100 percent by 2030.	• Reduce primary energy demand by 8 percent from the BAU level by 2030.
Philippines	• Achieve 100 percent electrification by 2028.	• Reduce energy intensity by 40 percent by 2030 from 2010 level. Decrease energy consumption by 1.6 percent a year by 2030 from baseline forecasts. Reduce energy intensity and total energy consumption by 24 percent relative to the BAU level by 2040
Singapore		• Improve energy intensity by 35 percent from the 2005 level by 2030.
Thailand		• Reduce energy intensity by 30 percent from the 2010 level by 2036.
Vietnam		• In June 2019, the government officially approved the Vietnam Scaling Up Energy Efficiency Project to promote energy efficiency in the industrial sector. The project received funding from the World Bank in March 2021.

Source: International Energy Agency (IEA); AMRO staff compilation.

III. In with the New: Growth Opportunities of Moving Toward Carbon Neutrality

The transition to net zero is rich in opportunities, holding out the prospect of expanding markets for renewable energy, low-emission products, carbon-removal technologies, and carbon offsets, among others. There are many ways to reduce the buildup of carbon dioxide and other GHGs in the atmosphere. High-emitting fuels like coal, oil, and gas can be replaced with nearly carbon-free alternatives, such as solar power, wind power, or nuclear power. Carbon dioxide can be captured from fossil fuel power and manufacturing plants and stored underground. Carbon dioxide can also be removed from the atmosphere by reforestation and farming practices that store more carbon in the soil. This section takes stock of what has been achieved in ASEAN+3 in this area so far, highlights the most promising transition opportunities for its economies given their natural, human, and technological resources, and explores what they can do to make the best use of these opportunities.

Clean Energy

"Ensure access to affordable, reliable, sustainable, and modern energy for all."

United Nations Sustainable Development Goal 7

Clean energy comes from zero-emission sources that do not pollute the atmosphere. This includes renewable energy, derived from sources that can constantly replenish, as well as alternatives like nuclear energy and hydrogen. Clean energy is considered "green" if it is generated from renewable sources like the sun, wind, and water. Hydrogen, for example, is considered a clean fuel in that it produces no emissions—only water—when consumed in a fuel cell, but hydrogen is considered "green" only if it is produced using renewable energy sources. Nuclear energy is not renewable by most definitions, but nuclear energy production does not release GHGs, so it is a clean fuel.[17]

[17] Nuclear energy is produced when atoms are split apart during nuclear fission. The most common fuel used for nuclear fission in nuclear power plants is uranium, which is a non-renewable resource.

Renewable energy

The ASEAN+3 region has an abundance of renewable energy resources. Sunlight, wind, and water are plentiful—at least in theory. In practice, an economy's renewable energy potential depends not just on resource potential, but also on technical potential (i.e., the amount of energy that can be generated given topographic, environmental, and land-use constraints, among others) and economic and market potential, which is the amount of energy that can be produced viably, taking into account market factors (Brown and others 2016). For example, even as solar energy is abundant, its widespread deployment may not be feasible for economies like Singapore, with its limited land area and rooftop space.[18] And while Japan is endowed with ample geothermal resources, lack of social acceptance limits their use for energy generation (GRSJ 2020). Yet even after adjusting for such factors, the region still has significant renewable energy potential to be tapped—according to ADB (2021), for example, most ASEAN economies have utilized less than 2 percent of their solar potential.

All ASEAN+3 economies include renewable energy targets among their climate change or sustainable growth strategies; many have also made commitments for specific types of renewable energy (Table 2.4). If these targets are met, the share of renewable energy in total electricity generation and consumption will increase substantially over the next decade and a half—driven mainly by solar, hydro, and wind energy.

Policymakers in the region are employing various measures to promote renewable energy. Key policies include: renewable energy auctions whereby the government issues a call for tenders to install a certain capacity of renewable energy-based electricity; feed-in tariffs that pay renewable energy producers to transfer excess electricity to the grid;[19] net metering, an electricity billing system that offers a credit to residential and commercial customers for sending excess electricity from their renewable energy sources (e.g., solar panel systems) to the grid; as well as government regulations mandating biofuel blending and renewable transport fuels (Table 2.5).[20] Outright fiscal support along with various tax reductions are also used to incentivize suppliers and help keep end-user prices low.

Table 2.4. ASEAN+3: Commitments on Renewable Energy

Economy	Commitment(s)
Brunei	• Meet 30 percent of overall power generation mix with renewable energy by 2035, using mainly solar photovoltaic.
Cambodia	• Increase the share of renewable energy in the power generation mix to 25 percent by 2030 (of which 12 percent will come from solar photovoltaic) and 35 percent by 2050.
China	• Meet more than 50 percent of additional electricity consumption over 2021–25 with renewable power generation. Increase the share of renewable energy in final electricity consumption (by 15 percent for hydro and 18 percent for non-hydro renewables) by 2025. Supply 33 percent of national power consumption with renewables by 2025.
Hong Kong	• Increase the share of renewable energy in the fuel mix for electricity generation to 7.5–10 percent by 2035 and to 15 percent before 2050.
Indonesia	• Increase the share of renewables in the power generation mix to 43 percent by 2050. Increase the installed capacity of renewables (by 10.4 GW of hydropower, 4.7 GW of solar photovoltaic, 3.4 GW of geothermal, 1.3 GW of other new renewables, 0.6 GW of bioenergy and 0.6 GW of onshore wind) in 2021–30.
Japan	• Increase the share of renewables in the energy mix to 36–38 percent (of which 14–16 percent solar, 11 percent hydropower, 5 percent wind, 5 percent biomass, and 1 percent geothermal) by 2030.
Korea	• Install 70 GW renewable energy out of a total of 198 GW capacity by 2030.
Lao PDR	• Increase the share of nonlarge hydropower renewables in the power mix to 30 percent by 2025.
Malaysia	• Increase renewable energy generation to 18 GW (40 percent of the country's energy supply) by 2035.
Myanmar	• Increase the share of renewable energy (hydro, solar and wind) in the total energy mix to 39 percent by 2030 (48 percent conditional on international support).
Philippines	• Increase the share of renewable energy in the power generation mix to 35 percent by 2030 and 50 percent by 2040.
Singapore	• Increase solar panel deployment to at least 2 GW-peak by 2030. Import up to 4 GW of low-carbon electricity, about 30 percent of electricity supply, by 2035.
Thailand	• Increase the share of renewable energy in the fuel mix used to produce electricity to 50 percent by 2040. Increase the share of biomass, biogas, solar, and wind to achieve the renewable energy target.
Vietnam	• Increase the share of renewables (excluding hydropower) in the power generation mix to 52 percent in 2045. Increase generation of wind power to 23.1 GW by 2030 and 122.4 GW by 2045; large-scale solar power to 11.2 GW by 2030 and 76.0 GW by 2045; biomass and other renewables to 1.2 GW by 2030 and 5.2 GW by 2045; and pumped hydroelectricity and storage to 2.5 GW by 2030 and 29.0 GW by 2045.

Source: AMRO staff compilation from various government announcements.
Note: GW = gigawatt.

18/ Singapore alone among the ASEAN+3 is as an "alternative energy-disadvantaged" economy due to its urban density, low wind speeds, limited and relatively flat land area, and lack of geothermal resources (Singapore Ministry of Sustainability and the Environment 2019).

19/ Feed-in tariffs and premiums typically involve long-term contracts and cost-based compensation. Renewable energy producers receive a fixed, above-market electricity price from the service provider or grid operator for each unit of energy they produce and deliver to the grid as part of this performance-based incentive program.

20/ A biofuel blending mandate sets a requirement on fuel suppliers to blend a certain percentage of fuels derived from biomass (e.g., ethanol or palm oil) with a petroleum-based fuel (e.g., diesel).

Table 2.5. ASEAN+3: Renewable Energy Policies

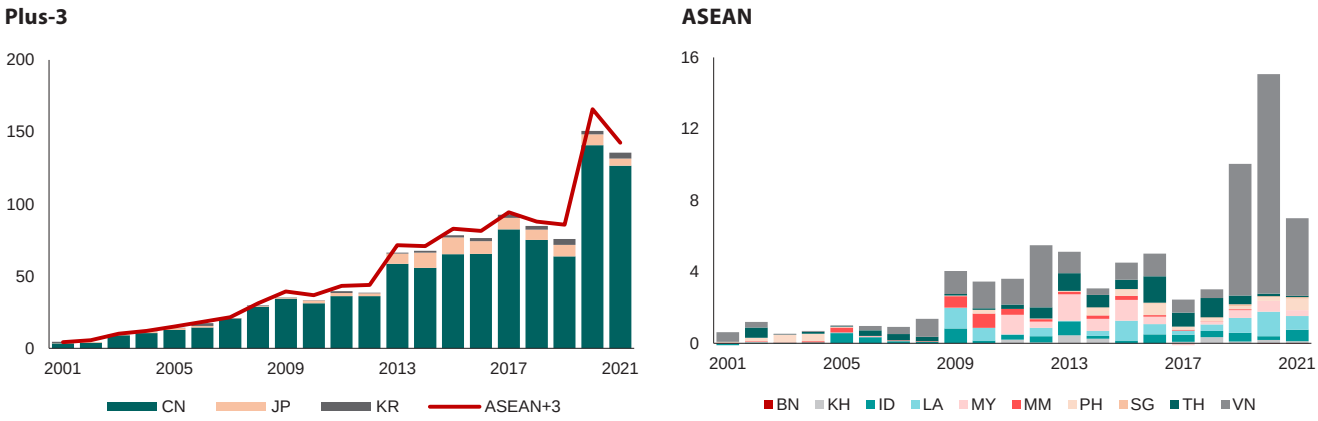
	Economy	BN	CN	ID	JP	KH	KR	LA	MM	MY	PH	SG	TH	VN
Regulatory	Feed-in tariff/premium payment		●	●	●					●	●		●	●
	Electric utility quota obligation/ Renewable portfolio standards		●	●			●			●	●			●
	Net metering/billing						●			●	●	●	●	●
	Biofuel blend, renewable transport obligation/mandate		●	●			●			●	●		●	●
	Renewable heat obligation or mandate, heat feed-in tariff, fossil fuel ban for heating		●				●							
	Tradable renewable energy certificates				●		●					●		●
	Tendering		●	●	●	●			●	●	●	●		●
Fiscal	Tax reductions		●	●	●		●		●	●	●		●	●
	Investment or production tax credits		●	●			●			●	●			●
	Energy production payment		●		●		●				●		●	●
	Public investment, loans, grants, capital subsidies or rebates		●	●	●		●			●	●	●	●	●

Source: REN21 (2022); AMRO staff compilation.
Note: BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

These policies, together with declining renewable energy-generation costs, have led to a robust rollout of renewables capacity in recent years (Figure 2.24). According to the International Renewable Energy Agency (IRENA), the global weighted average levelized cost of electricity of newly commissioned utility scale solar photovoltaic projects declined by 88 percent and that of onshore and offshore wind projects by at least 60 between 2010 and 2021 (IRENA 2022) (Figure 2.25). Renewables make up about a quarter of ASEAN+3 power generation on average, with the share ranging from as high as 70 percent in Lao PDR to less than 1 percent in Hong Kong and Brunei (Figure 2.26).[21] China leads the region in installed capacity, followed by Japan, Vietnam, and Korea (Figure 2.27) (Box 2.5). Hydropower, (onshore) wind, and solar photovoltaics are dominant sources, collectively accounting for more than 90 percent of the region's current renewable energy capacity and mix (Figure 2.28). These three sources of renewable energy are considered truly "zero" emissions, compared to other renewables such as geothermal energy (low emissions) and biomass (neutral emissions). They provide an especially advantageous pathway for the region to reduce its dependence on fossil fuels.

More can be done in the region to hit national targets on time (Figure 2.29). The uptake of renewable energy remains constrained by massive investment needs, administrative bottlenecks (e.g., licensing, lengthy contract negotiations) and tepid public support. Parallel efforts to upgrade and modernize national grids, improve the ease of doing business, improve rural electrification, and resolve land acquisition issues can entice much-needed private sector participation and resources. Regional cooperation will have a role to play, given the substantial investments needed for scaling up renewables.

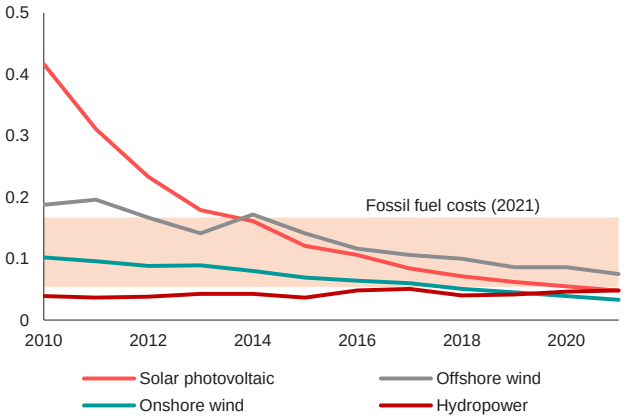
Figure 2.24. ASEAN+3: Renewable Net Capacity Additions
(Gigawatts)



Source: International Renewable Energy Agency (IRENA); AMRO staff calculations.
Note: BN = Brunei; CN = China; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; and VN = Vietnam.

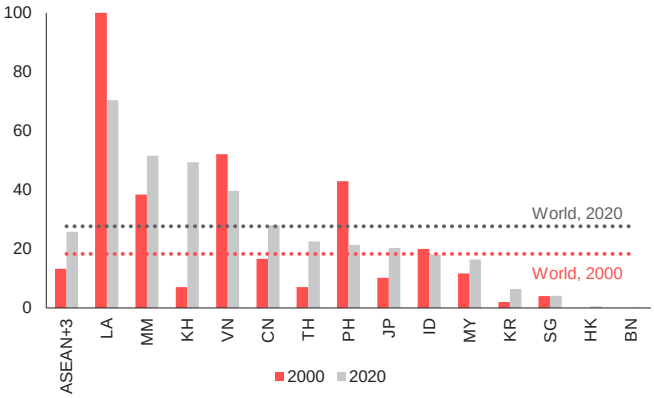
21/ Lao PDR, the Philippines, and Vietnam saw their shares of renewables in electricity generation decline between 2000 and 2020. The three economies increased the use of fossil fuels—mainly coal—for various reasons, e.g., to supplement variable hydropower supply, especially during the dry season (Lao PDR); as a cheaper and more reliable energy source (the Philippines); and to meet surging energy demand driven by rapid economic growth (Vietnam).

Figure 2.25. World: Levelized Costs of Electricity, by Selected Technology
(2021 US dollars per kilowatt-hour)



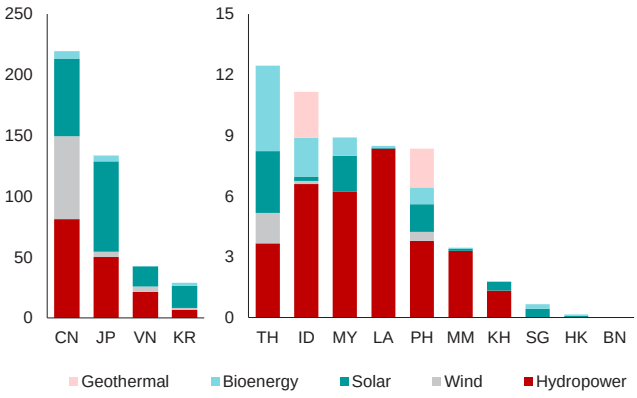
Source: International Renewable Energy Agency (2022).
Note: The levelized cost of electricity or energy calculates the present value of the total cost of building and operating a power plant over an assumed lifetime; as such, it allows for the comparison of projects with different technologies and varying risk-return characteristics.

Figure 2.26. ASEAN+3: Renewable Electricity Generation
(Percent of total generation)



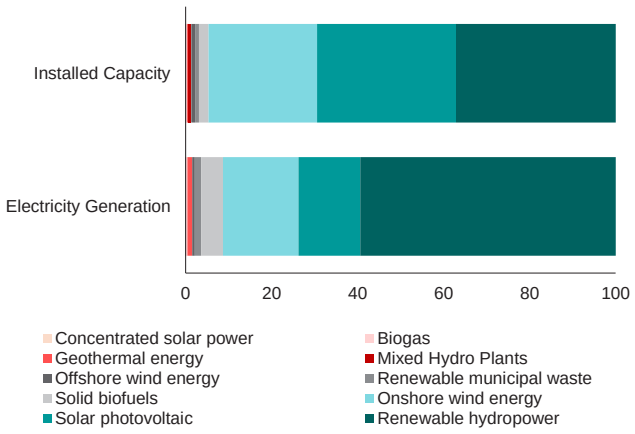
Source: International Renewable Energy Agency (IRENA); AMRO staff calculations.
Note: BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 2.27. ASEAN+3: Renewable Energy Installed Capacity, 2021
(Gigawatts)



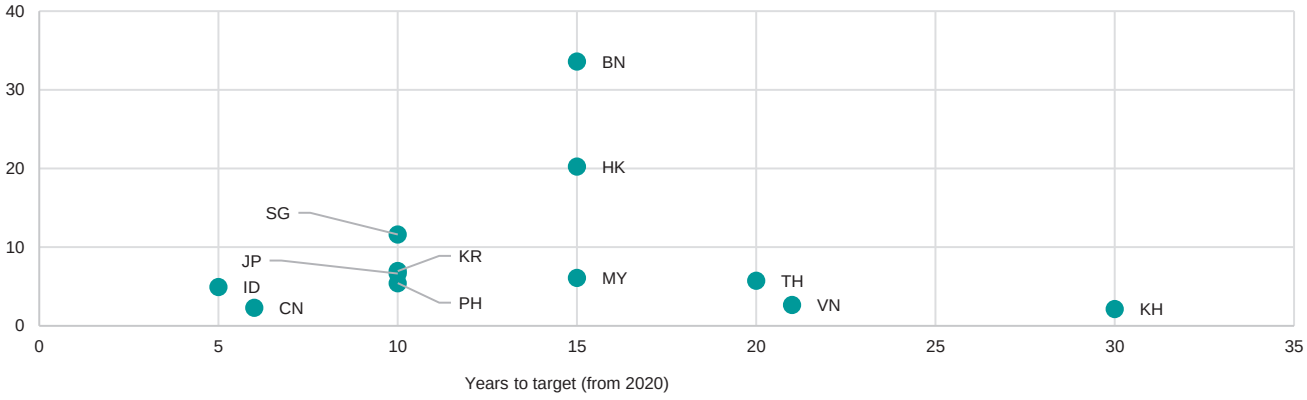
Source: International Renewable Energy Agency (IRENA); AMRO staff calculations.
Note: BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 2.28. ASEAN+3: Renewable Technology Mix
(Percent of total renewables)



Source: International Renewable Energy Agency (IRENA); AMRO staff calculations.
Note: Data for installed capacity as of 2021, while for electricity generation, data are as of 2020.

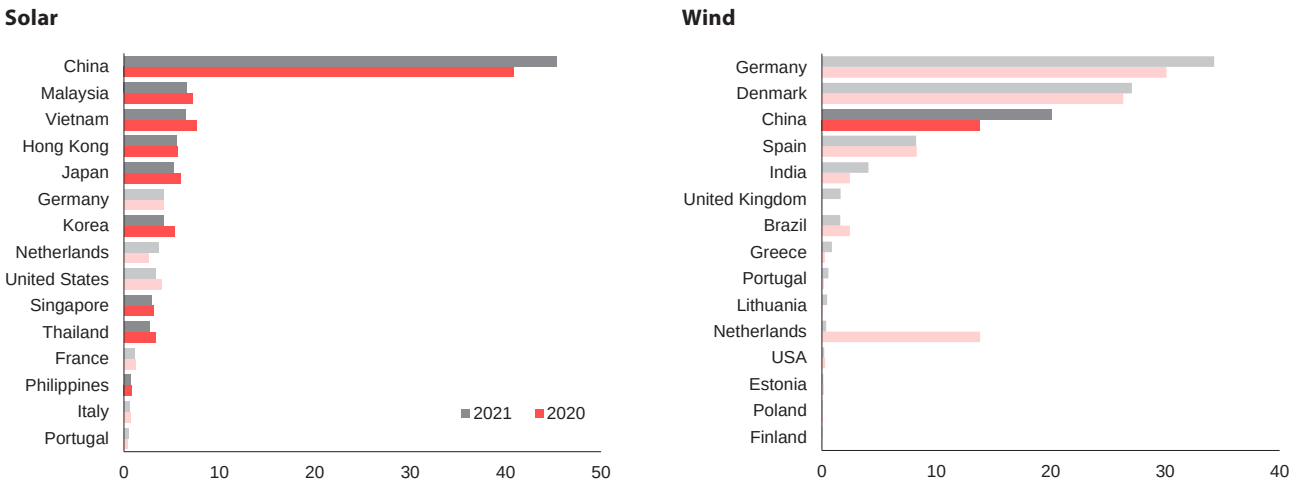
Figure 2.29. ASEAN+3: Implied Compound Annual Growth Rate of Renewables Share to Achieve Announced Target
(Percent)



Source: AMRO staff calculations.
Note: The implied compound annual growth rate for each economy is based on the difference between the actual share of renewable energy (as of 2020) and the target share of renewable energy that has been officially announced. Hence, economies in the upper left quadrant of the chart have to do more in less time in order to reach their announced targets compared to economies in the lower right quadrant of the chart, for example. Lao PDR and Myanmar are omitted due to unavailability of official actual data. Cambodia's data refer to its target for solar energy only. BN = Brunei; CN = China; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Trade in renewables will benefit the ASEAN+3 region as a whole, while providing an additional stream of revenues for exporters. In June 2022, Singapore started a two-year pilot project to import hydropower from Lao PDR; Thailand, Vietnam, and Cambodia also import hydropower from Lao PDR, which aims to build its reputation as the "battery of Southeast Asia" (PWC 2022) (Box 2.6). Similar agreements could provide revenue for other potential exporters in the region, such as Indonesia, Malaysia, Myanmar, Thailand, and Vietnam, although the export opportunities would be weighed against local needs (Tani 2022). The surge in demand for clean energy technology globally will be another boost for ASEAN+3 exporters of solar panels, wind turbines, and energy storage equipment, given their comparative advantage. ASEAN+3 economies are among the top 15 exporters of solar power products globally; China is also a major exporter of wind power products (Figure 2.30). However, trade restrictions in major trading partners could be obstacles—the United States' long-running restrictions on solar panel imports from China and, by extension, Cambodia, Malaysia, Thailand, and Vietnam, is a cautionary example.[22]

Figure 2.30. World: Top 15 Exporters of Solar and Wind Energy Products, 2020–21
(Percent of world exports in billions of US dollars)



Source: IHS Markit Global Trade Atlas; UN Comtrade; AMRO staff calculations.
Note: Solar energy products refer to HS code 854140. The top 15 exporters accounted for 92.6 percent of all solar energy products sold on international markets during 2021. Wind energy-related goods refer to HS code 850231. The top 15 exporters accounted for 99.7 percent of all solar energy products sold on international markets during 2021.

22/ The solar-panel trade conflict between the United States and China dates to 2012, when the United States began imposing duties on China-made solar panels, arguing that manufacturers in China were unfairly selling their products in the United States at prices below the cost of production. The United States also banned the import of polysilicon and solar power products from Xinjiang, claiming that they were made using forced labor. The tariffs were then expanded to apply to solar panels manufactured in Cambodia, Malaysia, Thailand, and Vietnam over suspicion that they were circumventing the restrictions on Chinese products. In June 2022, the United States announced a two-year tariff exemption for solar products from those four ASEAN economies. But in December 2022, the United States determined that four major Chinese manufacturers had circumvented existing tariffs on China-made solar cells and panels by finishing their products in Cambodia, Malaysia, Thailand, and Vietnam. Those companies will face the same duty rates the United States already assesses on their China-made products once the two-year waiver expires in June 2024. In addition, all solar companies exporting to the United States from Cambodia, Malaysia, Thailand, and Vietnam will be required to certify that a significant proportion of their materials are not from China.

Box 2.5:

Vietnam's Solar Energy Boom

Vietnam has seen unparalleled growth in solar power. Installed solar power capacity shot up from essentially zero in 2017 to over 16 gigawatts in 2021, putting Vietnam with China, Japan, and Korea among the top 10 countries with the highest solar capacity in the world (Figure 2.5.1). Solar power output increased to account for almost 5 percent of Vietnam's total electricity generation in 2021—the second-highest share in ASEAN+3 after Japan (Figure 2.5.2) (Ember 2022).

This growth was initiated by the 2015 Decision of the Prime Minister outlining the renewable energy development strategy and vision through 2050. Decision 2068/QD-TTg of 2015 sets targets for solar power production to increase to 35.4 billion kilowatt-hours (kWh) or 6 percent of total electricity production in 2030 and 210 billion kWh (20 percent of total electricity production) in 2050. The Decision was followed over the next five years by a raft of policies, regulations, initiatives, and programs focused on the development of solar energy in Vietnam.

Specific encouragement for solar power development includes feed-in tariffs (FITs) and preferential tax rates, land-use incentives, and access to finance. The government had early on identified the importance of creating favorable conditions for the private sector to participate in solar power development in Vietnam. In April 2020, Decision 13/2020/QD-TTg committed the country's largest power company, Vietnam Electricity, and its branches to purchase electricity from solar energy generators at fixed FIT rates for 20 years (Figure 2.5.3). The FIT program incentivized investors to move quickly to install rooftop solar power—by its expiry at the end of 2020, there were 104,000 rooftop solar power projects in 63 localities across the country.

A few key issues still need to be resolved for solar power to realize its full contribution to Vietnam's clean energy transition.

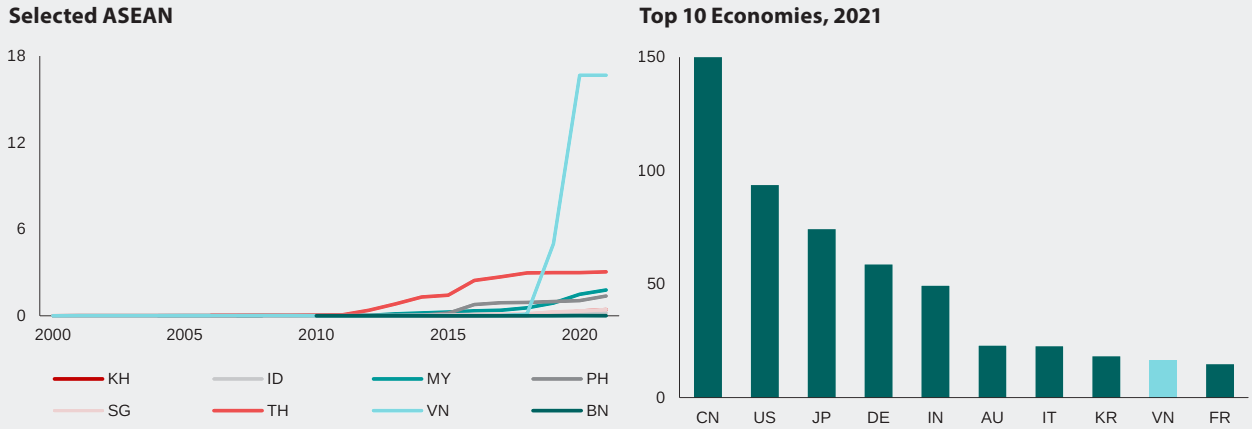
- *Grid congestion*. The national grid system is not able to integrate large amounts of solar power. The FITs proved so popular they caused an overload of supply and Vietnam Electricity stopped receiving requests for connection and signings of power purchase agreements at the end of 2020. Many solar power plants still cannot operate at full capacity, resulting in a waste of resources and electricity not being transmitted from areas with surplus to areas in need. A clear grid investment plan to integrate variable energy should be a priority.

- *Energy storage*. Solar energy production varies with the weather, season, time of day, region of the country, and so on. Therefore, it is necessary to find solutions to store excess solar power generated when the sun is shining for use when (or where) it is not. Better forecasting of variable solar energy production would also help grid management.

- *Regulatory framework*. Many of Vietnam's regulations on the licensing, construction, and operation of solar power plants and the purchase and sale of solar power are still incomplete and unclear. This has brought difficulties for businesses, such as unexpected costs, delays, and disputes with Vietnam Electric. A comprehensive and transparent regulatory and legal framework would help remove bottlenecks in transmission and capacity and improve the landscape for investment.

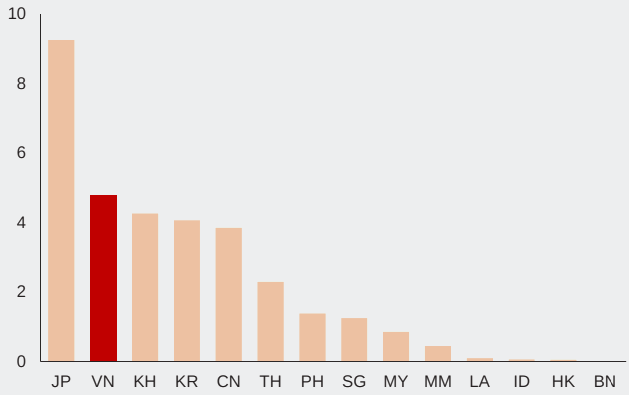
This box was written by Thi Thanh Do.

Figure 2.5.1. Selected Economies: Installed Solar Photovoltaic Capacity
(Gigawatts)



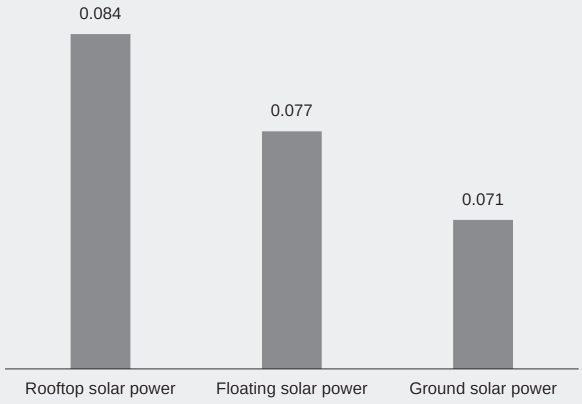
Source: International Renewable Energy Agency; AMRO staff calculations.
Note: AU = Australia; BN = Brunei; CN = China; DE = Germany; FR = France; ID = Indonesia; IN = India; IT = Italy; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States; VN = Vietnam.

Figure 2.5.2. ASEAN+3: Electricity Production from Solar Photovoltaics, 2021
(Percent of total electricity production)



Source: Our World in Data (2022b).
Note: BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 2.5.3. Vietnam: Feed-in Tariff Rates, 2021
(US dollars per kilowatt-hour)



Source: Vietnam National Steering Committee for Electricity Development.

Box 2.6:

(Hydro)Powering Lao PDR's Energy Trade

Lao PDR has a huge natural advantage in hydropower energy development over its ASEAN peers (Figure 2.27). With a considerable portion of the Mekong River located within its borders, along with favorable terrain, high yearly precipitation, and low population density, it is among the world's top economies in terms of hydropower potential per capita, and the highest among the ASEAN+3 (Hoes and others 2017).

Total installed hydropower capacity in Lao PDR jumped in the last decade, thanks to a massive investment program. Between 2019 and 2021, it added about 2.1 gigawatts (GW) of hydropower capacity, the third-highest globally during the period (Figure 2.6.1). Within the region, it ranked below only China, Japan, and Vietnam in terms of total installed capacity in 2021 (Figure 2.6.2).

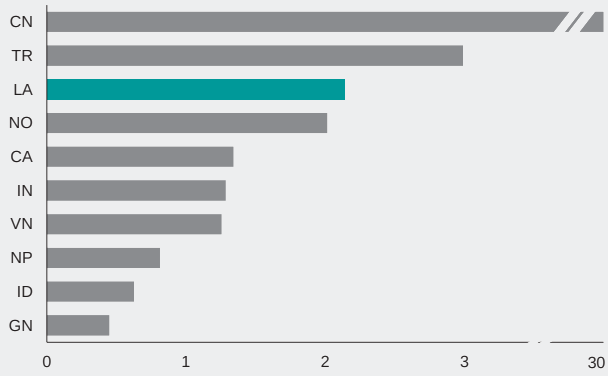
Lao PDR is the top net exporter of electricity in ASEAN (Figure 2.6.3). With installed hydropower capacity at least three times greater than domestic consumption of electricity, it has seized the economic opportunity to export surplus energy to the rest of the region (PWC 2022). Lao PDR exports nearly 80 percent of its total hydropower generation capacity. Electricity exports—mainly hydropower—are key drivers of the economy's trade and economic growth, accounting for about 22 percent of total export earnings during 2017–21, and about 9 percent of its 2021 GDP (Figure 2.6.4). Thailand is its largest export market, followed by Cambodia, Vietnam, and Myanmar. Singapore was added to the list in June 2022, with the signing of the Lao PDR–Thailand–Malaysia–Singapore Power Integration Project, which allows it to import up to 0.1 GW of hydropower through existing interconnections in Thailand and Malaysia for an initial period of two years—the first multilateral cross-border electricity trade involving four ASEAN economies.

Lao PDR's ambition is to become the "Battery of Southeast Asia." Much of the expansion in its electricity sector will be driven by strong external demand and official bilateral agreements: power exports are anticipated to increase sharply from about 4.5 GW currently to more than 25GW by 2030, of which about 10GW is earmarked for Thailand, about 8 GW for Vietnam, and 6 GW for Cambodia (UNESCAP 2022; VNA 2022). To meet the anticipated rise in demand for renewable energy, hydropower development is a top priority in Lao PDR's national energy policy. Besides about 70 operational hydropower dams, about 280 additional hydropower projects are in the pipeline, mostly backed by Thai and Chinese investors and partners from Korea, the United States, and Vietnam (Figure 2.6.5).

Substantial infrastructure development will be needed to propel this ambition. Grid expansion remains a physical limitation for energy trade within ASEAN (PWC 2022). In Lao PDR, power infrastructure development has been primarily for generation—less than 5 percent of the value of future power projects has been devoted to transmission and distribution (Stimson 2021). Expanding the transmission infrastructure would facilitate more power purchase agreements with regional neighbors and help guarantee the monetization of any excess capacity from projects in the pipeline. Exploring the use of pumped storage will also maximize the operational efficiency of hydropower plants, especially to address demand for energy during the dry season (Vientiane Times 2022). "Soft" infrastructure, i.e., trained and qualified hydropower experts, must also be expanded in parallel, in order to manage and assess upcoming projects for their economic, financial, social, and environmental impacts (ADB 2019). This could be achieved, for example, through joint training and research programs with external partners. Mobilizing financing—especially from development partners and the private sector—will be especially crucial to boost hydropower exports in a sustainable way, without overly increasing financial or fiscal vulnerabilities (AMRO 2022b).

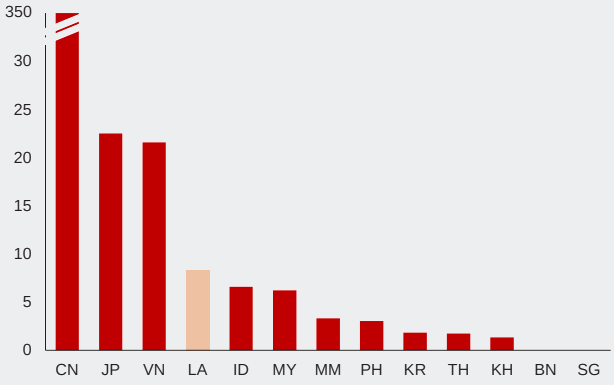
This box was written by Marthe M. Hinojales.

Figure 2.6.1. Top 10 Economies: New Installed Renewable Hydropower Capacity, 2019–21
(Gigawatts)



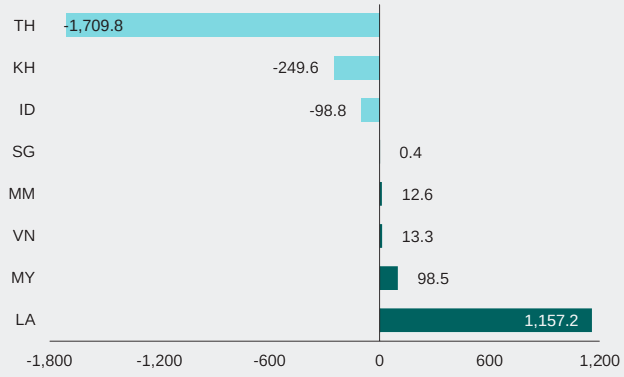
Source: IRENA; AMRO staff calculations.
Note: CA = Canada; CN = China; GN = Guinea; ID = Indonesia; IN = India; LA = Lao PDR; NO = Norway; NP = Nepal; TR = Turkey; VN = Vietnam.

Figure 2.6.2. ASEAN+3: Installed Renewable Hydropower Capacity, 2021
(Gigawatts)



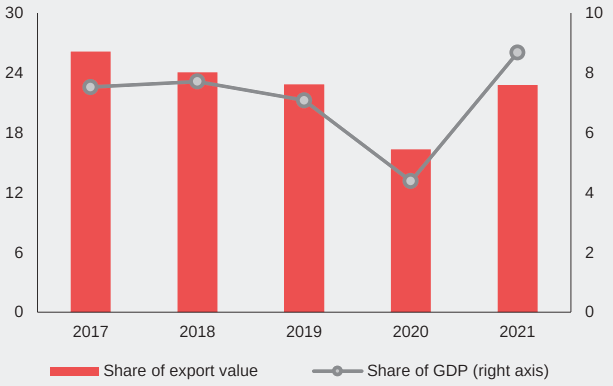
Source: IRENA; AMRO staff calculations.
Note: Data not available for Hong Kong. BN = Brunei; CN = China; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 2.6.3. ASEAN: Electricity Trade Balance, 2020–21
(Average value in millions of US dollars)



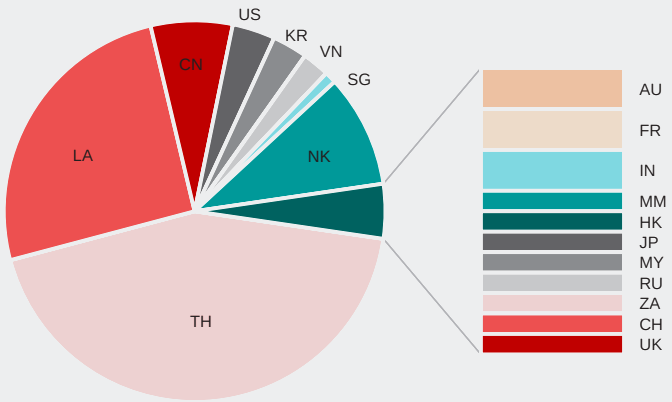
Source: UNComtrade; AMRO staff calculations.
Note: Data not available for Brunei and the Philippines. Data for electricity exports refer to commodities under HS Code 2716. ID = Indonesia; KH = Cambodia; LA = Lao PDR; MM = Myanmar; MY = Malaysia; SG = Singapore; TH = Thailand; VN = Vietnam.

Figure 2.6.4. Lao PDR: Electricity Exports
(Percent of total export value; percent of GDP)



Source: UNComtrade; World Bank, World Development Indicators; AMRO staff calculations.
Note: Data for electricity exports refer to commodities under HS Code 2716.

Figure 2.6.5. Lao PDR: Planned Hydropower Projects, by Economy of Sponsor, 2020
(Share of total number of projects)



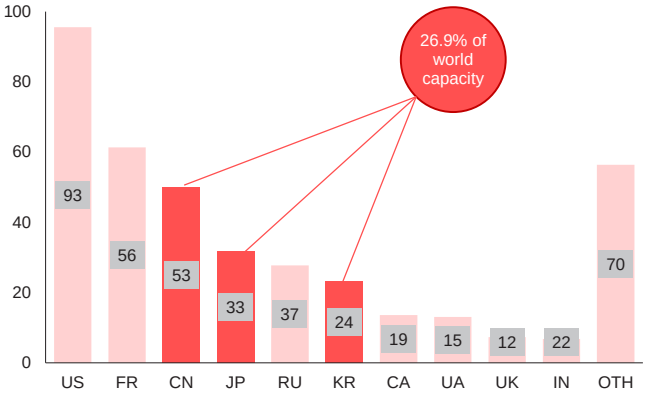
Source: Stimson (2020).
Note: Projects with multiple economy-sponsors are counted under each economy. AU = Australia; CH = Switzerland; CN = China; FR = France; HK = Hong Kong; IN = India; JP = Japan; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; NK = not known; RU = Russia; SG = Singapore; TH = Thailand; UK = United Kingdom; US = United States; VN = Vietnam; ZA = South Africa.

Nuclear energy

After declining in the wake of the 2011 Fukushima accident, the region's interest in nuclear energy is picking up again.[23] The Plus-3 economies account for more than a quarter of the world's nuclear capacity (Figure 2.31); within this group, Korea has the greatest reliance on nuclear energy for power generation (Figure 2.32). According to IEA (2022d), carbon dioxide emissions in Japan and Korea during 1990–2020 would have been appreciably higher if they had not used nuclear energy (Figure 2.33). There is now growing recognition by policymakers that the transition to net zero will be faster if nuclear is part of the energy mix.[24] China leads the global appetite for additional nuclear capacity, with more than 15 new reactors under construction at the end of 2021, and a target to double the share of nuclear energy in power generation by 2035 (Table 2.6). In Japan, public support for a nuclear restart reached above 60 percent in 2022—the highest since 2011 (Lee 2022). Korea reversed its nuclear phaseout policy (which had been in place since 2019) in 2022 (World Nuclear News 2022). Within ASEAN, Indonesia, the Philippines, and Vietnam have declared intentions to pursue or restart nuclear power projects to reduce fossil fuel dependence, and Singapore is also considering it as part of its 2050 energy mix (Ang 2022).

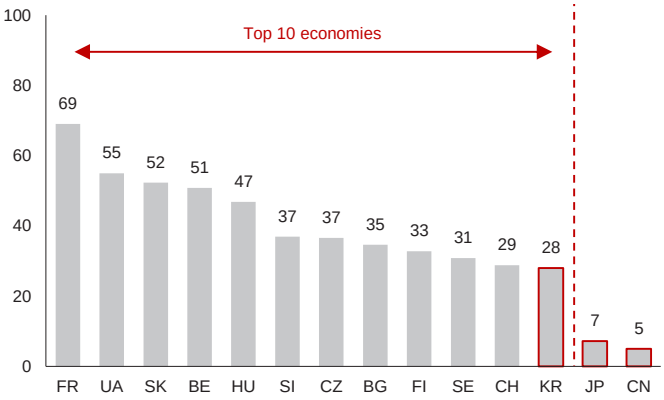
The potential for nuclear energy in an economy depends on factors such as its projected energy demand and decarbonization needs and the availability and quality of infrastructure and capacity (Energy for Growth Hub and Third Way 2022). Based on these criteria, the Plus-3 economies and Vietnam are assessed to be relatively more "nuclear-ready" markets, whereas economies like Singapore and Lao PDR have smaller energy needs that can be met efficiently by other sources (Figure 2.34). Public support is key in making nuclear energy a credible option in ASEAN—a 2018 survey found support to be generally lacking in Indonesia, Malaysia, Singapore, Thailand, and Vietnam (Figure 2.35) (Ho and Chuah 2022). Availability of international financing is also of utmost importance, given that nuclear energy involves substantial upfront costs. An appetite for nuclear energy in ASEAN would be a boon to China, Korea, and Japan, which are all major exporters of reactors (Figure 2.36).

Figure 2.31. World: Operational Nuclear Capacity, 2021
(Gigawatt electric)



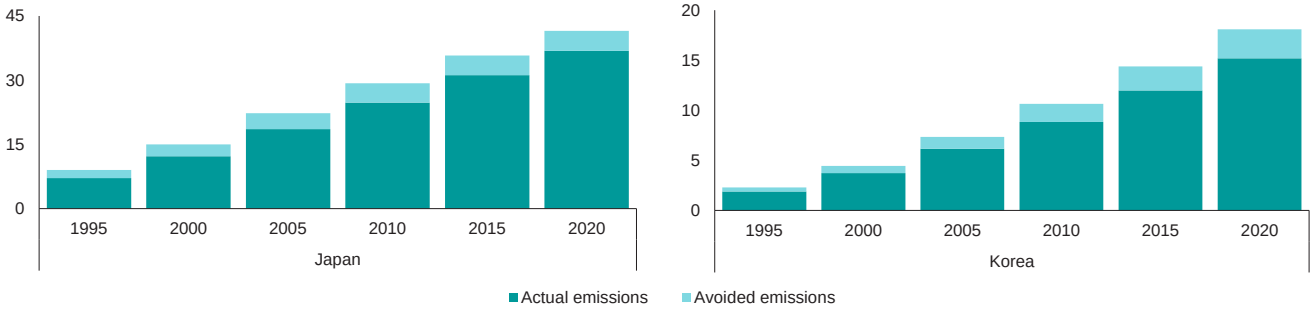
Source: International Atomic Energy Agency (IAEA); AMRO staff calculations.
Note: Figures refer to the number of operational reactors. CA = Canada; CN = China; FR = France; IN = India; JP = Japan; KR = Korea; OTH = Others; RU = Russia; UA = Ukraine; US = United States. Others refer to 22 other economies.

Figure 2.32. Selected Economies: Share of Nuclear Power in Electricity Generation, 2021
(Percent of total electricity supply)



Source: International Atomic Energy Agency (IAEA); AMRO staff calculations.
Note: BE = Belarus; BG = Bulgaria; CH = Switzerland; CN = China; CZ = Czech Republic; FI = Finland; FR = France; HU = Hungary; JP = Japan; KR = Korea; SE = Sweden; SI = Slovenia; SK = Slovakia; UA = Ukraine.

Figure 2.33. Japan and Korea: Cumulative Carbon Emissions Avoided by Nuclear Power Since 1990
(Gigatons)

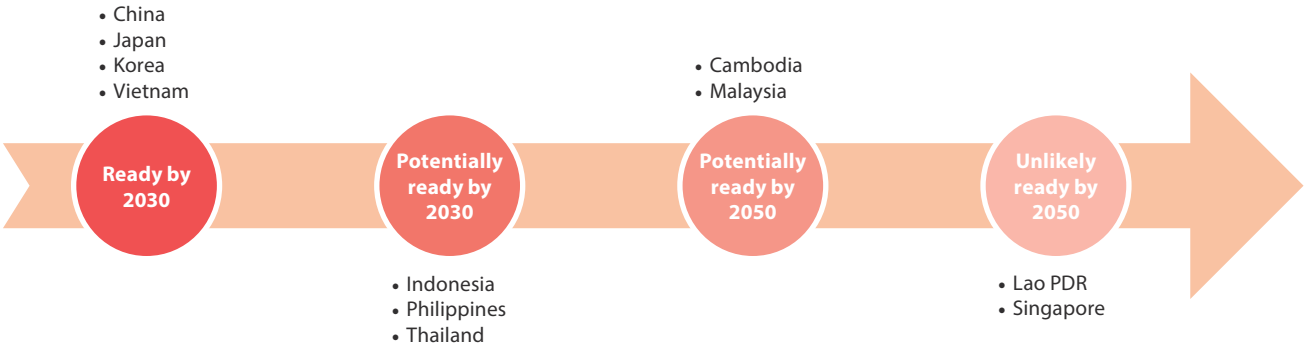


Source: International Energy Agency (IEA); Our World in Data; AMRO staff calculations.

23/ The Fukushima Daiichi Nuclear Power Station disaster in Japan sparked public distrust of the safety of nuclear technology. More than 20 reactors around the world have been decommissioned since then and new projects have been discouraged by lack of supportive policy, very stringent safety requirements, large upfront costs, long gestation periods, as well as unattractive electricity prices.

24/ As reactors can operate at capacity without interruption, they can provide a continuous and reliable supply of energy unlike variable renewable sources (such as solar or wind energy), help meet fluctuations in demand and stabilize power grids, expand the suite of decarbonization tools, and also provide economic savings (IEA 2019a; IEA 2020b). The land footprint of nuclear energy is smaller than other clean energy sources (NEI 2015).

Figure 2.34. Selected ASEAN+3: Readiness for Advanced Nuclear Development, 2022



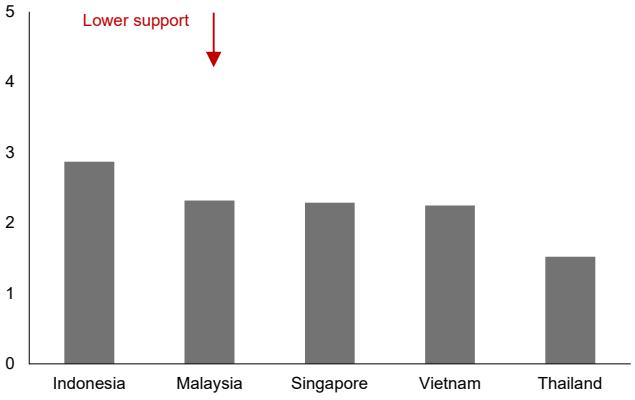
Source: Energy for Growth Hub and Third Way (2022).
Note: Data as of October 2022.

Table 2.6. Selected ASEAN+3: Policy Developments Related to Nuclear Energy, as of December 2022

Economy	Developments
Cambodia	• Expanded the ongoing triangular cooperation in the application of nuclear technology with Lao PDR and Vietnam in October 2022. • Signed a memorandum of understanding with Russia's State Atomic Energy Corporation (ROSATOM) and China National Nuclear Cooperation to boost cooperation on nuclear energy.
China	• Committed to "actively develop nuclear power in a safe and orderly manner" in the 14th Five-Year Plan (2021–25). The Plan targets an increase in nuclear power capacity to 70GW for the share of nuclear energy in the power generation mix to reach 10 percent by 2035. • Issued 26 regulations and standards related to nuclear safety in 2021, in accordance with its 2018 Nuclear Safety Law.
Indonesia	• Submitted draft legislation in June 2022 with a plan to open its first nuclear plant by 2045.
Japan	• Set a target share of 20 percent to 22 percent for nuclear energy in the 2030 power generation mix in its 6th Strategic Energy Plan.
Korea	• Reversed its earlier policy of nuclear phaseout and resumed construction in two plants. Nuclear energy is targeted to have a minimum share of 30 percent in the energy mix by 2030.
Lao PDR	• Expanded the ongoing triangular cooperation in the application of nuclear technology with Cambodia and Vietnam in October 2022. • Signed a memorandum of understanding with Russia's ROSATOM in July 2022 to promote nuclear energy domestically.
Myanmar	• Signed a roadmap agreement with Russia's ROSATOM in September 2022, which included the possible rollout of a small modular reactor.
Philippines	• Issued an executive order in February 2022 to incorporate nuclear power into the energy mix, which opens the possibility of restarting the Bataan Nuclear Power Plant (never operated).
Thailand	• To receive technical assistance to develop and deploy small modular reactors, under the US' Net Zero World Initiative, announced in November 2022.
Vietnam	• Considering the resumption of a suspended plan to build two nuclear power plants—a joint project with Russia's ROSATOM and a consortium led by Japan Atomic Power—following the program's suspension in 2016.

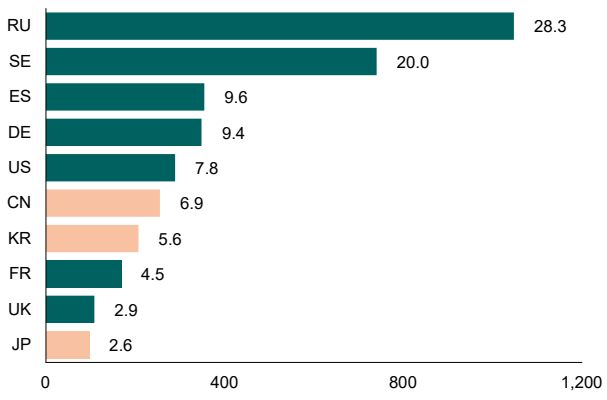
Source: AMRO staff compilation.

Figure 2.35. Selected ASEAN: Public Support for Nuclear Energy Development, 2018
(Mean score; 5 = Highest support)



Source: Ho and Chuah (2022).
Note: Each economy had 1,000 respondents. The survey was conducted in 2018.

Figure 2.36. World: Top 10 Exporters of Nuclear Reactors, 2021
(Millions of US dollars)



Source: UNComtrade; and AMRO staff calculations.
Note: Numbers refer to each economy's share of world exports. Data refer to HS code 8401. CN = China; DE = Germany; ES = Spain; FR = France; KR = Korea; RU = Russia; SE = Sweden; TW = Taiwan Province of China; US = United States.

Clean hydrogen

Clean hydrogen can help decarbonize heavy industry, expand zero-emission transport options and encourage the uptake of renewables. Hydrogen is an energy carrier rather than a primary energy source. This means that it does not exist freely in nature—it occurs naturally only in compound form—and it must be produced (separated) using other sources of energy through a process called electrolysis. Different colors denote the type of energy used in hydrogen production (Figure 2.37). About 99 percent of hydrogen in use globally is gray or black/brown, a color range indicative of a significant contribution to global carbon emissions (IEA 2019b). Demand for hydrogen comes largely from oil refining and industrial processes, particularly ammonia (for fertilizers), and methanol and steel production. Switching these and other hard-to-abate industries to clean (green, yellow, pink, or blue) hydrogen would be the fastest and easiest way to lower emissions. Clean hydrogen can power fuel cell electric vehicles (FCEVs). It can substitute for natural gas in national grids for power and heating. It can also enable the use of renewables by acting as a form of energy storage as well as an energy carrier capable of carrying large amounts of energy over long distances (Phoumin 2021).

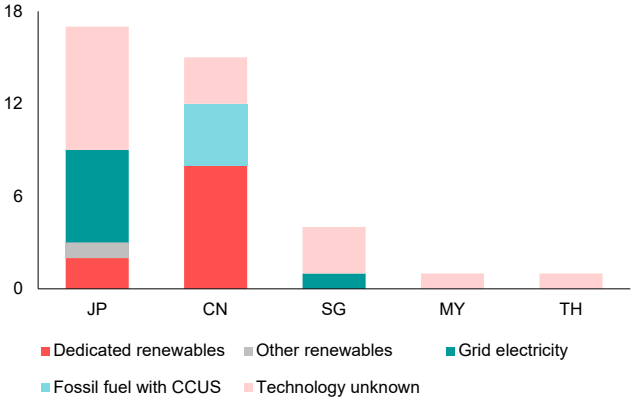
Clean hydrogen is beginning to take off across the ASEAN+3 region. About 38 operational projects in the region have been commissioned to help reduce emissions, decarbonize raw inputs to industrial applications, and explore hydrogen as an energy carrier. Most are in Japan and China, with the rest in Singapore, Malaysia, and Thailand (Figure 2.38). Blue hydrogen projects are mostly in China, which produces about 30 percent of the world's hydrogen, mostly fueled by coal (IEA 2022k). As for upcoming facilities, about 70 are in various stages of development across the region, primarily for industry and transport use (Figure 2.39). ASEAN+3 economies with a rapidly growing renewables sector could be especially well-placed to take advantage of opportunities from clean hydrogen.[25]

Figure 2.37. Hydrogen Energy Technologies

Gray	• Produced from natural gas (methane), with carbon emissions
Black/Brown	• Produced through gasification of bituminous orlignite coal, with carbon emissions
Blue	• Grey or black/brown hydrogen with carbon capture and storage
Green	• Produced through electrolysis powered by renewable energy sources
Yellow	• Produced through electrolysis using solar power
Pink	• Produced through electrolysis powered by nuclear energy
Turquoise	• Produced through methane pyrolysis, with solid carbon byproduct
White	• Found in underground deposits

Source: World Nuclear Association; AMRO staff compilation.
Note: Yellow hydrogen is a form of green hydrogen. Turquoise hydrogen production has yet to be proven at scale, White hydrogen can be obtained through fracking but there are no strategies to exploit it at present.

Figure 2.38. ASEAN+3: Operational Projects for Clean Hydrogen, by Technology Type, as of October 2022
(Units)



Source: International Energy Agency (2022j) (October 2022 database); AMRO staff calculations.
Note: CCUS = carbon capture, utilization, and storage; CN = China; JP = Japan; MY = Malaysia; SG = Singapore; TH = Thailand. The database covers all projects commissioned since 2000 to produce hydrogen for energy or to mitigate climate change. Clean hydrogen refers to hydrogen produced from renewable or nuclear energy or from fossil fuels with CCUS.

Currently, four ASEAN+3 economies have national hydrogen strategies in place.

- Japan issued its Basic Hydrogen Strategy in December 2017 (the world's first national hydrogen strategy) and its Strategic Roadmap for Hydrogen and Fuel Cells in March 2019, which together set out the broad policy framework to: develop an integrated hydrogen supply chain; reduce hydrogen production costs; enhance hydrogen storage and transportation; and expand industrial and consumer use of hydrogen and ammonia. The Green Growth Strategy issued in December 2020 and updated in June 2021 includes hydrogen and ammonia among 14 identified growth sectors for the Japanese economy (Clifford Chance 2022).
- Korea issued its Hydrogen Economy Roadmap in January 2019, focusing on market creation for hydrogen FCEVs and fuel cells for power generation. The Hydrogen Economy Promotion and Hydrogen Safety Management Law, which took effect in 2021, supports hydrogen-focused companies through research and development (R&D) subsidies, loans, and tax exemptions, and is the world's first law aimed at promoting hydrogen vehicles, charging stations, and fuel cells, as well as transparent hydrogen pricing (Nakano 2021; Kim 2021).

25/ The production of green hydrogen could divert renewable energy from other end uses, which prompts debate about whether green hydrogen should only be produced from renewable capacity that would not otherwise be commissioned or used.

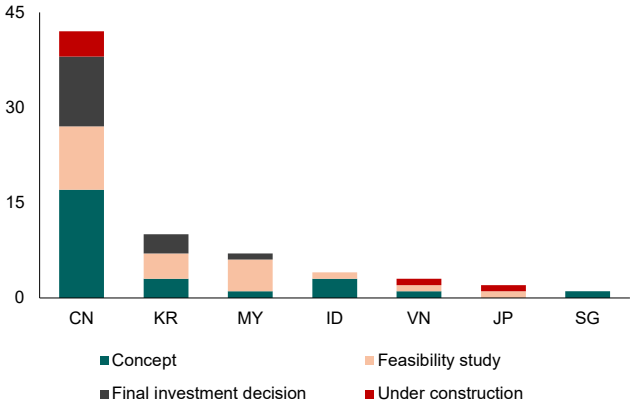
- China released its first National Hydrogen Development Plan in March 2022. It focuses on developing the domestic industry, improving internal expertise, and expanding manufacturing capacity for electrolyzers as the key component for clean hydrogen production (Yin 2022).

- Singapore released its National Hydrogen Strategy in October 2022, which focuses on R&D and experimentation in advanced hydrogen technologies; developing and scaling up supply chains for clean hydrogen; land and infrastructure plans to import, store and transform hydrogen into power; and workforce training for jobs along the hydrogen supply chain (Singapore Ministry of Trade and Industry 2022).

Cost is the key challenge to overcome. The hydrogen value chain is complex and capital-intensive, and evolving—many hydrogen technologies are still under development and a global supply chain has yet to be established. Current estimates suggest that the cost of supplying green hydrogen is about three to five times higher than natural gas, the "cleanest" fossil fuel (Phoumin 2021). Costs need to come down and production needs to ramp up for clean hydrogen to meet its promise in the ASEAN+3 region. This will require action to scale competitive supply, stimulate local demand, develop transportation technology, and facilitate cooperation across value chains and economies (de Pee and others 2022).

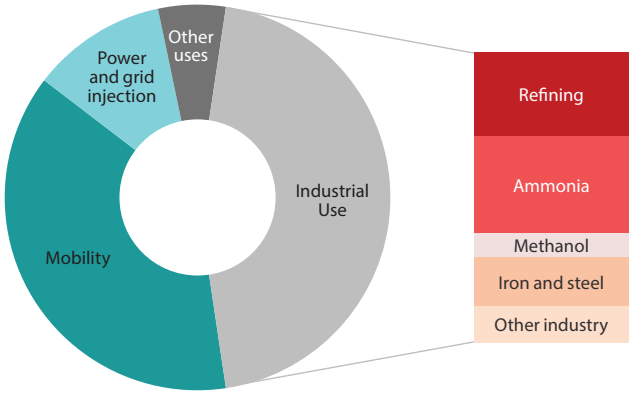
Figure 2.39. ASEAN+3: Upcoming Projects for Clean Hydrogen, as of October 2022

By Development Status
(Units)



Source: International Energy Agency (2022j) (October 2022 database); AMRO staff calculations.
Note: CN = China; KR = Korea; ID = Indonesia; JP = Japan; MY = Malaysia; SG = Singapore; VN = Vietnam.

By End-Use
(Percent of total projects)



Source: International Energy Agency (2022j) (October 2022 database); AMRO staff calculations.

Electric Vehicles

"The future of passenger vehicle powertrains is electric ..."

McKinsey & Company
September 2021

Electric vehicles (EVs) are an important part of meeting global goals on climate change. As EVs—and the broader category of zero emission vehicles (ZEVs)—do not run on fossil fuels, it is generally agreed that they create a lower carbon footprint than vehicles with traditional internal combustion engines (Figure 2.40).[26] In ASEAN+3, the share of carbon emissions from transport, while still below the world average, has been trending up over the last few decades in tandem with the increase in the number of motor vehicles—transport accounts for over 15 percent of carbon emissions in Japan, Korea, Malaysia, the Philippines, and Thailand (Figure 2.41 and Figure 2.42).

EV adoption is gaining traction but remains uneven across the ASEAN+3 region. China has the world's largest fleet of electric vehicles—it accounted for over 50 percent of the global EV stock in 2021 (Figure 2.43, left panel). More EVs were sold in China in 2021 than in the entire world in 2020 (Figure 2.43, right panel). In 2021, electric cars made up 16 percent of new car sales in China; by contrast, about 6 percent of Korea's total new car sales were EVs, while in Japan, the share was only about 1 percent (Figure 2.44). Uptake of passenger EVs is at an early stage in ASEAN economies: Singapore has the highest share among total registered vehicles (Figure 2.45), while interest in EVs is highest in Thailand (Figure 2.46).

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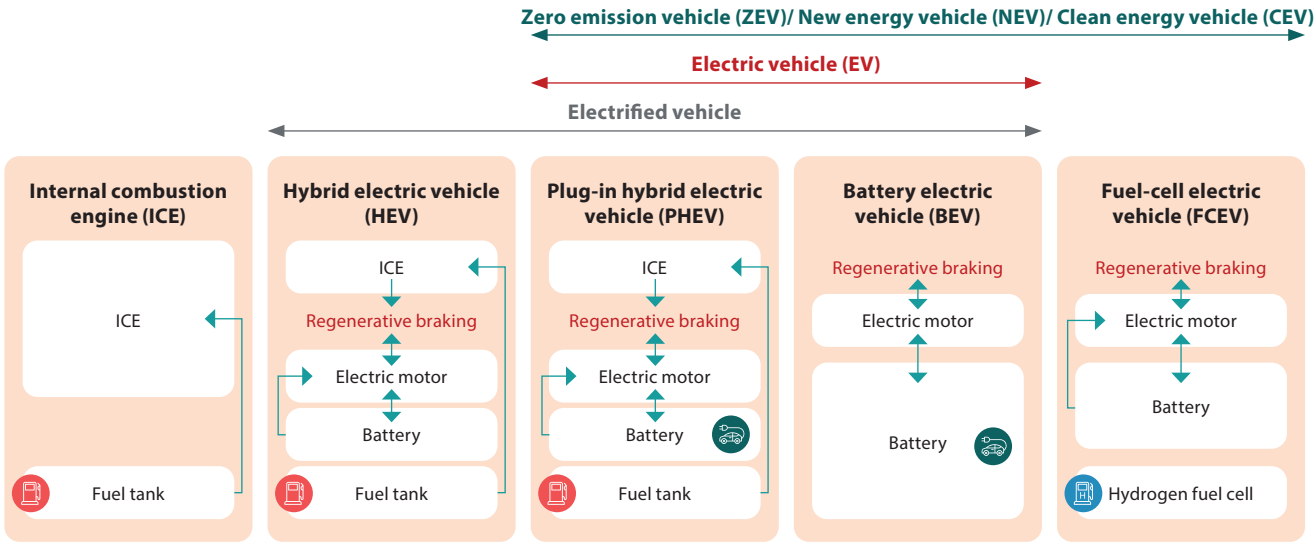
[26] EVs do not directly emit carbon dioxide but the electricity they run on is in large part still produced from fossil fuels in many parts of the world; energy is also used to manufacture EVs and their batteries. Different studies comparing lifetime emissions of EVs and gasoline-powered vehicles find different results due to differences in the specific make of vehicles being compared and different assumptions about the electricity grid mix, electricity emissions (marginal versus average), driving patterns, and so on (Hausfather 2022).

Figure 2.40. Electric Vehicles, Electrified Vehicles, and Zero Emission Vehicles

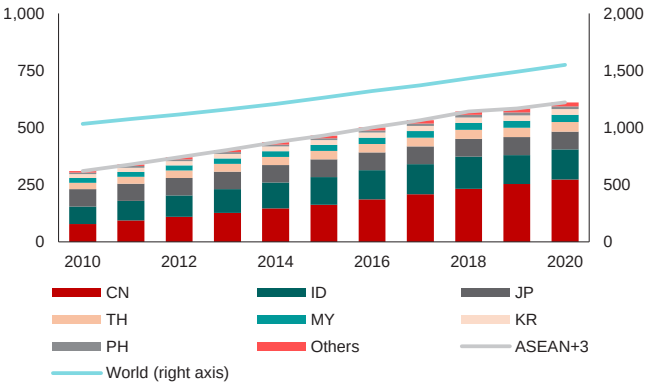


Source: AMRO staff compilation.
Note: EVs are vehicles that use electricity to power an electric motor. Technically, FCEVs are a type of EV since they also use electricity to power an electric motor. However, conventional usage refers to EVs as BEVs and PHEVs only.

Figure 2.41. ASEAN+3: Carbon Emissions from Transport
(Percent of economy's total carbon emissions)

Source: Our World In Data; AMRO staff calculations.
Note: Data for Hong Kong are not available. Transport excludes aviation and shipping.
BN = Brunei; CN = China; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea;
LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore;
TH = Thailand; VN = Vietnam.

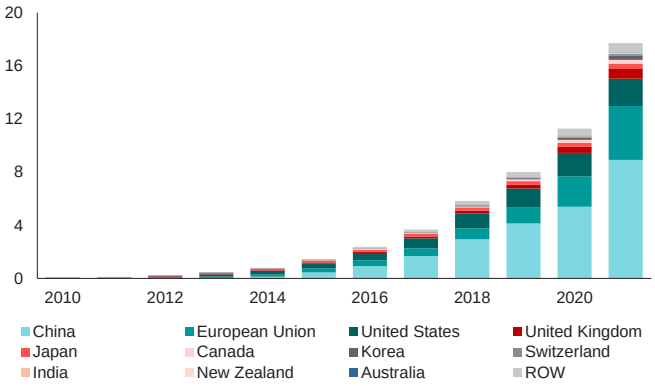
Figure 2.42. ASEAN+3: Number of Motor Vehicles
(Millions of units)



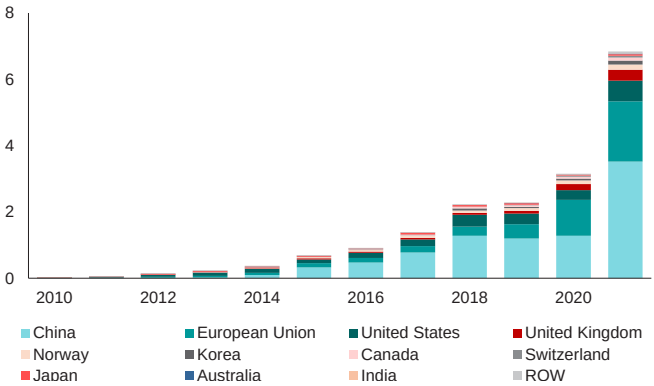
Source: ASEANstats; national authorities; AMRO staff calculations.
Note: Data for Japan, Indonesia, Thailand, Malaysia, and the Philippines refer to motor vehicles in use and registered road motor vehicles, respectively. CN = China; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; MY = Malaysia; Others = Brunei, Lao PDR, Hong Kong, Myanmar, Singapore, and Vietnam; PH = Philippines; TH = Thailand.

Figure 2.43. World: Electric Vehicle Stocks and Sales, by Economy
(Millions of units)

Stocks

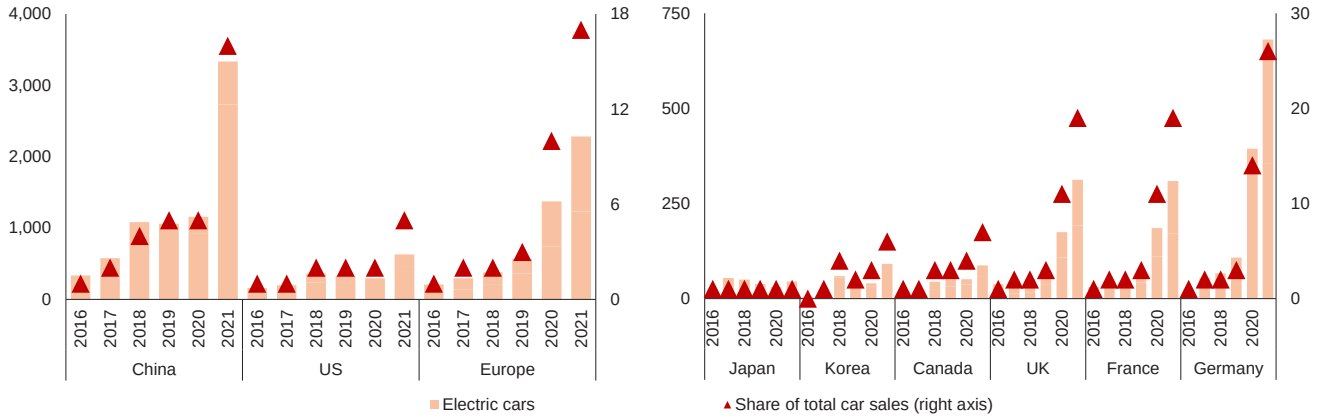


Sales



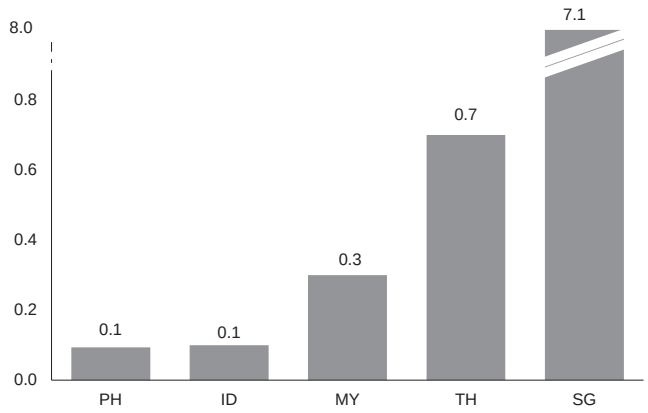
Source: International Energy Agency; AMRO staff calculations.
Note: Electric vehicles comprise battery electric and plug-in hybrid electric buses, cars, trucks, and vans. EU = European Union; ROW = rest of the world; UK = United Kingdom; US = United States.

Figure 2.44. Selected Economies: Electric Car Registrations and Sales
(Thousands of units; percent of total car sales)



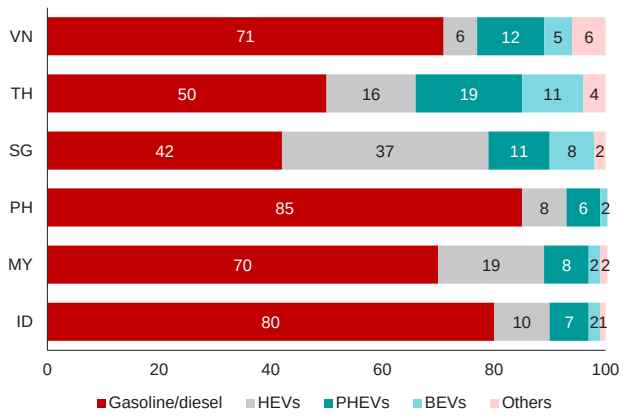
Source: International Energy Agency.
Note: Electric cars include battery electric cars and plug-in hybrid electric cars. UK = United Kingdom; US = United States.

Figure 2.45. Selected ASEAN: Electric Vehicle Adoption Rate, 2021
(Percent of registered vehicles)



Source: ASEANstats; national authorities; various media reports; AMRO staff calculations.
Note: The number of registered vehicles is sourced from ASEANstats whose latest data point is 2020 proxied as the latest data. ID = Indonesia; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand. Data for Thailand are as of 2022, and 2019 for the Philippines.

Figure 2.46. ASEAN-6: Powertrain Preferences, September–October 2022
(Percent of responses by country)



Source: Deloitte (2023).
Note: Responses to survey question "What type of engine would you prefer in your next vehicle?" from Indonesia (ID, 1,001 responses); Malaysia (MY, 1,005 responses); the Philippines (PH, 1,007 responses); Singapore (SG, 1,015 responses); Thailand (TH, 1,004 responses), and Vietnam (VN, 1,017 responses). BEVs = battery electric vehicles; HEVs = hybrid electric vehicles; PHEVs = plug-in hybrid electric vehicles. EVs refer to BEVs and PHEVs.

Almost all ASEAN+3 economies have targets for EV adoption (Table 2.7). In recent years, many of them have introduced policy measures to promote EV adoption, such as import duty reductions/exemptions for EVs and/or charging stations (Cambodia, Malaysia, the Philippines), tax and registration fee exemptions or rebates (Malaysia, the Philippines, Singapore, Thailand, Vietnam), and subsidies for EV purchases (China, Japan, Thailand) or installation of EV charging infrastructure (Hong Kong, Japan, Lao PDR). In September 2022, Indonesia mandated the use of EVs for government officials across the country in an effort to expedite its transition to battery-powered transportation (Thomas 2022).

Accelerated EV adoption in ASEAN+3 will help spur investment and bring about a needed transformation in the region's automobile industry. Many ASEAN+3 economies have also set targets or ambitions and supporting policies to develop their domestic EV industries (Table 2.7). China's domestic EV industry is already relatively mature and is now expanding its footprint overseas (Box 2.7). Korea's Hyundai Motor Group plans to invest USD 16.5 billion over the next eight years to expand its production of EVs in its home market and capture 12 percent of the global EV market by decade's end (Jennings 2022). Japan's automobile industry, having long enjoyed a competitive advantage in gasoline-powered and hybrid electric vehicles, has been relatively slower to ramp up EV production capacity and is racing to make up lost ground. Among ASEAN economies:

- Indonesia offers several incentives to encourage investment in EV manufacturing, including tax allowances and holidays, as well as tariff cuts for imported machinery and materials used in EV production. The country's huge nickel and copper reserves make it a competitive investment destination for EV manufacturers.

- Thailand—known for years as the "Detroit of Asia" for its track record in manufacturing automobiles—aims to become a global hub for EV and parts production. In

February 2022, the government approved measures to promote domestic manufacturing of EVs, including the exemption of import duty on significant electrical parts in 2021–25 (Theparat and Apisitniran 2022).

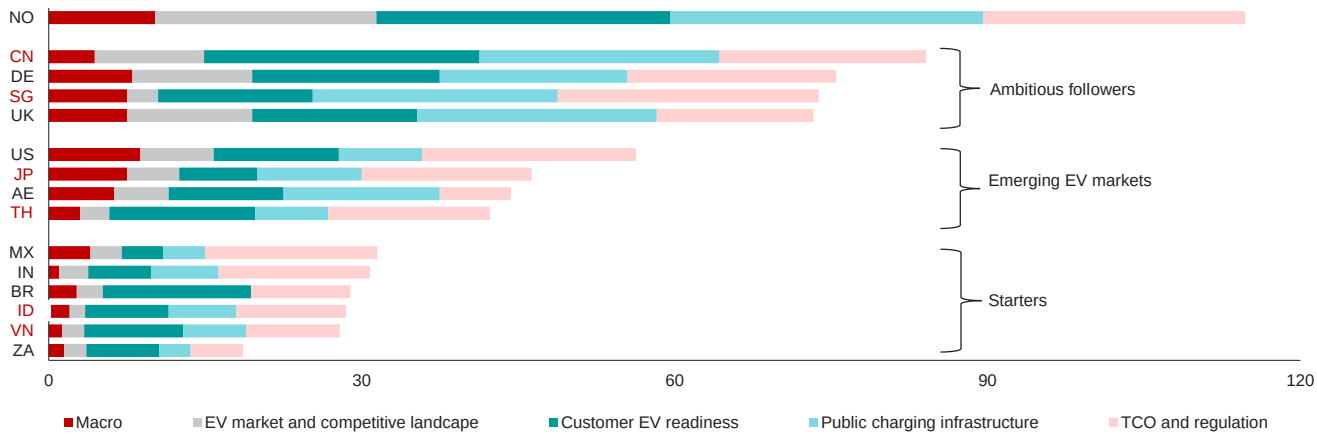
- Malaysia provides full import and excise duty exemptions and a sales and service tax waiver until the end of 2025 for locally assembled ("complete knocked down") EVs. Volvo Car Malaysia rolled out the first locally assembled EV in March 2022. Malaysia is focusing on producing EV components rather than competing with neighboring Indonesia and Thailand in EV production.

- Vietnam's VinFast, established in 2017, is the largest manufacturer of electric two-wheelers and the only domestic manufacturer of electric cars in the country. While demand for electric cars in Vietnam is embryonic, Vinfast has set its sights on the global market—in November 2022, it shipped its first batch of 999 electric cars to the United States and is building an EV plant there (Nguyen 2022).

For the region's EV industry to achieve its market potential, challenges to EV adoption need to be overcome. Developing economies such as Cambodia, Lao PDR, and Myanmar have relatively weak infrastructure and low technological capacity, which can affect their readiness for EV adoption. Even larger emerging-market economies such as Indonesia and Vietnam are rated by business consultancy Arthur D. Little as "starters" in electric mobility readiness, reflecting "major challenges in costs and infrastructure" (Schlosser and others 2022) (Figure 2.47). A recent survey by Deloitte (2023) indicates that lack of public charging infrastructure and battery safety and performance concerns are among the impediments to EV adoption in the ASEAN-6 (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam).

Competition from EV producers elsewhere and protectionist policies in large markets could challenge the region's EV export ambitions. US EV pioneer Tesla remains the dominant player in the luxury EV market, owning and operating the largest fast-charging network in the world. Traditional brands like General Motors and Volkswagen are also ramping up their EV lines, not only with luxury EVs but also with different vehicle body types and price points (Figure 2.48). Plus-3 EV makers are rising to meet the competition, but ASEAN EV makers might find the global field more daunting unless they can carve out their own niche. Moreover, policies in major trading partners that favor domestically produced EVs could short-circuit the region's promising EV export growth. The US Inflation Reduction Act, passed in August 2022, is a prime example.[27]

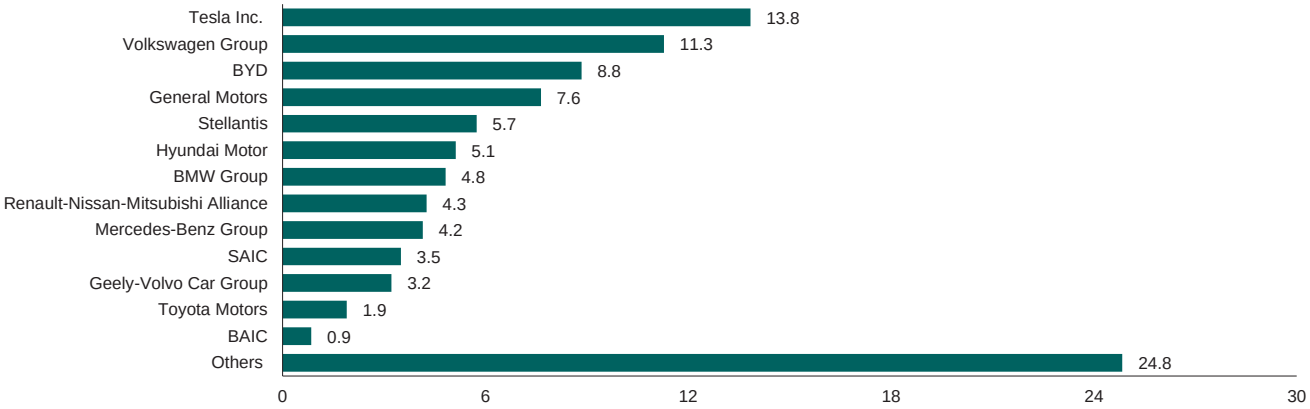
Figure 2.47. Selected Economies: Electric Mobility Readiness, 2022



Source: Schlosser and others (2022).
Note: "Macro" factors include GDP per capita and quality of electricity infrastructure; "EV market and competitive landscape" factors include the number of battery electric vehicles (BEVs) offered in the market and EV market share expectations for 2021–26; "Customer EV readiness" factors include home ownership rate and customers' likelihood of purchasing an EV as their next vehicle; "Public charging infrastructure" factors include third-party highway high-performance charging network density and compound annual growth rate of public/destination charging points; "TCO and regulation" factors include tax and tariff benefits and direct financial subsidies for BEVs. AE = United Arab Emirates; BR = Brazil; CN = China; DE = Germany; EV = electric vehicle; ID = Indonesia; IN = India; JP = Japan; MX = Mexico; NO = Norway; ZA = South Africa; SG = Singapore; TCO = total cost of ownership; TH = Thailand; UK = United Kingdom; US = United States; VN = Vietnam.

27/ The 2022 US Inflation Reduction Act includes a tax credit of up to USD 7,500 per EV purchased domestically, but only for EVs with final assembly in North America. In addition, as of January 2024, at least 40 percent of the critical minerals used in the production of the EV must come from the United States or its free trade agreement partners, while the battery must have at least 50 percent of North American content. These minimum thresholds rise to 80 percent by 2027 for critical minerals and 100 percent from 2029 for batteries (Feingold 2022).

Figure 2.48. Global Electric Vehicle Market Share, by Main Producer, 2021
(Percent)



Source: Statista.
Note: Includes battery electric vehicles and plug-in hybrid electric vehicles.

Table 2.7. Selected ASEAN+3: Targets for Electric Vehicle Adoption and Production

Economy	Type of Targets for Electric Vehicle (EV) Adoption	Target(s) for EV Production
Brunei	• EV share in annual vehicle sales	
Cambodia	• EV share of all cars, motorcycles, and urban buses	
China	• NEV share in annual vehicle sales; BEV share in NEVs • NEV share in public fleet stock (e.g., buses, taxis, delivery vehicles) FCEV sales and stock • Charging infrastructure	• 1.2 million NEV annual production capacity by 2025 (Shanghai).
Hong Kong	• Phase-out of fuel-propelled private cars including hybrid vehicles • Reduction in vehicular emissions	
Indonesia	• EV and electric motorcycle stock • EV share in car and two-wheeler sales • Charging stations and battery swap stations • Phaseout of fossil fuel-powered cars	• Production of 2 million electric motorcycles by 2024. • Production of 600,000 EVs and 2.45 million electric two-wheelers by 2030.
Japan	• EV, FCEV, and HEV share in passenger car sales • FCEV urban bus stock • EV charging points and hydrogen refueling stations	
Korea	• Passenger BEV and FCEV stock • EV share in new vehicle sales • Total cost of ownership-parity with internal combustion engines for EVs and FCEVs. • FCEV taxi, urban bus, and truck stock • Charging stations	• Production of 430,000 passenger EVs and FCEVs by 2022, 4.5 million by 2030.
Lao PDR	• EV share of all automobiles	
Malaysia	• EV market share • Charging stations	
Philippines	• EVs (two-, three-, or four-wheeled) in use	
Singapore	• Phase-out of internal combustion engine passenger vehicles • Charging stations	
Thailand	• ZEV share in new car sales • Charging stations and battery swapping stations for electric motorcycles	• Production of 250,000 EVs, 3,000 electric buses, and 53,000 motorcycles by 2025. • 50 percent of total auto production to be EVs by 2030. • 35 percent share of ZEVs in domestic bus production by 2025, 50 percent by 2030 and 85 percent by 2035. • 30 percent share of ZEVs in domestic car and van production by 2030, 50 percent by 2035.
Vietnam	• ZEV share of all vehicles	• Production capacity of 3.5 million EVs by 2040, 4.5 million by 2050.

Source: National authorities; International Energy Agency (2022c); AMRO staff compilation from various media reports.
Note: BEV = battery electric vehicles; EV = electric vehicle, which can be BEV or hybrid plug-in electric vehicle (HPEV); CEV = clean energy vehicle, which can be EV or fuel cell electric vehicle (FCEV); HEV = hybrid electric vehicle; NEV = new energy vehicle (same as CEV); ZEV = zero emissions vehicle (same as CEV). Targets include official targets and unofficial targets (ambitions).

Box 2.7:

China's Electric Vehicle Leapfrog

Mass production of electric vehicles (EVs) has long been a key element of China's industrialization strategy. The government began thinking about ways to build a domestic EV industry in the 1990s, recognizing that China could not match advanced economies in internal combustion engine innovation and aiming to address environmental issues such as air pollution in big cities. In the early 2000s, the 863 EV Project was rolled out as part of China's 10th and 11th Five-Year Plans, with the government investing CNY 2 billion (about USD 290 million) in EV research and development (R&D) during the decade. In 2004, 16 state-owned companies formed an EV industry association to integrate technological standards and work cooperatively to develop a top-of-the-line EV. In 2009, the government released a three-year Auto Industry Restructuring and Revitalization Plan, which included a goal to increase production capacity and sales of so-called new energy vehicles (NEVs) (Figure 2.39). The subsequent Energy-Saving and New-Energy Auto Industry Plan (2012–20) set ambitious targets to have half a million NEVs on the road by 2015 and 5 million by 2020, with the help of government support for pilot programs, purchase incentives, R&D programs, charging facilities, and battery recycling. Foreign ownership limits on NEVs were scrapped in 2018, paving the way for Tesla to set up a wholly owned Chinese subsidiary that began to build EVs in 2019, and for Volkswagen to raise its stake in an EV joint venture to 75 percent in 2020.

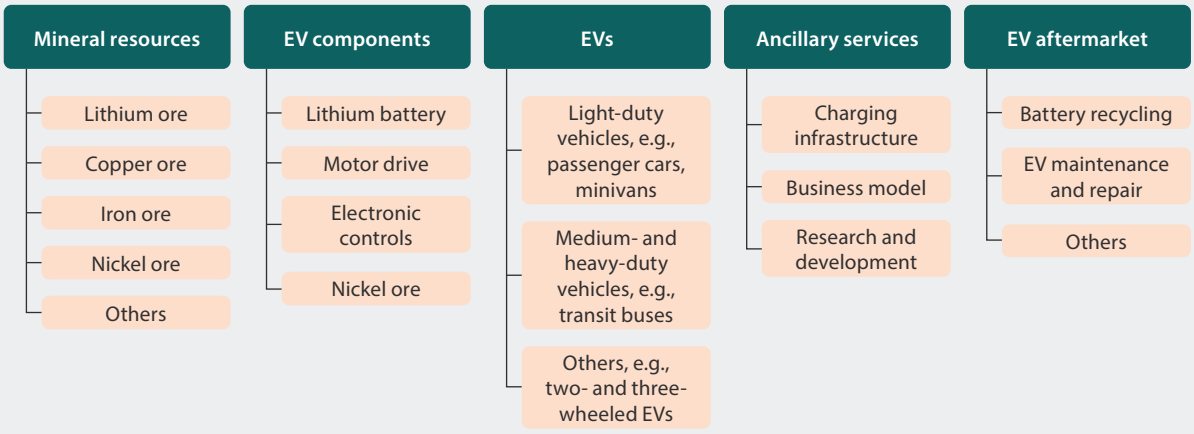
Ramping up domestic adoption has been an important—though costly—part of the EV development plan. As early as 2009, the government started to provide generous incentives to encourage EV purchases. EV manufacturers were granted subsidies for EVs sold, with the size of the subsidy largely determined by the vehicle's battery capacity—the larger the capacity, the larger the subsidy. The subsidies—together with preferential tax policies such as purchase tax waivers for NEVs (introduced in 2014) and local government incentives, e.g., bonuses for switching to NEVs and free EV license plates (introduced in 2012 in Shanghai) — helped to shrink the price difference between EVs and conventional vehicles and so increase their popularity. By 2017, the government began to wind down the subsidies in stages. The intention was to move from direct financial aid to a market-based approach by the end of 2021, although the subsidies were extended through 2022 to support the automobile sector during the downturn caused by the COVID-19 pandemic. In total, the government has spent about CNY 100 billion on EV subsidies. The purchase tax waiver for NEVs had been due to expire at the end of 2022 but was extended (for the third time) through 2023, at an estimated cost of CNY 100 billion in foregone revenue (Interesse 2022).

Progress in EV development and deployment has been rapid. Production has increased massively—by 2021, China accounted for about 60 percent of global EV production. EV production costs in China are about 50 percent lower than elsewhere in the world, thanks to important parts of the value chain being available inside the country (Figure 2.7.1) (Kawakami, Muramatsu, and Shirai 2022). EV charging points continue to be built—reaching even rural villages—at a speed faster than in any other country (Figure 2.7.2). Domestic consumption patterns are changing rapidly—by 2021, one out of every two EVs sold in the world was in China, and it will remain by far the top single country for EV sales for decades to come (Maguire 2022) (Figure 2.7.3). Exports have grown exponentially—mainly Tesla and European EV brands made in China to date, although cost-competitive Chinese auto manufacturers such as BYD, Nio, and SAIC are now making inroads in European markets and countries across Southeast Asia (Figure 2.7.4).

Still, more can be done. On the demand side, EV infrastructure availability, EV pricing, and climate change concerns will be key determinants of consumers' buying patterns, requiring continued efforts by the authorities. On the supply side, disruptions that affected China's EV production and exports in the past two years have highlighted how important it is for the industry to build resilience, including by strengthening links with ASEAN economies for technology sharing and development as well as production along the entire EV value chain.

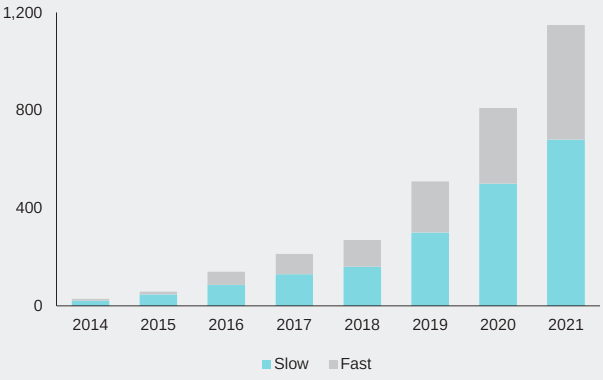
This box was written by Suan Yong Foo.

Figure 2.7.1. China: Electric Vehicle Industrial Ecosystem



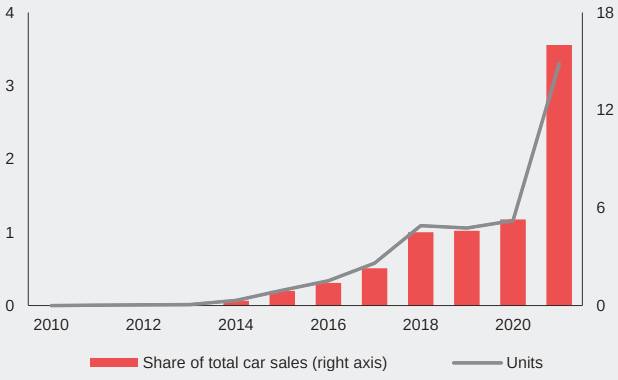
Source: Daxue Consulting (2022); AMRO staff.

Figure 2.7.2. China: Publicly Available Electric Vehicle Charging Points
(Thousand units)



Source: International Energy Agency.

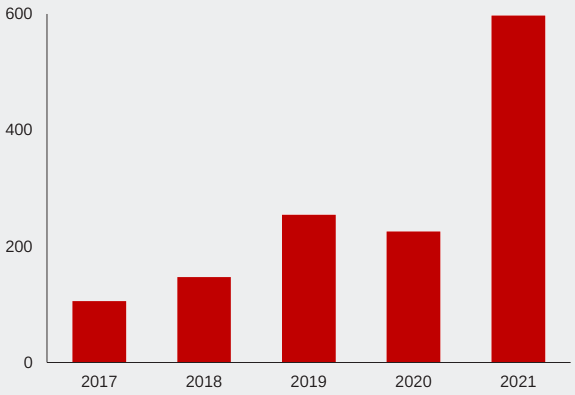
Figure 2.7.3. China: Electric Car Sales
(Million units; percent of total car sales)



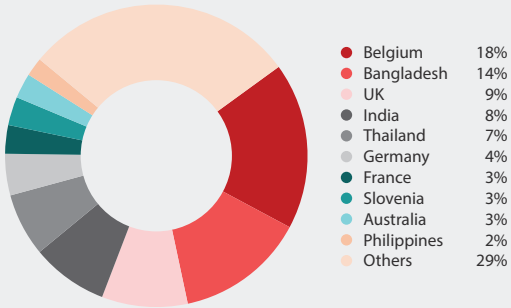
Source: International Energy Agency.

Figure 2.7.4. China: Electric Vehicle Exports

Volume
(Thousand units)



Destination market
(Percent of exports)



Source: China General Administration of Customs; Statista.
Note: UK = United Kingdom. EV exports to Bangladesh are mainly two- and three-wheeled vehicles.

Energy Storage

"This is the energy storage decade."

Yayoi Sekine
BloombergNEF Head of Decentralized Energy
November 2021

Energy storage is crucial for the green transition. Batteries and fuel cells will have a central place in road transportation systems that run mainly on electricity and/or hydrogen. Energy storage will also be crucial in future electricity systems reliant on variable renewable energy (VRE) sources like wind and sunlight. Storage technologies differ in duration (i.e., the length of time over which the storage facility can deliver maximum power when starting from a full charge), energy density (i.e., the maximum amount of energy that can be stored per unit volume), and other attributes such as scale economies. For example, most currently deployed energy storage uses electrochemical technology in the form of lithium-ion batteries, which have high energy density and short storage durations, making them particularly well-suited for EVs and mobile electronics. Mechanical technology, like pumped-storage hydropower, is widely used for grid-scale storage, while chemical technologies, like hydrogen, have potential for large-scale storage of VRE (Figure 2.49).

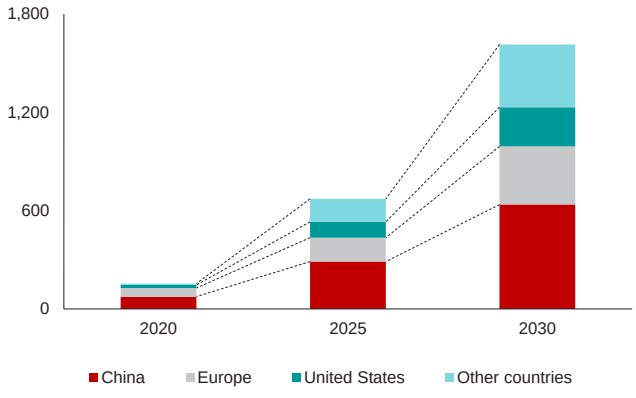
A rapid scaling-up of demand for energy storage is expected over the next few decades as EVs supplant internal combustion engines and as the share of electricity generation from wind and solar photovoltaics increases. According to the IEA (2020a), global annual lithium-ion battery production would need to reach about 1,500 gigawatt-hours (GWh) per year by 2030 to meet government EV targets around the world—and twice that amount to meet long-term sustainability goals (Figure 2.50).[28] As for grid-scale battery storage, total installed capacity would need to expand from about 16 gigawatts (GW) in 2021 to 680 GW in 2030 for the world to meet its ambition to reach net zero by 2050 (Figure 2.51) (IEA 2022g).

Figure 2.49. Energy Storage Technologies

Electrochemical	Chemical	Mechanical	Thermal
Lithium-ion batteries	Hydrogen	Pumped storage hydropower	Molten salt storage
Lithium-ion batteries are widely used in EVs and shortduration electricity system storage applications	Very large amounts of hydrogen can be stored in constructed underground salt caverns	Pumped storage hydropower accounts for over 90 percent of global functional grid-scale energy storage capacity	Molten salt is used as a heat transfer fluid and thermal energy storage in solar power plants

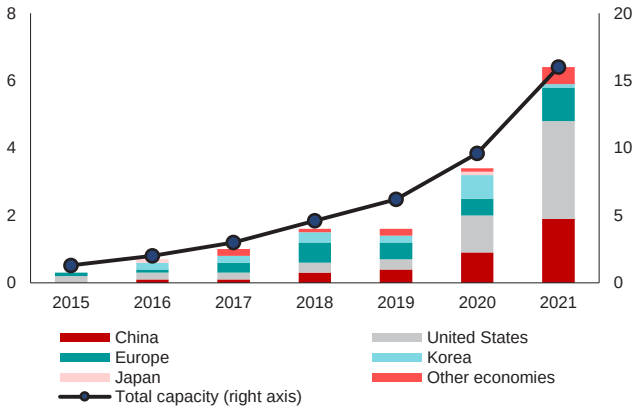
Source: AMRO staff compilation.

Figure 2.50. World: Projected Annual Electric Vehicle Battery Demand
(Gigawatt-hours)



Source: International Energy Agency (2021a).
Note: Only considers lithium-ion batteries. 2025 and 2030 projections based on current and announced policies.

Figure 2.51. World: Grid-Scale Battery Storage Capacity Additions
(Gigawatts)

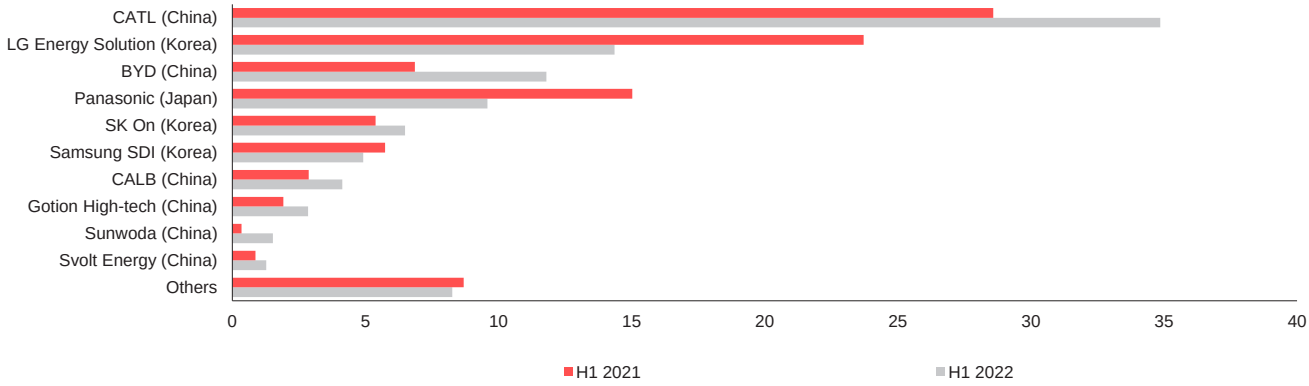


Source: International Energy Agency (2022g).

28/ Battery production for an output of 1,000 GWh per year would require the equivalent of 50 plants, each on the scale of a Tesla Gigafactory. Building a large-scale battery factory can take anywhere from two to five years, depending on the location.

Today's EV battery value chains are concentrated in the Plus-3, particularly China. China produces three-quarters of the world's lithium-ion batteries; Korea accounts for 5 percent and Japan 4 percent of global production capacity. These three economies are home to the world's top 10 EV battery producers, with a combined market share of more than 90 percent (Figure 2.52). Over half of the world's lithium, cobalt, and graphite processing and refining capacity, and 70 percent to 85 percent of production capacity for cathodes and anodes (key battery components) are in China. Korea and Japan have considerable shares of the value chain downstream of raw material processing, particularly in the production of cathode and anode material and other battery components such as separators (IEA 2022e).

Figure 2.52. World: Top 10 Electric Vehicle Battery Producers
(Percent of global sales)



Source: SNE Research (2022).
Note: H1 = first half of the year.

China's dominance in EV battery production is likely to be maintained in the medium term, although competition among the Plus-3 is heating up. Of the EV battery production capacity announced worldwide for the period to 2030, about 70 percent is in China. But Korea and Japan, which may be better positioned to penetrate the US and European EV markets, have started initiatives to boost the competitiveness of their own battery industries. In July 2021, the Korean government announced plans to invest USD 35 billion in its EV battery industry by the end of the decade—with key players LG Energy Solution, SK Innovation, and Samsung SDI driving investment in R&D and battery production—to secure the country's spot as a major global force in the sector (Park and Lee 2021). The Japanese government earmarked the equivalent of about USD 877 million in the fiscal 2021 supplementary budget for setting up domestic battery storage production, and subsequently indicated that a further USD 24 billion in public and private investment would be needed to develop a competitive manufacturing base for batteries (Jiji Press 2021; Reuters 2022b).[29]

ASEAN new entrants are poised to join the EV battery value chain by leveraging their proximity to the Plus-3 technology leaders as well as their upstream mineral and metal resources. Indonesia and Thailand, in particular, are attracting foreign investment from major battery and EV manufacturers.

- Indonesia aims to produce 140 GWh of EV battery capacity per year (of which 50 GWh will be for export) by 2030—from zero EV battery production today (IEA 2022a).[30] In March 2021, a holding company, Indonesia Battery Corporation (IBC), was created from four state-owned companies in the mining and energy sector with some USD 17 billion to invest in developing an EV battery ecosystem in the country. Construction has begun on Indonesia's first EV battery plant—a joint venture between IBC and a Korean consortium led by LG Energy, with production capacity of 10 GWh for Hyundai EVs—which is expected be operational in 2024 (Holman 2021). IBC has secured investments worth USD 15 billion from China's CBL and Korea's LG Energy Solution and is pursuing agreements with major global EV battery manufacturers such as CATL, Foxconn, and Tesla.

29/ In August 2022, Toyota announced that it would invest up to USD 5.6 billion to ramp up production of EV batteries in the United States and Japan, and Honda announced plans to jointly establish a USD 4.4 billion EV battery plant in the United States with LG Energy Solution (Herh 2022).

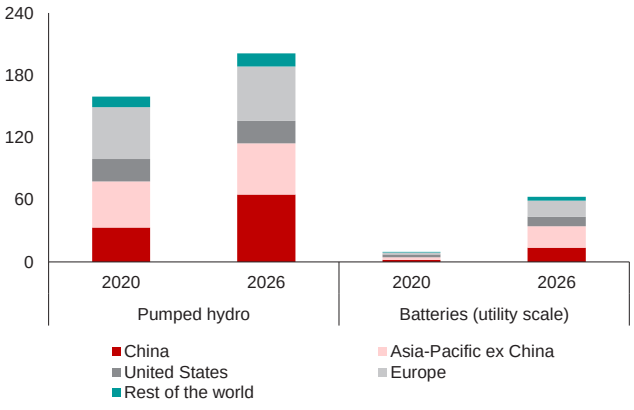
30/ For context, 140 GWh is equivalent to about 4–6 percent of global EV battery capacity demand in 2030, as forecasted in IEA (2022b).

- Thailand is developing a local EV battery industry clustered in the Eastern Economic Corridor (EEC) to help achieve its aim of becoming a regional EV production hub by 2035. The first lithium-ion battery factory in Southeast Asia was opened in the EEC in December 2021 by a domestic renewable energy company (Muramatsu 2021);[31] the utility arm of Thailand's state-owned oil and gas conglomerate is building an EV battery plant and developing EV battery technology; and a government-funded pilot plant is developing an alternative to lithium-ion batteries that will make use of the country's abundant zinc resources (Phoonphongphiphat 2022). Foreign companies, such as China's SAIC Motors and Great Wall Motors, also plan to build EV battery production plants in Thailand. In June 2022, the government approved enhanced benefits for investment in EV battery production: projects using advanced technology will enjoy a 90 percent reduction of import duty on raw and essential materials for five years if the output is sold domestically (Sullivan 2022).

- Vietnam's potential for nickel mining makes it a prime location for EV battery production (as featured in the next subsection). In December 2021, Vietnam's domestic car manufacturer, Vinfast, began construction of a facility to produce batteries for its own EVs. The localization of supply chains will expand Vietnam's capacity as a manufacturing hub and make the country an attractive target for investment.

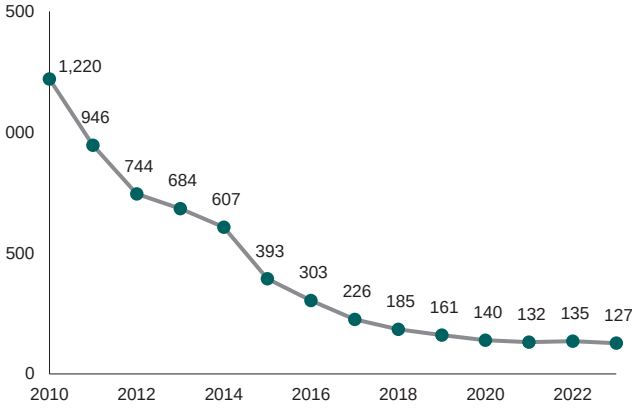
Batteries are a technology opportunity for the energy sector beyond just EVs—and the Plus-3, particularly China, are major global players. According to IEA (2021c), while pumped storage hydropower will remain the largest source of installed energy storage system capacity worldwide, utility-scale batteries are expected to account for most of the storage growth over the next few years as the price of lithium-ion technology has declined substantially with its widespread commercial use (Figure 2.53 and Figure 2.54). Lithium-ion battery storage contributed 95 percent of new utility-scale capacity globally in 2021 (Colthorpe 2022a).[32] China's 14th Five-Year Plan for New Energy Storage Technology Development sets out an ambitious target to install over 30 GW of energy storage (excluding pumped hydro) by 2025 and 100 GW by 2030—a nearly 3,000 percent increase on its installed capacity in 2020 (Reuters 2021a). The government encourages, and most provinces now require, renewable energy developers to bundle 10 percent to 30 percent of energy storage capacity with their projects. As noted earlier, China accounts for almost three-quarters of global manufacturing capacity of lithium-ion batteries; outside China, the largest manufacturers of lithium-ion batteries are in Korea, Japan, and the United States.

Figure 2.53. World: Actual and Projected Installed Energy Storage Capacity
(Gigawatts)



Source: International Energy Agency (2021c).

Figure 2.54. Lithium-ion Battery Price
(2021 USD per kilowatt-hour)



Source: BloombergNEF.
Note: Forecast prices (2022 and 2023) are in nominal terms.

31/ The plant has an initial production capacity of 1 GWh per year. The company plans to expand production capacity to 4 GWh at a later stage, and possibly to 50 GWh (Muramatsu 2021).

32/ Other types of batteries could emerge as breakthrough technology: for example, in July 2022, China commissioned the world's largest vanadium redox flow battery, with a capacity of 100 MW and a storage volume of 400 MWh (Colthorpe 2022b).

ASEAN has untapped markets for energy storage system applications. ASEAN has collectively set an aspirational target for renewable energy to make up 23 percent of its energy mix by 2025, and most members have plans for wind and/or solar power to be part of their renewable-energy implementation framework—hence, the development and deployment of energy storage technologies will be critical (Table 2.4). At present, however, unlike the Plus-3, few ASEAN economies count among the world's main markets for large-scale energy storage systems, and fewer still have specific policies to encourage energy storage adoption in the power sector.

- Thailand is realizing its plans to become a global production base for energy storage technology, with full support from the government and private firms. The Power Development Plan (2018–2037) released in 2019, mandated the state-owned Electricity Generating Authority of Thailand (EGAT) to develop energy storage systems to support the take-up of renewable energy. Thailand was the first ASEAN country to develop a wind-hydrogen hybrid power plant in 2018;[33] EGAT is also promoting solar-hydro battery energy storage.[34] Meanwhile, the private sector is also pursuing opportunities to develop projects with battery energy storage system technologies, including with foreign firms.[35]

- The Philippines has rapidly become one of the most active energy storage markets in ASEAN, with major power generation companies investing in portfolios of battery storage. Among its efforts to modernize its electricity sector, the government in 2019 issued guidelines to clarify who could own, operate, and ultimately benefit from the deployment of energy storage systems in the electric power industry. The country's first-ever co-located solar and storage plant went online in early 2022, and a proposal has been announced to build a massive solar-plus-storage facility that would be one of the biggest in the world (Colthorpe 2022c).

- Indonesia is attracting substantial investments in solar-plus-storage projects—for exporting electricity to the Singapore market. A Singapore-German joint venture is building a large-scale solar-plus-storage plant in the Riau Islands that will send electricity to Singapore through an undersea cable; and similar deals are being negotiated across the province (Murtaugh 2022).

Critical Minerals

"Wherever you are in the world, please mine more nickel ..."

Elon Musk
Founder and Chief Executive Officer of Tesla
July 2020

The shift to clean energy and EVs will drive a huge increase in requirements for critical minerals. Production of a typical electric car requires over 200 kilograms of minerals—graphite, copper, nickel, manganese, cobalt, lithium, and rare earth elements (REEs)—compared to about 35 kilograms of copper and manganese for a conventional car.[36] An onshore wind plant requires nine times more mineral resources (copper, zinc, manganese, chromium, nickel, and molybdenum) than a gas-fired plant (copper and chromium). The types of minerals used vary by technology. Vast quantities of copper and aluminium are required for electricity networks. Lithium, nickel, cobalt, manganese, and graphite are vital for battery performance, longevity, and energy density while permanent magnets used in turbines and EV motors rely crucially on REEs. According to the IEA, global mineral demand for clean energy technologies will rise by at least four times by 2040 to meet climate goals, with particularly high growth for EV-related minerals (Figure 2.55) (IEA 2022l).

China, Indonesia, Myanmar, and the Philippines are among the world's top producers of critical minerals. China is the world's largest producer of graphite, molybdenum, and REEs and the third-largest producer of lithium; it also mines more than 5 percent of the world's manganese, copper, and nickel. Indonesia and the Philippines are the world's top producers of nickel. Myanmar is the third-largest global producer of REEs (Figure 2.56).[37]

33/ In a wind-hydrogen hybrid system, excess electrical energy generated by wind turbines is used to decompose water in an electrolyzer to produce and store that energy as hydrogen. EGAT has applied this system to 12 wind turbines across the country.

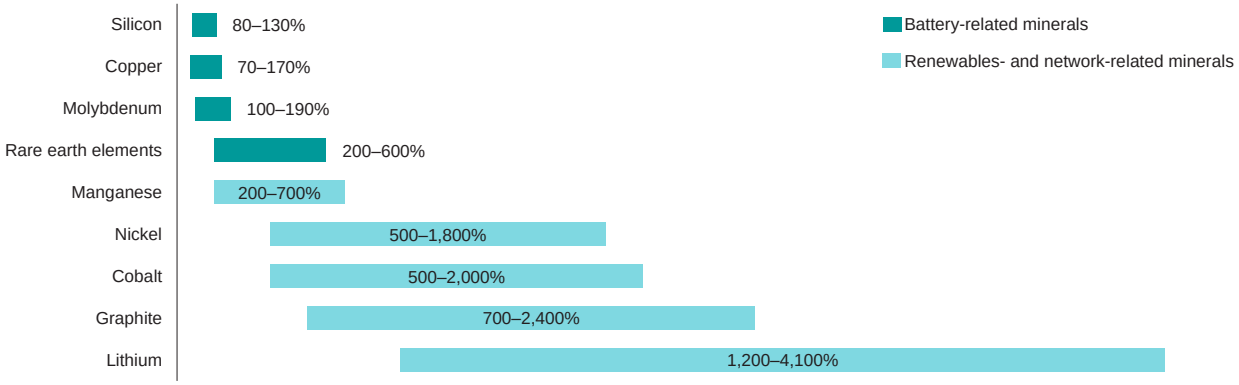
34/ After completing the world's largest hydro-floating solar power plant in 2021, EGAT is building a second one, which will be equipped with a battery energy storage system (The Nation 2022).

35/ Thai renewable energy company BCPG has obtained financing of more than USD 14 million (including from the Asian Development Bank) for a project integrating utility-scale wind power generation with a battery energy storage system (ADB 2020). Another Thai renewable energy company, Super Energy, is building Southeast Asia's largest battery energy storage system in partnership with a Chinese inverter manufacturer (Colthorpe 2021).

36/ REEs are a family of 17 elements. REEs are not rare, but minable concentrations are less common than most other minerals.

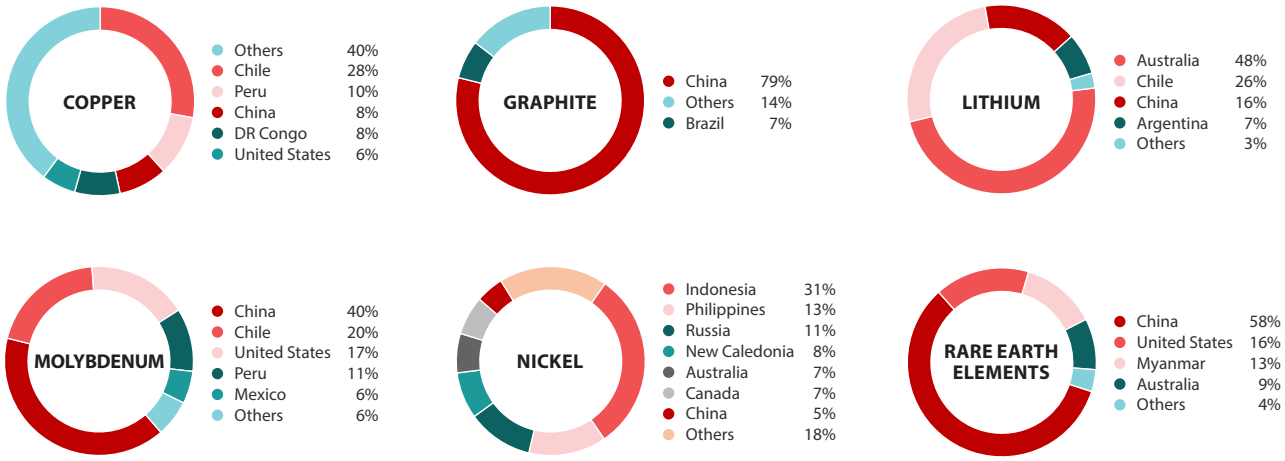
37/ About 55 percent of the world's REE reserves are in China and Vietnam (USGS 2022).

Figure 2.55. World: Projected Growth in Demand for Critical Minerals, 2020–40



Source: International Energy Agency (2022l).
Note: Projected demand growth between 2020 and 2040 for each mineral is presented as a range based on different underlying scenarios used in the IEA's simulations.

Figure 2.56. World: Major Producers of Critical Minerals, 2020
(Percent of total global production)



Source: USGS (2022).

Mineral-rich ASEAN economies are pursuing policies to capitalize on the rising global demand for these resources.

- Indonesia—the world's largest nickel producer and home to the largest reserves of the metal—aims to capture more of the value chain by developing a domestic nickel-based EV industry, from nickel mining to producing battery components and assembling EVs. Consistent with Indonesia's strategy of developing downstream industries for natural resources, and following its earlier success in developing an integrated steel supply chain, the government reimposed a ban on exports of unprocessed nickel ore in 2020 and is considering an export tax on nickel products with less than 70 percent nickel content as well as limiting the construction of nickel smelters producing nickel pig iron (ferronickel) with a view to shifting use from steelmaking toward battery production.[38] So far, the strategy appears to be

[38] Historically, Indonesia's nickel strategy focused on the supply chain for steel production. Its first export ban on nickel ore was imposed in 2014 to force mining companies to process the ore domestically into Class 2 nickel (e.g., ferronickel/nickel pig iron). The strategy succeeded in attracting investments in nickel processing from China, which were critical in developing a fully integrated steel supply chain. The export ban was relaxed in early 2017 with plans to fully reimpose it after a few years. Steel- and battery-related nickel products are not the same, however—Indonesia's processing industry is dominated by low nickel-content products like ferronickel/nickel pig iron with nickel content of 30–40 percent, whereas battery cathode production usually requires Class 1 products that contain a minimum of 99.8 percent nickel (Huber 2021).

working to attract downstream investments focused on nickel refining and processing—spending on nickel investment projects in one of its biggest industrial parks reached USD 18 billion in 2022, triple the figure in 2019 before the export ban was imposed (Listiyorini 2022).

- The Philippines—with the world's fifth-largest reserves of nickel and rich deposits of copper and gold—is also looking to ride the rising global demand for critical minerals. Unlike Indonesia, however, its recent efforts have focused more on the upstream segment. In 2021, the government lifted a nine-year moratorium on new mining agreements and a four-year ban on open-pit mining for copper, gold, silver, and complex ores. This opened the door for new investments and for pending projects to proceed to their development and commercial extraction stages.[39] The government aims to triple the size of the country's mining sector by 2027. It is estimated that as many as 190 new mining projects could get under way in the next four years, with nickel accounting for one-third of the new mines and the bulk of new open-pit mining (Mitchell 2022).

- Vietnam—with the world's second-largest reserves of REEs and abundant nickel deposits—also has potential for mineral exploitation, though it is at a much earlier stage than the Philippines and Indonesia. In 2018, the government approved a USD 400 million investment plan for mineral exploration, extraction, and processing over 2025–35, and announced a ban on all natural ore or mineral exports until the end of that period.[40] An Australian exploration and mining company is developing three projects in northern Vietnam with the aim of producing nickel-cobalt-manganese precursor products for Asia's growing lithium-ion battery industry.[41]

The policies are not without challenges. Indonesia's export ban on nickel ore has already been challenged by the European Commission at the World Trade Organization. Moreover, nickel mining in Indonesia is particularly carbon-intensive due to heavy reliance on coal, and it has been associated with deforestation, water pollution, and conflicts with indigenous people over land use. To meet the needs of EV companies and their environment-conscious consumers, the government will have to establish and enforce strict environmental standards for the mining and processing of nickel for EV batteries. The same applies to Vietnam. Mining is also contentious in the Philippines after past cases of environmental mismanagement fueled a strong lobby against the industry.

Carbon Capture, Utilization, and Storage

"Unless we develop carbon dioxide removals rapidly and on large scale ...
it will be impossible to limit global warming to 1.5 degrees Celsius."

Adair Turner
Chair of the Energy Transitions Commission
March 2022

Carbon capture, utilization, and storage (CCUS) refers to the process of capturing carbon dioxide before it enters the atmosphere and reusing or storing it. Carbon dioxide can be captured from fossil fuel combustion or industrial processes (or directly from the air) using separation technologies. It can then be transported by ship or pipeline to be used in a range of applications or stored permanently in underground geological formations like saline aquifers. Technologies for CCUS are not new: for many years the oil and gas industry has been using captured carbon for "enhanced oil recovery" (EOR), where it is injected into fields with declining output rates to extract more oil and gas. Almost three-quarters of carbon dioxide captured over the past five decades was used for EOR and then stored underground (Robertson and Mousavian 2022). The process of capturing and storing carbon dioxide without reusing it is known as carbon capture and storage (CCS).

CCUS can be valuable as a tool for decarbonization and emission reduction for ASEAN+3. The region has the youngest existing coal power plants among major regions in the world (Figure 2.57). Meeting the 1.5 degrees Celsius commitment under the Paris Agreement would mean most of these coal power plants would have to be retired at least 20 years early (IPCC 2022). Retrofitting these assets with CCUS technology would allow them to be used for longer, which could help minimize the negative impact on growth from asset stranding and economic dislocation (Section II). CCUS also is critical for the decarbonization of hard-to-abate but essential industries like cement, iron and steel, and chemicals manufacturing (Global CCS Institute 2022).

39/ More than a third of the Philippines' total land area has been identified as having high mineral potential and less than 5 percent of the Philippines' mineral reserves is estimated to have been extracted so far (Reuters and Dela Cruz 2021).

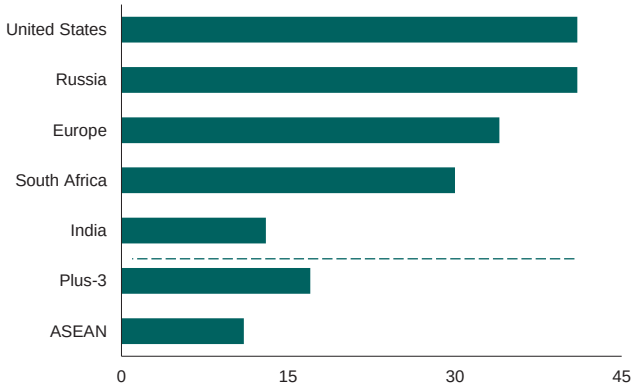
40/ The 11-year investment plan aims to produce more than 146,400 thousand tons of gold ore; 216,000 tons of copper ore; and 103,000 tons of nickel ore (Minh 2018).

41/ Northern Vietnam is already well equipped with infrastructure and established electronic supply chain networks of major EV battery manufacturers.

CCUS can also present new economic opportunities. Economies with large extractive sectors, e.g., Brunei, Indonesia, and Malaysia, could deploy CCUS to reduce emissions along their extractive supply chain, increasing the viability of fields that otherwise would remain undeveloped. Economies whose industrial sectors have strong carbon capture prospects, e.g., the Philippines and Singapore, could use CCUS for carbon recycling (IEA 2019) (Figure 2.58). Economies with domestic storage potential, e.g., Malaysia, Thailand, and Vietnam, could fill the demand for offshore storage of captured carbon.

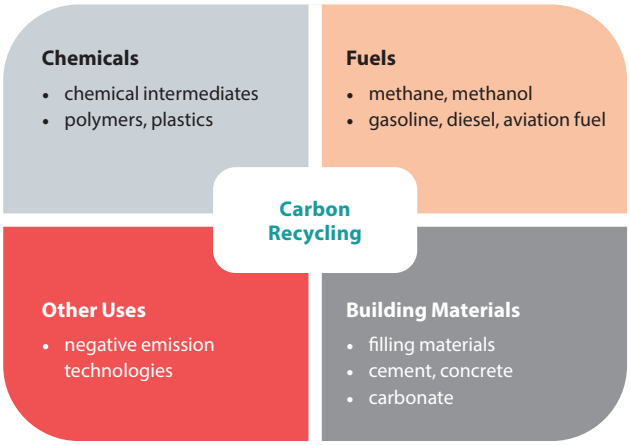
Available estimates of actual and potential carbon dioxide storage resources in the region total over 3,000 gigatons in the Plus-3 and almost 200 gigatons in ASEAN, although only a fraction will ever be economically and technically viable (Figure 2.59).[42] The development of large-scale shared carbon storage that industrial users can tap anywhere in ASEAN+3 would also foster a captured carbon value chain, which would increase opportunities for the region's shipping and logistics sectors—Japan is already active on this front.[43]

Figure 2.57. ASEAN+3 and Selected Economies: Average Age of Existing Coal Plants, 2020
(Years)



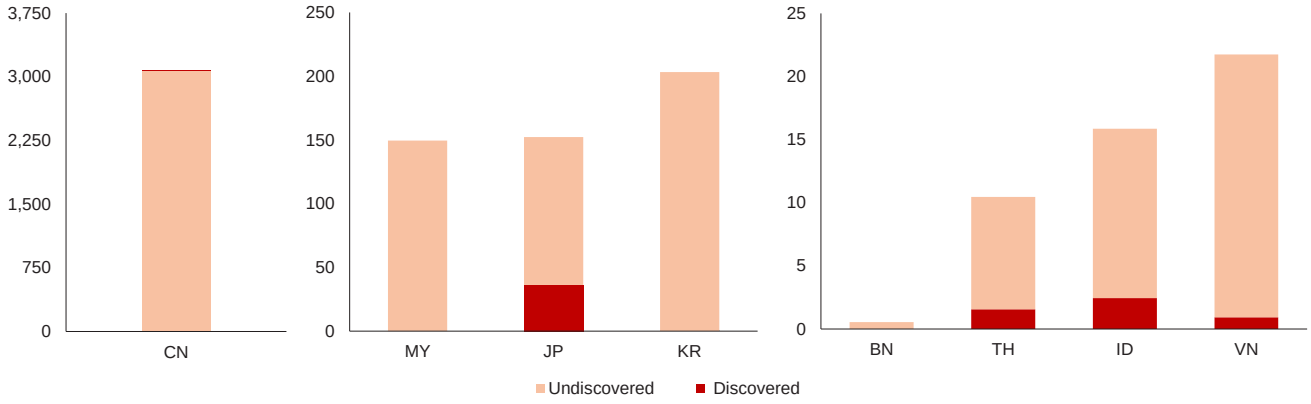
Source: International Energy Agency.

Figure 2.58. Carbon Recycling: Potential Applications



Source: International Energy Agency; AMRO staff compilation.
Note: This only refers to applications that require conversion. Direct (unconverted) uses of carbon dioxide also exist—e.g., to enhance the yield of biological processes, for solvents and heat transfer, and for food and beverage and medical uses.

Figure 2.59. Selected ASEAN+3: Estimated Carbon Storage Resources
(Gigatons of carbon dioxide)



Source: OGCI (2022).
Note: Discovered resources refer to the estimated quantity of storage resources in which the potential for storage has been ascertained within an assessed geologic formation. Undiscovered resources refer to the estimated quantity of resources in which the suitability for storage has not been ascertained within the target geologic formation. Undiscovered resources include: (1) prospective resources, i.e., storage resources estimated to be potentially accessible within undiscovered geologic formations or uncharacterized parts of discovered geologic formations by application of future exploration/development projects; and (2) inaccessible resources, i.e., resources that cannot be used by future storage development projects. Chart shows only ASEAN+3 economies with available data. BN = Brunei; CN = China; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; TH = Thailand; VN = Vietnam.

42/ Most of the storage in Southeast Asia is expected to be in saline aquifers, but depleted oil and gas fields can also provide important storage opportunities. The storage potential in the region is likely to exceed needs by a large amount, even in a scenario compatible with net zero (IEA 2021d).

43/ Mitsubishi Shipbuilding is building a demonstration test ship to transport liquefied carbon dioxide, the world's first such carrier intended specifically for CCUS (Mitsubishi Heavy Industries 2022).

CCUS activity and deployment in the ASEAN+3 is led by a handful of economies. Ten large-scale CCUS projects are in various stages of development in China, Indonesia, Korea, Malaysia, and Thailand (Table 2.8). China and Japan are the most CCUS-ready economies in the region, followed by Korea, Indonesia, and Malaysia (Figure 2.60) (Global CCS Institute 2022). CCUS momentum in China is driven by its energy production and use, as well as its abundant storage potential (Figure 2.59). Japan also has storage potential, as well as transport infrastructure and a supportive legal environment. Indonesia and Malaysia are CCUS frontrunners given their well-established extractive sectors, with both aiming to become key offshore storage hubs (Battersby 2022; Nair 2022). Brunei and Singapore have also indicated interest in CCUS (Table 2.9).

There is room for growth. According to the IEA, to be in line with the temperature objectives set out in the Paris Agreement, carbon capture in Southeast Asia will have to reach at least 35 million tons a year in 2030 and exceed 200 million tons a year by 2050, with CCUS deployed at scale across the fuel transformation, industry, and power generation sectors (IEA 2021d).

The main barriers to CCUS in the region are the lack of data on geological storage resources, legal and regulatory frameworks, and policy incentives. Early, accurate, and trustworthy "bankable" onshore and offshore storage data are critical for attracting capital and facilitating the development and uptake of CCUS in the region.[44] CCUS needs to be identified and integrated or (explicitly) mentioned in national climate policies and strategies for the requisite legal and regulatory frameworks to materialize soon enough to attract the necessary investments and public support (Table 2.9). Incentives for investment and financing—particularly blended finance—are critical as most governments are unable to fully fund CCUS projects, while carbon utilization projects can be technically and financially risky for investors (IEA 2021d; Robertson and Mousavian 2022). Regional cooperation can also identify opportunities to support wider and faster use of technology across the ASEAN+3, through collaboration in technology, knowledge, and infrastructure development.

Table 2.8. ASEAN+3: Carbon Capture, Utilization, and Storage Facilities and Projects, as of November 2022

Project Name	Status	Facility Industry	Capacity (Mtpa CO_2)	Purpose
China				
Karamay Dunhua Oil Technology CCUS EOR	●	Methanol production	0.1	EOR
CNPC Jilin Oil Field CO2 EOR	●	Natural gas processing	0.6	EOR
SINOPEC Qilu-Shengli CCUS	●	Chemical production	1.0	EOR
CNOOC South China Sea Offshore CCS	●	Natural gas processing	0.3	Storage
Guodian Taizhou Power Station Carbon Capture	●	Power generation	0.5	EOR
Huaneng Longdong Energy Base CCS	●	Power generation	1.5	Storage
SINOPEC Shengli Power Plant CCS	●	Power generation	1.0	EOR
Indonesia				
Repsol Sakakemang Carbon Capture and Injection	●	Natural gas processing	2.0	Storage
Sukowati CCUS	●	Oil refining	1.4	EOR
PAU Central Sulawesi Clean Fuel Ammonia Production with CCUS	●	Fertilizer production	2.0	Under evaluation
Korea				
Korea-CCS 1 and 2	●	Power generation	1.0	Storage
Malaysia				
Petronas Kasawari Gas Field Development Project	●	Natural gas processing	3.3	EOR
Thailand				
PTTEP Arthit CCS	●	Natural gas processing	1.0	Storage

● Operational ● In construction ● Early Development ● Advanced development

Source: Global CCS Institute (2022); AMRO staff compilation from various media reports.
Note: CCS = carbon capture and storage; CCUS = carbon capture, utilization, and storage; EOR = enhanced oil recovery; Mtpa CO2 = million tons of carbon dioxide a year.

44/ Long lead times are associated with developing carbon storage resources; some studies show this process alone can take up to 10 years.

Figure 2.60. ASEAN+3 and Selected Economies: CCS Readiness Index, 2021
(0 to 100; 100 = Highest assessment)

Economy	CCS Readiness *(overall)*	Interest	Storage	Policy	Legal
United States	72	82	96	49	73
Canada	71	48	98	41	75
Leader average	*72*	*65*	*97*	*45*	*74*
China	53	86	87	40	32
Japan	50	39	71	39	41
Korea	36	38	45	20	43
Malaysia	31	40	46	9	39
Indonesia	30	56	52	4	34
Vietnam	29	48	56	3	28
Philippines	22	24	35	2	29
Thailand	22	41	39	4	24
Memo items:					
Brunei	–	1	24	10	–
Hong Kong	–	–	–	–	–
Cambodia	–	–	–	3	–
Lao PDR	–	–	18	–	–
Myanmar	–	8	13	1	–
Singapore	–	15	0	12	–

Source: Global CCS Institute (2022); AMRO staff calculations.
Note: Carbon capture and storage (CCS) readiness is assessed on the basis of four factors: (1) interest—the intensity of fossil fuel production and/or consumption; (2) storage—factors that affect various aspects of carbon dioxide injection and storage, including site viability; (3) legal—presence of national frameworks conducive to CCS regulation; and (4) policy—presence of available explicit and implicit support for CCS. Each indicator is given different weights by the Global CCS Institute to come up with the overall score.

Table 2.9. ASEAN+3: Key Carbon Capture, Utilization, and Storage Policies and Initiatives

Economy	Policies and Initiatives
Brunei	• Brunei is exploring the potential of carbon capture, utilization, and storage (CCUS) to mitigate emissions from the oil and gas sector. • In January 2022, local start-up Perdana Solutions signed an agreement with consultancy Asia Pacific Energy Solutions on the first carbon capture and storage (CCS) partnership in Brunei. Shell is evaluating the technical and commercial feasibility of transporting carbon from Singapore to store in Brunei.
China	• CCUS has been included in China's carbon mitigation strategies since the 12th Five-Year Plan (2011–15). In 2019, the Ministry of Science and Technology and the Administrative Center for China's Agenda 21 jointly issued an updated Roadmap for Development of CCUS Technology in China, which set goals for reducing the cost and energy consumption of carbon capture by 10 percent to 15 percent in 2030 and by 40 percent to 50 percent by 2040. The 14th Five-Year Plan (2021–25) highlighted the role of CCUS in low-carbon development and called for implementing near-zero emissions CCUS demonstration projects.
Indonesia	• Indonesia's 2011 National Action Plan on Climate Change recognized that CCUS could contribute up to 40 percent of the energy sector's target emission reductions. The government is preparing draft regulations to accelerate implementation of CCS and CCUS projects in the oil and gas area. • In 2017, the Ministry of Energy and Mineral Resources opened the National Center of Excellence for CCS and CCUS, which acts as a knowledge hub and funding facilitator.
Japan	• In 2021, the Ministry of Economy, Trade, and Industry (METI) launched the Asia CCUS Network, an international industry-academia-government platform aimed at knowledge sharing and improvement of the business environment for utilization of CCUS in Asia. METI has drafted a long-term CCS roadmap to store 120–240 million tons of carbon dioxide a year by 2050. It plans to create a legal framework for CCS to enable companies to store carbon dioxide underground or under the seabed by 2030. • Japanese oil refiner Eneos Holdings and utility J-Power plan to launch the country's first permanent CCS operation by the end of this decade.
Korea	• The National CCS Comprehensive Plan was established in July 2011 and subsequently updated as Korea CCS 2020 to promote the development and use of CCS technology. The Ministry of Science and ICT launched the Korean CO2 Storage Environmental Management Research Center in April 2011. • Six Korean energy companies have signed an agreement with Malaysia's Petronas for a cross-border project to transport carbon captured in Korea to Malaysia for storage.
Malaysia	• Malaysia's state-owned oil and gas company, Petronas, is leading efforts to implement CCUS.
Singapore	• Singapore's Long-Term Low Emissions Development Strategy 2020 cites the need to adopt advanced low-carbon technologies like CCUS to facilitate its transition. The government is exploring partnerships with companies and other countries with suitable geological formations to enable carbon dioxide storage opportunities and carbon recycling pathways. • In 2020, the government established the Low-Carbon Energy Research Funding Initiative to support research, development, and demonstration projects in low-carbon energy technologies such as CCUS. Singapore is aiming to realize at least 2 million tons of carbon capture potential by 2030 as part of a plan to make its Jurong Island oil refinery hub more sustainable.
Thailand	• Thailand's state-owned oil and gas group PTT is leading efforts to implement CCUS. In 2022, PTT Group, together with national educational, government, and private sector partners, established the Thailand CCUS Technology Development Consortium to develop effective technology prototypes.

Source: AMRO staff compilation from various media reports.

Carbon Offsets

"Explore carbon sinks. Net zero is not gross zero."

Ricardo Hausmann
Harvard Kennedy School Professor
December 2022

Carbon offsetting refers to reductions in GHG emissions that compensate for GHGs generated elsewhere. A carbon offset typically represents one ton of carbon dioxide or its GHG-equivalent reduced through a project that avoids activities contributing to GHG emissions (e.g., deforestation and land use conversion) or a project that removes GHGs from the atmosphere (e.g., through afforestation/reforestation or carbon sequestration). It is a way to "undo" emissions that are considered to be not abatable given the current capabilities of technology. Carbon offsets can be bought and sold by generating carbon credits—tradeable instruments that represent ownership of (or the right to emit) a unit of emissions that typically is one ton of carbon dioxide equivalent. The emission reduction of a carbon-offset credit must be verified by an independent third party; the Gold Standard and Verra, for example, are two internationally recognized standard-setters.

Trade in carbon-offset credits takes place in three main types of markets, as well as under bilateral and multilateral results-based agreements.

- *Domestic compliance markets*—where companies trade domestic carbon-offset credits to meet part of their legal obligations under a cap-and-trade emissions system—are operational in most ETSs, including those in China, Japan, and Korea (Box 2.3).[45]

- *International compliance markets*—where governments or companies trade carbon-offset credits internationally to meet commitments to emission reduction—are still in the early stages. Demand in these markets stems mainly from the airline industry's compliance requirements under the carbon offsetting and reduction mechanism of the International Civil Aviation Organization (ICAO).[46] Another source of demand may arise from national governments trading emission credits to satisfy their Nationally Determined Contributions to climate change mitigation under Article 6 of the Paris Agreement. Japan has been cooperating with several countries, including Cambodia, Indonesia, Lao PDR, Myanmar, the Philippines, Thailand, and Vietnam, to develop carbon offset projects under the Joint Crediting Mechanism, which can pave the way for authorization as "internationally transferred mitigation outcomes" under the United Nations Framework Convention on Climate Change (UNFCCC) (Box 2.8).[47]

- *Voluntary carbon markets*—where companies and individuals purchase carbon offsets to comply with their own voluntary commitments—are a fast-growing segment of the global carbon offset market. Although the value of these markets is still small, demand is rising as more companies voluntarily adopt internal climate change goals as part of their corporate social responsibility or public relations strategy (Section IV).

- *Results-based climate finance*—which generally refers to payments made by international funders to developing countries for achieving climate-related results such as reductions in emissions—is a financing modality that can be used for the purpose of carbon offsetting. One of the more widely known results-based carbon offsetting programs is the UNFCCC's Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+) mechanism, which allows international development partners or private companies to make payments to—i.e., purchase carbon-offset credits from—developing countries after the latter's completion of actions to conserve and enhance carbon sinks and reservoirs in the forestry sector. Given that 15 percent of the world's tropical forests are in Southeast Asia, which has the highest rate of deforestation in the world, ASEAN countries could stand to benefit from participating in REDD+ (Box 2.9).

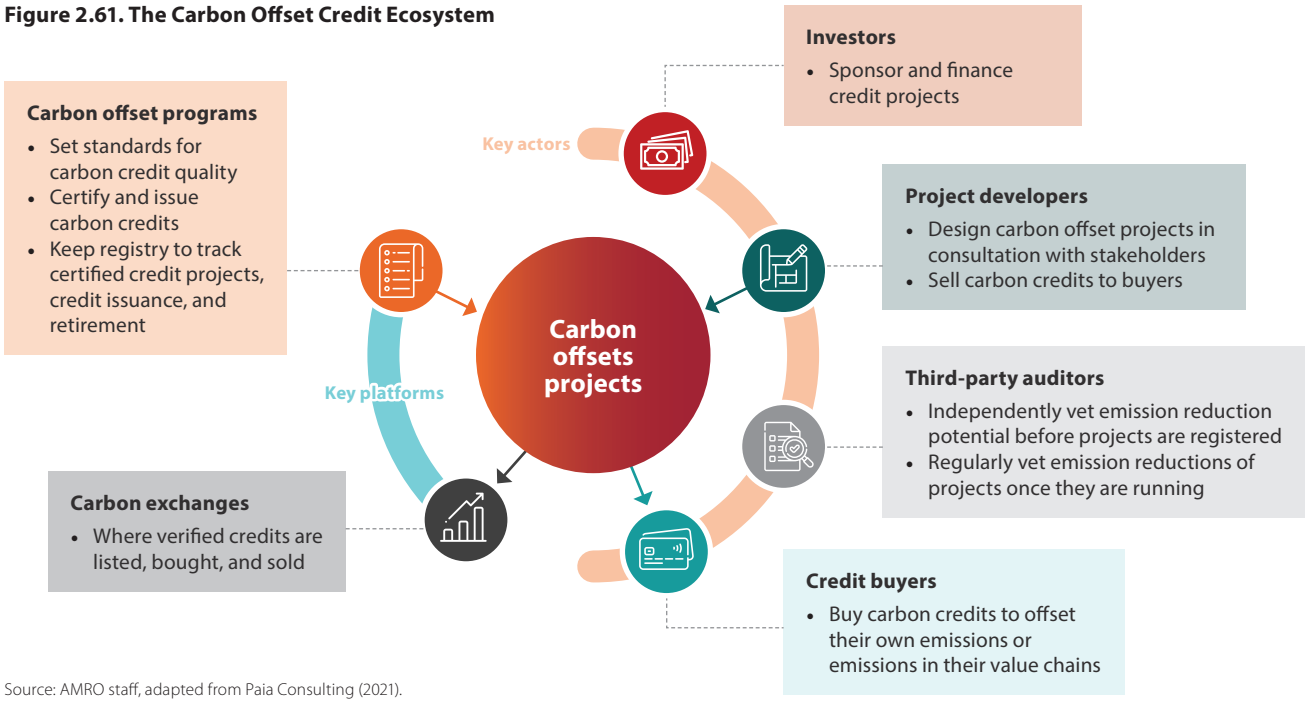
45/ Offsets in a cap-and-trade system are intended to increase flexibility for—and so reduce the overall cost of—compliance. However, one concern is that allowing capped entities to use offsets instead of requiring all reductions to come from their own facilities can shift or divert effort from capped sectors. Hence, the use of offset credits is restricted in most ETSs. For example, regulated entities can only use offsets for up to 5 percent of their compliance obligations in the national ETSs in China and Korea (Box 2.3).

46/ The ICAO's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) relies on use of emission units from the carbon market to offset carbon dioxide emissions that cannot be reduced through technological and operational improvements and sustainable aviation fuels. CORSIA is being implemented in three phases: a pilot phase (2021–23), a first phase (2024–26), and a second phase (2027–35). More than 100 economies will participate in the pilot phase, including ASEAN+3 economies: Cambodia, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, and Thailand.

47/ The Joint Crediting Mechanism is a project-based bilateral offset crediting mechanism launched by Japan in 2013 to facilitate the mitigation of GHG emissions through the diffusion of low-carbon technologies, products, systems, services, and infrastructure.

Carbon markets, particularly the voluntary segment, hold significant promise for the ASEAN+3 region. Bain & Company estimates that carbon offsets in Southeast Asia could generate up to USD 10 billion a year in financial opportunities by 2030 (Hardcastle, Kulkarni, and Lichtenau 2021). These benefits accrue to a variety of participants, ranging from project developers and financers to auditors and brokers (Figure 2.61). For the host economy, proceeds from the sale of carbon offsets can be used to foster investment in low-carbon projects and promote innovation in green technology. Growing carbon markets also encourage job creation in finance and other professional service sectors, such as auditing, consulting, and legal advisory. Moreover, as carbon offsets become more widespread, so does their role in creating financial instruments (e.g., derivatives structured around carbon-offset credits), contributing to financial market development at large.

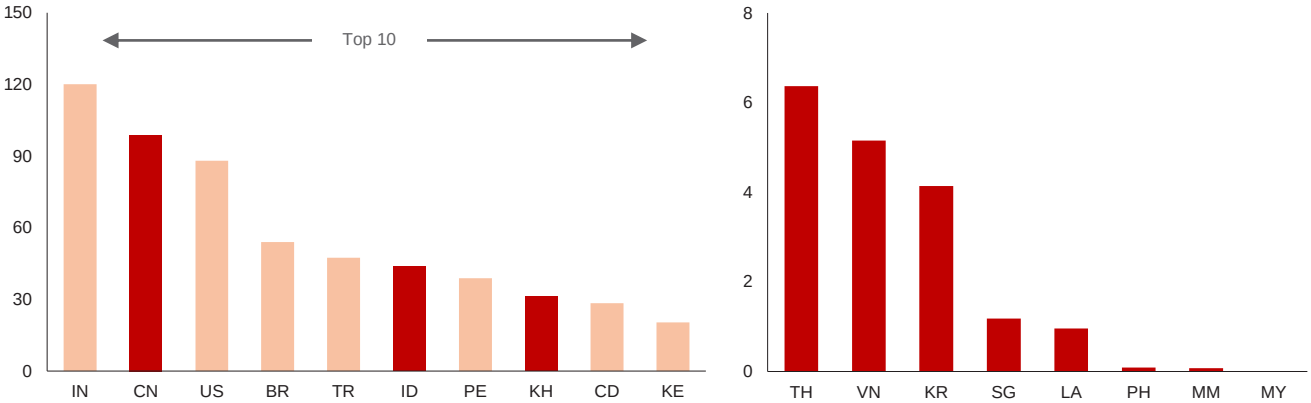
Figure 2.61. The Carbon Offset Credit Ecosystem



Source: AMRO staff, adapted from Paia Consulting (2021).

The ASEAN+3 region has significant potential to generate carbon offset projects. According to international advisory company Climate Focus, China is the world's second-largest supplier of voluntary carbon offsets, mostly as renewable energy (particularly wind power) projects. Indonesia is the world's fifth-largest supplier and Cambodia the eighth—largely on account of both having projects that avoid deforestation and land-use conversion (Climate Focus 2022) (Figure 2.62). Singapore is embarking on a five-year research effort, Carbon Integrity SG, to identify nature-based projects in Southeast Asia that can be developed as potential sources of carbon credits (Wong 2022). Malaysia's newly opened voluntary carbon market exchange aims to support the development of domestic carbon credit projects that can be purchased by domestic companies to offset their emissions.

Figure 2.62. ASEAN+3 and Selected Economies: Nonretired Voluntary Carbon Offset Credits, by Host Economy, March 2023
(Megatons of carbon dioxide equivalent)



Source: Climate Focus (2022); and AMRO staff calculations.
Note: Excludes nonretired voluntary offset credits from international projects that are not assigned to any country in particular. BR = Brazil; CD = Democratic Republic of Congo; CN = China; ID = Indonesia; IN = India; KE = Kenya; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PE = Peru; PH = Philippines; SG = Singapore; TH = Thailand; TR = Turkey; US = United States; VN = Vietnam.

The region is also becoming a substantial source of demand for voluntary carbon offsets as more companies adopt carbon-reduction targets. Out of some 3,400 companies that have signed up to the Science-Based Targets Initiative—a multilateral partnership that helps companies meet emission-reduction targets—about 500 are in ASEAN+3. Moreover, the region's demand is poised to expand as more multinationals require their Asia-based supply chains to follow stricter environmental standards.[48] Thailand's state-owned electricity generator, together with 10 of the country's largest energy-sector companies, set up a voluntary emission offset program in 2021 where members could trade carbon credits (Thanthong-Knight 2021).

Singapore and Hong Kong, as key international financial centers, are well placed to become regional and global trading hubs for voluntary carbon offsets.

- Singapore has two international exchanges trading voluntary carbon credits. The first, AirCarbon Exchange (ACX), was established in 2019 with government support. ACX began by offering trading opportunities focused on airlines, and has grown to more than 160 clients including financial institutions, project developers, and other key industry players. The second, Climate Impact X (CIX), was borne out of a private-public partnership in 2021. CIX's initial focus is on carbon credits generated from projects related to the protection, management, and restoration of natural ecosystems and biodiversity. By early 2023, the exchange expects to see carbon credits traded on a larger scale under standardized contracts among multinational companies, institutional investors, and financial firms (Nomura 2022).
- In October 2022, Hong Kong's stock exchange launched a new platform, Core Climate, an international carbon marketplace for trading carbon credits and other instruments to support the global transition to net zero. Participants will be able to use the platform to source, hold, trade, settle, and retire voluntary carbon credits from internationally certified carbon projects around the world.

A few challenges need to be resolved for the region to benefit more fully from carbon-offset trading. First, carbon offset credits sold in voluntary carbon markets today can be verified by any independent certification body with minimal (onsite) monitoring by third parties. As such, substantial variation in the quality of available carbon credits has led to low trust among buyers and investors.[49] Second, most offset transactions in the region are done through brokers or directly with developers, with wide variance in margins and little correlation with quality. Carbon credit trading exchanges can tackle this problem by standardizing margins, increasing market efficiencies, improving access to high-quality offset credits, and establishing a derivatives market to improve liquidity. Lastly, key regional challenges include inconsistent government support and policies and unresolved issues around Article 6 of the Paris Agreement and the international legitimacy of offsets (Box 2.8). Overcoming these challenges will benefit economies in the region that have potential for developing carbon offset projects (e.g., Cambodia and Indonesia) and economies with potential to become regional or global carbon trading hubs (e.g., Hong Kong and Singapore).

48/ For example, in 2020, Tesla required Korea's LG Chem to submit carbon emissions data from its battery production (Lee 2020).

49/ In general, high quality carbon offset credits must be associated with GHG reductions or removals that are: additional; not overestimated; permanent; not claimed by another entity; and not associated with significant social or environmental harms (Broekhoff and others 2019).

Box 2.8:

Carbon Offsets: From Kyoto to Paris

The 1997 Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) established a cap-and-trade system that imposed national caps on the greenhouse gas (GHG) emissions of advanced economies. Countries could meet their targets by reducing their own emissions, trading emission allowances, or purchasing carbon offset credits. To generate offset credits, the Clean Development Mechanism (CDM) was established for offset projects in countries without binding emission commitments under the Kyoto Protocol. Credits earned by CDM offset projects—called "certified emission reductions" (CERs)—could be used to cover part of the purchasing countries' emission-reduction obligations. In all, more than 8,000 projects in 111 countries (including Cambodia, China, Indonesia, Korea, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam) were registered to sell CERs from various ventures such as wind power development, bus rapid transit schemes, and the distribution of more efficient cookstoves.

The Paris Agreement, which replaced the Kyoto Protocol in 2015, requires all countries to set emission-reduction pledges, with Article 6 providing principles for "voluntary cooperation" to reach their climate targets. Articles 6.2 and 6.4 define the framework for the international compliance carbon market agreed at the 26th United Nations Climate Change Conference of the Parties (COP26) in Glasgow in 2021.

- Article 6.2 allows countries to trade emission reductions and removals with one another through bilateral or multilateral agreements. These traded credits are called "internationally transferred mitigation outcomes" (ITMOs). They can be measured in carbon dioxide equivalent or other metrics, such as kilowatt-hours of renewable energy.

- Article 6.4 will create a global carbon market overseen by a COP-designated supervisory body. Project developers will request to register their projects with the supervisory body. A project must be approved by both the country where it is implemented and the supervisory body before it can start issuing UN-recognized credits. These credits, known as "Article 6, paragraph 4, emission reductions" (A6.4ERs), can be bought by countries, companies, or even individuals.

ITMOs can already be traded between countries, in theory. Countries such as Japan and Switzerland have concrete projects in place to buy such credits and count them toward their Nationally Determined Contributions. However, it is typically a lengthy process for countries to conclude these agreements, so it may still be some time before ITMOs are widely traded.

It will likely take a few years before A6.4ERs can be issued and traded. Detailed rules still need to be worked out, such as rules to govern how projects will be assessed before being registered and how emission reductions will be measured, among others. Meanwhile, the CDM will continue for a transitional period while its underlying infrastructure and remaining funds will largely be repurposed for the future Article 6.4 mechanism.

This box was written by Ling Hui Tan.

Box 2.9:

Monetizing ASEAN's Forests

The Reducing Emissions from Deforestation and Forest Degradation (REDD+) scheme is a mechanism that creates financial value for the carbon stored in forests by offering results-based payments to developing economies for actions to reduce or remove forest carbon emissions. Support for REDD+ implementation comes from donor countries, including the European Union, Japan, and Norway, and multilateral initiatives including the Green Climate Fund and the World Bank's Forest Carbon Partnership Facility (FCPF).

Developing economies need to meet a host of requirements to qualify for results-based payments for REDD+ activities. These include: having a national strategy or action plan addressing the drivers of deforestation and forest degradation, land tenure issues, forest governance issues, gender considerations, and so on; a safeguards information system to support the rights of indigenous peoples and local communities; a national forest monitoring system providing reliable data on forest areas and their changes; and a system for measuring, reporting, and verifying results-based actions. Meeting these requirements takes many years—up to a decade in many cases.

Seven ASEAN countries are participating in REDD+.

- Vietnam was the first Asian country to reach eligibility for REDD+ results-based payments in 2018, but it will be some time before payments materialize. In October 2020, Vietnam signed an agreement with the World Bank's FCPF, unlocking up to USD 51.5 million in exchange for reducing 10.3 million tons of carbon dioxide equivalent (MtCO2e) of emissions from six North Central Region provinces through 2025 (World Bank 2020a).

- Indonesia received its first results-based payment of USD 103.8 million in August 2020 from the Green Climate Fund, in recognition of having avoided 20.3 MtCO2e of emissions in 2014–16. Further payments of up to USD 110 million could be forthcoming from a November 2020 program with the FCPF to reduce 22 MtCO2e of emissions in East Kalimantan through 2025 (World Bank 2020b). But Indonesia's REDD+ partnerships have not all been smooth. In September 2021, it terminated a longstanding agreement with Norway—under which it stood to receive USD 1 billion for slowing emissions from deforestation—after transfer of the first payment was stalled for more than two years (Reuters 2021b).

- Lao PDR completed its REDD+ readiness preparations and signed an agreement with the FCPF in December 2020 for its first jurisdictional program. Under the agreement, which runs to 2025, Lao PDR will receive up to USD 42 million for verified reductions of up to 8.4 MtCO2e of emissions in the north of the country (World Bank 2021).

- Cambodia has embarked on five REDD+ projects to date and has earned more than USD 12 million selling carbon credits from these projects to major international companies (Khmer Times 2022). However, it has not accessed REDD+ results-based finance at the national scale. Cambodia has announced its intention to pursue multiple financing opportunities for REDD+ implementation at different scales—the government has increased the size of protected areas to 41 percent of the country's total area, including 72 separate national parks, wildlife sanctuaries, multiuse areas, natural heritage sites, and biodiversity corridors (Kimmarita 2022).

- Malaysia, Myanmar, and Thailand are in the process of qualifying for REDD+ results-based payments.

This box was written by Jade Vichyanond.

IV. (How) Can Finance Pave the Way?

The transition to net zero GHG emissions requires significant changes by governments, businesses, and households—and an unprecedented amount of investment. While estimates vary, most suggest that over a trillion dollars in additional investment annually for decades will be needed to support the green transition in emerging market and developing economies. According to the IMF, the world would need about USD 3.3 trillion in energy-related investments a year until 2030 to achieve net zero by 2050 (Georgieva 2022).

Private capital will have to contribute the lion's share of needed investments. In theory, private capital should be attracted into green industries when it is more profitable to invest in clean energy and green technologies than in fossil fuels and the technologies that rely on them—and therefore market forces should drive the green transition on their own. In practice, however, this may not happen because the risk-adjusted private return on investment of "brown" (high emissions) projects is still relatively high while that of green (low or zero emissions) projects is still low; and investors, businesses, and consumers have insufficient information to make the decisions that would facilitate the green transition.

Financial markets are increasingly adopting products, tools, and practices to facilitate the green transition by improving information flow, price discovery, market efficiency, and liquidity. This is giving investors data to switch from market portfolios with significant exposure to fossil fuels into lower-carbon investments and/or companies that implement carbon neutrality. Sustainable finance is the practice of integrating environmental, social, and governance (ESG) criteria into financial services to bring about sustainable development outcomes (MAS 2022). ESG factors cover a broad range of issues, including climate change and the low-carbon transition under the "environmental" pillar. ESG investing considers these nonfinancial factors alongside traditional financial factors in the investment decision-making process.

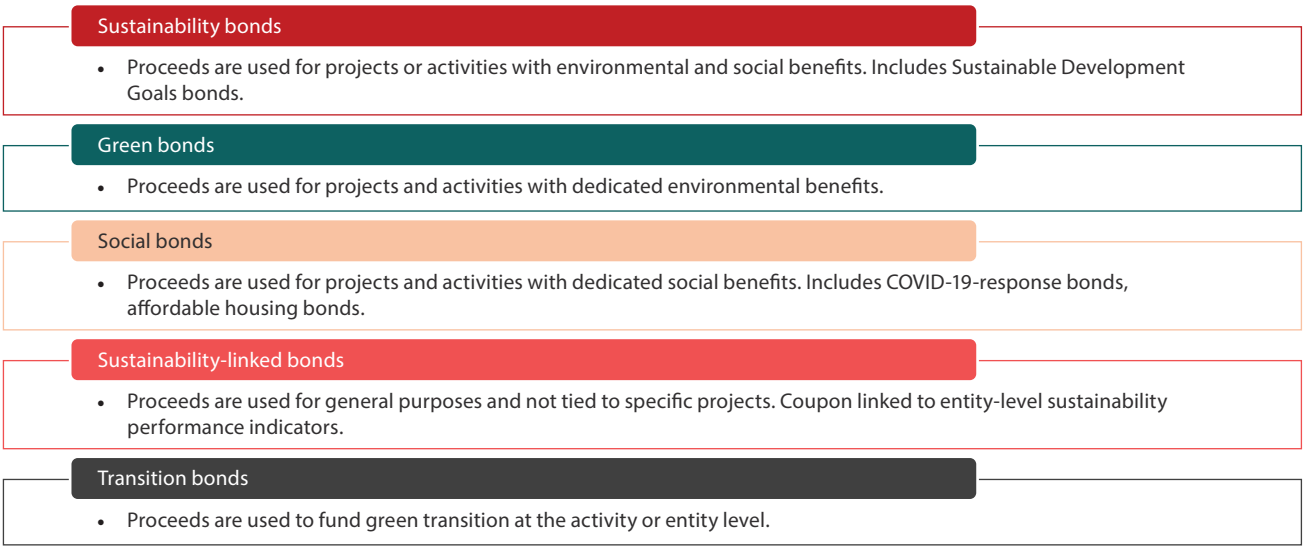
ESG issues are fast becoming a key factor in investment portfolio allocation and management.

- Total assets invested in ESG funds (comprising mutual funds and exchange-traded funds) globally more than doubled in a span of two years to reach nearly USD 10 trillion in 2021, based on data compiled by Bloomberg.[50] Europe and the United States are major investment destinations, while ESG funds dedicated to ASEAN+3 economies, either individually or regionally (e.g., Greater China or ASEAN), account for 3 percent of total assets, predominantly going to China and Japan.

- The market for so-called labeled bonds—bonds that have specific ESG or sustainability objectives—has also boomed. ESG-labeled bonds include project-based bonds such as green bonds, sustainability bonds, social bonds, and transition bonds, as well as sustainability-linked bonds that are not associated with a project but instead target firmwide key performance indicators (Figure 2.63). Europe is the main source of labeled bonds, followed by ASEAN+3 and North America (Figure 2.64). Among ASEAN+3 economies, China accounted for half of annual labeled bond volumes in 2021–22, followed by Korea and Japan, which together accounted for nearly 40 percent (Figure 2.65).

The rest of this section focuses on aspects of sustainable finance that pertain to climate change mitigation in the region.

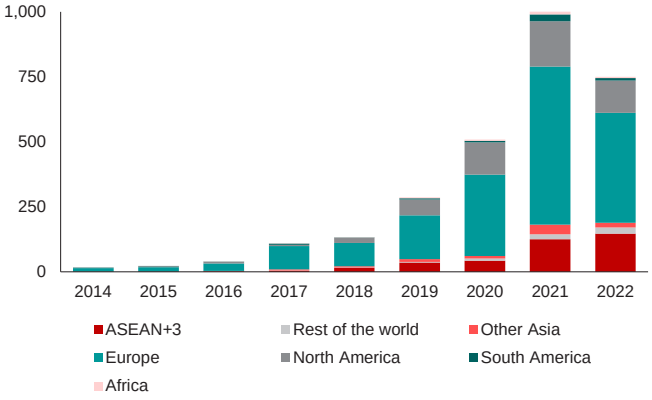
Figure 2.63. ESG-Labeled Bonds



Source: Climate Bonds Initiative; AMRO staff.

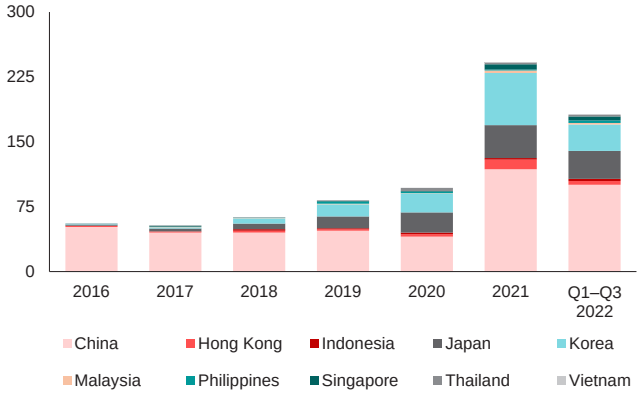
50/ Funds are classified by Bloomberg to be ESG funds if their prospectus indicates that they invest in one or more ESG activities.

Figure 2.64. World: Annual Issuance of Labeled Bonds, by Region
(Billions of US dollars)



Source: Bloomberg L.P.; AMRO staff calculations.
Note: Data include issuances of green bonds, social bonds, sustainability bonds, sustainability-linked bonds, and transition bonds. Available data up to 27 December 2022.

Figure 2.65. ASEAN+3: Annual Issuance of Labeled Bonds, by Jurisdiction
(Billions of US dollars)



Source: AsianBondsOnline, Asian Development Bank; AMRO staff calculations.
Note: Data include green bonds, social bonds, sustainabilty bonds, sustainability-linked bonds, and transition bonds.

Green Finance

"We need an energy transformation on the scale of the industrial revolution at the speed of the digital transformation. And therefore, we need a revolution in finance."

Mark Carney
United Nations Special Envoy on Climate Action and Finance
July 2022

Green finance products are debt and equity instruments issued by public or private actors that direct their investment capital toward mitigating or adapting to climate change. The first green finance product was a climate-awareness bond issued by the European Investment Bank in 2007. Since then, the global market has grown rapidly. Green bonds represent the largest segment of the sustainable finance market: global issuance of green bonds exceeded USD 600 billion in 2021, sales having doubled in one year, and the market has grown at a compound annual rate of about 60 percent in the past five years (Chandhok and others 2022).

At present, there is no common regional or global definition of "green." Two globally recognized principles and standards for green bonds are the Green Bond Principles developed by the International Capital Market Association (ICMA) and the Climate Bonds Standard by the Climate Bonds Initiative (CBI). In the region, the ASEAN Green Bond Standards, developed together with the ICMA and based on its Green Bond Principles, provide more specific guidance on how the principles are to be applied across ASEAN in order for bonds to be labeled as ASEAN Green Bonds (ACMF 2018). Issuers of green financial products in ASEAN+3 typically develop their own frameworks based on such principles and standards (Table 2.10).

China has the second-largest green bond market in the world after the United States. China was the world's most prolific issuer of green bonds—by volume, issuance, and number of issuers—in the first half of 2022 (Chen and Zhang 2022). By the end of the year, 2,178 green bonds had been issued, with a total balance of CNY 1.5 trillion (USD 215 billion). The country's central, provincial, and local governments, financial regulators, and stock exchanges have played key roles in deepening and supporting the growth of the green finance market. The government launched its Green Credit Policy in 2007, encouraging banks to lend more to climate-friendly projects and less to highly polluting ones. By 2011, two of China's major banks, China Development Bank and Industrial and Commercial Bank of China, had built a combined green credit loan portfolio of nearly USD 200 billion in areas like waste treatment, renewable energy, and pollution control (IFC 2012). In 2016, the People's Bank of China (PBC) became the first central bank to issue guidelines for establishing a green financial system. This was followed by guidelines for supporting green bond development by the China Securities Regulatory Commission in 2017, green investment guidelines by the Asset Management Association of China in 2018, green finance disclosure standards by the PBC in 2021, and new principles for green bond issuance by the China Green Bond Standard Committee in July 2022.[51]

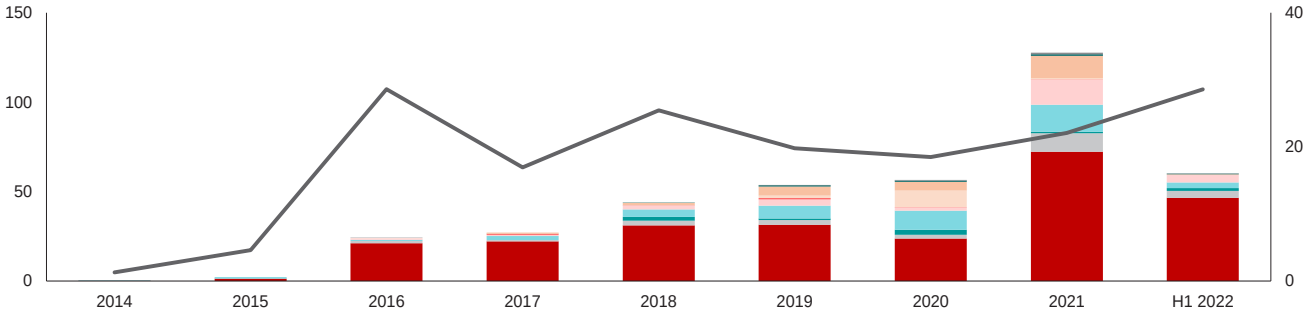
[51] China's domestic green taxonomy, the Green Bond Endorsed Projects Catalogue (2021 Edition) from the PBC, sets the criteria for eligible green projects.

Other ASEAN+3 governments, central banks, and regulatory authorities have also developed green bond markets. According to the CBI, ASEAN+3 economies have collectively issued more than USD 350 billion in green bonds in the past five and a half years, accounting for over 20 percent of green bonds issued globally (Figure 2.66). Some firms in the region have issued green debt (e.g., financial institutions, power companies, and real estate companies), while Hong Kong, Indonesia, Korea, and Singapore have sold green sovereign bonds (Table 2.10).

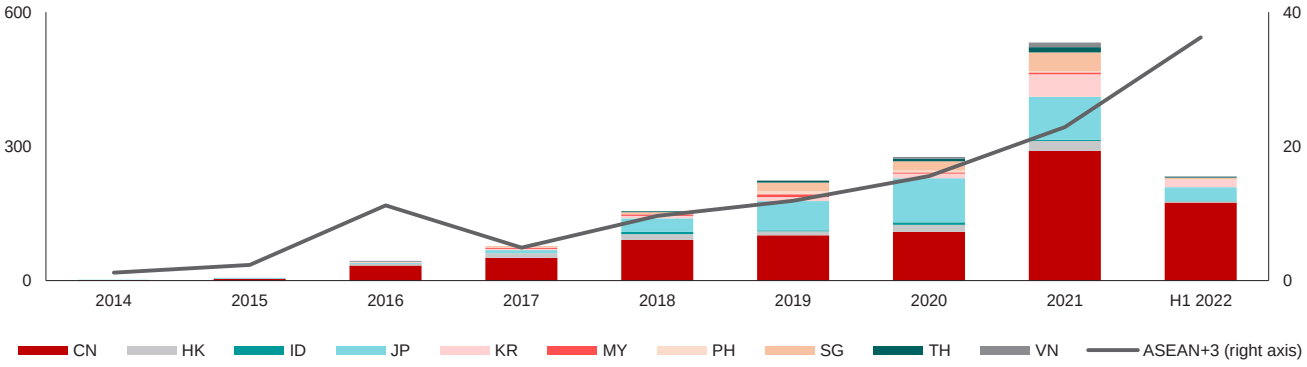
Nevertheless, the financing gap is still huge. ASEAN+3 finance ministries and central banks have a key role to play in continuing to build and develop the green finance market to ensure that sufficient financing can be raised to expedite the transition to a low-carbon economy. Notable policy measures in the region include offering low-cost funding for green projects, both directly (e.g., China's National Green Development Fund and Japan's Green Innovation Fund) and indirectly (e.g., the PBC's Carbon Emission Reduction Facility and Bank Negara Malaysia's Low Carbon Transition Facility), as well as subsidies or grants to cover review and verification costs for issuing green bonds—e.g., Hong Kong, Japan, Malaysia, and Singapore (Table 2.11).

Figure 2.66. ASEAN+3: Green Bond Issuance

Amount Issued
(Billions of US dollars; percent of global amount issued)



Number of Deals
(Count; percent of global deals)



Source: Climate Bonds Initiative Green Bond Database.
Note: Climate Bonds Initiative screens self-labeled debt instruments to identify bonds and similar debt instruments as "green bonds" based on eligible sectors and eligible use of proceeds. The database includes only bonds that are expected to allocate all net proceeds to aligned green assets, projects, or activities. CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Table 2.10. ASEAN+3: Green Bond Developments

Economy	Green Finance Initiative
Cambodia	• In October 2022, the government agreed in principle to the listing of the first green bond on the Cambodia Securities Exchange. The green bond, issued by a real estate company, has been certified as compliant with ASEAN standards.
China	• China's first green bond was reportedly issued by a wind energy firm in July 2015. • Major banks including Bank of China and China Construction Bank issued green bonds in 2022 under the Common Ground Taxonomy-Climate Change Mitigation, a list of green and sustainable economic activities recognized by China and the European Union first published in November 2021 and updated in June 2022.
Hong Kong	• The inaugural offering of the Government Green Bond Program was made in May 2019, followed by three offerings in 2021 including the first offering of offshore renminbi green bonds. The program raises financing for projects that will improve the environment and facilitate the transition to a low-carbon economy, per the government's Green Bond Framework. • A few financial institutions and corporations in Hong Kong have also issued green bonds. For instance, the MTR Corporation that runs Hong Kong's mass transit railway issued its first green bond in 2016 and a new green bond in 2020.
Indonesia	• The first sovereign green sukuk was issued in March 2018, with proceeds going to selected eligible green projects based on the Green Bond and Green Sukuk Framework. The fifth global green sukuk issued in 2022 was the largest ever green sukuk tranche globally and the first since Indonesia published its Sustainable Development Goals Government Securities Framework in August 2021.
Japan	• The first green bond was issued by the Development Bank of Japan in 2014. In 2017, the Ministry of the Environment published Green Bond Guidelines with the objective of spurring issuances of and investments in green bonds in Japan. The Ministry updated its Green Bond Guidelines in 2020 and 2022, expanding their scope to cover green loans and sustainability-linked loans/bonds, provide guidance on the criteria for "green" eligibility, and develop a list of eligible green projects. • The Japan Bank for International Cooperation (JBIC) launched its first green bond in January 2022. Proceeds from JBIC green bonds, which are guaranteed by the government, are used to fund existing or future eligible projects in accordance with the JBIC Green Bond Framework published in October 2021.
Korea	• The first green bond was issued by the Export-Import Bank of Korea in 2013 for renewable energy development. The first corporate climate bond was issued by Hyundai Capital Services in 2016 to finance leases on hybrid and electric vehicles. The Finance Ministry sold its first "green and sustainability note" in 2019. The Ministry of Environment and the Financial Services Commission published the Korean Green Bond Guideline in December 2020 and supplemented it a year later with the K-Taxonomy Guideline, which provides principles and standards on the types of economic activities that are considered green. • In October 2021, Korea raised EUR 700 million in its first green bond issuance in the London Stock Exchange. • In April 2022, Shinhan Bank issued Korea's first green bond certified by the Climate Bonds Initiative (CBI).
Malaysia	• Malaysia's Tadau Energy issued the world's first green sukuk in July 2017 to finance large-scale solar photovoltaic power plants in Sabah. The green sukuk was issued under the Sustainable and Responsible Investment (SRI) Sukuk Framework developed in 2014 and according to the Guidelines on SRI Funds issued in 2017.
Philippines	• The government raised its first US-dollar denominated green bond in March 2022, followed by a green samurai (yen-denominated) bond issuance in April. The proceeds are earmarked for green assets and projects under the country's Sustainable Finance Framework. • A Philippine geothermal company issued the first CBI-certified climate bond in Asia-Pacific in 2016. Since then, other Philippine companies have tapped the green bond market. The Securities and Exchange Commission approved the ASEAN Green Bonds Standards Guidelines on the Issuance of Green Bonds in August 2018, effectively adopting procedures for issuance set out in the ASEAN guidelines.
Singapore	• The first green bond by a Singapore company was issued by real estate company City Developments Limited in April 2017. In September 2021, the National Environment Agency became the first statutory board to issue a green bond, in accordance with its own green bond framework. The Housing and Development Board and the Public Utilities Board have also issued green bonds and published green bond frameworks. • Singapore launched its inaugural sovereign green bond in August 2022, following the publication of the Singapore Green Bond Framework two months earlier. The so-called Green Singapore Government Securities (Infrastructure) will be used to finance major long-term green infrastructure projects that qualify under the Framework.
Thailand	• The government issued its first "sustainability bond" in August 2020. The first and third tranches of the bond financed clean infrastructure projects such as construction of the Bangkok Mass Rapid Transit Orange Line. • A few financial institutions and corporations in Thailand have also issued green bonds. For instance, B.Grimm Power issued the first CBI-certified climate bond in Thailand in December 2018. The state-owned Export–Import Bank of Thailand issued its first green bond in accordance with the ASEAN Green Bond Standards in September 2022.
Vietnam	• In December 2018, the government introduced a legal framework for corporate green bonds under Decree 163/2018/ND-CP. The first certified green loan in Vietnam was issued in October 2020 by Phu Yen Joint Stock Company to develop and operate a solar power plant in Hoa Hoi.

Source: Climate Bonds Initiative; AMRO staff compilation from various media reports.

Table 2.11. ASEAN+3: Green Finance Incentives and Policy Measures

Economy	Initiative
China	• The CNY 88 billion National Green Development Fund invests in green projects, mainly in national strategic programs. The fund was launched in July 2020 by the Ministry of Finance, Ministry of Ecology and Environment, and Shanghai city government. It has begun making its first batch of investments, which include financing efforts to decarbonize the steel sector and to clean up Erhai Lake. • The People's Bank of China's Carbon Emission Reduction Facility provides low-cost funding to financial institutions to back loans issued to finance companies' emission reduction efforts. The first batch of low-cost loans was issued to financial institutions in December 2021. • Some local governments offer incentives for green finance. For example, Huzhou and Shenzhen offer a subsidy of up to CNY 0.5 million to local enterprises that issue green bonds.
Hong Kong	• The Hong Kong Monetary Authority's Green and Sustainable Finance Grant Scheme provides a subsidy for eligible borrowers to cover their expenses on bond issuance and external review services. The scheme began in May 2021 and runs for three years.
Japan	• The Ministry of the Environment's Financial Support Program for Green Bond Issuance provides subsidies to cover expenses for external reviews or consultation on establishing a green bond framework. • The Ministry of Economy, Trade and Industry's Green Innovation Fund provides 10 years of support to business-led decarbonization initiatives. The JPY 2 trillion fund, established in March 2021, targets priority areas for which action plans have been formulated in the government's Green Growth Strategy for 2050. The fund's first project, a hydrogen-related project developing technologies for transportation, storage, and power generation, started in August 2021. • The Bank of Japan has so-called Funds-Supplying Operations to Support Financing for Climate Change Responses.
Lao PDR	• In September 2022, Lao PDR signed a memorandum of understanding with the International Finance Corporation (IFC) to create a green finance market. The partnership will start with a market readiness assessment to review the current framework for green finance and identify market opportunities for potential green financing products.
Malaysia	• The Sustainable and Responsible Investment (SRI) Sukuk and Bond Scheme helps to offset the external review cost incurred by green sukuk issuers. The MYR 6 million scheme, introduced in 2018 as the Green Sukuk SRI Grant Scheme, has benefited more than 15 issuers involved in renewable energy, green building, and sustainable projects to date. Grant recipients enjoy income tax exemptions up to 2025. • The government's Green Technology Financing Scheme provides government guarantees for working capital, term loan financing facilities, and green bond/sukuk issuances. The MYR 2 billion scheme was open for applications until the end of 2022. • Bank Negara Malaysia's Low Carbon Transition Facility funds capital expenditure or working capital for small and medium enterprises to initiate or facilitate the transition to low-carbon and sustainable operation. The MYR 1 billion facility was launched in January 2022.
Singapore	• The Monetary Authority of Singapore's (MAS') Sustainable Bond Grant Scheme offsets additional expenses for external reviews of eligible green, social, sustainability and sustainability-linked bonds and promotes the adoption of internationally accepted standards. The grant is valid through May 2023. • MAS' Green and Sustainability-Linked Loan Grant Scheme helps firms to obtain green and sustainable financing by defraying the expenses of engaging independent service providers to validate the green and sustainability credentials of a loan and encouraging banks to develop green and sustainability-linked loan frameworks to make such financing more accessible to small and medium enterprises. The grant is valid through December 2023.
Thailand	• The Bank of Thailand has issued guidelines for banks to take account of environmental factors in the financial products and services they offer including for small- and medium-sized enterprises. It is also planning to launch Thailand's "green taxonomy" in the first half of 2023.
Vietnam	• In April 2021, the State Securities Commission, in collaboration with the IFC, introduced a handbook for corporate issuers and other market players in Vietnam on how to issue green bonds, social bonds and sustainability bonds, with guidance in applying the global and ASEAN standards as well as national regulations.

Source: Climate Bonds Initiative; AMRO staff compilation from various media reports.

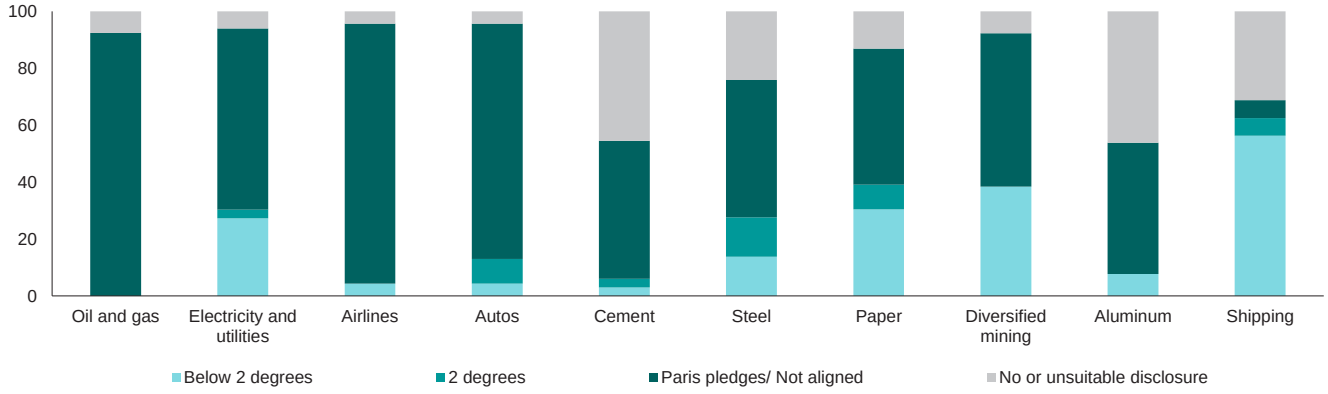
Transition Finance

"To reach net zero, greening the economy is more important than growing the green economy."

Ravi Menon
Monetary Authority of Singapore Managing Director
August 2022

Transition finance is geared toward helping high-carbon industries implement long-term changes to lower their carbon emissions. The transition out of fossil fuels is not straightforward for hard-to-abate or high-carbon sectors, because the technology is still lacking or its cost remains prohibitive (Figure 2.67). These sectors—aviation, oil and gas, mining, and heavy industries such as steel and cement, to name a few—would need to undertake complex transformations to reduce their carbon emissions, e.g., by investing in carbon capture and storage, or by completely redesigning assets and processes to become more energy-efficient. While green finance focuses largely on supporting green activities that generate low or no carbon emissions, a much larger amount of financing is required for non-green high-carbon activities—which make up the bulk of most economies—to reduce their carbon footprint. The role of transition finance is therefore "to provide the funding support for companies that are not so green, to become greener" (Menon 2022)—these include businesses that would not qualify for green finance under the current definitions, and those that are at risk of losing their funding sources because investor preferences change.

Figure 2.67. Carbon Performance Alignment with Paris Agreement Benchmarks in 2030, by Sector
(Percent of companies per sector)

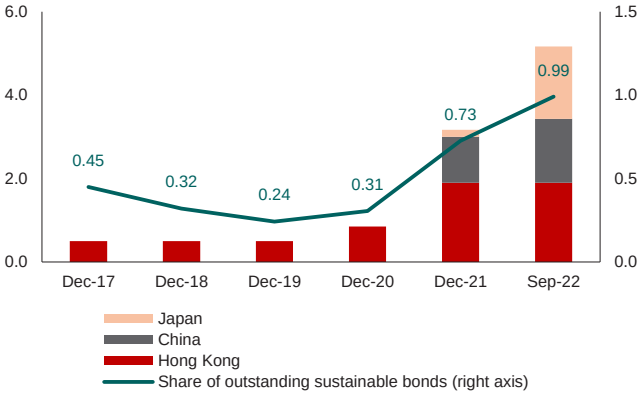


Source: Dietz and others (2021).
Note: The carbon performance assessment covers 292 companies across 10 sectors. Companies are classified according to whether their emissions intensities are aligned with a pathway to limit global warming to 2 degrees Celsius, or with a more ambitious pathway to limit global warming to below 2 degrees Celsius. Companies assessed as meeting benchmarks set by countries' first Nationally Determined Contributions (from 2015) or international commitments (for aviation and shipping) are considered "not aligned" here, as both benchmarks are insufficient to limit global warming to 2 degrees Celsius or below. Of the 292 companies assessed, 16 percent provided insufficient disclosure to calculate their carbon performance.

In the region, China, Hong Kong, and Japan have taken the lead in issuing transition bonds. The Castle Peak Power Company, which owns Hong Kong's largest coal-fired power station, issued the region's first energy transition bond in 2017 (HKEX 2020). Chinese and Japanese companies—mostly from the energy, heavy industry, and transport sectors—entered the market in 2020–21, urged by domestic policymakers to utilize this instrument. Since then, outstanding transition bonds in the region have tripled in volume from USD 850 million at the end of 2020 to USD 5.2 billion by the third quarter of 2022 (Figure 2.68 and Figure 2.69). Still, transition bonds accounted for only about 1 percent of outstanding sustainable bonds in the region.[52] More growth may be to come: China recently rolled out low-carbon transition bonds to help fund decarbonization efforts in eight carbon-intensive industries and the PBC has indicated it will explore more transition finance instruments (Reuters 2022c; Jiang 2022), and Japan aims to issue about JPY 20 trillion worth of sovereign transition bonds over the next 10 years (Reuters 2022d).

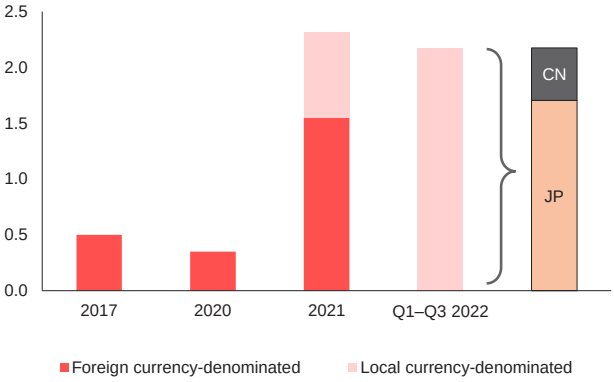
52/ By comparison, green bonds comprise about 70 percent of the total of sustainable bonds outstanding in the region (ADB 2022).

Figure 2.68. ASEAN+3: Outstanding Transition Bonds
(Billions of US dollars, end of period; share of outstanding sustainable bonds)



Source: AsianBondsOnline, Asian Development Bank; AMRO staff calculations.

Figure 2.69. ASEAN+3: New Issuances of Transition Bonds
(Billions of US dollars)



Source: AsianBondsOnline, Asian Development Bank; AMRO staff calculations.
Note: CN = China; H1 = first half; JP = Japan.

Other ASEAN+3 economies are now beginning to issue guidelines and explore instruments for transition finance. Most of the guidelines and frameworks have a broader policy objective to encourage and support the development of sustainable finance-related instruments, including—but not limited to—transition financing. A 2022 survey of ASEAN+3 developments in transition finance—led by the People's Bank of China with support from AMRO—indicates that some economies are exploring the use of government securities for transition finance, and other channels like private equity and venture capital to cater to different types of projects and needs and to provide investors with more options for ESG-related assets. Some banks in the region—notably, Singapore's DBS Bank and UOB Bank—now offer transition financing in the form of loans.

However, many challenges need to be overcome. At the forefront is the lack of market consensus, standards, and overall clarity on what constitutes credible transition finance and how to classify its operations. Transition bonds do not require the issuer or the project to be labeled as green. The ICMA currently does not require separate bond principles for transition bonds as it did for green bonds, sustainable bonds, and sustainability-linked bonds—in part due to the challenge of defining hard-to-abate sectors in a way that can be standardized globally (Furness 2022).[53] As a result, transition financing may suffer from inadequate disclosure which could encourage false transition activities and lead to investor fears of "greenwashing" or "transition-washing"—a situation where high-carbon borrowers overstate their emission-reduction achievements. Other barriers to transition finance include potential reputational risks for lenders supporting companies that are big emitters and the lack of available technology to achieve decarbonization in hard-to-abate sectors (Murdoch 2022; Ma and Terada-Hagiwara 2022).

Transition taxonomy will be "the next milestone for sustainable finance" for the region (CBI 2022). The ongoing development of sustainable finance frameworks and taxonomies across the region—especially for sustainability-linked bonds—should help provide some guidance to address gray areas associated with transition finance, e.g., by delineating specific transition activities with descriptions of technical pathways and emission-reduction targets. Currently, China and Japan have guidelines specifically focused on transition finance.[54] In September 2022, the Asia Transition Finance Study Group, a private initiative of 19 Asian and global commercial banks, published a compilation of voluntary process guidelines for financing low-carbon technologies and energy transition projects in Asia. The Monetary Authority of Singapore is developing a multitier ASEAN taxonomy. Ultimately, interoperability across national taxonomies—as they are developed—would help facilitate intraregional transition financing flows in the ASEAN+3 (Menon 2022), particularly as high-emitting sectors—such as iron and steel, cement, and chemicals—are key players in intra-regional trade.

53/ The ICMA defines sustainability-linked bonds as "bond instrument[s] for which the financial and/or structural characteristics can vary depending on whether the issuer achieves predefined Sustainability/ ESG objectives." (ICMA 2021). It argues, and some commentators agree, that transition bonds are a form of sustainability-linked bonds, and a separate "bond label" would cause unnecessary confusion in the market (Michaelsen 2020; Wright 2021).

54/ Japan's Financial Services Agency, Ministry of Economy, Trade, and Industry, and Ministry of the Environment published Basic Guidelines on Climate Transition Finance in May 2021. China has developed a transition finance taxonomy in some pilot regions (Ma and Terada-Hagiwara 2022; CBI 2022).

V. Summary and Policy Implications

Climate change mitigation, long envisioned as a gradual process of reducing GHG emissions in the world's most carbon-intensive economies, has now become an urgent global imperative. For the ASEAN+3 region, as for the rest of the world, the accelerated transition to a carbon-neutral economy will have major macroeconomic implications in the medium term. Because of the size and breadth of the policy efforts involved—subsidies, incentives, government expenditures, taxes, and regulations—and the pace of the transformation implied, the macroeconomic consequences of the transition are hard to pin down, let alone quantify. While putting a price—explicit or implicit—on carbon (emissions) should help to address the negative externalities created by fossil fuel use, it will also drive up the price of fossil fuel energy and could potentially affect export competitiveness, trigger an accelerated obsolescence of existing capital stock, and even cripple economic growth. On the other hand, the pricing of carbon should stimulate research expenditures, the development of new industries and technologies, new infrastructure spending, and the creation of new financial assets.

The economic costs of moving away from fossil fuels are significant if good alternatives are not readily at hand. Much will thus depend on the speed of development, dissemination, and adoption of new technology, e.g., clean energy options, low-carbon industrial processes and transportation, and carbon capture and sequestration technologies. The sooner scalable, reliable, and affordable low-carbon alternatives become available, the less painful and costly the transition from fossil fuels would be.

ASEAN+3 economies are in a good position to meet the transition challenge and take advantage of emerging opportunities. China—the region's largest economy in geographic and economic size—is the leader on almost every front. Others are well placed to leverage their existing comparative advantage in technology (e.g., Japan and Korea), manufacturing (e.g., Malaysia and Thailand), natural resources (e.g., Indonesia, Lao PDR, and Vietnam), and financial services (e.g., Hong Kong and Singapore) to propel decarbonization efforts and reap economic benefits on the road to net zero. Most of the region's economies will find fresh sources of comparative advantage in their natural endowments of sunlight, wind, water, minerals, flora, and fauna that will enable them to join or create new value chains in renewable energy, hydrogen, EVs, batteries, and carbon offset credits. Those with surplus renewable energy generation capacity and/or massive carbon storage resources, as well as first-movers in clean energy technologies such as hydrogen, will find new markets and sources of growth as global demand for these goods and services is poised to substantially increase. Macroeconomic and financial policies—such as economy-wide carbon pricing, providing public guarantees for mitigation-related loans, speeding up private–public partnerships for emerging technology projects, and promoting climate finance through green credit policies—can contribute to the transition by creating the right conditions and incentives to realize these new drivers of exports and growth.

Fiscal and economic policymakers can play a role through climate-informed public expenditure and utilizing climate fiscal tools such as carbon taxes and ETSs to bring about an orderly transition. As the region emerges from the COVID-19 pandemic, a strong "green public investment" push can lay the foundation for both a sustainable recovery and the transformation needed for a low-carbon economy. On the other hand, rebuilding fiscal buffers drawn down during the pandemic is a top priority in most economies, while other spending priorities—such as for education and health—also compete for public financing. And introducing or ramping up carbon pricing—particularly at rates needed for meaningful climate mitigation—is a challenge when inflation (particularly energy price inflation) is elevated. ASEAN+3 finance ministries will need to find ways to navigate these challenges and mobilize private and public funding for climate change mitigation. Cross-government agency cooperation will be crucial to ensure that public finances and fiscal policy feed into a credible long-term transition strategy for the economy.[55]

Monetary and financial regulatory authorities can play a role by enhancing the ability of the financial system to mobilize funds for green and low-carbon investments while managing climate-related risks. Theoretically, green finance should achieve scale over time as long as the risk-adjusted return from green assets is sufficiently positive. In practice, however, financial supervisory and regulatory authorities need to maintain the integrity of the green finance market by ensuring transparency and information

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55/ These and related issues are the focus of the Coalition of Finance Ministers for Climate Action, a group of fiscal and economic policymakers from over 75 countries including 6 ASEAN+3 economies—Indonesia (co-chair), Japan, Korea, Malaysia, the Philippines, and Singapore. The Coalition's work program focuses on: (1) how to align policies and practices with Paris Agreement commitments; (2) sharing experiences and expertise on policies and practices for climate action; (3) carbon pricing measures; (4) mainstreaming climate change in economic policies; (5) mobilizing private sources of climate finance; and (6) how to engage in domestic preparation and implementation of Nationally Determined Contributions to the Paris Agreement goals.

disclosure and setting and enforcing standards to prevent greenwashing. Central banks may go beyond this role by subsidizing "green" firms and/or penalizing "brown" firms, depending on the specific circumstances in each economy.[56] As noted, some ASEAN+3 central banks are already developing green bond markets and guiding credit to climate-mitigation loans. But as more industries switch to low-emission technologies, "greenflation" will become an issue. The imbalance between rising demand for clean energy and technologies and constrained supply of mineral and other inputs for these technologies can be expected to exert sustained upward pressure on the prices of a broad range of products during the transition.[57] The dilemma for monetary policy would be either accepting a higher inflation rate for a prolonged period or responding to these price pressures with higher interest rates and risking slowing down the green transition and economic growth at large.[58]

Regionally coordinated action will achieve a greater impact than economies acting alone. The net zero transition is a race against time; to "win" this race, ASEAN+3 needs to strengthen regional cooperation based on a shared vision for carbon neutrality. Carbon-neutral declarations by China, Japan, and Korea have helped to produce a visible shift in the decarbonization momentum in the region. Various initiatives are under way in ASEAN but a collective long-term vision and mitigation strategy has yet to be formed (Table 2.12). Enhanced cooperation among the ASEAN+3 economies would support the region's journey to net zero through sharing knowledge and technologies and facilitating partnership programs. Potential areas of cooperation include cross-border electricity transmission, innovation and new technology, and green financial networks. Each is summarized in turn.

- *Energy*. Cross-border power grid connections would improve power supply efficiency and help secure a more sustainable energy supply across the region by locating large-scale hydro, wind, and solar power plants in the most ideal places for energy-generation and energy-sharing with other economies. The Lao PDR-Thailand-Malaysia-Singapore Power Integration Project, which started in June 2022, marked a milestone as the first cross-border electricity trade among four ASEAN countries and a step toward realizing the broader ASEAN Power Grid vision of expanding regional multilateral electricity trading. Further efforts could be directed to accelerate ASEAN power grid integration and ensure that it supports future developments in regional renewable energy deployment.

- *Technology*. Technological innovation is important for realizing green growth, but it is expensive. Regionally targeted government efforts in research could help to nurture innovative technologies by creating an expanded market that would justify the initial high start-up costs. As highlighted in Section III, promising new areas include clean hydrogen, energy storage, and CCUS. Clean hydrogen deployment at scale will require supply chain development at the regional level. Energy storage technology is crucial for this, as well as to enable the rollout and transport (trade) of renewable energy. CCUS technology can dramatically cut carbon emissions from conventional fossil fuel use and could create new business fields in green technology across ASEAN+3. In this regard, the region could draw inspiration from EU initiatives to develop and promote new technology, such as the European Clean Hydrogen Alliance, the European Battery Alliance, and European CCS Project Network (Sekine 2021).[59]

- *Finance*. Green financial networks are beginning to have increased influence on the direction of energy development in the ASEAN+3 region. With the number of investors seeking green or sustainable investments growing in the region, it is increasingly important for ASEAN+3 policymakers, state-owned enterprises, and the finance community to discuss regional green project developments, including public-private partnership frameworks and project risk management. Early-stage coordination with the financial community could help in mobilizing funding, especially for innovative (risky) projects.

56/ For example, the European Central Bank and the Bank of England are tasked first with price stability and only then with supporting the government's wider economic strategy—which includes a transition to net zero. The US Federal Reserve, on the other hand, is mandated to focus on price stability and employment and considers it "inappropriate … to use [its] monetary policy or supervisory tools to promote a greener economy or to achieve other climate-based goals" (Newburger 2023).

57/ This is in addition to "fossilflation" caused by the rising price of fossil fuel energy—e.g., as the carbon price is raised (Section II) (Schnabel 2022).

58/ These and related issues are the focus of the NGFS, a group of central banks and financial supervisors from over 85 economies, including 10 ASEAN+3 economies—Cambodia, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore (chair), and Thailand. The NGFS' work program focuses on: (1) how to incorporate climate-related and environmental risks in supervisory frameworks and practices; (2) climate scenario analysis; (3) developing a framework for how central banks should assess, and respond to, diverse climate-related developments; (4) issues and approaches relating to net zero in central banks' own operations; (5) mainstreaming the consideration of nature-related risks; and (6) capacity building and training.

59/ The European Clean Hydrogen Alliance, which was set up in 2020, brings together industry, public authorities, civil society, and other stakeholders to discuss the large-scale deployment of clean hydrogen technologies and what this requires. Six thematic working groups meet throughout the year and focus on the hydrogen value chain parts. The European Battery Alliance was launched in 2017 to bring together EU national authorities, regions, industry research institutes, and other stakeholders in the battery value chain to build up the EU's battery technology and production capacity. The European CCUS Projects Network, which builds on the 2009–18 European CCS Demonstration Project Network, represents and supports major industrial CCS and CCUS projects under way across Europe. Among its notable initiatives is the Northern Lights project, the first ever cross-border, open-source carbon dioxide transport and storage infrastructure network. When it starts operations in 2024, it will offer companies across Europe the opportunity to store carbon emissions permanently deep under the seabed in Norway.

Table 2.12. ASEAN+3: Key Regional Cooperation Initiatives on Climate Change Mitigation

Initiative	Program Areas
ASEAN Plan of Action for Energy Cooperation (APAEC) 2016–25	• Expand regional multilateral electricity trading under the ASEAN Power Grid, strengthen grid resilience and modernization, and promote clean and renewable energy integration. • Pursue the development of a common gas market for ASEAN and enhance gas and liquefied natural gas connectivity and accessibility through the trans-ASEAN gas pipeline. • Optimize the role of clean coal technology in facilitating the transition toward sustainable and lower emission development. • Reduce energy intensity by 32 percent in 2025 (from 2005 levels) and encourage further energy efficiency and conservation efforts, especially in the transport and industry sectors. • Increase the share of renewable energy in the ASEAN energy mix to 23 percent by 2025, and its share in installed power capacity to 35 percent by 2025, among others. • Advance energy policy and planning through regional cooperation to accelerate the region's energy transition and resilience. • Build human resource capabilities on nuclear science and technology for power generation.
ASEAN Catalytic Green Finance Facility	• Provide ASEAN members with technical assistance to identify and prepare commercially viable green infrastructure projects. • Facilitate access to over USD 1 billion in loans from co-financing partners to cover upfront capital investment costs.
ASEAN-Japan Climate Action Agenda 2.0	• Assist in members' long-term strategy and policymaking, including scenario formulation and policy dialogue on mitigation-related issues. • Prioritize decarbonization of selected industries by using fluorocarbons, renewable energy, waste-recycling, water-air, and green logistics (shipping, ports, airports, transport). • Disseminate decarbonization technologies through the Joint Crediting Mechanism and related schemes and expand "zero-carbon" cities.
ASEAN-ROK Carbon Dialogue	• Share policies and know-how regarding carbon pricing (work-plan development is ongoing). • Facilitate cooperation projects to reduce greenhouse gas emissions, including through existing mechanisms such as the Partnership for ASEAN-ROK Methane Action, the ASEAN-ROK Cooperation Centre for Carbon Neutrality and Green Transition; and the ASEAN Green Deal.
ASEAN-China Environmental Cooperation Strategy and Action Plan 2021–25	• Facilitate high-level environmental policy dialogue and exchange, including on environmental data and information management. • Develop sustainable cities, reduce marine plastics, and improve air quality through policy dialogue, joint research, capacity building, and community activities. • Promote biodiversity conservation and ecosystem management through joint projects, capacity building, and research.

Source: ASEAN (2021); AMRO staff compilation.
Note: ROK refers to Korea.

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Annex:

Developments in ASEAN+3 Economies

Brunei Darussalam

Economic activities in Brunei started to recover in 2022 after the setback to growth in 2021 due to the outbreak of the Delta variant of COVID-19. Thanks to high vaccination rates, daily new cases declined sharply, enabling containment measures and border restrictions to be lifted. The resumption of economic activities amid fuller economic re-opening has benefited the non-oil and gas (O&G) sector. Particularly, with the return of travel, transport services have notably improved. The diversion of domestic O&G supplies to the downstream industry has also provided the impetus to the non-O&G sector growth. However, the O&G sector continues to face production challenges, reflecting ongoing efforts to rejuvenate offshore O&G fields and the compound effect of disruptions during COVID-19 restrictions.

Real GDP grew by 0.9 percent in Q3 2022 —the first quarterly expansion since Q3 2020, driven by the robust activities in the non-O&G sector. The O&G sector also improved during the period, with the decline in O&G production bottoming out. Despite positive outturns, real GDP contracted by 2.6 percent in the first three quarters of 2022, reflecting the unexpectedly large contraction in the O&G sector in the first half of 2022 (–9.4 percent year-on-year). For 2022, the economy is estimated to have contracted by 1.2 percent from –1.6 percent in 2021, benefiting from fuller economic re-opening.

Labor market condition has improved markedly since 2021. Constraints on labor supply have started to ease since 2022 with more migrant workers expected to return after the lifting of border restrictions. Total and youth unemployment rates fell in 2021 (4.9 percent and 16.3 percent, respectively) as local jobseekers filled jobs in several industries previously dominated by foreign workers. Local workers in the private sector also grew in number, though at a slower pace of 3.7 percent in 2021 from 16.2 percent in 2020.

Inflation has risen to multi-year highs, driven mainly by global commodity price shocks. As Brunei is a net food importer, elevated global food prices, especially in the first half of 2022, contributed significantly to the broadening of food inflation. Meanwhile, the spike in prices of transport services and vehicles has also induced higher transport inflation. Miscellaneous goods and services inflation, chiefly in the form of higher vehicle insurance premiums influenced by market prices of cars, added to overall price pressures. As a result, inflation remained high at 3.7 percent in 2022, increasing from 1.7 percent in 2021.

The external position remained strong, with an estimated balance of payments (BOP) of 6.4 percent of GDP in 2022. This reflects significant widening of the current account surplus (12.8 percent of GDP) amid favorable O&G prices and robust non-O&G exports. The overall BOP surplus translates to higher international reserves, estimated at USD 6.1 billion in 2022 from USD 5.0 billion in 2021, or equivalent to 7.2 months of imports.

The financial sector remains sound with ample capital buffers and recovering profitability. Financial institutions continued to be highly capitalized, with capital adequacy ratio of over 20 percent in 2022. Non-performing loan ratio declined to 3.3 percent in 2022 from 3.6 percent in 2021, suggesting an improvement in asset quality. Profitability also improved, with returns on equity increasing to 9.5 percent in 2022 from 8.6 percent in 2021.

After being curtailed by the pandemic, credit growth recovered, driven mainly by corporate sector loan demand. Credit growth strengthened to 4.7 percent in 2022 from 4.6 percent in 2021. The shift in the composition of bank lending toward productive sectors has been notable. As of 2022, lending to manufacturing and other services sectors doubled in size from a decade ago, reaching 15.5 percent and 10.1 percent of total credit, respectively.

The fiscal position has improved considerably since FY2021, led by the significant gains in O&G revenue. High energy prices have benefited Brunei, which led to a surge in O&G revenue since early FY2021. As a result, the fiscal deficit narrowed sharply to 5.2 percent of GDP in FY2021 from 20.0 percent in FY2020. In the first half of FY2022, fiscal revenue reached BND 3.4 billion, exceeding the revenue target of BND 3.2 billion for the whole year of FY2022. Meanwhile, expenditure realization reached 47.2 percent of the total budget. In view of the strong revenue performance, a fiscal surplus of 0.5 percent of GDP is expected for FY2022.

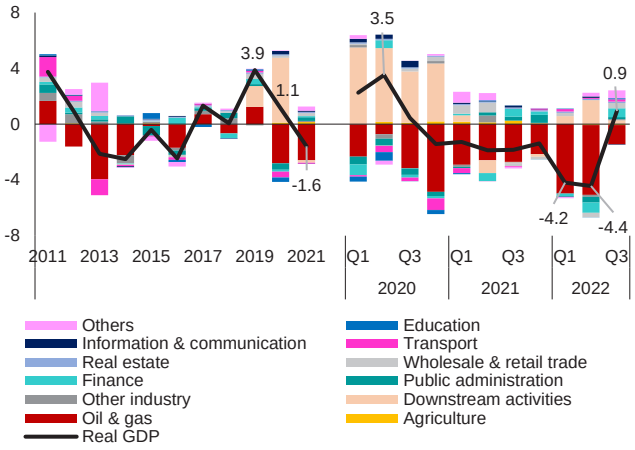
Risks to Brunei's outlook are tilted to the downside. Continuing reliance on the O&G sector makes Brunei vulnerable to both domestic and external shocks, which could derail the growth prospects and put strains on the external and fiscal positions. Possible re-emergence of new and more virulent COVID-19 variants could set back the economic recovery. Sharply higher borrowing costs could exert downward pressure on corporate earnings, at a time when external demand is moderating. Perennial risks, such as those posed by climate change, could also undermine Brunei's macro-financial stability in the longer term.

The author of this note is Vanne Khut.

Brunei Darussalam: Selected Figures

Brunei's economic activities have started to gain traction.

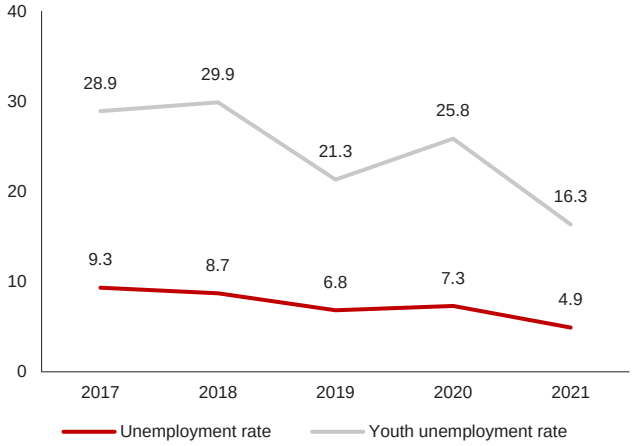
Contributions to Real GDP Growth (Production)
(Percentage points, year-on-year)



Source: Department of Economic Planning and Statistics; AMRO staff calculations.

Labor market conditions markedly improved in 2021.

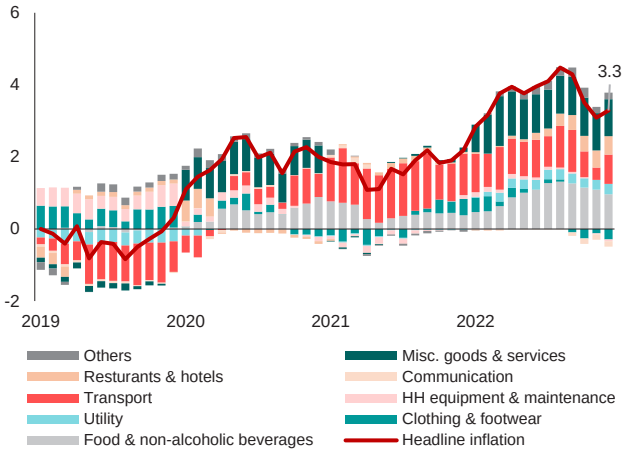
Unemployment Rate and Youth Unemployment Rate
(Percent)



Source: Department of Economic Planning and Statistics

Inflation has risen to multi-year highs, driven by soaring food and transport prices.

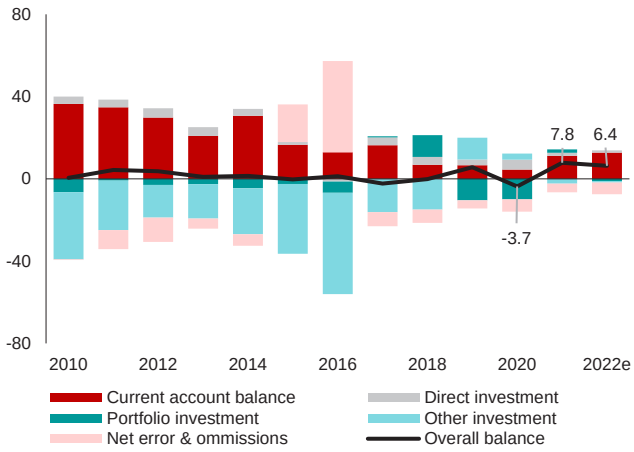
Contributions to Consumer Price Inflation
(Percentage points, year-on-year)



Source: Department of Economic Planning and Statistics; and AMRO staff calculations.
Note: HH = household; Misc. = miscellaneous.

The external position remains strong, benefiting from high commodity prices and robust growth of non-O&G exports.

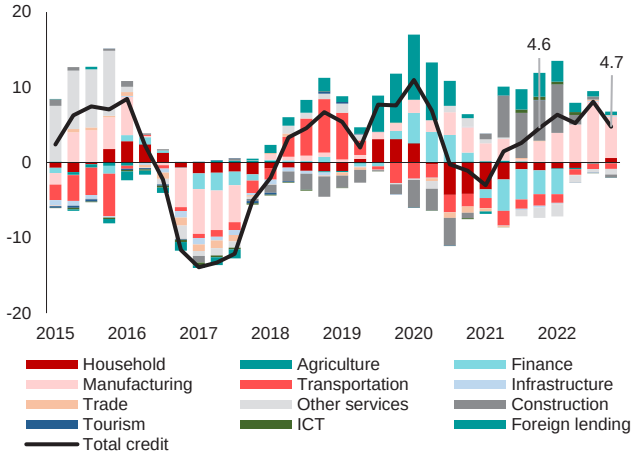
Balance of Payments
(Percent of GDP)



Source: Department of Economic Planning and Statistics; AMRO staff calculations.
Note: e denotes estimate. Brunei's BOP follows BPM6. Financial account sign is reversed for charting purpose.

Credit growth has recovered, led by stronger corporate sector demand.

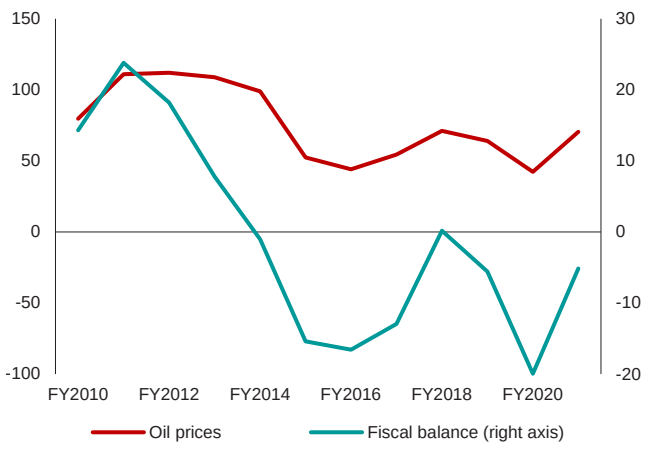
Contributions to Banking Sector Credit Growth
(Percentage points, year-on-year)



Source: Brunei Darussalam Central Bank; AMRO staff calculations.
Note: ICT = information and communication technology.

Fiscal deficit narrowed significantly on higher oil and gas revenue, reflecting the favorable commodity prices.

Fiscal Balance and Oil Prices
(USD/barrel; percent of GDP)



Source: Ministry of Finance and Economy; AMRO staff estimations.
Note: Brunei's fiscal data are in fiscal year (FY) starting from April to March.

Brunei Darussalam: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	3.9	1.1	–1.6	–1.2
Private consumption	5.9	5.3	21.9	6.8
Government consumption	1.8	–9.6	2.6	0.1
Gross fixed capital formation	–4.4	–9.3	–13.9	–0.5
Imports of goods and services	13.8	–2.1	29.5	10.7
Exports of goods and services	14.9	7.5	8.8	4.5
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance[1]	6.6	4.5	11.2	12.8
Trade balance	7.6	4.4	14.2	15.7
Capital and financial account balance	–3.0	2.2	–0.9	0.7
Direct investment	–2.8	–4.8	–1.5	–1.1
Portfolio investment	10.4	9.9	–1.7	1.1
Other investment	–10.6	–2.9	2.3	0.7
Errors and omissions	–4.0	–6.0	–4.2	–5.7
Overall balance	5.6	–3.7	7.8	6.4
International reserves (in USD billion, end of period)[2]	4.3	4.0	5.0	6.1
Fiscal sector[3]	(in percent of GDP)			
Revenue and grants	26.4	12.6	24.3	23.7
Expenditure	31.9	32.6	29.5	23.2
Fiscal balance	–5.6	–20.0	–5.2	0.5
Monetary and financial sectors	(in annual percentage change)			
Broad money	4.3	–0.4	2.7	1.3
Domestic credit[4]	2.2	18.3	–19.6	–15.6
Private sector credit	2.0	0.2	2.7	6.0
Memorandum items:				
Nominal GDP (in BND billion, calendar year)	18.4	16.6	18.8	23.4
Nominal GDP (in BND billion, fiscal year)	18.4	16.2	19.6	23.8
Headline inflation (in percent y-o-y, period average)	–0.4	1.9	1.7	3.7
Exchange rate (in BND/USD, period average)	1.4	1.4	1.3	1.4

Source: National Authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: Numbers in red denote AMRO staff estimates. y-o-y = year-on-year.

1/ Brunei's balance of payments follows BPM6. A negative (positive) financial account balance indicates net inflow (outflow). Overall balance = Current account balance - Capital and financial account balance + Errors and omissions.
2/ Gross international reserves include gold.
3/ Fiscal data are in fiscal year, which starts from April to March.
4/ Domestic credit refers to domestic claims from the Depository Corporations Survey.

Cambodia

Cambodia's economy continued to recover in 2022. Driven by the strong external demand and a resumption in domestic activity, real GDP growth is estimated to have accelerated to 5.0 percent in 2022 from 3.0 percent in 2021. The manufacturing sector was robust, supported by expansion of both garment and non-garment exports. Tourism grew rapidly from a low base but remained far below pre-pandemic levels. For 2023, the economy is projected to expand at a faster pace, with services sectors expected to benefit from a robust return of tourism, reflecting the re-opening of China. However, the rebound in services could be partially mitigated by a weaker outlook for manufacturing.

Headline inflation spiked to 5.3 percent in 2022 from 2.9 percent in 2021, reflecting soaring global energy and food prices. Inflation pressures were particularly acute during the first half of 2022, with inflation peaking at 7.8 percent in June. Inflation has since trended downward and is projected to further ease in 2023.

The current account deficit is expected to narrow but remain high for 2022. Despite a strong export performance, the trade deficit remained large at an estimated trade deficit of 34.8 percent of GDP, given increased spending on petroleum imports due to elevated global oil prices, and that imports of gold remained substantial. With tourism receipts and remittances recovering, the current account deficit is estimated to have narrowed to around 31 percent of GDP, down from the historical high of 46 percent of GDP seen in 2021. Despite steady foreign investment inflows, Cambodia is estimated to have recorded an overall balance of payments deficit in 2022, resulting in a reduction in international reserves. Nonetheless, external buffers remained a sizable USD 17.8 billion as of end-2022, equivalent to 8.4 months of imports of goods (excluding gold) and services.

Financial conditions remained easy in 2022 with sufficient liquidity and strong credit growth. Liquidity is ample as the National Bank of Cambodia (NBC) maintained several measures to ease conditions in the financial system, particularly keeping reserve requirement at a low 7 percent.[1] Credit growth has remained resilient and although a loan restructuring program was phased out as scheduled in June 2022, nonperforming loan ratios have remained manageable. With capital adequacy ratios well above regulatory requirements and banks' increased provisions, balance sheets are expected to stay healthy even with the end of loan restructuring program.

The fiscal deficit narrowed in 2022 due to higher revenue and the rollback of pandemic stimulus. Revenue was buoyant in 2022 by the resumption of economic activity. With most of the population already vaccinated and COVID-19 infection rates low, healthcare spending declined, while spending on other key measures remained stable or increased slightly. The net result was a stimulus package 1.4 percent of GDP smaller than it was 2021. The gradual withdrawal of fiscal stimulus and higher revenue collection enabled the fiscal deficit to fall to 5.4 percent of GDP from 8.5 percent in 2021. Public debt is estimated have risen only slightly to 35.9 percent of GDP at end-2022 from 35.0 percent at end-2021, as Cambodia drew down its fiscal reserves to finance its deficit.

The economy's growth trajectory toward a robust recovery faces several external and domestic risks. Headwinds from slowing global demand amid monetary tightening of most central banks could further dampen Cambodia's manufacturing exports. A tail risk with potentially large impact would be the emergence of more virulent COVID-19 variants, which could lead to the return of tight containment measures and delay the expected recovery of international tourism. Despite the recent trend of easing inflation pressures in Cambodia, a resurgence remains a risk, particularly if oil prices soar again due to geopolitical tensions and supply constraints.

Cambodia's large current account deficits are a potential source of external vulnerability. Most of Cambodia's external liabilities are funded from FDI inflows and concessional loans from multilateral and donor agencies, which are relatively stable. However, capital inflows from external private debt and banks' nonresident deposits, which are more short-term in nature, have become substantial in the past five years. If a shock were to reverse these short-term flows, the external position could come under pressure.

Prolonged rapid credit growth amid already high private debt may result in a deterioration in loan quality. The country's rapid credit growth and credit-to-GDP ratio of 177 percent have given rise to concerns of financial distress. Risks may have shifted away from banks toward shadow banking activities with the emergence of property developers providing their own long-term financing with lax loan screening and minimal supervision. Such shadow banking activities are more vulnerable to shocks, such as from a fall in property prices.

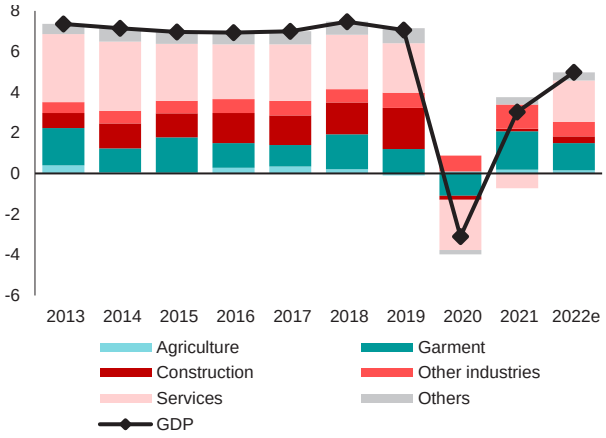
The author of this note is Paolo Hernando.

1/ With the economic recovery on track, the NBC in January 2023 raised the minimum reserve requirement for foreign exchange deposits and released plans for a gradual normalization of monetary conditions back to pre-pandemic level.

Cambodia: Selected Figures

The economy gradually recovered in 2022 amid steady reopening after a surge in COVID-19 in 2021.

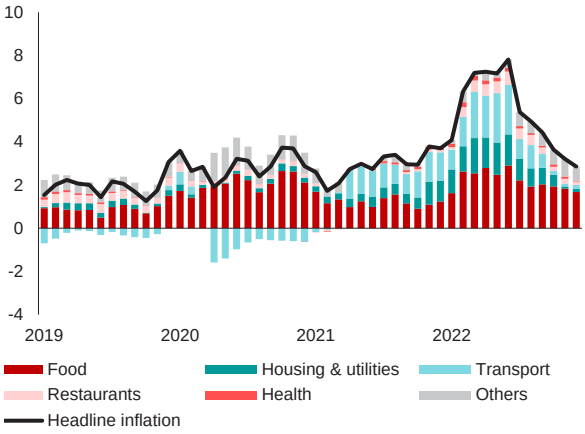
Contributions to Real GDP Growth
(Percentage points, year-on-year)



Source: National Institute of Statistics of Cambodia; AMRO staff estimates.
Note: e denotes estimate.

Inflation rose significantly in the first half of 2022 driven by rising energy prices but slowed in the second half.

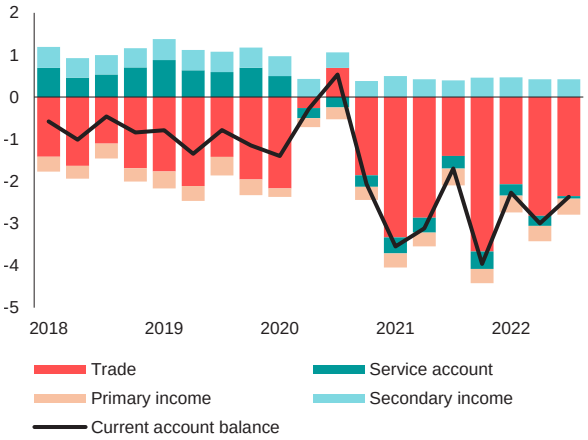
Contributions to Consumer Price Inflation
(Percentage points, year-on-year)



Source: National Bank of Cambodia; AMRO staff calculations.
Note: Food includes non-alcoholic beverages.

The current account deficit narrowed in 2022 from the historical high seen in 2021, but remains large.

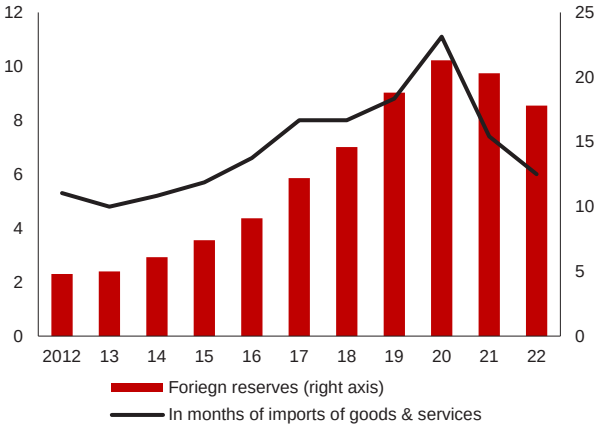
Current Account Balance
(Billions of US dollars)



Source: National Bank of Cambodia; AMRO staff calculations.

Cambodia's gross international reserves remained high, but dropped to USD 17.8 billion as of end-2022 from USD 20.3 billion in 2021.

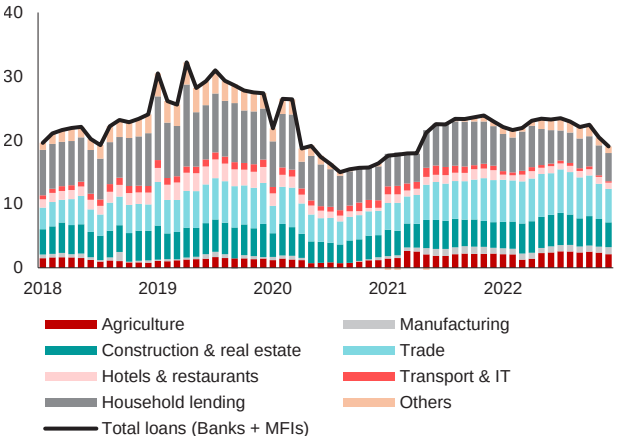
International Reserves
(Months of imports; billions of US dollars)



Source: National Bank of Cambodia; AMRO staff calculations.
Note: The figures for 2022 are as of the end-September.

Credit growth remained robust in 2022 at above 20 percent led by increased lending to households, trade, construction, and real estate.

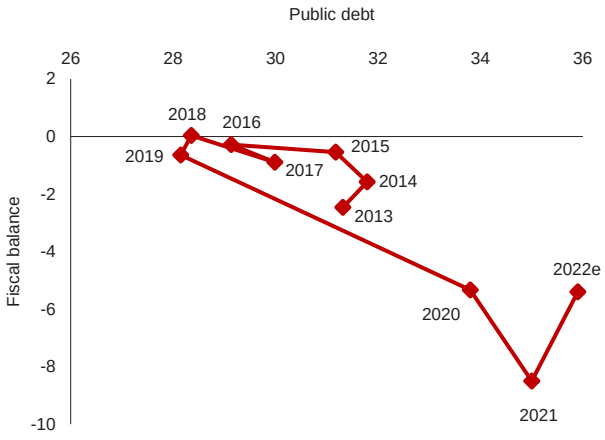
Contributions to Credit by Banks and Microfinance Institutions (MFIs)
(Percentage points, year-on-year)



Source: National Bank of Cambodia; AMRO staff calculations.
Note: IT = information technology.

As the pandemic waned, fiscal policy was tightened in 2022 with the government ramping up revenue efforts and scaling back fiscal stimulus.

Fiscal Balance and Public Debt
(Percent of GDP)



Source: Ministry of Economy and Finance.

Cambodia: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	7.1	–3.1	3.0	5.0
Private consumption	6.1	–4.3	–3.7	11.6
Government consumption	6.8	13.0	78.7	–3.3
Gross fixed capital formation	14.3	–2.7	6.8	5.3
Imports of goods and services	11.1	–8.9	23.1	4.3
Exports of goods and services	13.3	–11.3	13.5	9.0
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	–15.0	–8.5	–45.7	–32.7
Trade balance	–16.4	–10.8	–47.1	–34.2
Capital and financial account balance	24.8	12.7	45.8	26.2
Direct investment	13.1	13.5	12.6	12.0
Portfolio investment	0.0	–0.4	–0.2	–0.4
Other investment	10.4	–1.5	32.6	14.1
Errors and omissions	0.0	–1.7	0.1	–0.2
Overall balance	9.8	2.5	0.3	–6.7
Gross external debt	56.8	68.1	74.4	75.7
International reserves (in USD billion, end of period)	18.8	21.3	20.3	17.8
Fiscal sector	(in percent of GDP)			
Revenue and grants	26.2	23.4	21.2	23.3
Expenditure	26.9	28.8	29.9	28.6
Fiscal balance	–0.6	–5.3	–8.5	–5.4
Government debt	28.1	33.8	35.0	36.5
Monetary and financial sectors	(in annual percentage change)			
Broad money	18.2	15.3	16.3	10.3
Domestic credit	24.4	20.0	32.3	18.4
Private sector credit	28.0	17.2	23.4	19.3
Memorandum items:				
Nominal GDP (in KHR trillion)	110.0	105.9	110.5	120.2
GDP per capita (USD)	1,694	1,544	1,585	1,706
Headline inflation (in percent y-o-y, period average)	1.9	2.9	2.9	5.4
Exchange rate (in KHR/USD, period average)	4,061	4,093	4,099	4,096

Source: National authorities; AMRO staff estimates.
Note: Numbers in red denote AMRO staff estimates. y-o-y = year-on-year.

China

China's economy has been resilient while being hit by multiple shocks since the start of the global pandemic. These include recurrent COVID-19 outbreaks, supply chain disruptions and input cost pressures due to the Ukraine crisis, and financial distress in the property sector. In 2022, as many of these pressures intensified, GDP growth came in at a subdued 3.0 percent with both consumption and investment faltering, while exports contracted on a year-on-year basis in Q4.

Labor market conditions deteriorated significantly through 2022. The surveyed urban jobless rate was an elevated 5.5 percent in December, having risen as high as 5.7 percent earlier in the year. Some groups such as fresh graduates and migrant workers faced difficulties securing jobs although the 12.06 million urban jobs created in 2022 exceeded the policy target of 11 million. Overall wage growth slowed.

Inflation was contained in 2022 due to weak demand and administrative measures. In 2022, headline consumer price inflation was 2.0 percent, core inflation was 0.9 percent, and producer price inflation was 4.1 percent. Subdued demand was a key factor. Authorities' efforts to address supply disruptions and ensure timely supply of daily necessities also helped contain inflation.

China's external position is strong. The balance of payments recorded a surplus in 2022—with strong export performance being a key driver even as shipments contracted year-on-year in Q4. Affected by the asset price changes and devaluation of non-US currencies, foreign currency reserves decreased through most of 2022, but rose in the last two months to reach USD 3.1 trillion. After having depreciated in the middle of 2022, the renminbi has strengthened from November 2022, and the performance of renminbi is relatively stable compared with other major currencies.

The banking system remains sound and stable overall although some banks experienced significant asset quality deterioration. Capital buffers and liquidity are ample for the stronger banks but considerably weaker for some smaller and mid-sized banks. Bank' profits have generally decreased reflecting the marked slowdown of the economy and the continued downturn of the real estate sector. Total social financing growth slowed significantly in 2022 but was still a firm 9.6 percent for the year and picked up to 9.7 percent in January 2023.

The property sector remains depressed, and a firm recovery will need strong efforts and time for policy measures to take effect as well as confidence to be restored. Several developers are still distressed. Prices continue to fall across cities, especially Tier-2 and Tier-3 cities. Transaction volumes remain markedly lower than those seen in previous years. Several banks and asset management companies and a state-owned bond insurer, guided by authorities, have strengthened their support for property developers and the real estate sector, while managing credit risks and keeping the economy on track for multiyear deleveraging.

China's fiscal position remains sound but the budget deficit widened significantly in 2022. The economic growth slowdown and tax reduction policies have weakened revenue collection. The need to stabilize and lift the property sector while strengthening the recovery of the entire economy and labor market has posed a stiff fiscal challenge. Given the economic and fiscal conditions in 2022, the general budget revenue growth could be 0.6 percent, while the general public expenditure growth could be an elevated 6.1 percent, resulting in a sizeable general account deficit of 4.9 percent.

In this context, the authorities have made greater use of both monetary and credit policy tools and fiscal resources to support the economy and contain risks over the past few years.

China's economic recovery should become increasingly firm in 2023, with momentum markedly stronger in the second half of the year. A baseline scenario entails the economy strengthening markedly in Q2 as pandemic conditions come under control, and gaining further traction through the rest of the year. As the labor market improves, consumption should rebound as the key driver of recovery. Investment should also pick up as business operations normalize, the property sector turns around, and infrastructure projects continue to ramp up.

Risks to China's economic outlook remain significant and elevated. The most pronounced are those related to COVID-19 outbreaks, particularly the emergence of more virulent variants; renewed strains in the property sector; production and supply chain challenges due to geopolitical tensions; and weakening global demand. Besides these, intermittent power shortages, which affected industrial production in the past, may recur in 2023, while capital challenges facing some small and mid-sized banks may squeeze credit supply to micro, small and medium-sized enterprises.

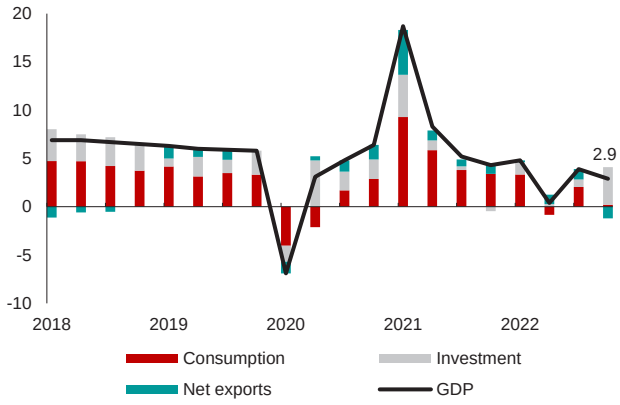
The author of this note is Suan Yong Foo.

China: Selected Figures

China's economic recovery has been bumpy due to factors including recurrent COVID-19 outbreaks and the Ukraine crisis.

Contributions of GDP Growth

(Percentage points, year-on-year)

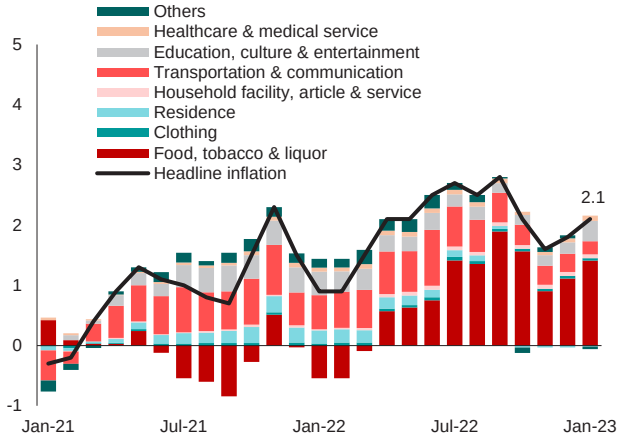


Source: National Bureau of Statistics.

Consumer price inflation has stayed low, with authorities taking several measures to deal with supply-side issues.

Contributions to Consumer Price Inflation

(Percentage points, year-on-year)

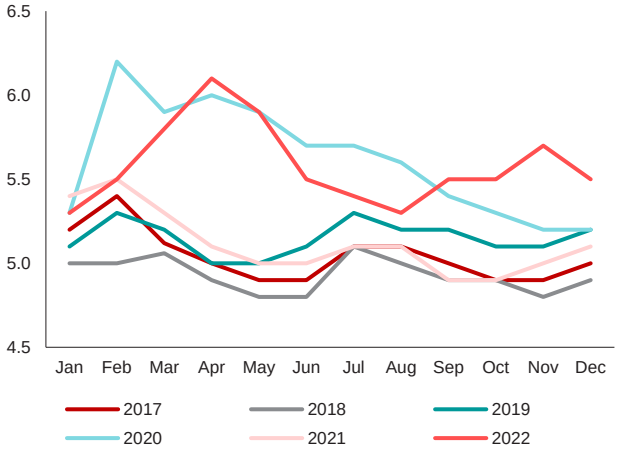


Source: National Bureau of Statistics.

The surveyed urban unemployment rate has risen due to weak economic conditions and pandemic control measures.

Surveyed Urban Unemployment Rate

(Percent)

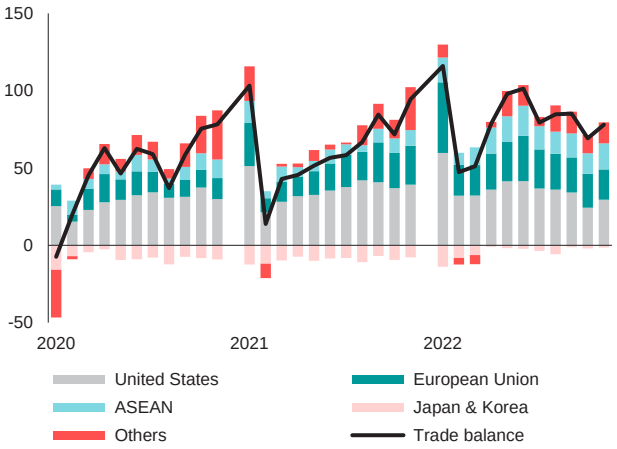


Source: National Bureau of Statistics.

China's sizeable trade surplus has been a key driver of the health of its overall BOP position.

Trade Balance

(Billions of US dollars)

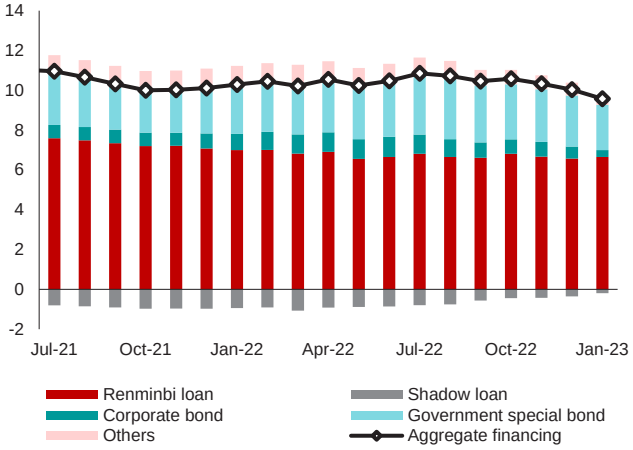


Source: General Administration of Customs.

Growth in total social financing came in at a firm 9.58 percent in 2022 despite constrains on the demand and supply side.

Contributions to Total Social Financing

(Percent year-on-year, year-to-date)

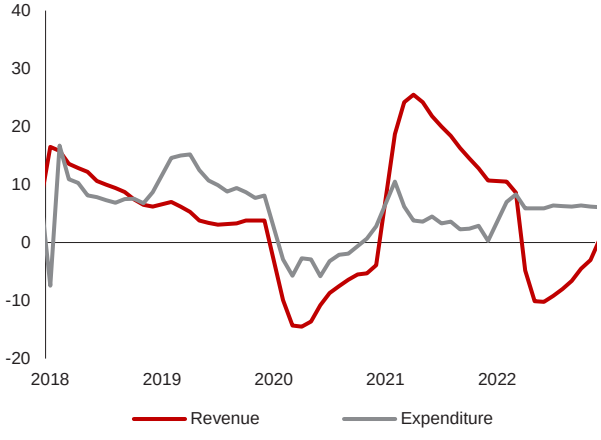


Source: The People's Bank of China.

Fiscal revenue growth slowed markedly in 2022 as the economy slowed, while spending growth stayed brisk.

Fiscal Revenue and Expenditure Growth

(Percent, year-on-year, year-to- date)



Source: China Ministry of Finance.

China: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	5.9	2.2	8.4	3.0
Private consumption	6.4	–0.9	9.8	1.8
Gross fixed capital formation	4.5	5.1	2.6	5.1
Imports of goods and services	–2.8	–0.4	30.1	7.9
Exports of goods and services	0.5	9.9	29.9	13.7
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	0.7	1.7	1.8	2.3
Trade balance	0.9	2.4	2.6	3.3
Capital and financial account balance	0.2	–0.6	–0.8	–1.7
Direct investment	0.4	0.7	1.2	0.2
Portfolio investment	0.4	0.6	0.3	0.3
Other investment	–0.7	–1.7	–1.3	–1.5
Errors and omissions	0.1	–0.2	–1.1	0.0
Overall balance	–0.1	0.9	0.1	0.3
Gross external debt	14.5	16.2	15.5	15.2
FX reserves (in USD billion, end of period)	3,107.9	3,216.5	3,250.2	3,127.7
Fiscal sector[1]	(in percent of GDP)			
Revenue and grants	19.3	18.0	17.7	16.8
Expenditure	24.2	24.2	21.5	21.5
Fiscal balance	–4.9	–6.2	–3.8	–4.9
Government debt	38.6	45.9	46.8	51.0
Monetary and financial sectors	(in annual percentage change)			
Broad money[2]	8.7	10.1	9.0	11.8
Total Social Financing	10.7	13.3	10.3	9.6
Memorandum items:				
Nominal GDP (in CNY trillion)	98.7	101.4	113.4	121.0
Headline inflation (in percent y-o-y, period average)	2.9	2.5	0.9	2.0
Lending prime rate, 1 year (period-end)	4.15	3.85	3.80	3.65
Exchange rate (in CNY/USD, period average)	6.91	6.90	6.45	6.74

Source: National authorities via CEIC and WIND; AMRO staff estimates.
Note: Numbers in red denote AMRO staff estimates. FX = foreign exchange. y-o-y = year-on-year.
1/ Includes only general government account and incorporates AMRO staff estimates.
2/ Broad money refers to M2.

Hong Kong, China

Economic recovery was interrupted by the outbreak of the fifth wave of the COVID-19 pandemic in the first quarter of 2022. Soaring new infections and stringent social distancing measures weighed heavily on domestic demand in Q1 2022, while the deteriorated external environment and regional logistical disruptions related to COVID-19 depressed exports, and tightened financial conditions posed constraint on domestic demand in the rest of the year. As a result, GDP contracted by 3.5 percent in 2022.

Labor market conditions deteriorated in early 2022 before improving gradually in the rest of the year. The seasonally adjusted unemployment rate increased to 5.4 percent in February–April, before declining to 3.5 percent in October–December, with total employment growing from 3.56 million to 3.67 million over the same period. Despite that unemployment rate was largely back to the pre-COVID-19 level of November 2019–January 2020, total employment was still 4.5 percent lower through those months, reflecting the impact of a shrinking labor force.

Inflation rose modestly in 2022 with headline CPI increasing by 1.9 percent, primarily due to the rising prices of imports. The geopolitical conflict and pandemic-related supply chain disruptions pushed up local energy and food prices, contributing the rise in the headline CPI. The private housing rental component of inflation decreased in 2022, helping to contain overall price pressures.

The overall external position has remained strong. Following a robust performance in 2021, Hong Kong's merchandise exports contracted by 8.6 percent in value in 2022. Supported by strong services and primary income surpluses, Hong Kong maintained a large current account surplus in the first three quarters of 2022. Reflecting outflows from the Hong Kong dollar and the triggering of the weak-side Convertibility Undertaking, foreign reserves decreased from USD 497 billion at the beginning of 2022 to USD 424 billion at the end of December.

The FY2022 fiscal budget aimed to deploy timely and effective fiscal measures to support the economy while buttressing long-term growth. The government budgeted over HKD 170 billion of counter-cyclical measures, including HKD 66 billion for a second round of consumption vouchers and HKD 54 billion for anti-pandemic and other measures targeted at supporting vulnerable sectors and households. Apart from the pandemic measures, the government also set aside funds to enhance Hong Kong's innovation and technology ecosystem and to deepen its integration into the Guangdong-Hong Kong-Macao Greater Bay Area. The updated fiscal outlook in September 2022 suggested that the consolidated fiscal deficit in FY2022 would likely exceed HKD 100 billion, which compared to HKD 56.3 billion announced in the February 2022 Budget Speech.

The banking sector remains resilient, bolstered by strong buffers and supported by COVID-19 relief measures. Bank capital and liquidity positions remain strong, together with improved profitability, providing a cushion against shocks despite lower profitability. Despite a slight uptick of nonperforming loan ratio from 0.88 percent at end-2021 to 1.38 percent at end-2022, the overall asset quality of Hong Kong's banking sector remains sound by historical and international standards.

Domestic financial and credit conditions have tightened in recent months. Loan demand weakened in 2022, mainly due to an uncertain external environment and rising interest rates. Hong Kong dollar interest rates have risen in tandem with United States' interest rates while volatility in financial markets has heightened amid the economic downturn and global financial backlash. The residential property market has softened, with its various segments displaying signs of downward pressure.

The government has stepped up efforts to boost the supply of both public and private housing to address the supply-demand imbalance and housing affordability. In 2022, the government announced it had identified sufficient land for providing 360,000 public housing units in the coming decade (i.e. from 2023–24 to 2032–33). The government also planned to introduce a new Light Public Housing scheme, which promises to produce 30,000 units of public housing in the coming five years. Taking into account the total supply of Light Public Housing and traditional public rental housing, the target is to cap the waiting time at about 6 years and shorten it to 4.5 years in four years' time (2026–27).

The growth outlook has improved on the back of the reopening of both mainland China and Hong Kong, although downside risks remain in the short term. A higher-for-longer United States policy interest rate would lead to much tighter domestic financial conditions, and weaken the recovery. If the United States and Europe were to go into recession, this could weaken Hong Kong's already feeble economic recovery in the short term. The mainland China's economic growth outlook would also would affect Hong Kong's inbound tourism and economic recovery. A sharp downshift in Hong Kong's property market, should it happen, would weigh on economic growth. In the medium term, further escalation of China-US tensions could undermine Hong Kong's role as an international financial and business center.

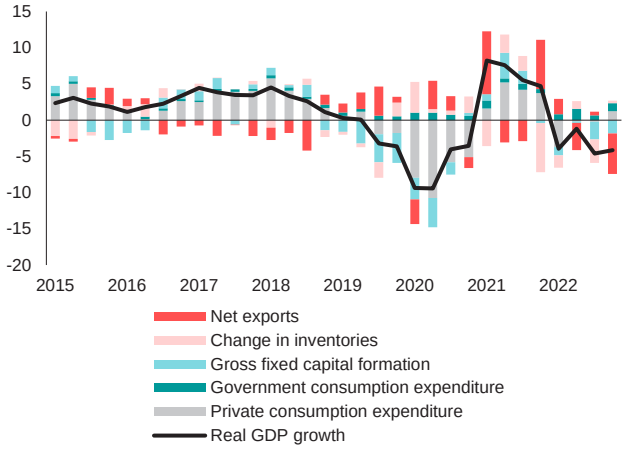
The author of this note is Fan Zhai.

Hong Kong, China: Selected Figures

Hong Kong's economy contracted in 2022 after a strong recovery in 2021.

Contributions of GDP Growth

(Percentage points, year-on-year)

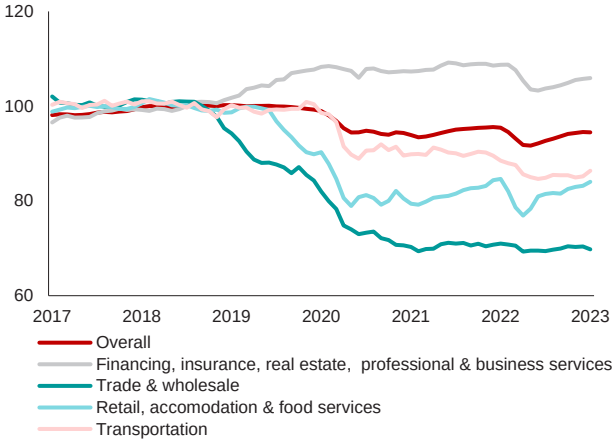


Source: Census and Statistics Department.

Overall employment improved in the second half of 2022, but the recovery remained uneven across sectors.

Employment by Sector

(Index, 2018=100, non-seasonally adjusted, three-month moving average)

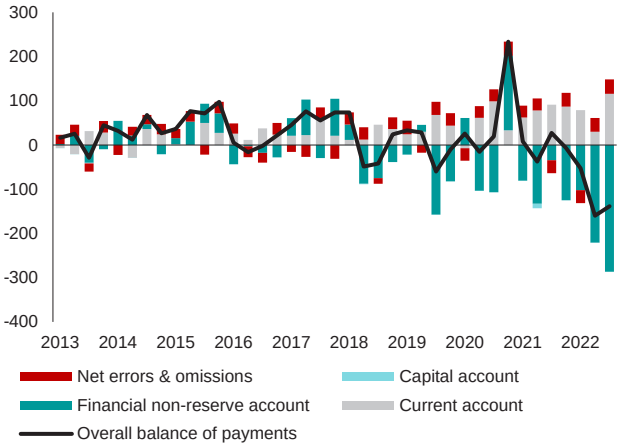


Source: Census and Statistics Department.

The external position deteriorated in 2022 amid capital outflow driven by rising US dollar interest rates.

Balance of Payments

(Billions of Hong Kong dollars)

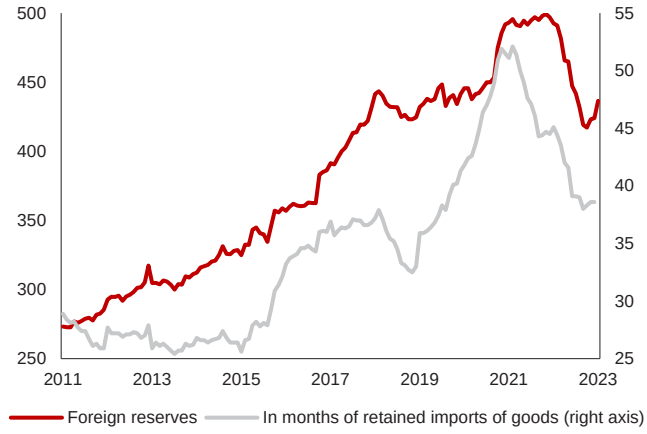


Sources: Census and Statistics Department.

Foreign exchange reserves remained ample, covering about 39 months of retained imports.

Foreign Reserves

(Millions of US dollars; months of imports)

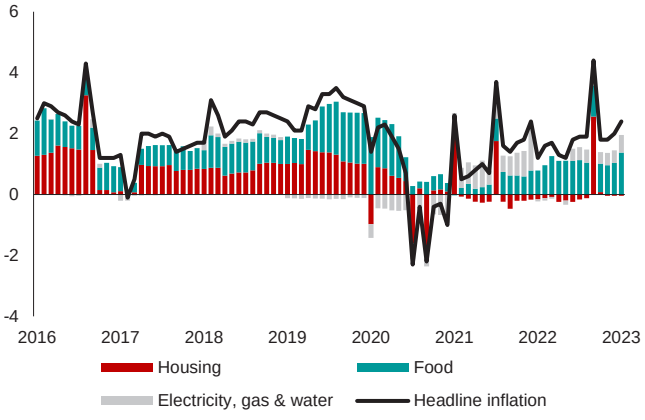


Source: Hong Kong Monetary Authority.

Inflation rose moderately on rising energy and food prices.

Contributions to Consumer Price Inflation

(Percentage points, year-on-year)

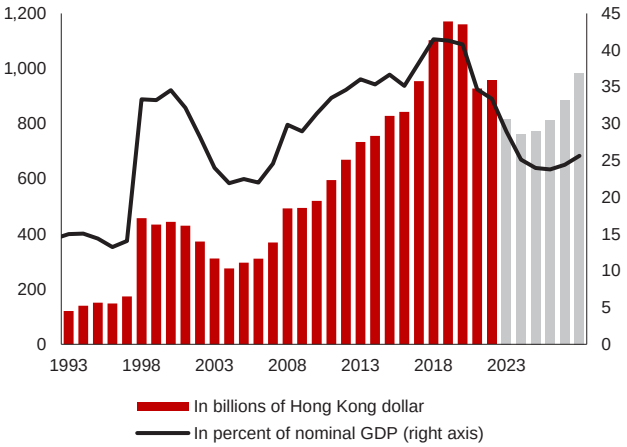


Source: Census and Statistics Department.

The government projected fiscal reserves as a percentage of GDP would revert its declining trend in FY2024.

Fiscal Reserves Projections

(Billions of Hong Kong dollars; percent of GDP)



Source: Financial Services and the Treasury Bureau.
Note: Grey bars denote government projections in the 2022 Budget Speech.

Hong Kong, China: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	–1.7	–6.5	6.4	–3.5
Private consumption	–0.8	–10.6	5.6	–1.0
Government consumption	5.1	7.9	5.9	8.1
Gross fixed capital formation	–14.9	–11.1	8.3	–8.5
Imports of goods and services	–7.2	–6.9	15.8	–12.2
Exports of goods and services	–6.1	–6.7	17.0	–12.6
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	5.9	7.0	11.8	6.6
Trade balance	1.6	1.9	5.6	0.5
Capital and financial account balance	–8.7	0.7	–13.4	–22.0
Direct investment	5.6	9.9	11.9	2.0
Portfolio investment	–7.6	–19.7	–21.6	–9.6
Other investment	–6.7	9.9	–4.8	–16.5
Errors and omissions	2.5	2.1	1.2	2.0
Overall balance	–0.3	9.8	–0.3	–13.4
Gross external debt	458.6	518.4	508.8	483.4
International reserves (in USD billion, end of period)	441.4	491.9	496.9	424.0
Fiscal sector[1]	(in percent of GDP)			
Revenue and grants	20.8	21.1	24.2	21.4
Expenditure	21.4	30.5	24.2	28.6
Fiscal balance	–0.6	–9.4	0.0	–7.3
Government debt	0.3	1.0	2.0	4.3
Monetary and financial sectors	(in annual percentage change)			
Broad money[2]	2.7	5.8	4.3	1.6
Domestic credit	6.7	1.2	3.8	–3.0
Private sector credit	6.8	1.6	4.8	0.0
Memorandum items:				
Nominal GDP (in HKD trillion)	2.8	2.7	2.9	2.8
Headline inflation (in percent y-o-y, period average)	2.9	0.3	1.6	1.9
Policy rate (in percent per annum)	2.54	0.90	0.50	2.13
Exchange rate (in HKD/USD, period average)	7.84	7.76	7.77	7.83

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: Numbers in red denote AMRO staff estimates. y-o-y = year-on-year.
1/ Refers to fiscal year, which starts on 1 April and ends on 31 March.
2/ Broad money refers to M3.

Indonesia

The Indonesian economy posted a solid recovery in 2022. Growth momentum was boosted by strengthened domestic demand, while exports benefited from elevated commodity prices and downstream efforts in natural resource-based industries. Real GDP grew by 5.3 percent in 2022 and is likely to remain firm in 2023, supported by resilient domestic demand amid an expected slowdown in global demand. Despite pass-through from soaring global food and fuel prices onto domestic prices, consumer price inflation was relatively more contained than in regional peers, and has moderated recently.

The external position remained strong in 2022. Like other emerging markets, Indonesia saw outflows from the government bond market due to risk aversion triggered by the US Federal Reserve aggressive monetary tightening. Rupiah stability was, nevertheless, maintained thanks to a current account surplus and increased FDI inflows. External debt declined steadily to about 30 percent of GDP by end-2022, down from about 35 percent in 2021 and 39 percent in 2020. The debt maturity structure remained sound with short-term external debt accounting for only about 17 percent of total external debt.

Listed firms' financial performance has improved. Increased earnings were observed in commodity exporters on the back of higher demand and prices. Likewise, resumed domestic activity benefited sectors that produce consumer goods. This was in line with the movement of the Jakarta Composite Index which outperformed regional peers in 2022.

Banking sector soundness has remained intact. Banks' profitability indicators improved on the back of a strong recovery in loan growth. Economic recovery also underpinned improved loan quality. Notably, the size of restructured loans moderated from 11 percent of total loans outstanding in 2021 to 8 percent as of October 2022. The nonperforming loan ratio also fell to 2.4 percent in December 2022, from 3.0 percent as at end-2021. At the same time, Indonesian banks remained well buffered with elevated capital adequacy ratio and provisions.

The central bank's policy mix has been appropriately adjusted in response to external headwinds to maintain growth momentum while ensuring financial stability. Bank Indonesia (BI) started to normalize the monetary policy by raising the rupiah reserve requirement ratio. BI also increased its benchmark policy rate to contain rising inflation expectations and support the rupiah exchange rate. As the banks remained financially sound, macroprudential policies stayed relaxed in line with other policy measures of the Financial System Stability Committee to support economic recovery.

Efforts to upgrade payment systems and promote financial inclusion have accelerated. Notably, BI launched the real-time retail payment system BI-FAST and expanded the standardized quick response payments at home and with neighboring countries. The recent publication of a white paper on Project Garuda on central bank digital currency was another step toward enhancing the payment system in the digital era.

The government has actively taken policy measures to contain inflation and maintain people's purchasing power. These include efforts to strengthen the inter-regional supply and distribution of necessity goods, notably food and food ingredients. To absorb the global commodity price shock, the government raised the subsidy spending in the 2022 budget and kept subsidized fuel prices unchanged. More recently, the government increased the prices of several types of subsidized fuel to minimize pressures on the budget, while providing additional cash transfers and wage subsidies to vulnerable groups.

The fiscal position has consolidated faster than budgeted on the back of robust revenue collection. Implementation of the 2021 tax reform package, coupled with rebounding economic activity and commodity price windfalls, underpinned a strong revenue performance in 2022. The budget deficit narrowed to 2.4 percent of GDP in 2022, one year ahead of the government plan of restoring a fiscal rule capping the budget deficit at 3 percent.

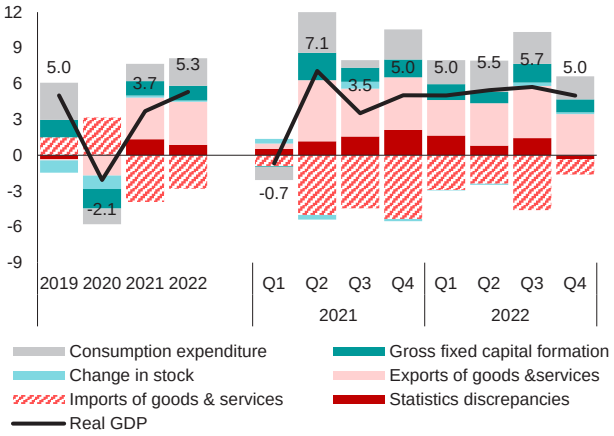
Indonesia's short-term outlook is weighed down by risks of a global slowdown and potential recession in some major trading partners. Meanwhile, a deepening of the global energy crisis may stoke inflation pressures, and cause the US Federal Reserve to tighten further, heightening uncertainty in global financial markets. On a positive note, recent easing of China's zero-COVID policy and a re-opening of its borders will benefit tourism and present an upside opportunity for Indonesia. Challenges in the medium to long-term arise from the need to improve the investment climate, supported by infrastructure development and connectivity enhancement. A smooth transition to a green and sustainable economy is also critical.

The author of this note is Thi Kim Cuc Nguyen.

Indonesia: Selected Figures

Recovery momentum strengthened in 2022, boosted by stronger domestic demand and resilient exports.

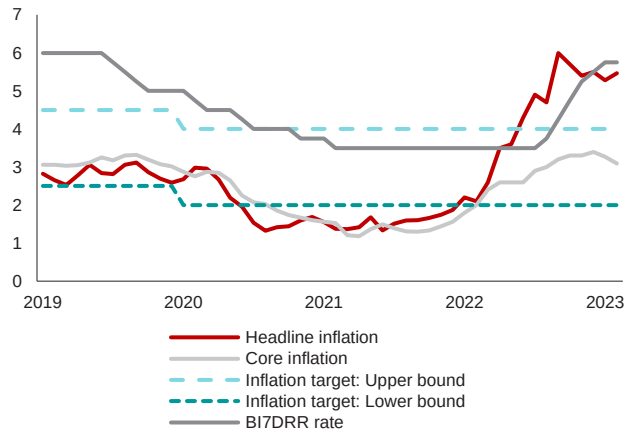
Contributions to Real GDP Growth
(Percentage points, year-on-year)



Source: Statistics Indonesia.

Bank Indonesia raised its benchmark policy rate from a record-low to contain inflation expectations arising from global commodity price shocks

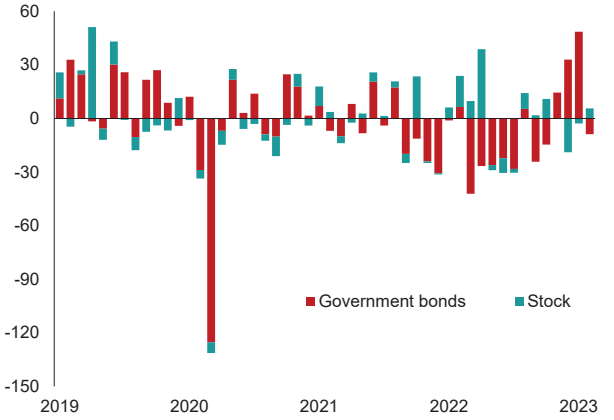
Consumer Price Inflation and Policy Rate
(Percent)



Source: Statistics Indonesia, Bank Indonesia.
Note: BI7DRR refers to Bank Indonesia's 7-day reverse repo rate.

Despite capital outflows, especially from the government bond market…

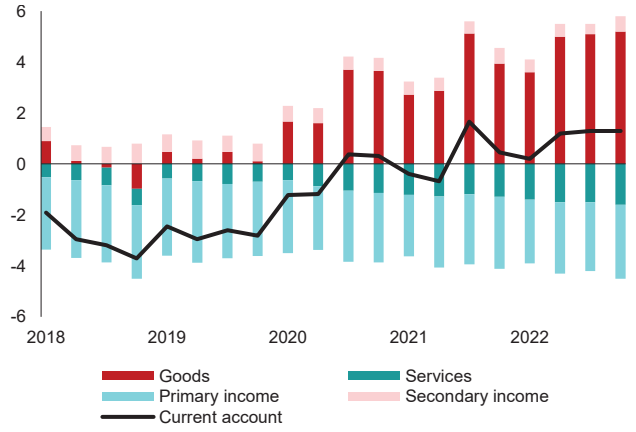
Net Capital Flows to Government Bond and Equity Markets
(Trillions of Indonesian rupiah)



Source: Indonesia Stock Exchange; Ministry of Finance of Indonesia.

… an improved current account balance, coupled with continued FDI…

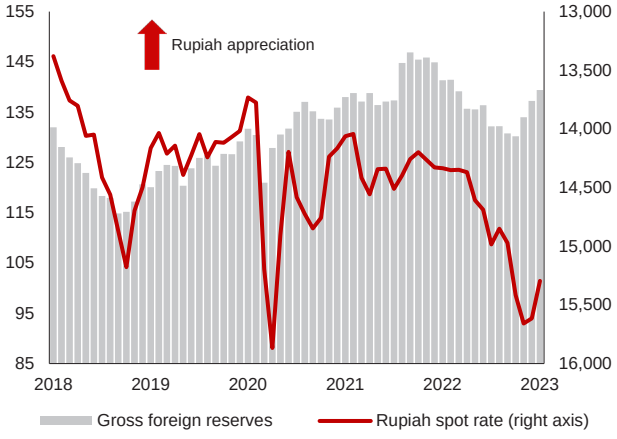
Current Account Balance
(Percent of GDP)



Source: Bank Indonesia.

… supported the rupiah and reserve position in 2022.

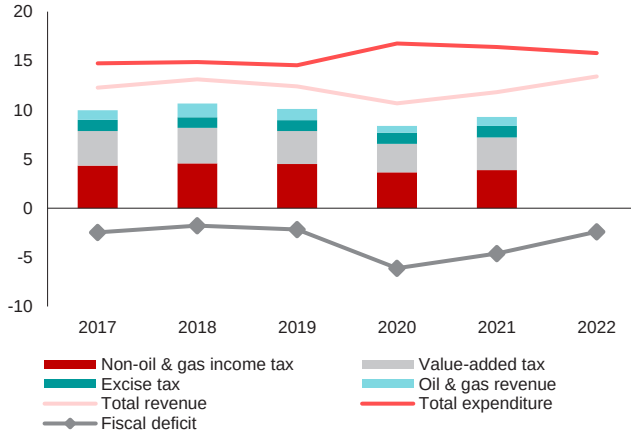
Gross Foreign Reserves and Rupiah Spot Rate
(Billions of US dollars; IDR/USD-reverse order)



Source: Bank Indonesia

A strong revenue performance underpinned the fiscal deficit to narrow to below 3 percent of GDP ahead of the government plan.

Budget Revenue, Expenditure, and Balance
(Percent of GDP)



Source: Ministry of Finance of Indonesia
Note: Data for 2022 are preliminary fiscal realization data announced by Ministry of Finance of Indonesia.

Indonesia: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	5.0	–2.1	3.7	5.3
Household consumption	5.0	–2.6	2.0	4.9
Government consumption	3.3	2.0	4.2	–4.5
Gross fixed capital formation	4.5	–5.0	3.8	3.9
Imports of goods and services	–7.1	–16.7	23.3	14.7
Exports of goods and services	–0.5	–8.1	24.0	16.3
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	–2.7	–0.4	0.3	1.0
Trade balance	–0.4	1.7	2.5	3.2
Capital and financial account balance	3.3	0.7	1.1	–0.7
Direct investment	1.8	1.3	1.5	1.1
Portfolio investment	2.0	0.3	0.4	–0.7
Other investment	–0.5	–0.9	–0.9	–1.1
Overall balance	0.4	0.2	1.1	0.3
Gross external debt	36.1	39.3	34.9	30.1
International reserves (in USD billion, end of period)	129.2	135.9	144.9	137.2
Fiscal sector	(in percent of GDP)			
Revenue and grants	12.4	10.7	11.9	13.4
Expenditure	14.5	16.8	16.4	15.8
Fiscal balance	–2.2	–6.1	–4.7	–2.4
Government debt	30.2	39.4	40.7	39.5
Monetary and financial sectors	(in annual percentage change)			
Broad money	6.5	12.5	14.0	8.4
Private sector credit	5.5	–1.7	5.2	10.6
Memorandum items:				
Nominal GDP (in IDR trillion)	15,834	15,434	16,971	19,588
Headline inflation (in percent y-o-y, period average)	3.0	2.0	1.6	4.2
Policy rate (in percent per annum)	5.00	3.75	3.50	5.50
Exchange rate (in IDR/USD, period average)	14,237	14,148	14,308	14,850

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates
Note: Numbers in red denote AMRO staff estimates. y-o-y = year-on-year.

Japan

The Japanese economy continued to recover at a moderate, though sometimes volatile, pace as the COVID-19 pandemic shifts to an endemic phase. An Omicron variant surge shrank GDP by 1.8 percent (annualized, quarter-on-quarter) in Q1 2022, and a strong 4.7 percent rebound in Q2 was followed by contraction again, by 1.1 percent, amid another spike in infections before the economy returned to growth of 0.1 percent in Q4. Overall, GDP grew 1.0 percent in 2022. Private consumption remained robust amid the recovery and business investment began to show some signs of improvement from the second quarter. However, exports continued to grow at a slower pace than imports.

Employment remained firm in 2022, as the growth of non-regular workers turned positive, recovering from the pandemic. The unemployment rate gradually declined to 2.4 percent in January 2023 from its 3.1 percent pandemic peak of October 2020. Nominal wage growth is now on a rising trend. However, escalating inflation has led to real wage growth turning negative since April 2022.

Consumer price inflation accelerated in 2022, mainly driven by soaring energy and food prices. Core CPI, less fresh food, rose by 4.2 percent year-on-year in January 2023, exceeding the Bank of Japan's (BOJ) price stability target. Stripping out fresh food and energy, "core-core" CPI inflation also rose strongly by 3.2 percent in the same month. That said, Japan's inflation remains relatively low compared to peer economies, with a modest increase in services prices, coupled with a limited pass-through of the cost of imported goods to consumer prices. Meanwhile, medium-term inflation expectations increased significantly to over 2 percent according to the BOJ Tankan survey.

Japan's external position remained resilient, supported by a large primary income surplus and substantial foreign reserves despite widening trade deficits. In 2022, the current account remained in surplus, while declining to 2.1 percent of GDP from 3.9 percent in 2021, reflecting higher commodity prices. The services account stayed in deficit, largely due to a sharp drop in inbound tourism. The primary income surplus remained strong in 2022, offsetting the trade deficit. The yen depreciated sharply against the US dollar by more than 12 percent in 2022, reflecting a diverging monetary policy stance from the US Federal Reserve and a widening trade deficit.

The banking sector remained largely sound. Bank lending expanded moderately in 2022 by 3.0 percent year-on-year, and broadly comparable to the pre-pandemic rate of 2–3 percent. The financing needs of small and medium-sized enterprises and households largely drove the loan growth. Asset quality in the banking system remained solid with the average nonperforming loan ratio standing at 1.3 percent as of March 2022. Capital adequacy ratios have been well above the regulatory requirements. Profitability picked up in FY2021 at major and regional banks, partly attributable to the BOJ's policy support during the pandemic. Liquidity conditions remained robust as deposits grew faster than loans. The liquidity coverage ratios at Japanese megabanks were higher than, or were comparable to, those of other global systemically important banks.

The fiscal deficit narrowed in FY2021 on the back of strong revenue collection after widening in FY2020 because of the massive COVID-19 stimulus packages. For FY2022, the government launched an emergency package of JPY 6.2 trillion, equivalent to 1.1 percent of GDP, primarily to mitigate the impacts of soaring crude oil and commodity prices, which was partly funded by a supplementary budget of JPY 2.7 trillion. In October 2022, the government announced another economic package, totaling JPY 39 trillion, equivalent to 6.9 percent of GDP, to mitigate the impact of price increases and to support investment and reforms for sustainable growth, which would be backed by a second supplementary budget proposal of JPY 29.6 trillion.

Japan's macro-financial outlook is tilted to the downside with substantial uncertainties, mainly from the external sector. A resurgence of global energy prices would hurt the Japanese economy, which relies on energy imports, by worsening the terms of trade and weighing down domestic consumption. A recession in the United States and Europe would dampen global demand and so make conditions difficult for Japan's manufacturing and export sectors.

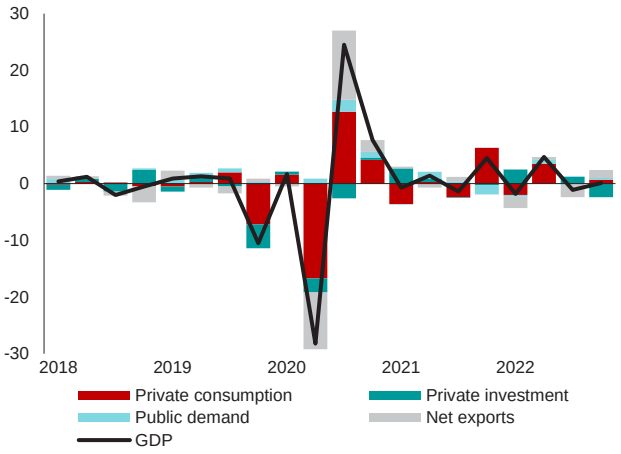
Medium- to long-term vulnerabilities and challenges include the low profitability of regional banks, weakening fiscal discipline, side-effects from prolonged monetary easing, and the demographic drag from population aging and low fertility rates.

The author of this note is Jinho Choi.

Japan: Selected Figures

Japanese economy continued to expand at a moderate pace in 2022.

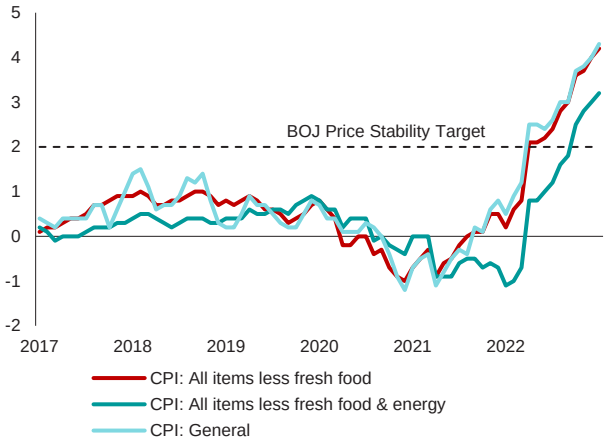
Contributions to Real GDP Growth
(Percent, quarter-on-quarter, seasonally adjusted annualized rate)



Source: Cabinet Office via Haver Analytics

Consumer price inflation accelerated in 2022 on the back of soaring energy and food prices.

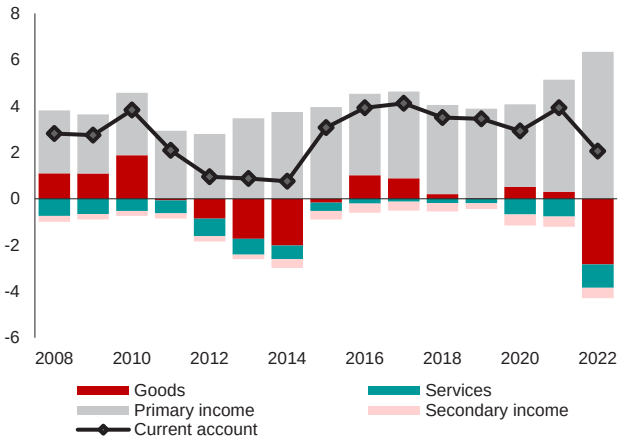
Consumer Price Inflation
(Percent, year-on-year)



Source: Ministry of Internal Affairs and Communications via Haver Analytics.
Note: CPI = consumer price index

The current account surplus remained resilient in 2022 on the back of a large primary balance surplus.

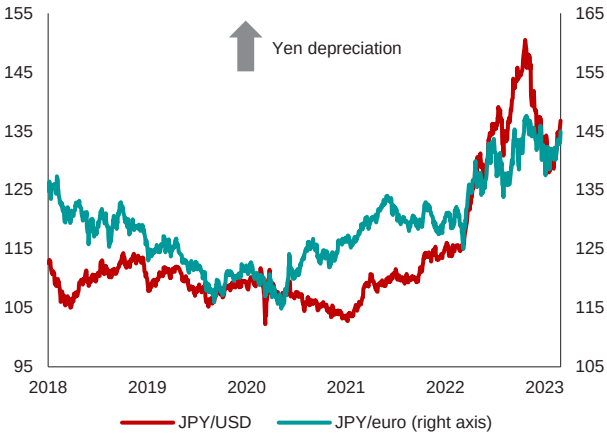
Current Account Balance
(Percent of GDP)



Source: Ministry of Finance via Haver Analytics

The yen depreciated sharply against the US dollar by more than 12 percent in 2022.

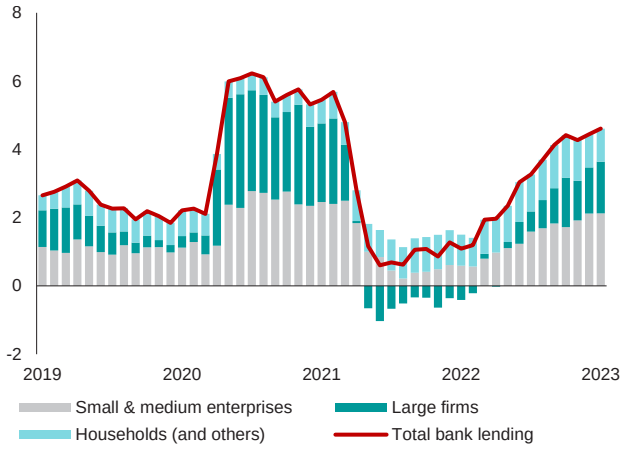
Exchange Rates
(JPY/USD; JPY/euro)



Source: Bank of Japan via Haver Analytics

Loan growth recovered to pre-pandemic levels, driven by financing needs of small and medium enterprises, and households.

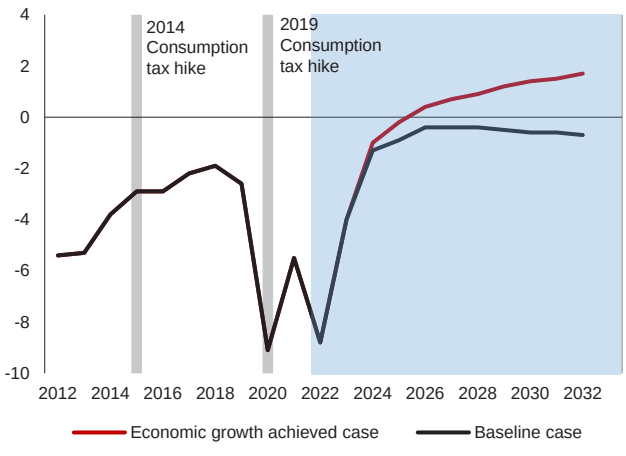
Contributions to Bank Lending Growth
(Percentage points, year-on-year)



Source: Bank of Japan via Haver Analytics

The fiscal deficit narrowed in FY2021 amid strong revenue collection.

Primary Balance of Central and Local Governments
(Percent of GDP)



Source: Cabinet Office (January 2023) via Haver Analytics.
Note: The shaded area indicates the Cabinet Office's projection period.

Japan: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	–0.4	–4.3	2.1	1.0
Private consumption	–0.6	–4.7	0.4	2.1
Government consumption	1.9	2.4	3.5	1.5
Gross fixed capital formation	0.5	–3.6	–0.1	–1.1
Imports of goods and services	1.0	–6.8	5.0	7.9
Exports of goods and services	–1.5	–11.6	11.7	4.9
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	3.5	2.9	3.9	2.1
Trade balance	–0.2	–0.2	–0.5	–3.8
Capital account balance	–0.1	0.0	–0.1	0.0
Financial account balance	4.0	2.4	1.8	2.7
Direct investment	4.3	1.7	3.6	3.2
Portfolio investment	1.7	0.8	–4.0	–3.5
Financial derivatives	0.1	0.1	0.4	0.9
Other investment	–2.1	–0.3	1.8	2.0
Errors and omissions	1.1	–0.3	–0.8	–0.6
Overall balance	0.5	0.2	1.3	–1.3
Gross external debt	83.0	92.7	96.4	101.8
International reserves (in USD billion, end of period)	1,323.8	1,394.7	1,405.8	1,227.6
Fiscal sector[1]	(in percent of GDP)			
Revenue and grants	35.4	36.8	38.0	41.2
Expenditure	38.6	46.8	43.9	50.6
Fiscal balance	–3.1	–10.0	–5.9	–9.4
Government debt	238.8	261.6	259.0	268.4
Monetary and financial sectors	(in annual percentage change)			
Broad money	1.7	4.1	5.6	4.0
Domestic credit	2.6	4.9	4.9	1.5
Private sector credit	3.6	5.4	7.0	0.3
Memorandum items:				
Nominal GDP (in JPY trillion)	557.9	539.1	549.4	556.4
Headline inflation (in percent y-o-y, period average)	0.5	0.0	–0.3	2.5
Core inflation[2] (in percent y-o-y, period average)	0.6	–0.2	–0.2	2.3
Policy rate (in percent per annum, end of period)	–0.1	–0.1	–0.1	–0.1
Exchange rate (in JPY/USD, period average)	109.0	106.8	109.8	131.4

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: Numbers in red denote AMRO staff estimates. y-o-y = year-on-year.
1/ Refers to fiscal year, which starts on 1 April and ends on 31 March.
2/ Refers to CPI of all items less fresh food

Korea

The Korean economy rebounded during 2021 and 2022 mainly on strong export growth and recovering private consumption. Real GDP growth in 2022 was 2.6 percent, above the potential growth rate estimate of 2.0 percent, driving the output gap into positive territory for the first time since 2020. However, economic recovery from the pandemic remains uneven across sectors. While manufacturing rebounded quickly, services recovered only gradually.

The labor market remained tight. The unemployment rate fell to 2.9 percent in 2022 from 4.0 percent in 2020. Total employment exceeded pre-pandemic levels, although again the jobs recovery was uneven, with accommodation and food services still lagging due to a heavy toll from the pandemic.

Headline inflation has probably peaked and is expected to decline to 3.3 percent in 2023 from 5.1 percent in 2022. The increase in inflation was broad-based in 2022, both from the supply side, reflecting rising energy and food prices, and from the demand side, spurred by the economic reopening and larger-than-expected fiscal stimuli. Core inflation, which excludes food and energy prices, also rose at a fast pace of 3.6 percent. Higher inflation appears to have transmitted to wage growth to some extent, but an inflation-wage spiral is expected to be unlikely even as the labor market is tight. Short-term inflation expectations have been high, although long-term expectations remain well anchored.

The external sector has been resilient despite widening trade deficits and some decline in foreign reserves. The current account surplus is forecast to narrow from 4.7 percent in 2021 to 1.8 percent in 2022 mainly due to trade deficits. International reserves dropped by USD 40 billion to USD 423 billion in 2022 amid the depreciation of the won and a continual net increase in residents' overseas portfolio investments. Despite the recent decline, foreign reserves remain ample, covering about 2.4 times short-term external debts and about six months' of imports.

Monetary policy tightening has become restrictive. To tame the rapid and broad-based increase in inflation following the surge in commodity and import prices together with elevated household debts, the Bank of Korea (BOK) has raised the base rate on 10 occasions since August 2021, to 3.50 percent from 0.50 percent, including two big hikes of 50 basis points each.

Financial institutions have slowed down lending since the BOK embarked on its hiking cycle, but borrowers' debt-servicing capacity has remained broadly robust. The slowdown of loan growth has been driven mainly by fewer household and small and medium enterprise loans as the cost of borrowing rose. Overall, the loan quality of banks and nonbank financial institutions remains sound. This is reflected by the low average delinquency rates. That said, the debt-servicing capability of young adults and small firms has deteriorated somewhat and could continue to worsen amid the increase in interest rates.

The property market has been slowing down since mid-2021. Housing demand softened due to the tighter financial environment amid stringent macroprudential measures and real estate taxes, and a slowdown in the domestic economy. Accordingly, mortgage lending moderated. Meanwhile, the supply shortage eased amid new housing coming on the market and a relaxation of housing redevelopment regulations. As a result, property and rental prices, especially for apartments, have continued to fall across the country.

The budget for 2023 and the National Fiscal Management Plan (NFMP) 2022–26 envisage a fiscal policy shift from expansion to consolidation. The fiscal deficit, excluding social security funds (SSFs), is budgeted to decline sharply to 2.6 percent of GDP in 2023, mainly attributable to the spending being cut by 6.0 percent relative to the second supplementary budget in 2022. Over the medium term, the NFMP 2022–26 aims to maintain the fiscal deficit (excluding SSFs) at mid-2 percent of GDP and the government debt at below mid-50 percent of GDP.

Risks to the economic outlook are tilted to the downside in the near term, with a lot of uncertainty surrounding the baseline forecast. Short-term risks include a weaker-than-expected recovery in China, more aggressive policy rate hikes by the US Federal Reserve, a sharper economic slowdown in advanced economies, the spread of new and more infectious coronavirus variants in Korea and its major trading partners, renewed commodity price hikes, and supply chain disruptions.

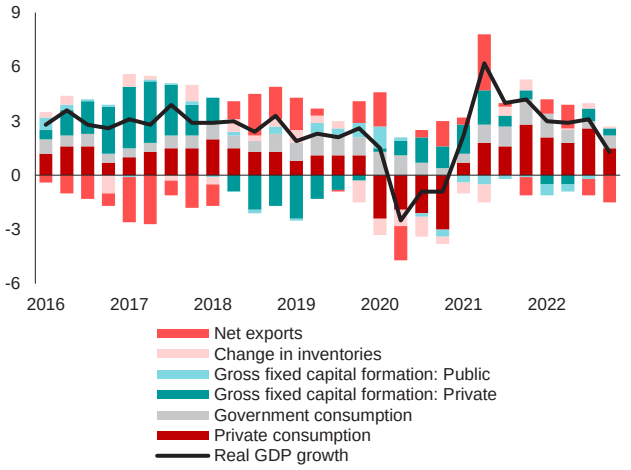
Over the medium term, a rising interest burden and slowing economy could lead to financial distress in vulnerable families and businesses, although household and corporate debt are generally sound. Vulnerabilities could also arise among some land developers and small securities companies. In addition, geopolitical tensions could intensify and dampen economic activities. In the long term, rapid population aging will aggravate the fiscal burden and weigh on the country's economic potential.

The author of this note is Xu (Kimi) Jiang.

Korea: Selected Figures

The Korean economy rebounded during 2021 and 2022, mainly on strong export growth and recovering private consumption.

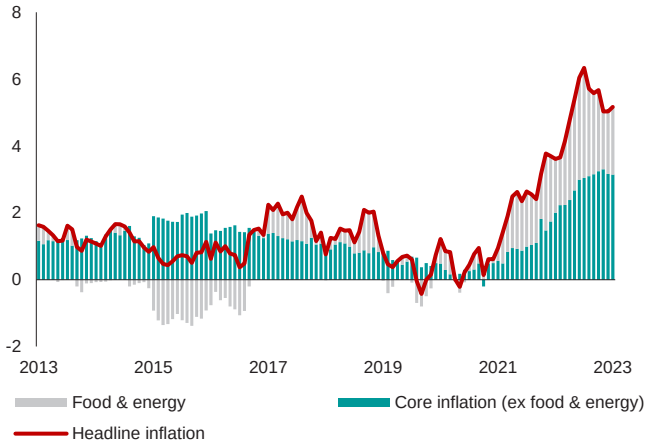
Contributions to Real GDP Growth
(Percentage points, year-on-year)



Source: Bank of Korea via Haver Analytics;

The increase in inflation was broad-based in 2022, both from the supply side and the demand side.

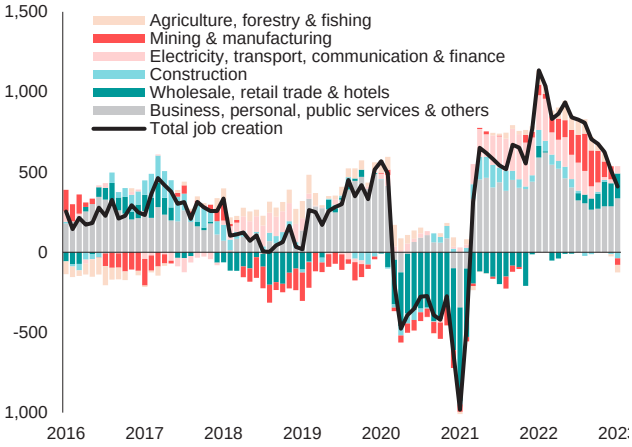
Contributions to Consumer Price Inflation
(Percentage points, year-on-year)



Source: Statistics Korea via Haver Analytics;

Job growth was strong in 2022, although uneven across sectors.

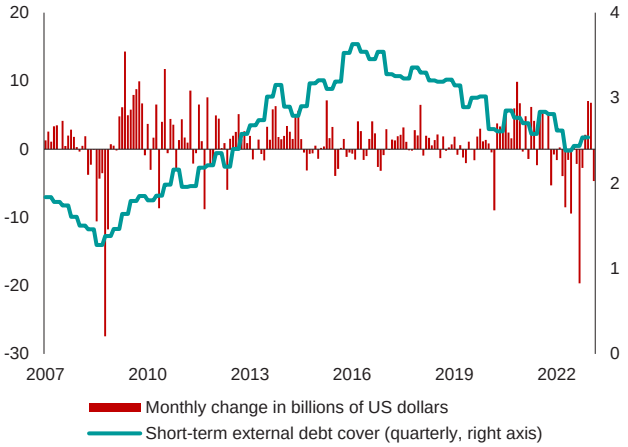
Change in Employment
(Thousands, year-on-year, non-seasonally adjusted)



Source: Statistics Korea via Haver Analytics; AMRO staff calculations

Despite the recent decline, foreign reserves remain ample, covering about 2.4 times short-term external debt.

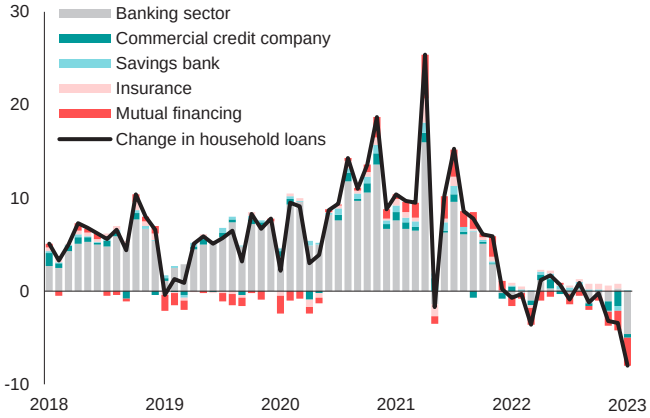
Foreign Exchange Reserves
(Billions of US dollars; times)



Source: Bank of Korea via Haver Analytics; AMRO staff calculations

Loans to the household declined in 2022, led by banking sector.

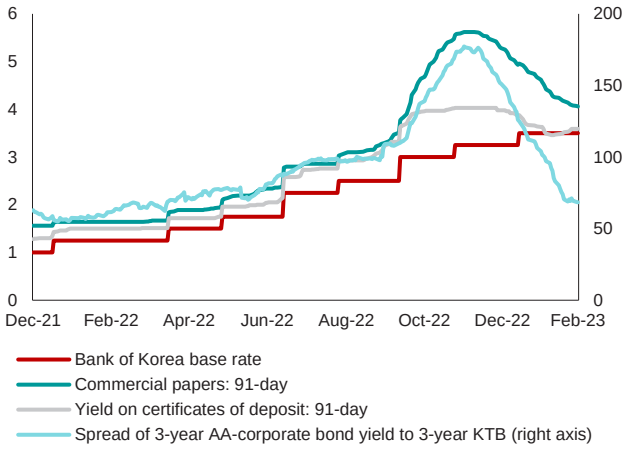
Change in Household Loans
(Trillions of Korean won, non-seasonally adjusted)



Source: Financial Supervisory Service via Haver Analytics

Yields of corporate bonds and short-term money market instruments rose rapidly in October and November 2022 following the default of the Legoland Korea developer.

Policy and Market Interest Rates
(Percentage; basis points)



Source: Bank of Korea via Haver Analytics; AMRO staff calculations.
Note: KTB = Korean treasury bond.

Korea: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	2.2	–0.7	4.1	2.6
Private consumption	2.1	–4.8	3.7	4.4
Government consumption	6.4	5.1	5.6	4.2
Gross fixed capital formation	–2.1	3.5	2.8	–0.9
Imports of goods and services	–1.9	–3.1	10.1	3.5
Exports of goods and services	0.2	–1.7	10.8	2.9
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	3.6	4.6	4.7	1.8
Trade balance	3.2	4.0	3.9	0.6
Capital and financial account balance	3.5	3.9	3.4	4.0
Direct investment	1.6	1.6	2.4	2.9
Portfolio investment	2.6	2.5	1.1	1.5
Other investment	–1.0	–0.5	–0.1	–0.9
Errors and omissions	0.0	0.4	–0.4	0.5
Overall balance	0.1	1.1	0.8	–1.7
Gross external debt	28.5	33.5	34.9	39.7
International reserves (in USD billion, end of period)	408.8	443.1	463.1	423.2
Fiscal sector	(in percent of GDP)			
Revenue	24.6	24.7	27.5	28.6
Expenditure	25.2	28.3	29.0	31.2
Fiscal balance (include social security funds)	–0.6	–3.7	–1.5	–2.7
Government debt[1]	37.6	43.6	46.9	49.5
Monetary and financial sectors	(in annual percentage change)			
Broad money	7.9	9.8	12.9	3.5
Domestic credit	9.6	9.7	12.1	8.0
Private sector credit	9.0	9.1	11.3	7.0
Memorandum items:				
Nominal GDP (in KRW trillion)	1,924.5	1,940.7	2,071.7	2,162.4
Headline inflation (in percent y-o-y, period average)	0.4	0.5	2.5	5.1
Policy rate (in percent, end of period)	1.25	0.50	1.00	3.50
Exchange rate (in KRW/USD, period average)	1,165.7	1,180.1	1,144.4	1,292.2

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates
Note: Numbers in red denote AMRO staff estimates. y-o-y = year-on-year.
1/ Government debt refers to only debt securities and loans.

Lao People's Democratic Republic

The Lao PDR's economy in 2022 continued to recover from the pandemic. The recovery was underpinned by strong construction and mining. Mobility data suggest that movement restrictions were no longer a constraint on domestic business amid the reopening of borders. On the other hand, extremely high inflation since mid-2022 dampened consumption. GDP growth is estimated at 4.0 percent in 2022. The closure of copper and gold mines could weaken growth in 2023, while the reopening of the Chinese border would increase FDI and tourist arrivals to Laos through the recently completed Lao-China railway.

Inflation has surged since mid-2022, driven by domestic and external factors. Domestic energy prices increased in 2022 due to the global oil price increase and depreciation of the kip. The Lao currency's sharp depreciation also pushed up food prices, partly due to the reliance on food imports. In addition, food prices spiked in September and October 2022, on account of higher logistics costs due to flooding.

The kip depreciated 30 percent against the US dollar in the parallel market between March and June 2022 and then stabilized. The depreciation was due to a sharp rise in spending on imports as a result of higher global oil prices, as well as high debt repayments and low repatriation of export earnings. The pace of depreciation slowed after July, helped by the Bank of the Lao PDR (BOL) issuing high-yield bonds in June to mop up liquidity. The kip gradually appreciated from around 19,000 LAK/USD in November 2022 to 17,000 LAK/USD in January 2023 amid the weakening of US dollar.

The external balance weakened in 2022, resulting in lower gross international reserves. The current account balance deteriorated with slower export growth while recovery and higher energy prices pushed up imports. The financial account turned negative due to an increase in debt repayments and a slowdown in FDI. Gross international reserves declined from USD 1.3 billion at the end of 2021 to USD 1.1 billion in September 2022.

Bank lending has picked up, while deposit growth has slowed in recent months. Strong loan growth, especially in kip loans, may be related to the improved financial position of construction companies as government arrears were cleared in 2021. In addition, two state-owned banks were recently recapitalized. Following the issuance of BOL bills in June, bank liquidity declined as depositors switched out of bank deposits. The kip loan-to-deposit ratio increased to 91.0 percent as of October 2022, up from 79.4 percent at the end of 2021.

The government continued its fiscal consolidation in 2022. The budget deficit was reduced to 0.6 percent of GDP in 2022 from 1.3 percent in 2021. In 2022, revenue growth was robust, driven by strong activity in the hydropower and mining sectors, while expenditure growth was moderate due to slower capital expenditure disbursements. However, despite fiscal consolidation, the public debt-to-GDP ratio estimated to have risen further from 75 percent to 97 percent of GDP in 2022 due to the decline in the exchange rate.

The external sector is exposed to downside risks. The global economic slowdown and the closure of copper and gold mines could weigh on growth and the external balance in future, although the reopening of the Chinese border would provide a boost to tourism. Given low gross international reserves, the kip remains vulnerable to external shocks, including higher energy prices and tighter US dollar financing conditions, amid large external debt repayments. Another round of kip depreciation could further accelerate inflation and weaken the balance sheets of firms whose borrowings are denominated in foreign currencies and revenues are in the kip, including Électricité du Laos (EDL), the state-owned electricity company.

Although financial soundness varies across banks, loan quality is subject to downside risks. Banque Pour Le Commerce Exterieur Lao Public, the largest bank with a 40 percent share in total bank deposits, reported a further decline in its capital adequacy ratio to below 6 percent in Q2 2022, against a regulatory minimum of 8 percent. While nonperforming loans ratios remained low and stable, bank asset quality could be affected by the withdrawal of regulatory forbearances on COVID-19-related restructured loans.

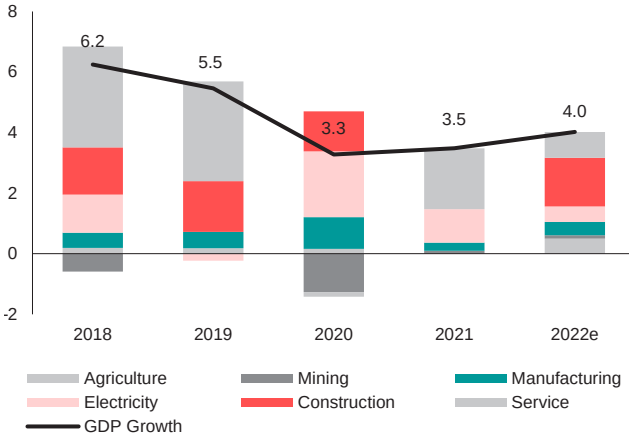
Given the low level of gross international reserves and limited access to external financing, the government's debt service capacity is a major concern. External debt service is expected to remain above USD 1 billion a year for the next few years, while securing external financing is challenging due to unfavorable market conditions and Lao PDR's low credit ratings. EDL's financial position continues to deteriorate due to operational and foreign exchange losses. EDL's financial difficulties could strain the fiscal position through delayed on-lending payments and potential bailout costs.

The author of this country note is Yoki Okawa.

Lao PDR: Selected Figures

The Lao PDR economy continues its recovery from pandemic in 2022.

Contributions to Real GDP Growth
(Percentage points, year-on-year)



Sources: Lao Statistics Bureau; and AMRO staff estimates.
Note: e denotes estimate.

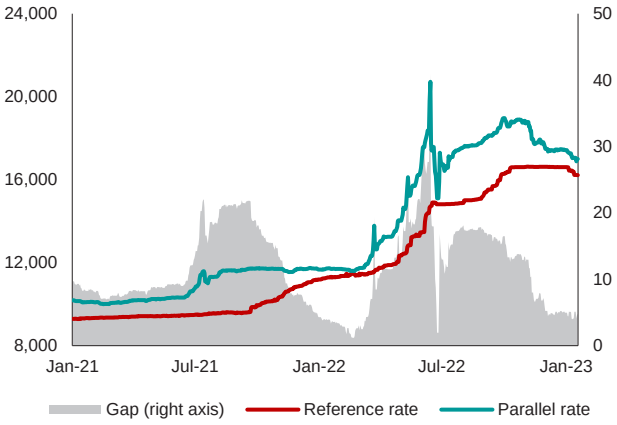
Inflation accelerated in 2022, driven by food price and currency depreciation.

Contributions to Consumer Price Inflation
(Percentage points, year-on-year)

Source: Lao Statistics Bureau.
Note: CPI = consumer price index.

The kip depreciated sharply from March to June 2022 while it gradually appreciated from November 2022 to January 2023.

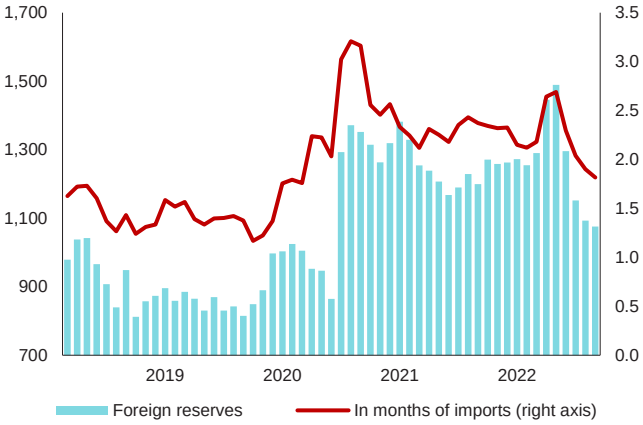
Exchange rates
(LAK/USD; percentage points)



Source: Bank of Lao PDR
Note: Gap is a difference between parallel rates and reference rates.

Foreign exchange reserves were on a downward trend in 2022.

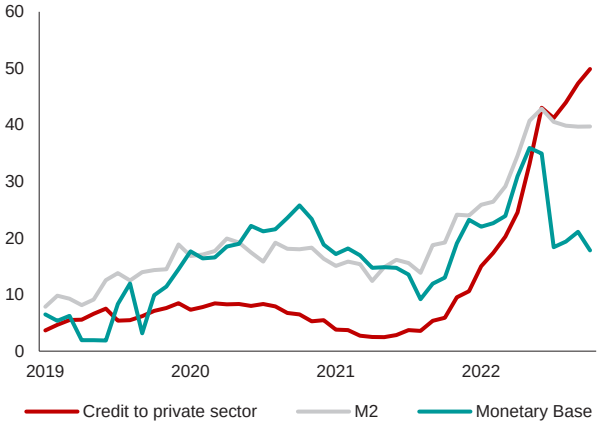
International Reserves
(Millions of US dollars; months of imports)



Source: Bank of Lao PDR; AMRO staff estimates.

Credit growth accelerated partly due to the improved financial conditions as public arrears were resolved.

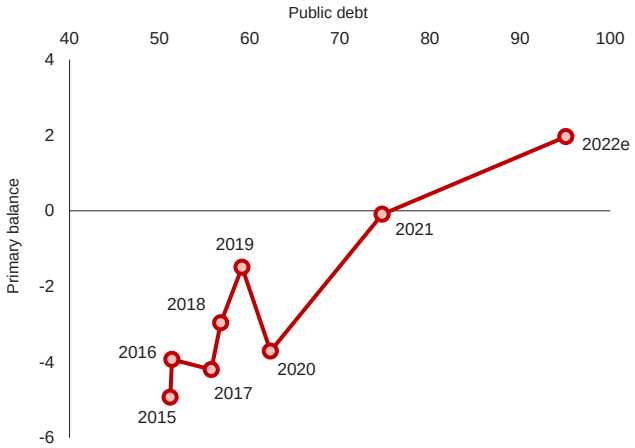
Credit Growth
(Percent, year-on-year)



Source: Bank of Lao PDR.

The primary balance improved in 2022 but public debt increased because of currency depreciation.

Primary Balance and Public Debt
(Percent of GDP)



Source: Ministry of Finance; AMRO staff estimates.
Note: e denotes estimate.

Lao PDR: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	5.5	3.3	3.5	4.0
Agriculture	1.2	1.1	1.5	2.4
Industry	5.6	9.2	6.1	4.8
Services	6.9	–1.2	1.4	3.9
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	–7.0	–1.2	2.7	–0.3
Trade balance	–2.8	3.4	6.8	5.3
Capital and financial account balance	10.4	5.7	1.6	–1.8
Direct investment	4.0	5.1	5.6	2.9
Portfolio investment	–0.2	–1.3	–1.6	–0.5
Other investment	6.6	1.9	–2.4	–4.1
Errors and omissions	–2.7	–2.8	–4.3	0.7
Overall balance	0.7	1.7	–0.3	–1.3
Gross external debt[1]	85.3	84.8	94.2	119.2
International reserves (in USD billion, end of period)	997.0	1,319.0	1,263.0	1,066.0
Fiscal sector	(in percent of GDP)			
Revenue and grants	15.6	12.7	14.7	15.3
Expenditure	18.8	17.9	16.0	16.3
Fiscal balance	–3.3	–5.2	–1.3	–1.0
Primary balance	–1.5	–3.7	–0.1	2.2
Government debt	59.1	62.3	74.7	95.1
Monetary and financial sectors	(in annual percentage change)			
Broad money	18.9	16.3	24.0	41.5
Domestic credit[2]	7.4	4.3	11.5	43.4
Private sector credit[3]	8.5	5.5	10.6	44.2
Memorandum items:				
Nominal GDP (in LAK billion)	162,657	172,612	184,981	211,604
Nominal GDP (in USD million)	18,737	19,076	19,056	14,742
GDP per capita (in USD)	2,630	2,637	2,593	1,974
Headline inflation (in percent y-o-y, period average)	3.3	5.1	3.8	23.0
Exchange rate (in LAK/USD, period average)	8,681	9,048	9,707	14,076

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates
Note: Numbers in red denote AMRO staff estimates. y-o-y = year-on-year.
1/ Using end of period exchange rates.
2/ Domestic credit composes net claims from central government, local government, nonfinancial corporations and households.
3/ Private sector credit excludes credit to state-owned enterprises.

Malaysia

The economy rebounded strongly in 2022, but with growth momentum eased somewhat toward the end of the year. From 3.1 percent in 2021, GDP growth increased to 8.7 percent in 2022. A strong recovery in domestic demand, particularly private consumption, drove Malaysia's GDP to expand by 6.9 percent year-on-year in the first half of 2022. Growth surged further to 14.2 percent in Q3 from a low base and due to robust exports, which received a boost from 1 April 2022 as international borders were reopened. Growth eased to 7.0 percent year-on-year in Q4, as weakening global demand began to weigh on Malaysia's manufacturing and external sectors, and the strong rebound in private consumption, which started in Q4 2021, peaked toward end-2022 as pandemic support measures were gradually unwound. Nonetheless, going forward, consumer demand is likely to remain supported by the sustained recovery of the labor market—in line with the pick-up in infrastructure investment and a strong pipeline of FDI—as well as ample household savings.

Price controls and subsidies have put a lid on inflation, although the broadening of price pressures has prompted a normalization of monetary policy. Headline inflation rose to 3.3 percent in 2022 from 2.5 percent in 2021, with price controls on selected food items and energy subsidies mitigating the pass-through of global inflation to domestic prices. However, a rebound in demand from the lifting of COVID-19 restrictions has contributed to a broadening of price pressures, with core inflation rising to its highest in nearly seven years, at 4.0–4.2 percent in September–December 2022. After taking its policy rates to a record low of 1.75 percent in 2020, Bank Negara Malaysia (BNM) started to normalize monetary policy in May 2022, raising the policy rate in four 25-basis-point increments to 2.75 percent by February 2023.

Robust trade surpluses and FDI inflows have kept Malaysia's external position strong despite some outflows of portfolio investment following aggressive monetary policy tightening by the US Federal Reserve in 2022. The trade surplus was supported by favorable terms of trade and upbeat demand for Malaysia's exports of commodities, electrical and electronic products, and other manufactured goods. At the same time, FDI rose remarkably to 4.1 percent of GDP in 2022, from 3.1 percent in 2021 and 2.2 percent in 2018–19. These positive developments have helped mitigate the decline in BNM's international reserves amid currency depreciation pressures and portfolio investment outflows as the US Federal Reserve monetary tightening triggered a reallocation of global funds to safer assets. BNM's international reserves remain adequate to cover short-term external liabilities despite a decline of USD 1.7 billion from USD 116.9 billion at end-2021 to USD 115.2 billion as of end-January 2023.

The banking system, with its ample capital and liquidity buffers, remains able to facilitate continued credit growth. The banking system's capital and liquidity buffers are well above their regulatory requirements of 10.5 percent (inclusive of the capital conservation buffer) and 100 percent, respectively. Loan impairments have likewise remained low at 1.72 percent of total loans at the end of 2022, only 0.05 percentage point higher from end-2021, despite heightened credit risks from the phasing out of the loan repayment assistance in June 2022 and higher borrowing costs. Loan growth picked up from 4.4 percent at end-2021 to peak at 6.8 percent in August before easing to 5.5 in November and 5.7 percent in December.

Fiscal performance in 2022 beat initial Ministry of Finance (MOF) projections, while the revised 2023 budget seeks to balance growth and fiscal consolidation. The fiscal deficit was at 5.6 percent of GDP in 2022 compared to the MOF's initial estimate of 6.0 percent, with fiscal revenue getting a boost from the surprise upside in global commodity prices and a robust domestic recovery. The revised 2023 budget, tabled by the new government on 24 February 2023, aims to continue to support growth and alleviate cost-of-living pressures. Yet, it takes on a faster pace of fiscal consolidation, with a projected fiscal deficit of 5.0 percent in 2023 and narrowing further to 3.2 percent in 2025, by raising new sources of revenue such as a luxury goods tax.

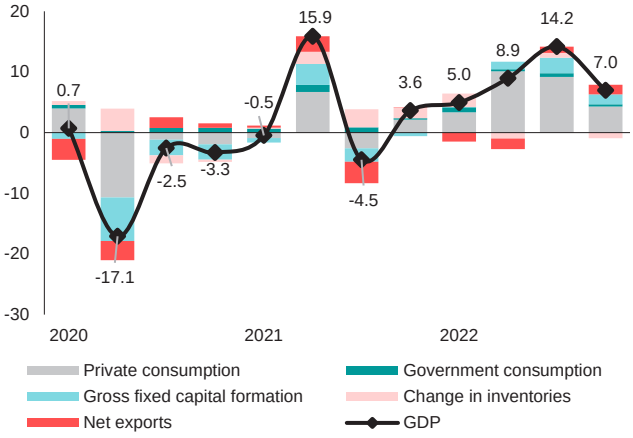
While the economy has recovered strongly from the COVID-19 pandemic, its near-term outlook faces multifaceted risks. Chief among them are: (1) a deeper, or more protracted, recession in the US and Europe, and a weak recovery of the Chinese economy, (2) elevated inflation due to supply related disruptions, such as from prolonged geopolitical conflicts and spikes in COVID-19 cases causing worker shortages in China, and (3) a sharp tightening of financial conditions, including renewed currency depreciation pressures, from the US Federal Reserve continued rate hikes. On the upside, the recent reopening of China's international borders could expedite recovery in Malaysia's tourism industry and support merchandise export.

The authors of this country note are Diana del Rosario and Wee Chian Koh.

Malaysia: Selected Figures

A strong recovery in consumer demand and a low base pushed up GDP growth to 8.7 percent in 2022.

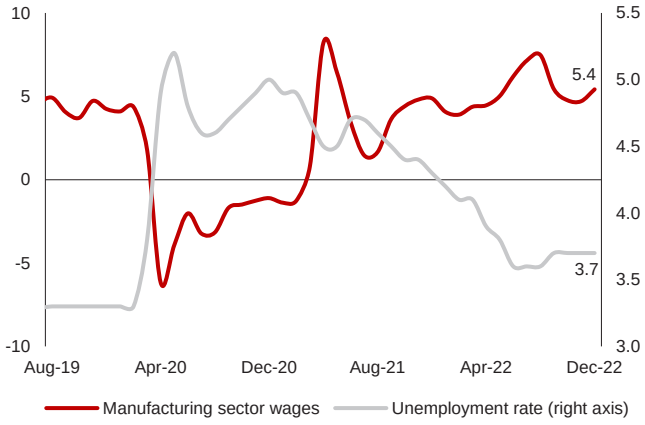
Contributions to Real GDP Growth
(Percentage points, year-on-year)



Source: Department of Statistics Malaysia; AMRO staff estimates.

Employment and wage growth are supporting the rebound in private consumption.

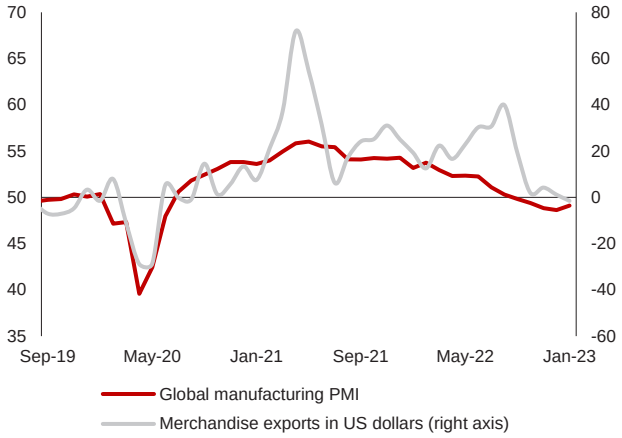
Wages and Unemployment Rate
(Percent year-on-year; percent, seasonally adjusted)



Source: Department of Statistics Malaysia.

Merchandise exports posted robust growth until closer to end-2022 when the global manufacturing outlook dimmed.

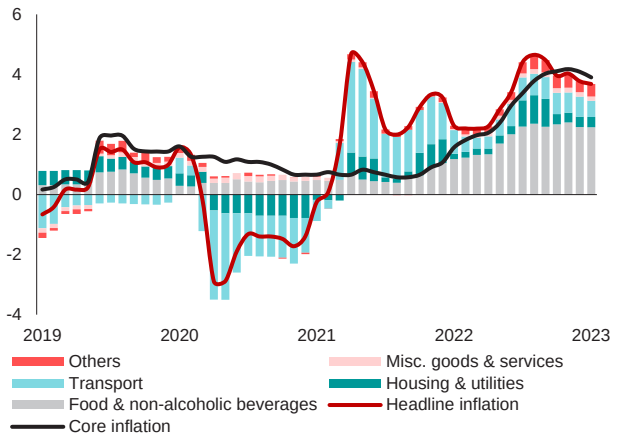
Manufacturing Sector PMI and Merchandise Exports
(Index; percent year-on-year)



Source: Bank Negara Malaysia; Department of Statistics Malaysia; S&P Global.
Note: For global manufacturing purchasing managers' index (PMI), data above level 50 denote expansion.

Price controls and subsidies have put a lid on headline inflation but have not kept core inflation from rising steadily.

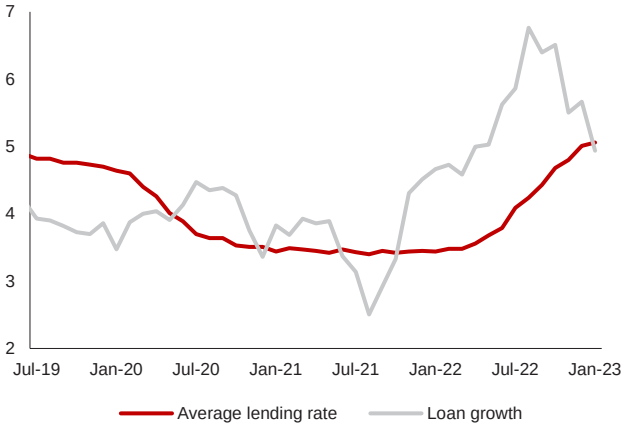
Contributions to Consumer Price Inflation
(Percentage points, year-on-year)



Source: Department of Statistics Malaysia.
Note: Misc. = miscellaneous.

Loan growth strengthened in 2022 despite the increase in lending rate following BNM's policy rate normalization.

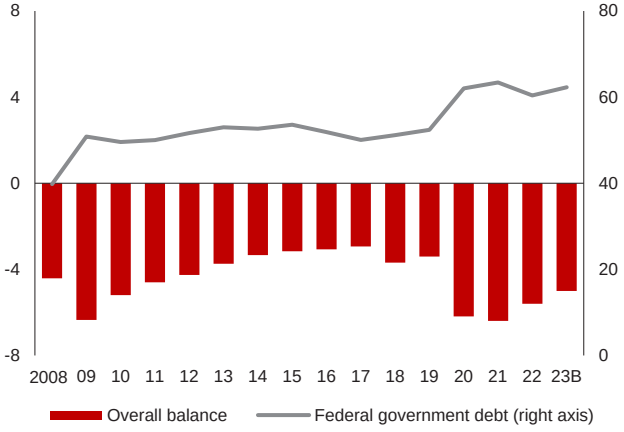
Lending Rate and Loan Growth
(Percent, percent year-on-year)



Source: Bank Negara Malaysia.

The fiscal deficit and government debt, after rising in 2020-2021, have remained well above pre-pandemic levels.

Fiscal Balance and Federal Government Debt
(Percent of GDP; percent of GDP)



Source: Bank Negara Malaysia; Department of Statistics Malaysia; Malaysia Ministry of Finance; AMRO staff estimates.
Note: 23B refers to estimates under the revised 2023 budget.

Malaysia: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	4.4	–5.5	3.1	8.7
Private consumption	7.7	–4.2	1.9	11.3
Government consumption	1.5	5.0	5.3	3.9
Gross fixed capital formation	–2.1	–14.4	–0.9	6.8
Imports of goods and services	–2.4	–7.9	17.7	14.2
Exports of goods and services	–1.0	–8.6	15.4	12.8
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	3.5	4.2	3.8	2.6
Trade balance	7.5	6.4	7.1	6.9
Capital and financial account balance	–2.5	–5.5	0.8	0.8
Direct investment	0.4	0.2	1.8	0.9
Portfolio investment	–2.1	–3.5	1.2	–2.9
Other investment	–0.8	–2.2	–2.1	2.9
Errors and omissions	–0.5	0.0	–1.6	–0.5
Overall balance	0.6	–1.4	3.0	3.0
Gross external debt	62.6	67.6	70.0	64.0
International reserves (in USD billion, end of period)	103.6	107.6	116.9	114.6
Fiscal sector	(in percent of GDP)			
Revenue and grants	17.5	15.9	15.1	16.5
Expenditure	21.0	22.2	21.5	22.0
Fiscal balance	–3.4	–6.2	–6.4	–5.6
Government debt	52.4	62.0	63.4	60.4
Monetary and financial sectors	(in annual percentage change)			
Broad money	3.5	4.0	6.4	4.3
Private sector credit	4.4	3.5	3.8	5.2
Loans	4.2	3.2	4.5	5.7
Securities	5.7	6.0	–0.7	1.2
Memorandum items:				
Nominal GDP (in MYR billion)	1,513	1,418	1,545	1,788
Headline inflation (in percent y-o-y, period average)	0.7	–1.2	2.5	3.3
Policy rate (in percent per annum)	3.00	1.75	1.75	2.75
Exchange rate (in MYR/USD, period average)	4.14	4.20	4.14	4.40

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimation.
Note: y-o-y = year-on-year.

Myanmar

After a sharp decline in GDP 2021, the Myanmar economy recovered modestly in 2022. The COVID-19 infection has subsided and caseload has remained low after slightly picking up in September. The ban on international flights was lifted since late April. Google mobility data show that activities such as the workplace and grocery shopping have recovered in big cities. Overall, domestic consumption is resilient and gradually recovering with the resumption of activities. Manufacturing has been weighed down in recent months by electricity outages, supply-chain disruptions, and spikes in fuel prices, while garment exports have started to recover, yet remain below pre-pandemic level.

Inflation rose significantly in 2022 on the back of higher energy and food prices amid the significant depreciation of kyat. Headline inflation has been trending up, reaching 19.6 percent year-on-year in July 2022, up from 12.6 percent at the end of 2021. Rising energy prices and exchange rate depreciation were the key factors behind the surge. Food inflation has also been rising on the back of supply chain disruptions and higher transport costs.

Myanmar's external position deteriorated amid a decline in exports, a pullback in FDI, and a drop in overseas remittances. Trade volumes, especially border trade, have been gradually rebounding after Thailand and China reopened their borders. Service income deteriorated amid a collapse in tourism-related services during the pandemic. Investment has fallen due to a halt in new FDI inflows as business conditions worsened and amid continuing uncertainties since a state emergency was announced in February 2021. As a result, the current account turned into a deficit of USD 1 billion in FY2021/22 while the financial account deteriorated to a small surplus of USD 0.9 billion. The overall balance of payments was estimated to be in a slight deficit of USD 0.06 billion.

Overall financial condition has remained constrained since 2021. Outstanding loans to the private sector increased by only 0.02 percent in 2021, down from 4.2 percent in 2020, reflecting the weak economy. Bank funding also tightened as deposits fell by 12.9 percent in 2021. The Central Bank of Myanmar (CBM) has maintained its policy rate at 7 percent since May 2020.

In FY2020/21, both expenditure and revenue declined significantly. Notwithstanding a sharp contraction in GDP, government revenue is estimated to have increased by 36.7 percent due to an improvement in tax collection on local production, import duties, and consumption. Government expenditure is estimated to have increased by 24.8 percent due to a rise in interest payments. The overall fiscal deficit narrowed to 7.0 percent of GDP in FY 2021/22, down from 7.7 percent in FY2020/21. External financing declined significantly, with USD 837 million in disbursements in 2021, down from almost USD 2 billion in 2020.

The uncertain business environment amid recurrent COVID-19 outbreaks, political uncertainties, and sanctions from advanced economies, will continue to dampen investor sentiment. Uncertainties linger and headwinds are gathering, particularly on the political front. Targeted sanctions imposed primarily by the United States and European Union have discouraged new FDI inflows, cut off support from international donors, and prompted several multinational corporations to adopt a wait-and-see strategy. Furthermore, a blacklisting by the Financial Action Task Force after banks in Myanmar failed to implement counter-terrorism and anti-financial crime measures in October 2022 would pose difficulties to businesses in transferring funds in and out of the country.

The banking sector remains highly vulnerable amid mounting risks. Although some bank functions have resumed, overall banking sector soundness, including asset quality and capital adequacy, has deteriorated since the state emergency was declared. Also, as deposits have stagnated and the business outlook is uncertain, bank credit support to the private sector will continue to be tepid, and informal lending may play a bigger role.

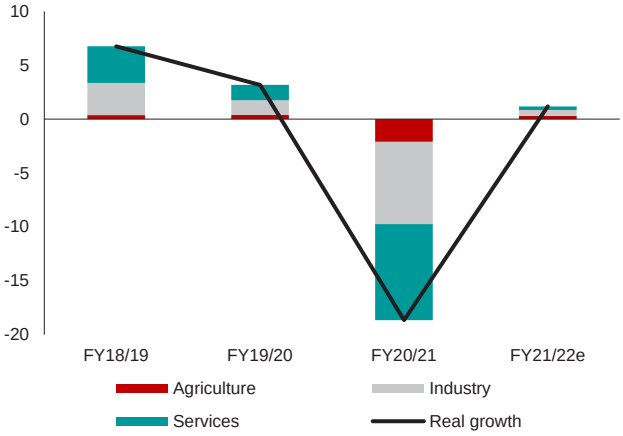
The kyat continues to be under significant pressure, with a persistent divergence between the official and parallel rates. Foreign exchange has been a severe shortage in Myanmar since 2021. In response, the CBM has tightened regulations, including foreign exchange surrender requirements, which has had significant negative impacts on businesses and households.

The author of this note is Tanyasorn Ekapirak.

Myanmar: Selected Figures

After a sharp decline in GDP in 2021, the Myanmar economy started to recover modestly in 2022.

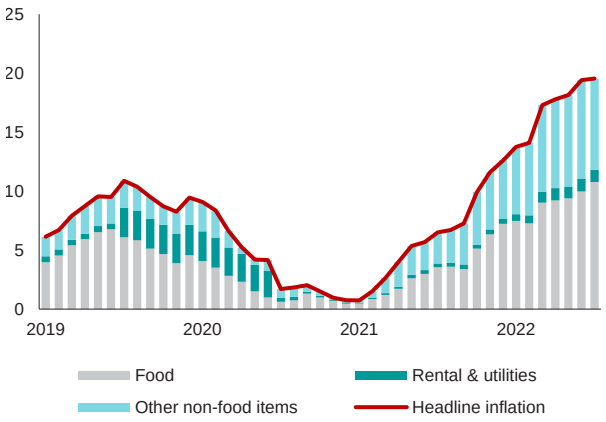
Contributions to Real GDP Growth
(Percent points, year-on-year)



Source: Ministry of Planning and Finance; AMRO staff estimation.
Note: e denotes estimate. FY denotes fiscal year.

Inflation has risen significantly in 2022 on the back of higher energy and food prices

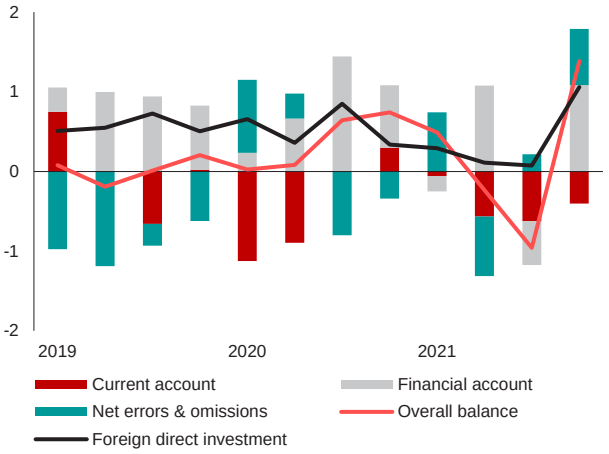
Contributions to Consumer Price Inflation
(Percentage points, year-on-year)



Source: Central Statistical Organization.

External position deteriorated amid a pullback in FDI and a drop in overseas remittances.

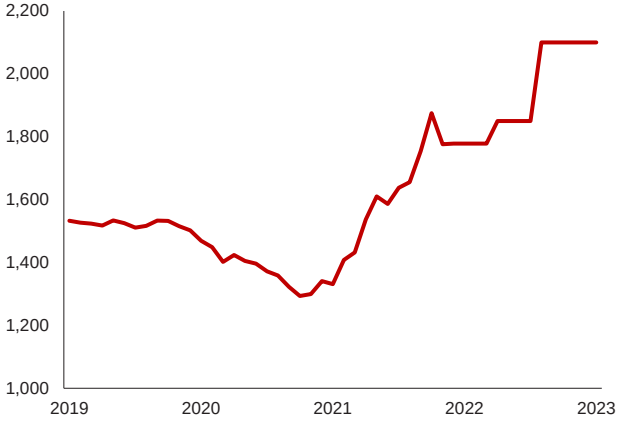
Balance of Payments
(Percent of GDP)



Source: Central Bank of Myanmar; AMRO staff calculations.

The Central Bank of Myanmar set the official exchange rate at 2,100 MMK/USD amid significant downward pressure on the currency.

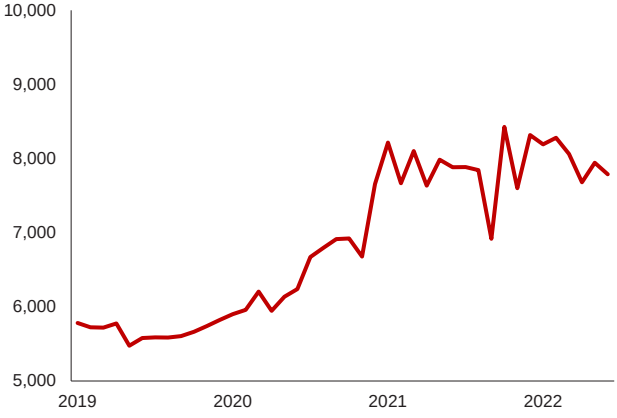
Exchange Rate
(MMK/USD)



Source: Central Bank of Myanmar.

Foreign reserves continued to be under pressure amid significant uncertainties.

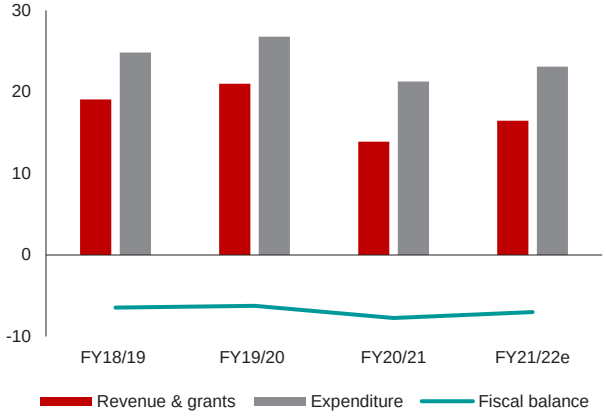
Gross International Reserves
(Millions of US dollars)



Source: Central Bank of Myanmar.

The fiscal deficit remained elevated.

Fiscal Balance
(Percent of GDP)



Source: Ministry of Planning and Finance.
Note: e denotes estimate. FY denotes fiscal year.

Myanmar: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	6.8	3.2	–18.7	1.2
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	–0.2	–2.5	–0.2	–4.3
Trade balance	–4.3	–5.3	–1.6	–3.7
Capital and financial account balance	3.3	4.3	2.6	2.4
Direct investment	2.4	3.0	1.4	1.8
Other investment	1.5	1.8	1.5	–1.2
Errors and omissions	–2.7	–0.2	–2.4	2.6
Overall balance	0.3	1.5	0.0	0.8
Gross external debt	14.7	15.1	15.6	17.1
International reserves (in USD million, end of period)	5,604.6	6,913.4	6,917.9	6,858.7
Fiscal sector[1]	(in percent of GDP)			
Revenue and grants	18.7	20.5	13.5	16.4
Expenditure	24.9	26.8	21.3	23.1
Fiscal balance	–6.5	–6.2	–7.7	–6.7
Government debt	38.7	42.2	51.0	55.8
Monetary and financial sectors	(in annual percentage change)			
Broad money	15.4	15.0	11.4	–0.7
Domestic credit	17.4	14.4	14.5	7.9
Private sector credit	16.1	8.6	1.5	0.6
Memorandum items:				
Headline inflation (in percent yoy, period average)	8.6	5.8	3.6	18.2
Policy rate (in percent per annum, end period)	10.00	7.00	7.00	7.00
Exchange rate (in MMK/USD, period average)	1,531.9	1,426.0	1,493.7	1,856.7

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimation.
Note: Red number denotes AMRO staff estimate. y-o-y = year-on-year.
1/ Refers to fiscal year, which starts on 1 October and ends on 30 September.

The Philippines

The Philippine economy registered a strong recovery in 2022 amid a calibrated relaxation of quarantine protocols and continued progress in the government's vaccination program. GDP growth was 7.6 percent in 2022, following a post-pandemic rebound of 5.7 percent in 2021. The recovery was mainly driven by an improvement in private investment and household consumption. On the production side, the main driver of GDP recovery was the services sector, particularly wholesale and retail trade. The labor market also improved markedly. Unemployment rate was at 4.3 percent in December 2022, which was lower than the pre-pandemic rate of 4.6 percent. In addition, both employment and the labor force participation rates have surpassed pre-pandemic levels.

Headline inflation picked up rapidly in 2022 owing to rising oil and food prices. The average inflation rate rose from 3.9 percent in 2021 to 5.8 percent in 2022 following higher energy prices, domestic food shortages, which eventually led to second-round effects. Core inflation, which is the headline inflation excluding food and energy items, also increased from 3.0 percent to 3.9 percent, suggesting that the inflation pressures were broad-based.

The external position remained sound despite an increase in the current account deficit from USD 6.0 billion in 2021 to USD 17.8 billion in Q1–Q3 2022, or 6.1 percent of GDP. The widening was partly offset by net inflows in the financial account of USD 10.3 billion. Weakening in the current account, mainly due to an increase in the trade deficit coupled with the US dollar strength to exert downward pressure on the peso. The peso depreciated from 50.8 PHP/USD in early 2022 to an all-time low of 59.2 PHP/USD in late September before rebounding to 56.1 PHP/USD at the end of the year. Over 2022, while the peso depreciated by 10.5 percent against the US dollar, it was by only 3.3 percent in nominal effective terms. Meanwhile, the gross international reserves declined from USD 108.8 billion at end-2021 to USD 96.1 billion at end-2022, due mainly to the government's repayments of its foreign currency debt. That level is sufficient to cover short-term external funding needs with import coverage of 7.3 months and 3.9 times the short-term external debt as of December 2022.

The Bangko Sentral ng Pilipinas (BSP) started to normalize its monetary policy stance in May 2022 as inflation pressure intensified. In 2022, the BSP raised the policy rate seven times from a historic low of 2.0 percent to 5.5 percent in December. The BSP has already started to unwind some of the measures implemented to cushion the pandemic impact. Measures included repo transactions, and treasury bond purchases in the secondary market.

In 2022, loan growth picked up steadily across sectors, rising from 4.8 percent year-on-year in December 2021 to 13.4 percent in December 2022. Benefiting from relaxing pandemic restrictions, loans to the real estate, manufacturing, and services sectors, and for household consumption expanded significantly. Meanwhile, loan growth was boosted by write-offs of nonperforming loans under the Financial Institutions Strategic Transfer Act, which helped to free up banks' balance sheets for new lending.

The fiscal situation improved in 2022, driven mainly by solid revenue performance. In 2022, the government revenue increased by 18 percent compared to 2021. This was attributable to robust economic recovery, high commodity prices, and improved tax administration. Meanwhile, expenditure grew by 10.4 percent while infrastructure spending rose by 14.3 percent in the first eleven months, consistent with economic growth. As a result, the fiscal deficit fell to 7.3 percent of GDP in 2022, compared with 8.6 percent of GDP in 2021.

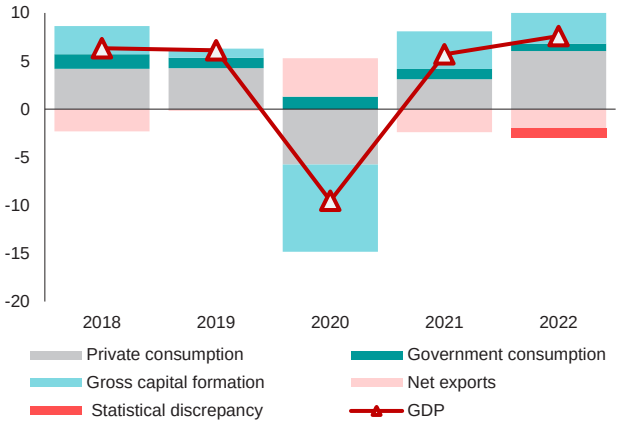
Several risks and challenges are clouding the Philippine economic recovery. High inflation and global economic slowdown weigh on growth prospect. High inflation caused by the Ukraine crisis and the influence of other supply factors could dampen domestic consumption. High food and oil prices in particular have impacted households' ability to afford other discretionary items. A weak economic recovery in China and slower global growth would affect exports, although the direct impact will be limited as the contribution of merchandise trade to the economy is less significant. In addition, capital flow volatility could heighten in the short term should, as expected, global financial conditions tighten significantly. Over a longer term, scarring effects of the pandemic could become more apparent. The challenge will be to address the learning losses from repeated school closures during the pandemic, which may impact productivity and growth potential. Moreover, the Philippines' social and economic costs of natural disasters are increasing due to global climate change, given that the Philippines is among the countries that are most susceptible to natural disasters. These points raise the urgency for the Philippines to take action to build resilient, sustainable, and inclusive long-term growth.

The author of this note is Heung Chun (Andrew) Tsang.

The Philippines: Selected Figures

The momentum of economic recovery strengthened.

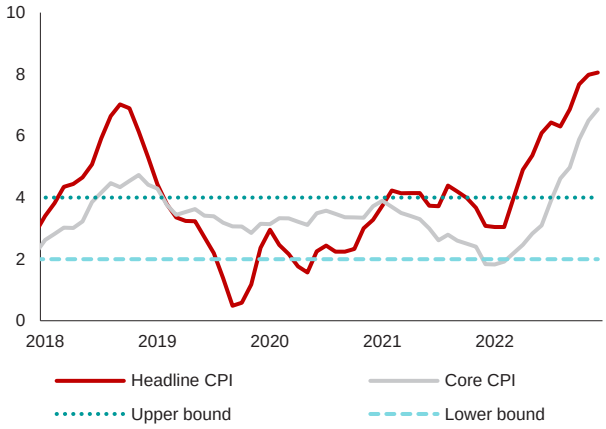
Contributions to Real GDP Growth
(Percentage points, year-on-year)



Source: Philippine Statistics Authority; AMRO staff calculations.

Inflation accelerated and stayed above the 2–4 percent target range.

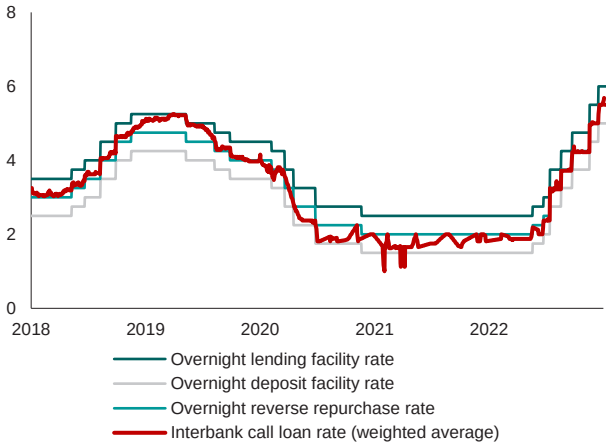
Consumer Price Inflation and Inflation Target
(Percent, year-on-year)



Source: Philippine Statistics Authority; AMRO staff calculations.
Note: Data for inflation is calculated from consumer price index (CPI, base year = 2018).

Monetary policy started to tighten in 2022.

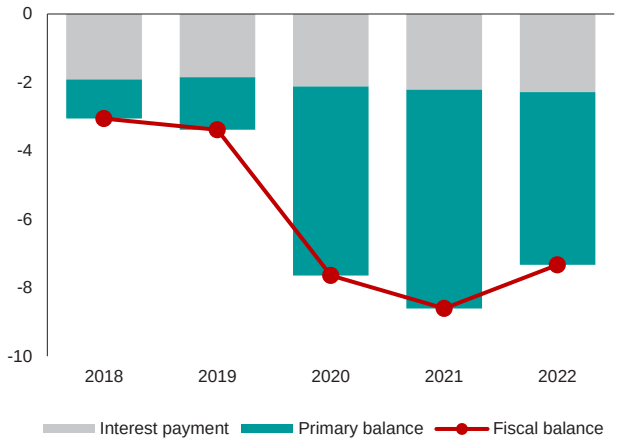
Monetary Policy and Market Rates
(Percent)



Source: Bangko Sentral ng Pilipinas.

The fiscal deficit narrowed with solid revenue performance.

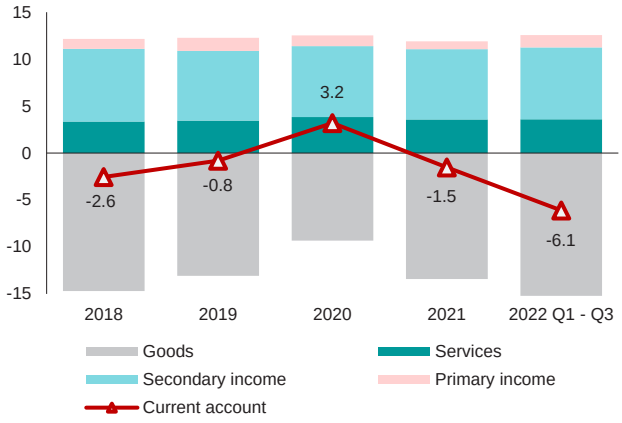
Fiscal Balance
(Percent of GDP)



Source: Bureau of Treasury.

The current account deficit widened, driven by a surge in imports.

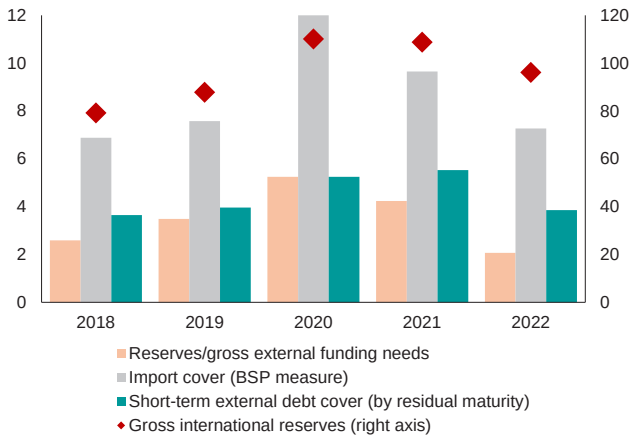
Current Account Balance
(Percent of GDP)



Source: Bangko Sentral ng Pilipinas.

International reserves remained sufficient for external funding needs.

International Reserve Adequacy
(Months or times; billions of US dollars)



Source: Bangko Sentral ng Pilipinas.(BSP)
Note: Import cover (BSP measure) refers to number of months of average imports of goods and payment of services and primary income.

The Philippines: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	6.1	–9.5	5.7	7.6
Private consumption	5.9	–8.0	4.2	8.3
Government consumption	9.1	10.5	7.1	5.0
Gross fixed capital formation	3.9	–27.3	9.9	10.4
Imports of goods and services	2.3	–21.6	13.0	13.1
Exports of goods and services	2.6	–16.1	8.0	10.7
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance[1]	–0.8	3.2	–1.5	–5.3
Trade balance	–9.6	–5.5	–9.8	–13.7
Capital and financial account balance	–2.1	–1.9	–1.8	–3.5
Direct investment	–1.4	–0.9	–2.5	–2.0
Portfolio investment	–0.7	–0.5	2.6	–0.3
Other investment	0.0	–0.5	–1.7	–1.0
Errors and omissions	0.7	–0.7	0.0	0.0
Overall balance	2.1	4.4	0.3	–1.8
Total external debt	22.2	27.2	27.0	26.4
International reserves (in USD billion, end of period)	87.8	110.1	108.8	96.1
Fiscal sector	(in percent of GDP)			
Revenue and grants	16.1	15.9	15.5	16.1
Expenditure	19.5	23.5	24.1	23.4
Fiscal balance	–3.4	–7.6	–8.6	–7.3
Government debt	39.6	54.6	60.4	60.9
Monetary and financial sectors	(in annual percentage change)			
Broad money[2]	9.8	8.7	8.0	7.4
Domestic claims	10.7	4.7	8.2	12.5
Claims on private sector	7.8	–0.2	3.8	10.5
Memorandum items:				
Nominal GDP (in PHP billion)	19,517.9	17,951.6	19,410.6	22,023.3
Headline inflation (in percent y-o-y, period average)	2.4	2.4	3.9	5.8
Policy rate (in percent per annum, end of period)	4.0	2.0	2.0	5.5
Exchange rate (in PHP/USD, period average)	51.8	49.6	49.3	54.5

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates.
Note: Red number denotes AMRO staff estimate. y-o-y = year-on-year

1/ The Philippines' balance of payments follows BPM6. A negative (positive) financial account balance indicates net inflow (outflow). Trade balance refers to the trade balance of goods and services. Overall balance = Current account balance - Capital and financial account balance + Errors and omissions.

2/ Broad money refers to M4.

Singapore

Singapore's growth momentum moderated as the reopening tailwinds subside. After growing by 8.9 percent year-on-year in 2021, Singapore's GDP growth slowed to 3.6 percent in 2022, as normalization continued. Manufacturing lost some steam as global growth slowed, while the services sector remained strong, thanks to the recovery in tourism and the relatively resilient retail sector. Growth is expected to slow as prospects for global growth worsen and inflation pressures constrain domestic demand.

Inflation rose significantly in 2022. Singapore's headline inflation rose from 4.0 percent year-on-year at the end of 2021 to a high of 7.5 percent in September 2022 before moderating in the subsequent months. While the main contributors were largely domestic (car ownership and accommodation costs), external pressure was also significant as it was responsible for rising prices of in food, electricity, and petrol.

In light of heightened inflation pressure, throughout 2022, exchange rate policy was tightened with the slope of the Singapore dollar nominal effective exchange rate (SGD NEER) policy band adjusted upward twice, in January and April, and the band re-centered upward three times, in April, July, and October. As a result, the SGD NEER appreciated by about 6.8 percent in Q4 2022.

The labor market improved considerably, with more signs of tightness evident. The seasonally adjusted overall unemployment rate declined significantly, from a high of 3.6 percent in October 2020 to 2.0 percent in December 2022. Relaxation of border restrictions supported nonresident employment, particularly easing the labor shortage in the construction sector. However, the labor market is exhibiting signs of tightness, with the job vacancy-to-unemployed person ratio up from an average of 1.0 during the few years pre-pandemic to 2.6 in June 2022.

Non-oil domestic exports (NODX) slowed along with softening external demand. After growing at 12.1 percent in 2021, NODX slowed to 3 percent in 2022, as reflected in the deceleration of both electronics and non-electronics exports.

The financial sector has remained resilient throughout the pandemic period. The banking system's overall nonperforming loan (NPL) ratio fell further, to 1.9 percent in Q2 2022 from 2.1 percent in Q4 2021, although the NPL ratios of 5.0 percent in the wholesale trade segment and 8.6 percent in the transport and storage segment remained relatively high. This reflected the significant impact of the pandemic on trade and tourism-related sectors. Meanwhile, nonbank lending to residents grew by around 6 percent year-on-year in Q3. Capital and liquidity buffers remained strong and well above regulatory requirements.

A phased hike in the Goods and Services Tax rate will support revenue collection in the medium term. The staggered increase—from the current 7 percent to 8 percent in 2023 and 9 percent in 2024—is in line with the government's revenue mobilization drive to meet growing social spending needs. A number of support packages in the form of cash payouts, rebates, and vouchers, has been rolled out to help offset rising living costs, especially for low-income households.

A spate of macroprudential measures has been rolled out to cool the property market. In December 2021, the Additional Buyer's Stamp Duty was raised by between 5 percentage points and 15 percentage points, except for Singapore citizens and permanent residents buying their first property. In addition, the Total Debt Servicing Ratio (TDSR) for housing loans granted by financial institutions was lowered from 60 percent to 55 percent, and the Loan-to-Value (LTV) limit for public housing loans was lowered from 90 percent to 85 percent. In September 2022, the authorities further tightened LTV limit for public housing loans and the TDSR, and introduced a 15-month wait-out period for former private property owners wishing to buy resale public flats. The impact of the measures thus far appears to be limited. Demand remains resilient, backed by strong household balance sheets and sustained growth in household income, albeit with lower transaction volumes. This has sustained real estate prices amid limited supply, with pronounced price increases of 10.3 percent and 8.6 percent year-on-year observed in both public (resale) and private housing in 2022, respectively.

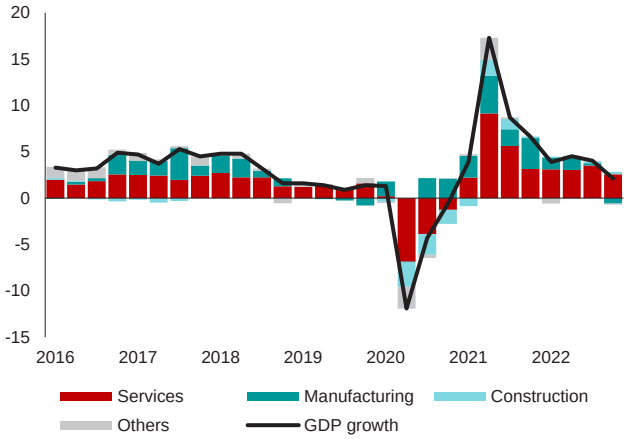
A gloomier outlook for global demand and elevated price pressure constitutes key risks for the coming quarters. First, the uptrend in policy rates in key global economies clouds the prospects for global growth, which will directly affect Singapore's manufacturing and export performance. Second, inflation pressure is likely to persist in the near term on the back of both external and domestic factors; supply chain disruptions and elevated prices of some key commodities pose challenges on the external front, while rising car ownership fees and accommodation costs remain key domestic inflation risks. Over the longer term, Singapore will need to contend with challenges arising from an aging population and climate change.

The author of this note is Jade Vichyanond.

Singapore: Selected Figures

Singapore's growth momentum has moderated as the reopening tailwinds subside.

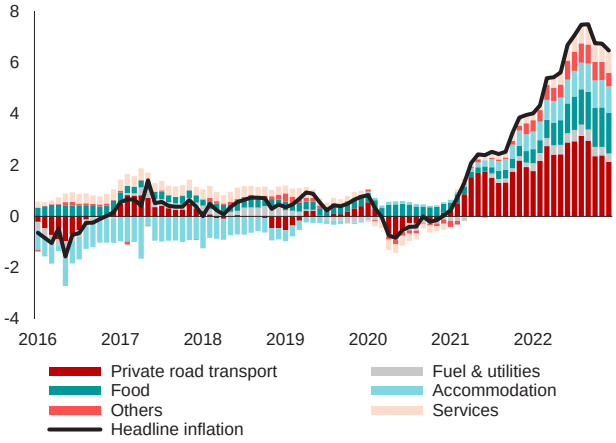
Contributions to Real GDP Growth
(Percentage points, year-on-year)



Source: Singapore Department of Statistics via CEIC; AMRO staff calculations

Inflation rose significantly in 2022 due to both external and domestic factors.

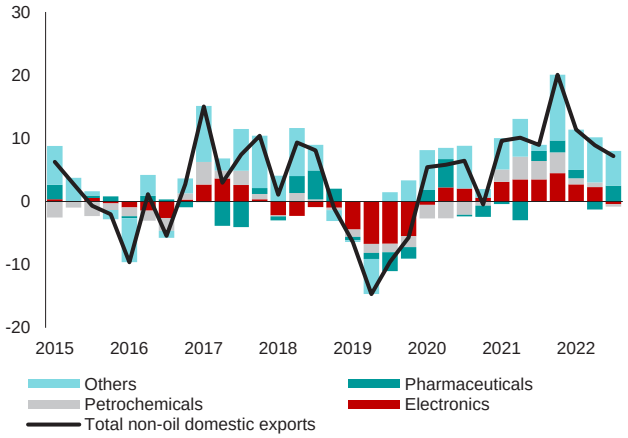
Contributions to Consumer Price Inflation
(Percentage points, year-on-year)



Source: Singapore Department of Statistics and Monetary Authority of Singapore via CEIC; AMRO staff calculations

Non-oil domestic exports slowed along with softening external demand.

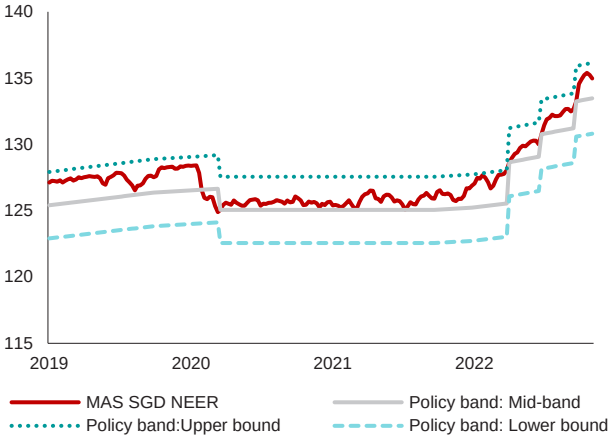
Contributions to Non-oil Domestic Exports
(Percentage points, year-on-year)



Source: Enterprise Singapore via CEIC; AMRO staff calculations.

In light of inflation pressure, throughout 2022, the slope of the SGD NEER policy band was adjusted upward twice, and the band was re-centered upwards three times.

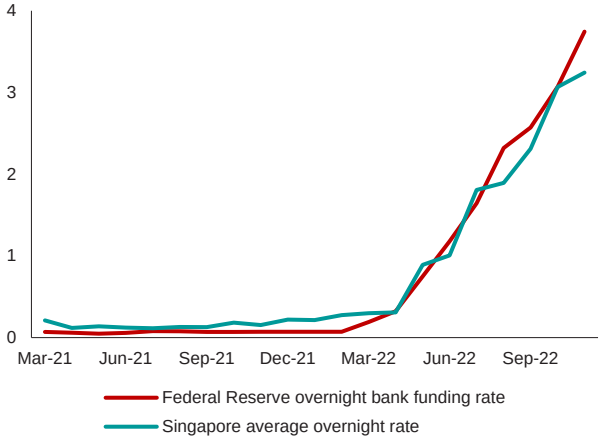
SGD NEER and Policy Band
(Index)



Source: Monetary Authority of Singapore (MAS) via CEIC; AMRO staff calculations and estimates.
Note: SGD NEER = Singapore dollar nominal effective exchange rate. Upper, mid and lower bounds of policy band are AMRO staff estimates.

The Singapore overnight rate average has risen along with the US Federal Reserve's overnight bank funding rate.

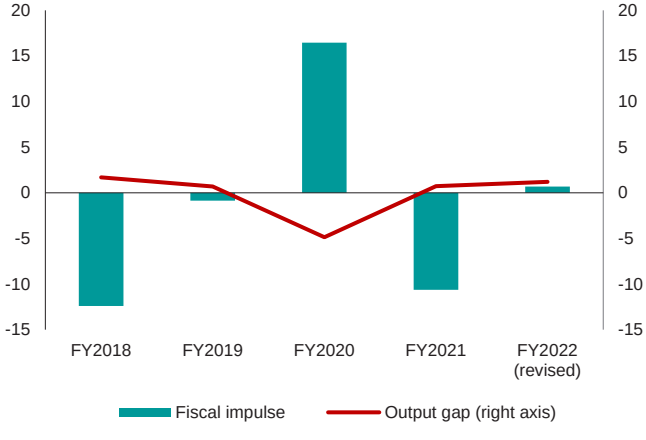
Overnight Interest Rates
(Percent per annum)



Source: United States Federal Reserve and Monetary Authority of Singapore via CEIC; AMRO staff calculations

A small negative fiscal impulse is expected in FY2022.

Estimated Fiscal Impulse and Output Gap
(Percent of GDP; percent of potential GDP)



Source: Ministry of Finance via CEIC; AMRO staff calculations and estimates.
Note: FY denotes fiscal year. Fiscal impulse data are estimated by AMRO staff.

Singapore: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	1.3	–3.9	8.9	3.6
Private consumption	2.8	–13.1	6.6	9.7
Government consumption	3.2	13.0	3.7	–2.3
Gross fixed capital formation	2.3	–14.8	18.0	1.6
Exports of goods and services	0.2	0.4	11.7	–1.3
Imports of goods and services	0.0	–1.1	12.0	–1.9
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance[1]	16.2	16.5	18.0	19.3
Trade balance	26.0	30.5	29.7	29.2
Capital and financial account balance	19.1	–5.0	2.0	43.4
Direct investment	–10.4	–11.5	–20.7	–19.3
Portfolio investment	28.8	17.4	14.2	14.8
Other investment	–1.1	–10.1	8.8	47.4
Errors and omissions	0.7	0.0	–0.4	–0.4
Overall balance	–2.2	21.5	15.6	–24.5
International reserves (in USD billion, end of period)	279.5	362.3	417.9	289.5
Fiscal sector	(in percent of GDP)			
Revenue and grants	14.5	14.0	13.9	13.8
Expenditure	14.7	20.2	16.0	16.4
Fiscal balance[2]	0.2	–10.5	0.3	–0.3
Government debt	124.7	146.6	136.6	167.8
Monetary and financial sectors	(in annual percentage change)			
Broad money	4.4	10.7	8.8	7.8
Domestic credit	2.4	1.1	9.3	–0.3
Memorandum items:				
Nominal GDP (in SGD billion)	514.1	480.7	569.4	643.5
Headline inflation (in percent y-o-y, period average)	0.6	–0.2	2.3	6.1
Core inflation (in percent y-o-y, period average)	1.0	–0.2	0.9	4.1
Exchange rate (in SGD/USD, period average)	1.36	1.38	1.34	1.38

Source: National authorities via CEIC; and AMRO staff estimates.
Note: Numbers in red denote AMRO staff estimates. y-o-y = year-on-year.

1/ Singapore's balance of payments follows BPM6. A negative (positive) financial account balance indicates net inflow (outflow).
Overall balance = Current account balance - Capital and financial account balance + Errors and omissions

2/ Fiscal balance denotes the overall fiscal position, i.e., the difference between operating revenue and expenditure, minus special transfers and top-ups to endowment and trust Funds, plus Net Investment Returns Contribution and capitalization of nationally significant infrastructure, net of depreciation and Significant Infrastructure Government Loan Act interest costs and loan expenses.

Thailand

The Thai economy grew at a faster pace of 2.6 percent year-on-year in 2022, after growing by 1.5 percent in 2021. The recovery was underpinned by strengthening domestic demand and a stronger rebound in tourist arrivals following the further relaxation of border restrictions in Thailand and other countries since end-2021. The faster reopening boosted recovery in the services sector, particularly accommodation and food services. On the demand side, private consumption grew strongly, supported by robust tourism spending, a labor market recovery, and rising farm incomes.

Headline inflation climbed to 6.1 percent in 2022 from 1.2 percent in 2021 due to the surge in global oil, domestic pork, and commodity prices. Meanwhile, core inflation increased to 2.5 percent in 2022 from 0.2 percent in 2021, reflecting mainly higher prices in the prepared and cooked food categories.

Thailand's current account deficit widened further in 2022, reflecting a smaller trade surplus due to strong imports, and notwithstanding an improvement in the tourism services account. The trade surplus narrowed as imports continued to grow faster than exports, driven by soaring energy, commodity and fertilizer prices. International reserves fell to USD 216.6 billion in December 2022 from USD 246.0 billion in December 2021, although it continues to be high and covers more than 2.3 times Thailand's short-term external debt.

Reflecting the significant tightening of global financial conditions, the yields of Thai Treasury bills and government bonds rose sharply in 2022. Domestic monetary conditions have also tightened, with the overnight interbank rate rising slightly since August in tandem with the Bank of Thailand's policy rate hikes. Notwithstanding the tighter financial conditions, the corporate bond market expanded at a faster pace. Moreover, the well-diversified domestic bond market remains sufficiently deep to absorb the government bond issuances, with other depository corporations continuing to play a larger role in 2022.

The banking sector has weathered the pandemic shock well. Banks' overall loan growth slowed to 2.1 percent year-on-year in 2022 from 6.5 percent in 2021. The capital adequacy ratio remained high at 19.4 percent, and the same was true for Common Equity Tier 1 ratio of 15.9 percent. As a result of financial assistance measures and banks' loan portfolio management, nonperforming loans (NPLs) ratio remained stable at 2.7 percent in 2022, broadly unchanged from 3.1 percent in 2020, while the NPL ratio of small and medium enterprise loans remained elevated at 6.8 percent.

Fiscal policy remained on an expansionary track. The authorities rolled out phases 4 and 5 of the co-payment and "We Travel Together" schemes, totalling THB 67.7 billion, to continue supporting consumer spending and businesses affected by the pandemic. For lower-income households, cost-of-living measures included on-budget social assistance programs, such as increasing the cooking gas subsidy from THB 45 to THB 100 per welfare cardholder every three months for six months between April and September 2022. In addition, the government also rolled out quasi-fiscal operations by government-backed institutions such as the State Oil Fund, which the government has approved to subsidize half of any further increases of the diesel market price above the latest capped price of THB 35 per liter.

Downside risks to the near-term outlook remain high. Risks to growth stem mainly from a protracted global slowdown, further supply chain disruptions, and the emergence of more virulent strains of COVID-19. A prolonged and sharper rise in United States' interest rates would heighten the risk of capital outflows and exchange rate depreciation while further increasing borrowing costs. Inflation may stay elevated for longer due to the withdrawal of price subsidies and higher wages.

Thailand will need to address its long-term structural challenges. Government-linked institutions are bearing the high costs of providing the subsidies through their quasi-fiscal operations, which will increase total public debt. At the same time, the significant economic scars from the pandemic can be a drag on growth in the long term. Thailand will also need to address structural challenges stemming from a rapidly aging population, digital transformation and climate change.

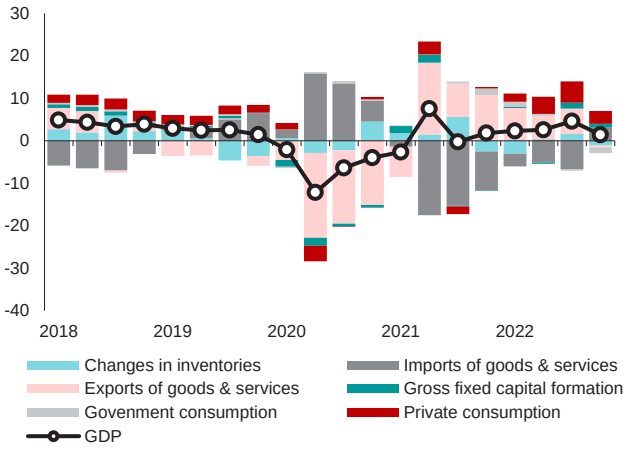
The author of this note is Ming Han (Justin) Lim.

Thailand: Selected Figures

Growth expanded at a faster pace in 2022 due to higher private consumption.

Contributions to Real GDP Growth

(Percentage points, year-on-year)

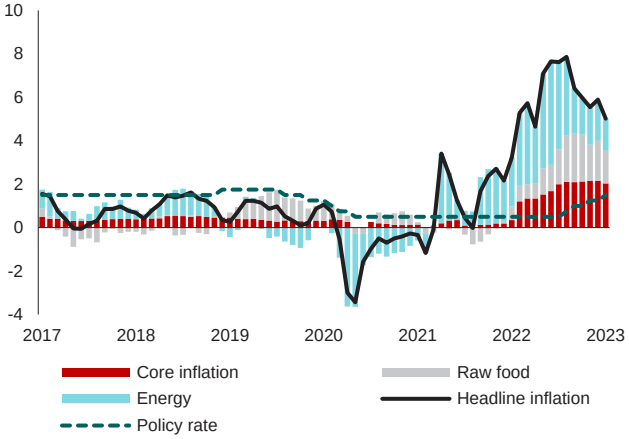


Source: Office of the National Economic and Social Development Council.

Headline inflation rose sharply due to the surge in global oil, pork and commodity prices.

Contributions to Consumer Price Inflation

(Percentage points, year-on-year)

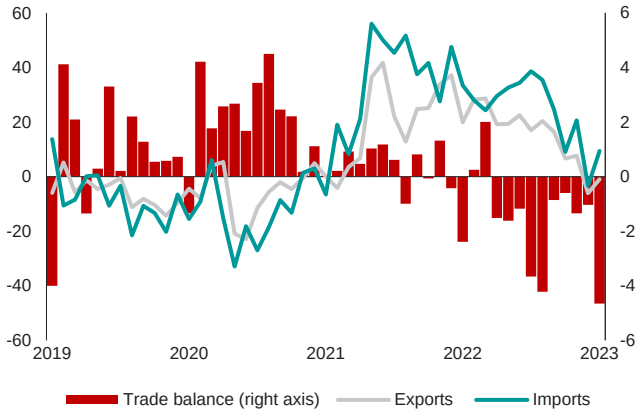


Source: Bank of Thailand; Thailand Ministry of Commerce.
Note: Policy rate refers to 1-day repurchase rate of Thailand.

The trade deficit widened significantly as imports continued growing at a faster pace while the growth in exports slowed.

Trade Balance

(Percent, year-on-year; billions of US dollars)

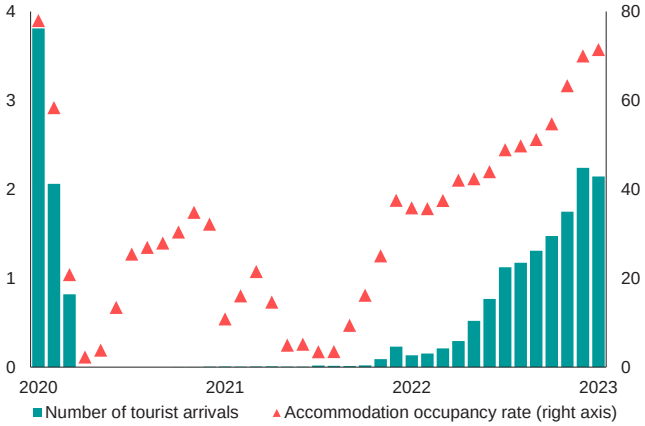


Source: Bank of Thailand; AMRO staff calculations.
Note: Data for exports and imports are on customs basis.

Tourist arrivals rebounded sharply, and the hotel occupancy rate rose but remained lower than before the pandemic.

Tourism Sector

(Millions of persons; percent)

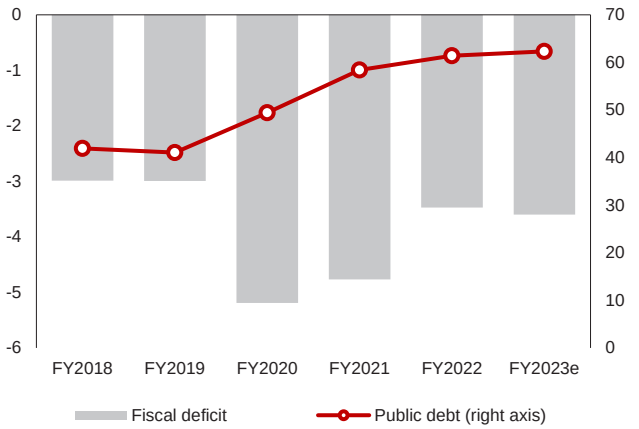


Source: Bank of Thailand.

The public debt-to-GDP ratio rose at a slower pace as the budget deficit narrowed and off-budget COVID-19 spending decreased.

Fiscal Balance and Public Debt

(Percent of GDP; percent of GDP)

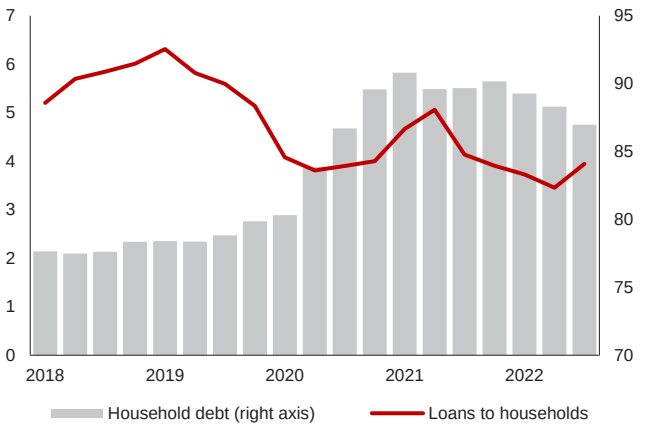


Source: Ministry of Finance; AMRO staff estimations.
Note: e denotes estimate. A fiscal year (FY) runs from 1 October to 30 September.

The high household debt-to-GDP ratio eased slightly but remained elevated.

Household Debt and Bank Lending to Households

(Percent, year-on-year; percent of GDP)



Source: Bank of Thailand; AMRO staff calculations.

Thailand: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	2.2	–6.1	1.5	2.6
Private consumption	4.0	–0.8	0.6	6.3
Government consumption	1.6	1.4	3.7	0.0
Gross fixed capital formation	2.0	–4.8	3.1	2.3
Imports of goods and services	–5.2	–13.9	17.8	4.1
Exports of goods and services	–3.0	–19.7	11.1	6.8
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	7.0	4.2	–2.1	–3.4
Trade balance	4.9	8.0	6.5	2.2
Capital and financial account balance	–2.7	–2.3	–1.2	1.0
Direct investment	–0.9	–4.6	–0.9	0.0
Portfolio investment	–1.6	–2.4	–2.4	–0.7
Other investment	–0.4	4.8	2.3	1.7
Errors and omissions	–1.8	1.8	1.9	0.3
Overall balance	2.5	3.6	–1.4	–2.1
Gross external debt	31.6	38.1	38.8	37.9
International reserves (in USD billion, end of period)	224.3	258.1	246.0	216.6
Fiscal sector[1]	(in percent of GDP)			
Revenue and grants	15.3	15.1	14.9	14.7
Expenditure	18.1	20.0	20.1	18.3
Fiscal balance	–2.8	–4.9	–5.2	–3.6
Government debt	41.0	49.4	58.4	60.4
Monetary and financial sectors	(in annual percentage change)			
Broad money	3.6	10.2	4.8	3.9
Domestic credit [2]	2.0	8.1	8.8	3.1
Private sector credit	3.7	5.0	4.8	4.1
Memorandum items:				
Nominal GDP (in THB trillion)	16.9	15.7	16.2	17.4
Headline inflation (in percent y-o-y, period average)	0.7	–0.8	1.2	6.1
Policy rate (in percent per annum)	1.25	0.50	0.50	1.25
Exchange rate (in THB/USD, period average)	31.0	31.3	32.0	35.1

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates
Note: Numbers in red denote AMRO staff estimates. y-o-y = year-on-year.

1/ A fiscal year (FY) runs from 1 October to 30 September. For example, FY2023 is from 1 October 2022 to 30 September 2023.

2/ Domestic credit composes net claims from central government, local government, nonfinancial corporations and households.

Vietnam

Following a slump due to the pandemic, the Vietnamese economy rebounded rapidly in 2022, recording GDP growth at 8 percent for the year. The recovery has been broad-based—manufacturing was boosted by robust exports and strong FDI inflows, while domestic consumption expanded, driven by the relaxation of mobility restrictions and the economic stimulus package.

High oil prices were chiefly responsible for elevated consumer price inflation in 2022. However, state-administered prices and temporary tax cuts helped curb inflation. Although inflation still exceeded the State Bank of Vietnam's (SBV's) 4-percent target in Q4, average headline inflation stood at 3.2 percent in 2022, lower than in other regional economies.

Continued demand for Vietnam's manufacturing products helped the export sector recover rapidly in the first three quarters of 2022. However, slow global economic activity started to weigh down on manufacturing exports in the last quarter. Meanwhile, capital inflows were dragged down by large deposit outflows from banks despite resilient FDI. In addition, the record of net errors and omissions was large. As a result, the balance of payments turned into deficit, leading to a USD 23.5 billion decline in foreign reserves from end-2021—which stood at around USD 82.4 billion as of October 2022, equivalent to 2.5 times the short-term external debt.

The SBV started to raise key policy rates in September 2022 in response to a sharp depreciation of the dong, triggered by the US Federal Reserve's rate hikes. At the same time, the SBV increased its credit growth target by 1.5–2 percent at the end of the year from the initial target of 14 percent to support economic recovery. Meanwhile, bank lending to risky sectors, including real estate, was closely monitored, to ensure that credit was sufficiently redirected to productive sectors.

The impact of temporary tax reduction reduced revenue collection to 17.0 percent of GDP in 2022 from 18.5 percent in 2021. Meanwhile, as a result of the economic stimulus package, the government's expenditure remained above 21 percent of GDP. Fiscal deficit thus widened significantly to 4.4 percent of GDP in 2022 from 3.4 percent of GDP in 2021.

Looking ahead, Vietnam's economy is expected to moderate to a more sustainable rate of 6.8 percent in 2023. Weakening global demand will likely dampen manufacturing production. Meanwhile, the relaxation of China's border restrictions will benefit Vietnam's services sector and export.

Key downside risks to Vietnam's growth outlook are derived mainly from the chances of a global economic slowdown. A weakening of the global economy, in tandem with tightened monetary conditions across various countries, may worsen Vietnam's external demand. The recovery also remains susceptible to the risk of further waves of COVID-19 infection. In addition, a prolonged Ukraine crisis will put pressure on energy prices.

Elsewhere, financial sector risks may arise from the lingering impact of COVID-19 on asset quality and uncertainty in the real estate market. Meanwhile, tepid sentiment in the real estate market has exacerbated vulnerabilities in Vietnam's financial system.

The government should accelerate structural reforms to ensure a sustainable development path. Corporate bond market development is at an early stage, with private placements by property developers and banks dominating the market. Meanwhile, the equitization and the divestment of state-owned enterprises (SOEs) has slowed down substantially in recent years. Therefore, SOEs still command a significant share of the economy, a dominance which can, at times, impede development of the private sector. In addition, the delayed development of domestic industries and a shortage of skilled labor continue to hinder the country's efforts to move up the global value chain.

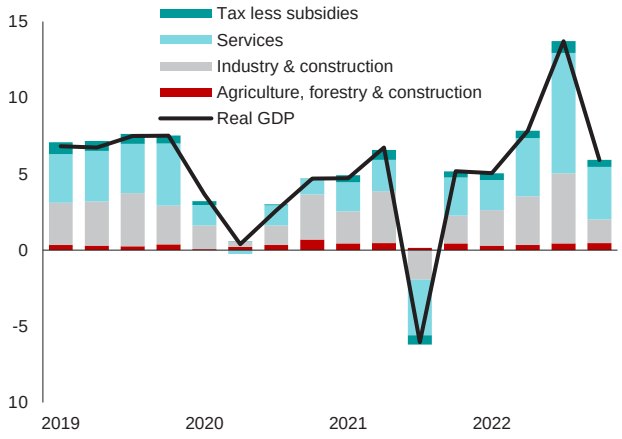
The author of this note is Wanwisa (May) Vorranikulkij.

Vietnam: Selected Figures

Growth has rebounded from 2021 on the back of robust manufacturing production.

Contributions of Real GDP Growth

(Percentage points, year-on-year)

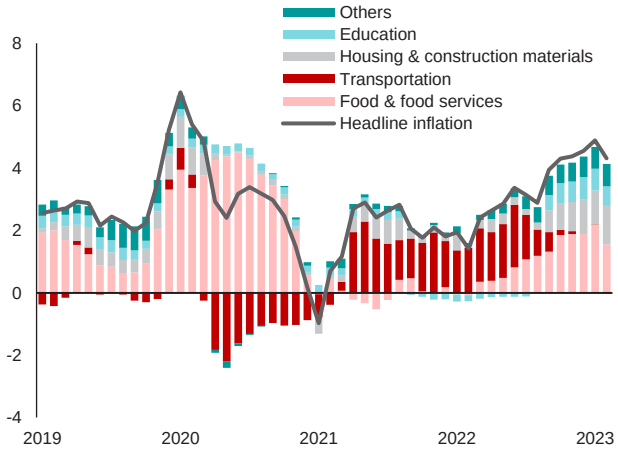


Source: General Statistics Office via CEIC; AMRO staff calculations

State-administered prices and tax cuts have kept Vietnam's inflation lower than regional peers' despite inflation pressure from high global oil prices.

Contributions to Consumer Price Inflation

(Percentage points, year-on-year)

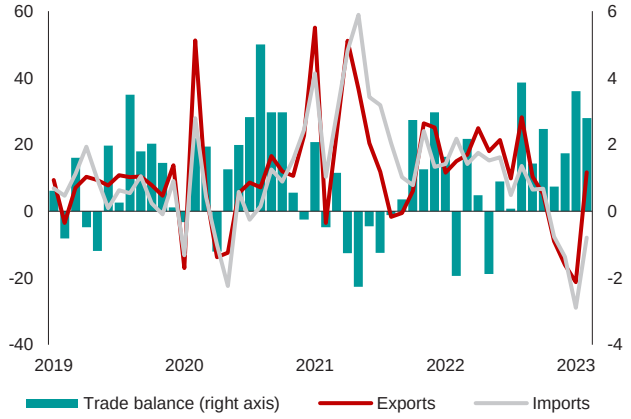


Source: General Statistics Office via CEIC; AMRO staff calculations

Trade balance registered a surplus through 2022 on the back of exports.

Trade Balance

(Percent year-on-year; billions of US dollars)

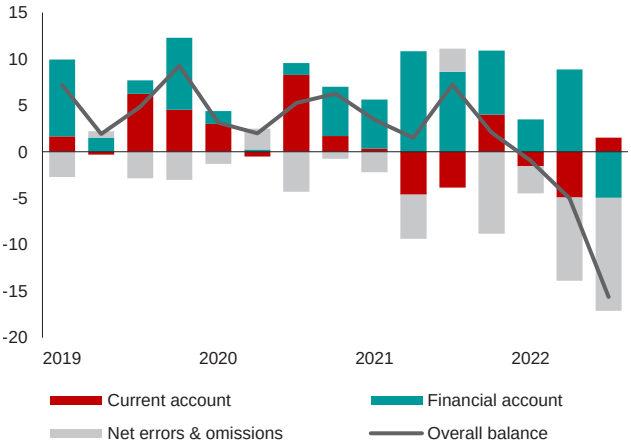


Source: General Statistics Office via CEIC; AMRO staff calculations

A large number of net errors and omissions and deposit outflows widened the balance of payments deficit.

Balance of Payments

(Billions of US dollars)

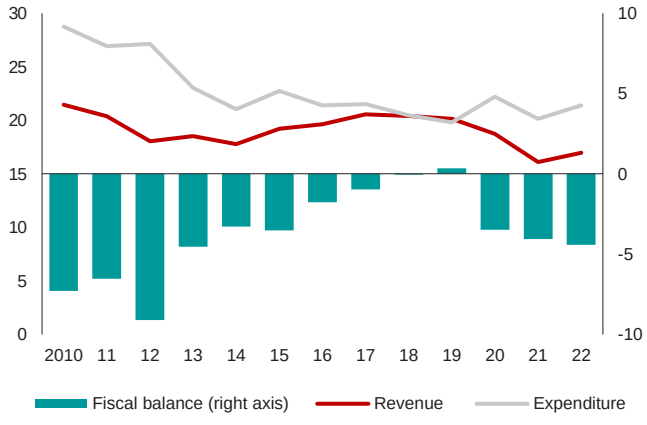


Source: State Bank of Vietnam via CEIC; AMRO staff calculations

The fiscal deficit widened in 2021 as a result of the economic stimulus package in response to the COVID-19 pandemic.

Fiscal Balance

(Percent of GDP)

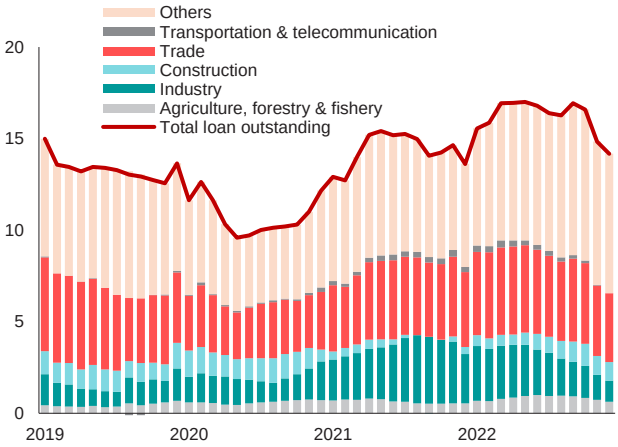


Source: Ministry of Finance via CEIC; AMRO staff estimations

Credit growth remained high last year, in line with the SBV's credit policy to support economic recovery.

Contributions to Credit Growth

(Percentage points, year-on-year)



Source: State Bank of Vietnam via CEIC; AMRO staff calculations

Vietnam: Selected Economic Indicators

Indicator	2019	2020	2021	2022
Real sector	(in annual percentage change)			
Real GDP	7.4	2.9	2.6	8.0
Agriculture, forestry, and fishing	2.7	3.0	3.3	3.4
Industry and construction	8.2	4.4	3.6	7.8
Services	8.1	2.0	1.6	10.0
Product tax excluding subsidy	6.0	6.0	6.0	7.0
External sector	(in percent of GDP, unless otherwise specified)			
Current account balance	3.7	4.4	–1.1	0.3
Trade balance	6.4	8.9	4.5	7.2
Capital and financial account balance[1]	5.7	2.5	8.5	8.4
Direct investment	4.7	4.5	4.2	5.3
Portfolio investment	1.0	–0.4	0.1	0.4
Other investment	0.1	–1.6	4.2	2.8
Errors and omissions	–2.4	–2.0	–3.5	–1.8
Overall balance	6.9	4.9	3.9	6.9
Gross external debt	35.2	36.4	37.6	40.4
International reserves (in USD billion, end of period)	78.8	95.5	110.0	83.0
Fiscal sector	(in percent of GDP)			
Revenue and grants	20.2	18.8	18.5	17.0
Expenditure	19.8	21.3	21.9	21.4
Fiscal balance	0.3	–2.5	–3.4	–4.4
Government debt	43.4	44.2	43.1	42.8
Monetary and financial sectors[2]	(in annual percentage change)			
Broad money	13.6	13.6	9.7	9.6
Domestic credit	9.3	12.4	12.6	11.6
Private sector credit	12.8	11.6	13.5	14.7
Memorandum items:				
Nominal GDP (in VND trillion)	7,707	8,044	8,480	9,513
Headline inflation (in percent y-o-y, period average)	2.8	3.2	1.8	3.2
Policy rate (in percent per annum)	4.0	2.5	2.5	4.5
Exchange rate (in VND/USD, period average)	23,051	23,208	23,160	23,271

Source: National authorities via CEIC and Haver Analytics; AMRO staff estimates
Note: Numbers in red denote AMRO staff estimates. y-o-y = year-on-year.

1/ Vietnam's financial accounts are recorded in the way to reflect a nature of fund flows. Positive figures show net inflows into the country while negative figures show net outflows from the country.

2/ Monetary and financial sector data for 2022 are as at the end of November 2022.

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