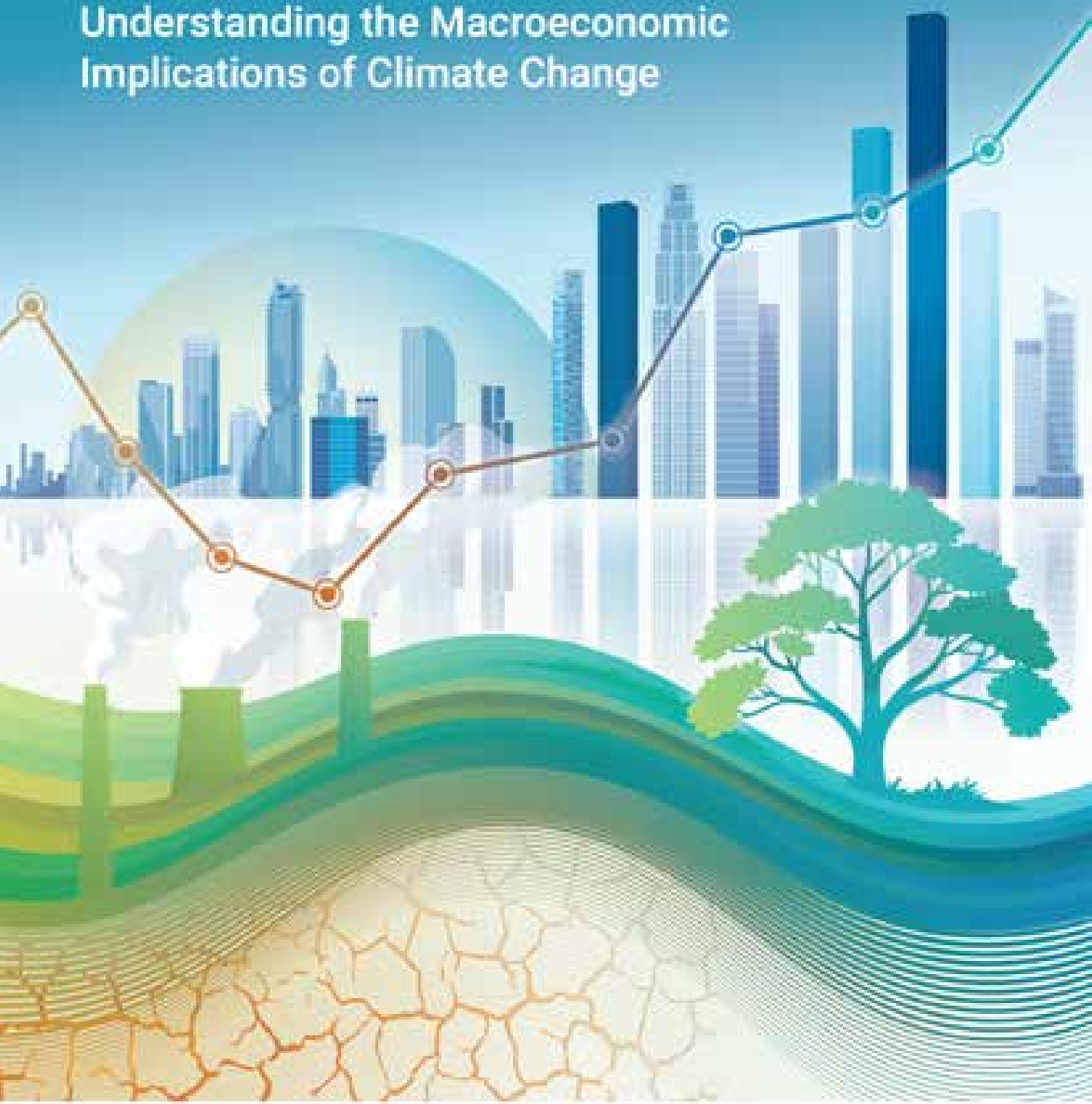
# ECONOMIC AND SOCIAL SURVEY OF ASIA AND THE PACIFIC *2025*

## Understanding the Macroeconomic Implications of Climate Change



ESCAP
Economic and Social Commission for Asia and the Pacific

*The shaded areas of the map indicate ESCAP members and associate members.**

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The ESCAP secretariat supports inclusive, resilient and sustainable development in the region by generating action-oriented knowledge, and by providing technical assistance and capacity-building services in support of national development objectives, regional agreements and the implementation of the 2030 Agenda for Sustainable Development.

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# Economic and Social Survey of Asia and the Pacific 2025

## Understanding the Macroeconomic Implications of Climate Change

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# Foreword

With just five years to go, the Sustainable Development Goals are facing significant headwinds – from the devastating effects of conflicts and climate change, to geopolitical divisions and rising mistrust.

This year's edition of the *Economic and Social Survey of Asia and the Pacific* highlights one such area where leadership is essential to accelerate progress: climate action.

Countries across Asia and the Pacific are particularly vulnerable to the devastating effects of a warming planet – including climate shocks and disasters like floods and droughts, as well as rising sea levels, melting glaciers and warmer ocean temperatures.

This *Survey* reminds us that the health of our climate and the health of our economies go hand in hand.

It calls on governments, businesses and policymakers across Asia and the Pacific to join forces to develop proactive policies that integrate climate risks into fiscal and monetary policies.

It also urges governments to accelerate investments into climate-resilient infrastructure that can safeguard hard-won development gains and protect key sectors – like agriculture – from worsening climate impacts.

And it highlights the need for energy solutions grounded in renewables to curb greenhouse gas emissions while creating new jobs and sources of economic prosperity.

As this *Survey* makes clear, Asia and the Pacific is uniquely positioned to benefit from the green revolution, and – with the right macroeconomic policies – can build resilience, lower its exposure to the impacts of climate change and spur development.

Now is the time to seize these opportunities and, guided by this *Survey*, build a future of stability, sustainability and shared prosperity for all across Asia and the Pacific and around the world.

António Guterres
Secretary-General of
the United Nations

# Preface

The Asia-Pacific region is seeking to balance its role as the engine driving global economic growth with emerging policy and deepening climate change challenges. The 2025 edition of the *Economic and Social Survey of Asia and the Pacific* highlights how domestic and external pressures, including relatively high interest rates, persisting sovereign debt risks and rising trade tensions and fragmentation, are testing the economic resilience of the region.

We expect that most economies in the region will continue to demonstrate resilience in the coming years. Nevertheless, deceleration in productivity growth and income convergence, difficulty in diversifying into economic sectors with higher value addition and policy dilemmas to balance economic growth with green economic transformation present complex challenges. Increasing global economic uncertainty and deepening climate risks are also not making it easy for macroeconomic policymakers. Navigating this evolving landscape requires not only sound national policies but also coordinated regional efforts to safeguard long-term economic prospects and tackle climate change.

To secure long-term economic prosperity, the *Survey* underscores the need to prioritize productivity enhancement and sectoral upgrading with active involvement of Governments, capitalize on regional green value chains as a new engine of economic growth and promote inclusive regionalism.

At the same time, understanding the complex and constantly evolving macroeconomic and climate nexus is essential for coping with climate risks and effectively supporting national climate action and sustainable development. A key contribution of the *Survey* is its comprehensive evaluation of the macroeconomic-climate interplay. It provides a comprehensive assessment of how climate change and climate action affect different aspects of societies and economies. These socioeconomic impacts are partly reflected in macroeconomic indicators, and there remain many unknowns in this emerging research and policy area.

The *Survey* also conducts a readiness assessment of both climate exposure and macroeconomic coping capacity, offering a holistic picture of economic vulnerability. It shows that several Asian and Pacific economies are not fully ready to cope with climate shocks and the much-needed energy transition. Robust national economic strategies, such as adequate fiscal space, effective public financial management and preparedness of the financial sector can help strengthen the adaptive capacity of policymakers.

Regional cooperation is equally critical to address shared macroeconomic and climate challenges. To achieve sectoral upgrading, for instance, economies can leverage their unparallelled production networks and leading green technologies to strengthen green value chains. To realize climate-aligned macroeconomic policies, countries in the region and multilateral development partners can share knowledge and experiences to navigate this new endeavour.

ESCAP will continue to play a central role in providing analytical assessments and policy ideas, fostering dialogues and enhancing cooperation across borders to support policymakers to proactively mitigate vulnerabilities and unlock pathways for inclusive, sustainable and climate-resilient development.

As the world strives to realize the Pact for the Future, it is time to act collaboratively to regain trust in inclusive multilateralism. Only multilateral solutions can address the worryingly uncertain and divided global sustainable development landscape.

Armida Salsiah Alisjahbana
Under-Secretary-General of the United Nations
and Executive Secretary of ESCAP

# Executive Summary

## Navigating uncertain near-term economic outlook

*Overall steady macroeconomic conditions mask diverse situations faced by countries and people*

Asia-Pacific economies remained vibrant relative to other parts of the world, contributing about 60 per cent to global economic growth in 2024. Nevertheless, average economic growth in the developing Asia-Pacific region slowed to 4.8 per cent in 2024 from 5.2 per cent in 2023 and 5.5 per cent during the five years prior to the COVID-19 pandemic. The rebound in merchandise exports, underpinned by rising demand for high-technology products, drove overall economic expansion. Services exports, especially tourism and remittance receipts, also grew strongly. Average inflation eased to 5.0 per cent in 2024 from 5.4 per cent in 2023 amid lower global commodity prices and tight monetary policy stance earlier. However, cost of living remains higher – the overall price level was 19 per cent higher in 2024 compared with 2021 – and that explains the relatively smaller contribution of consumer spending to overall economic growth.

Despite largely steady overall economic growth, some economies and people fared worse than others. For instance, the average economic growth rate of 3.7 per cent in the least developed countries in 2024 was significantly lower than the 7.0 per cent per annum GDP growth target set out in Sustainable Development Goal target 8.1. While the overall unemployment rate remained stable at 4.2 per cent in 2024, youth faced a much higher unemployment rate of almost 14 per cent. Post-pandemic employment recovery has also been uneven, with sluggish turnaround in sectors that hire low-skilled workers, such as manufacturing, accommodation and food services. Similarly, although overall inflation-adjusted wage levels increased more strongly in 2024 relative to the past few years, wage levels have still not kept pace with inflation in several economies. These developments are contributing to persistence in poverty and widening income inequality in many countries.

*Near-term economic prospects are stable although certain risks cannot be ignored*

Average economic growth in the developing Asia-Pacific region is projected to moderate slightly further to 4.5 per cent in 2025 and 4.4 per cent in 2026. Merchandise exports are likely to be constrained due to weaker demand in major developed economies. While stable job markets and lower inflation, projected at 4.4 per cent in 2025 and 3.7 per cent in 2026, would support consumer demand, market sentiments could be weak amid rising economic uncertainty. Room for fiscal support, if needed, has also shrunk as public debt interest payments are taking away an increasing share of public revenues.

These baseline projections are subject to at least three risks and uncertainties. One, the extent of global trade-restrictive measures, which reached a new spike in 2024, are likely to intensify further amid tariff hikes in the United States of America and retaliation measures of other economies. Two, the inflationary impacts of these shifts in trade policies as well as rising economic uncertainty could keep global interest rates at a high level for a longer-than-expected period. An escalation in geopolitical conflicts in parts of Europe and the Middle East may also cause fluctuations in global commodity prices and thus shifts in interest rates. Three, within the region, the pace and magnitude of additional fiscal and monetary stimulus measures to support the Chinese economy, which accounts for 46 per cent of economic output in Asia and the Pacific, can lead to both upside and downside surprises, with notable implications for trade and investments in other regional peers.

## Charting long-term economic prosperity pathways

*For sustained economic performance, policymakers should focus on productivity-driven economic growth and development*

The region is facing two interconnected challenges to achieving sustained economic growth and development in the longer term. First, the convergence of per capita income levels between developing Asia-Pacific countries and the world's frontier countries has decelerated, driven by slower labour productivity growth and the diminishing impacts of capital accumulation on productivity gains. Second, many countries in the region remain trapped in production activities with lower value addition, and it is becoming more difficult to upgrade into high-value-addition segments of global supply chains amid rising trade protectionism and fierce international competition on technologies.

Keeping in view these challenges, Asia-Pacific countries should prioritize productivity enhancement and sectoral upgrading. Targeted education and vocational training, technological innovation, efficient resource allocations and a friendly business environment are necessary for increasing labour productivity. Proactive government support in the 'developmental state' style, including through industrial policies, can effectively facilitate sectoral upgrading, but its implementation should be conditional on having clear objectives, time horizons and accountability. Meanwhile, the region should also seek to embrace regional green value chains, building on its endowments of critical minerals and unparalleled manufacturing value chains.

## Understanding the complex and evolving macroeconomic and climate change nexus

While ensuring steady economic growth with stable inflation and charting out long-term economic prosperity pathways are important objectives, macroeconomic policymakers cannot and should not ignore the broader well-being of people. As the world experiences more climate disasters and steps up climate action, there will be significant implications on societies, economies and macroeconomic outcomes. Understanding the complex and evolving macroeconomic and climate change nexus is thus necessary for macroeconomic policymakers to achieve their traditional goals and targets while effectively supporting national climate action.

### *Macroeconomic impacts of climate change and related policies are notable and wide-ranging, yet not fully understood*

Many social and economic sectors and macroeconomic outcomes are affected by climate change and climate policies. As agricultural productivity in Asia and the Pacific still largely relies on weather conditions, both the well-being of agricultural workers and countries' food security hinges upon climate-induced disasters, such as floods and droughts, and slow onset changing climate conditions, such as rising temperatures and sea levels. Similarly, coastal economies and nature-based tourism are also exposed to climate change, while climate-related damage to energy infrastructure can have significant impacts on several economic sectors and on people. Heatwaves and reduced water availability undermine people's health conditions and education opportunities, while catastrophes can induce migration, with potential adverse impacts across generations.

These climate-related socioeconomic impacts directly and indirectly influence macroeconomic outcomes. Losses and damage of agricultural output and production can significantly push up inflation and unemployment, increase import needs and hamper economic growth. Fiscal and public debt positions would face greater pressure amid significant needs to support affected people and drive reconstruction efforts. Financial stability can also be at risk due to a surge in default loans and private insurance payouts. In addition to these sudden shocks, long-term economic impacts of climate change, such as lower labour productivity and agricultural yields, can also constrain economic growth potential and increase sovereign risks, especially in countries with already weakened macroeconomic fundamentals.

Policies and regulatory changes in response to climate change also pose trade-offs and influence macroeconomic outcomes. For instance, an ambitious energy transition plan can help countries achieve their climate goals more quickly with the potential to generate additional fiscal revenues from carbon-pricing schemes. Yet, this may raise inflation and erode export competitiveness amid higher domestic energy prices and lead to job losses in carbon-heavy industries. Similarly, effective green public investments can reduce perceived fiscal risks given the smaller expected climate-related fiscal burden in the future, but less effective ones can raise fiscal risks especially if such investment is debt financed.

### *Making decisions under considerable uncertainties*

While researchers are in constant pursuit of better data collection and analytical approaches, many macroeconomic-climate impact channels and feedback loops remain poorly understood, especially in the Asia-Pacific context. Macroeconomic indicators are also short term in nature and thus do not adequately capture long-term climate or environmental issues. This complicates macroeconomic policymaking which typically relies on available macroeconomic indicators. Given various unknowns and considerable uncertainties, policymakers would benefit from innovative decision-making strategies, such as strategic foresight analysis that explores different future scenarios and provides pre-emptive insights. A bottom-up approach, which uses available sectoral evidence to inform economy-wide policies, should be pursued further. More broadly, policies must be continuously updated or even reversed in the face of new information, while decision-making based on precautionary principles or no-regret options can be considered.

## Assessing the extent of macroeconomic exposure and coping ability of Asia-Pacific economies in the wake of climate change

Keeping in view the complex macroeconomic and climate change nexus, a critical question is whether Asia-Pacific developing economies are ready to cope with climate shocks and transition to low-carbon development. In this context, an economy is considered more vulnerable if it is more exposed to the potential impacts of climate change and climate transition and has weaker macroeconomic coping ability.

### *Many Asia-Pacific developing economies are less ready to cope with the implications of climate change*

According to a new readiness assessment by ESCAP, countries are deemed as more exposed if they face larger estimated economic losses from climate shocks, have a larger agricultural sector that is exposed to climate risks, rely more on carbon-intensive sectors as a source of economic growth and are expected to face higher inflation due to climate factors. Of the 30 developing Asia-Pacific countries analysed by ESCAP, 11 are considered more exposed. These are Afghanistan, Cambodia, the Islamic Republic of Iran, Kazakhstan, the Lao People's Democratic Republic, Mongolia, Myanmar, Nepal, Tajikistan, Uzbekistan and Viet Nam. For example, losses due to climate shocks can amount to 11 per cent of gross domestic product (GDP) in Cambodia every year, while agricultural activities located in areas with high climate risks account for about one fifth of GDP in Myanmar. Similarly, as an economy with a sizeable coal mining sector, Mongolia can face a decline in its exports as the world speeds up energy transition. Finally, in Mongolia, Tajikistan and Uzbekistan, extreme climate conditions alone can drive up long-term inflation by about 2.6 percentage points.

Being more exposed to climate shocks and climate transition by itself may not be a great concern, if a country has strong macroeconomic coping ability. To measure such ability, ESCAP examined 10 indicators that together capture the availability of fiscal resources, monetary and financial preparedness and institutional quality. The analysis suggests that 3 out of the 11 more exposed economies (Kazakhstan, Mongolia and Viet Nam) have relatively stronger coping ability. With regard to fiscal resources, some of them have sizeable tax revenues and/or climate finance relative to their estimated economic losses from climate shocks. For some, relatively better sovereign credit ratings also indicate lower fiscal borrowing costs. From the monetary and financial perspective, banking sectors in some of these countries have more room to absorb shocks while others are more committed to adopt green financial policies. Regarding institutional quality, a combination of effective civil services, transparent information on public finance and strong alignment between budget preparation and government policies have enhanced some of these economies' ability to cope with macroeconomic implications of climate change.

## Many macroeconomic policymakers in Asia and the Pacific have taken notable actions to tackle implications of climate change

Ministries of finance and central banks in Asia and the Pacific have undertaken various policies to support sustainable economies, manage climate-induced economic risks and promote green development. For example, to better understand and manage climate-induced fiscal risks, fiscal authorities have examined the economic impacts of post-disaster financing needs in the Lao People's Democratic Republic and the early retirement of coal-fired power plants in Indonesia, while Maldives has adopted flexible fiscal rules in the event of disaster shocks. To reduce carbon emissions, such policies as carbon pricing schemes or fiscal incentives for electric vehicles have been introduced in such countries as China, Kazakhstan and Thailand. Fiscal authorities have also adjusted their own operations to support national climate action, such as adoption of climate budgeting in Bangladesh, Nepal and the Philippines and green public procurement policies in Malaysia.

At the same time, central banks in such economies as Georgia and Thailand have worked with financial regulators to formulate national green finance taxonomies and sustainable finance frameworks. Central banks in Australia and the Russian Federation have issued guidance to ensure consistent and transparent disclosure of climate risks faced by financial institutions to manage financial stability risks, while those in India, Japan and Singapore encourage green financing through concessional lending and promoting the issuance of sustainable bonds. Meanwhile, central banks in China and the Republic of Korea have also adjusted monetary policy frameworks to include green credits as eligible assets for their lending facilities and increased the proportion of green bonds in official reserves.

## Going forward: factors to consider while pursuing climate-aligned macroeconomic policymaking

Despite these notable actions by macroeconomic policymakers in the region, designing and implementing climate-aligned fiscal, monetary and financing policies is still a relatively new endeavor. In going forward, there are various interconnected considerations that policymakers should keep in view.

First, macroeconomic policymakers are likely to face various new and difficult policy dilemmas and trade-offs as they seek to promote both economic development and environmental sustainability. For example, Governments with tight fiscal space may have to choose between sustaining essential public services, such as health care and social protection, and subsidizing energy transition to avoid higher inflation.

Second, there is a need for new thinking on policy tools and approaches. Since coping with and responding to climate change are not traditional macroeconomic goals, the effectiveness of traditional policies and approaches may be questioned. For example, monetary policy may not be able to address a prolonged period of high inflation driven by climate-induced supply shocks as such a policy typically focuses on managing aggregate demand to control inflation over the short term.

Third, policymakers should be mindful of unintended adverse social impacts of climate-aligned macroeconomic policies. For example, carbon-pricing schemes that do not use part of additional government revenue to support people affected by higher energy prices can raise poverty and widen income inequality.

In view of these and other similar considerations, ESCAP is developing a macroeconomic-climate toolkit to promote more systematic and coherent macroeconomic analysis and policy conduct amid climate change. The toolkit would help fiscal and monetary authorities in Asia and the Pacific to think through how to cope with climate-related risks, leverage opportunities and support national climate action given country-specific situations and challenges.

# Infographics

# Pursuing *economic prosperity* while dealing with *climate change*

## In the near future

### 1. Economies of Asia and the Pacific are expected to grow steadily in 2025 and 2026...

### 2. ...but risks are rising, especially trade tensions and economic uncertainty

### 3. Many economies and people may fare worse than others

- ✓ Below-target economic growth in the least developed countries
- ✓ Slower post-pandemic job recovery for lower-skilled workers
- ✓ Rising youth unemployment
- ✓ Persistent poverty and income inequality

## Over a longer time horizon

### 1. Economies in Asia and the Pacific must sustain economic growth while managing the green economic transformation, by

- ✓ Lifting labour productivity
- ✓ Upgrading economic sectors
- ✓ Capitalizing on green value chains

### 2. Macroeconomic policymakers will need to understand and cope with the implications of climate change, by

- ✓ Managing climate-induced economic risks
- ✓ Embedding climate factors into macroeconomic policy strategies
- ✓ Supporting climate action

# Stay resilient and prepared amid growing macroeconomic uncertainties

## Asia-Pacific region stayed economically resilient in 2024...

Average GDP growth: 4.8%,
↓ 0.4% compared with 2023

Average inflation: 5.0%,
↓ 0.4% compared with 2023


High inflation & interest rates

Ongoing trade & geopolitical tensions

Softened domestic consumption demand

## ...with variations across subregions

✓ **North and Central Asia**: Resilient economies supported by growing domestic demand and intra-subregional trade

✓ **South and South-West Asia**: Growth moderated from an above-trend high, but inflation also eased

✓ **East and North-East Asia**: Weak private demand, but robust public investment & growth in high-tech sectors

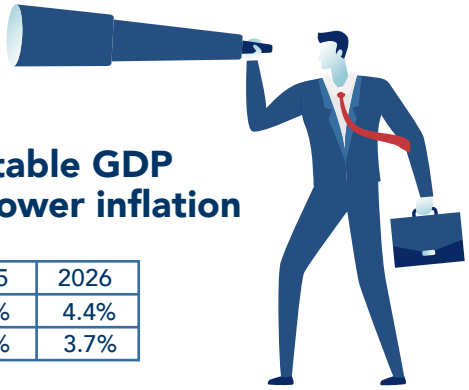
✓ **South-East Asia**: Strong performance driven by a global electronics boom

✓ **The Pacific**: Economic recovery continued, but debt risks remain persistent

## Outlook for 2025-2026 is broadly stable amid rising risks

### Major risks

- Resurging global inflation & higher-for-longer global interest rates
- Rising global trade tensions & escalating geopolitical conflicts



### Baseline: stable GDP growth & lower inflation

| | 2025 | 2026 |
|---|---|---|
| Growth | 4.5% | 4.4% |
| Inflation | 4.4% | 3.7% |

### On the upside

- Policy stimulus & better-than-expected growth of Chinese economy

## Policy considerations

Prudent monetary & fiscal management in anticipation of emerging risks

Timely and flexible support for domestic industries & value chains

Strengthened economic cooperation as a shield against external uncertainties

# The future of economic growth

## Productivity growth and income convergence has slowed down in Asia and the Pacific

Decline in labour productivity growth, 2000-2007 vs. 2011-2019

**9.8%** → **6.9%**
China

**3.9%** → **3.4%**
North and Central Asia

**4.5%** → **3.3%**
South-East Asia

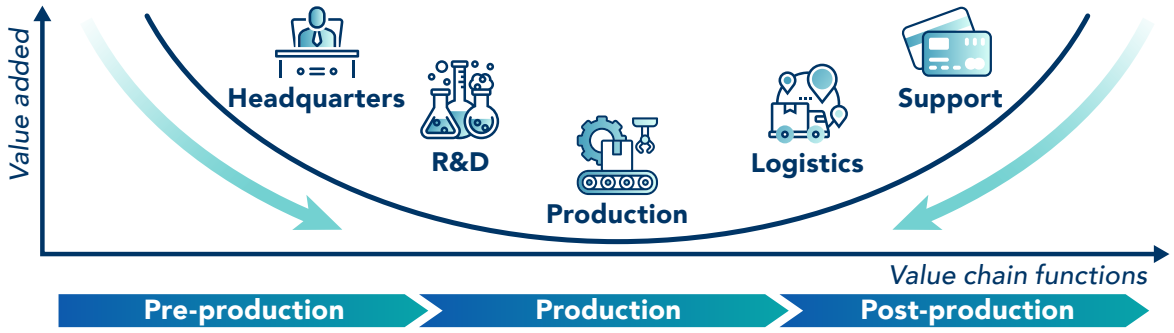
**5.0%** → **3.5%**
South and South-West Asia

Per capita income in **44** Asia-Pacific developing countries, vs. that of the United States

**25** left further behind **19** catching up



## Most developing countries are at the low value added "production" segment of the value chain




**Green economic transformation**

**They are also confronted with a difficult balancing act**

**Conventional economic growth**

## To escape the "middle-income trap", Asia-Pacific countries need to:

1. **Strengthen** the role of the State in championing sectoral economic upgrading

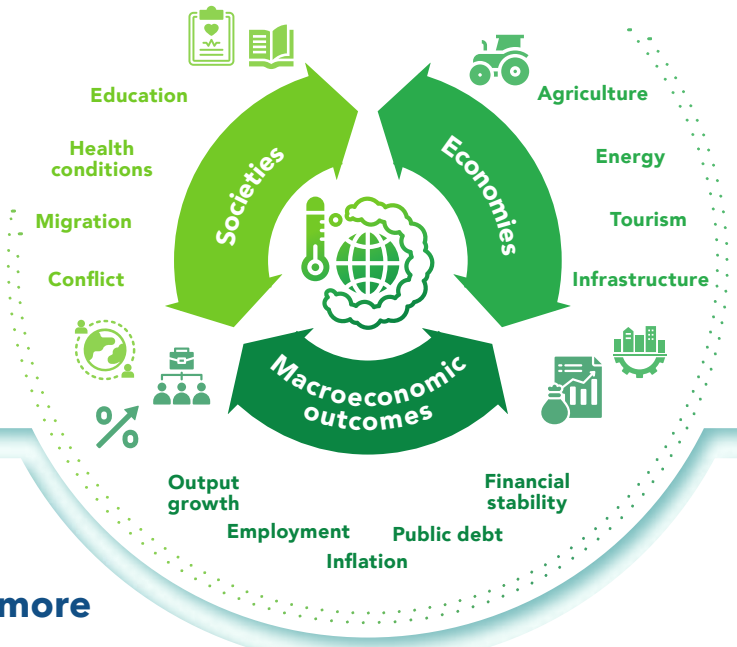
2. **Capitalize on** green value chains as a source of future economic growth

3. **Embrace** inclusive regional economic cooperation for shared prosperity

# Understanding the macroeconomic-climate change nexus

**1.**

**Climate shocks and climate action have myriad, less-understood implications on**




**2.**

**In response, fiscal and monetary authorities have introduced some policies, but more changes are needed to**

**Analyse and cope with climate-induced economic risks**

**Foster climate action**

- which will affect decisions by businesses and consumers
- which will require adjustments in existing policy frameworks

**3.**

## Main considerations for realizing climate-aligned macroeconomic policies

Ensure coherence across policymaking entities

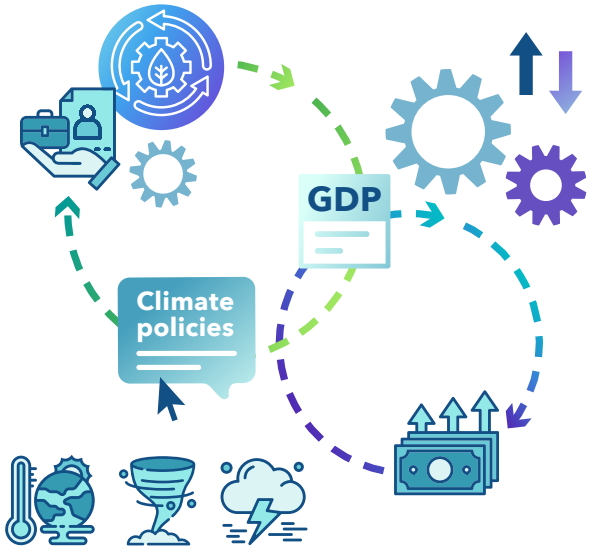
Make changes happen

Mitigate unintended adverse impacts on people

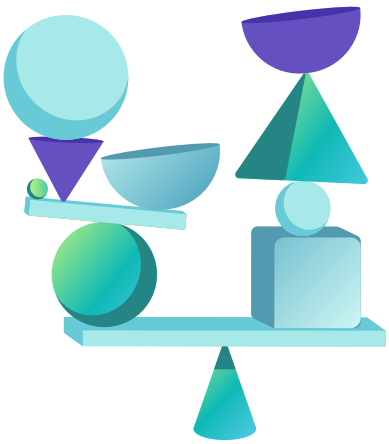
- Amending laws
- New policy tools and approaches
- Innovative financing
- Buy-in from broader stakeholders

# Climate change and macroeconomic indicators

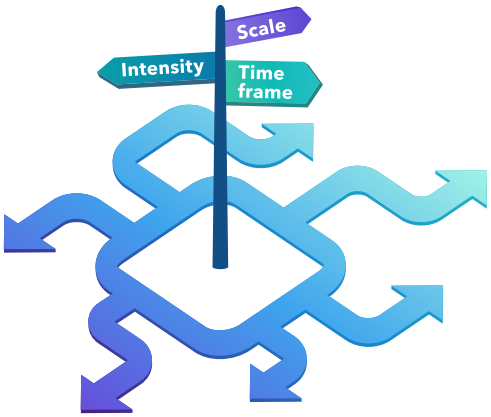
**1** Climate change and climate action have impacts on societies and economies in **complex ways**, often still not fully understood.




**2** Policymakers must prioritize the most impactful climate policies while **balancing** investments between climate action and socioeconomic objectives.



**3** Economists should intensify their search for **the most effective decarbonization paths**, considering both their intensity and time frames.




**4** A deeper understanding is needed regarding the **complex interplay** between climate change, climate action and macroeconomic indicators.


**5** **Uncertainty** and **risk** are a part of climate action, and policymakers must learn how to embrace them better in policy design and decision-making processes.

# Are Asia-Pacific economies ready to cope with climate change and transition?


## 1. Exposure to climate change and transition

**Physical risks**
- **Average annual loss** — Average annual loss due to multi-hazard risk as a share of GDP
- **Agricultural value at risk** — Agricultural value added at risk due to climate change as a share of GDP

**Transition risks**
- **Carbon intensity** — $CO_2$ emissions per unit of GDP

**Dual risks**
- **Inflationary impact** — Impact on prices due to temperature and precipitation extremes

## 2. Macroeconomic coping ability

### Fiscal resources
- Tax-to-AAL (average annual loss) ratio
- Climate finance mobilization as a share of AAL
- Sovereign debt ratings

### Monetary & financial preparedness
- Strength of banking sector
- Use of green financial policymaking
- Ability to meet inflation targets
- State of financial market development

### Institutional quality
- Government effectiveness
- Transparency of public finances
- Policy-based fiscal strategy & budgeting

**Exposure** (horizontal) × **Coping capacity** (vertical)

| | Less exposed | More exposed |
|---|---|---|
| **Lower coping capacity** | Armenia, Azerbaijan, Bangladesh, Bhutan, Fiji, Kyrgyzstan, Pakistan, Papua New Guinea, Sri Lanka, Turkmenistan | Afghanistan, Cambodia, Islamic Republic of Iran, Lao People's Democratic Republic, Myanmar, Nepal, Tajikistan, Uzbekistan |
| **Higher coping capacity** | China, Georgia, India, Indonesia, Malaysia, Philippines, Republic of Korea, Thailand, Türkiye | Kazakhstan, Mongolia, Viet Nam |

## 3. Policy suggestions

- Strengthen fiscal resilience
- Prioritize green economic development
- Develop climate-resilient financial systems
- Mobilize innovative financing
- Foster regional collaboration

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This issue of the *Survey* was produced under the overall guidance of Armida Alisjahbana, Under-Secretary-General and Executive Secretary of ESCAP, and Lin Yang, Deputy Executive Secretary for Programme of ESCAP, with support from the Editorial Board of ESCAP. Each annual edition draws on expertise available in the secretariat's substantive divisions and subregional offices and from across the United Nations system.

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Mitchell Hsieh, Raggie Johansen, Kavita Sukanandan, Sompot Suphutthamongkhon and Veronika Verner, all from the ESCAP Communications and Knowledge Management Section, coordinated the media launch and dissemination of the report.

# Explanatory notes

Analyses in the *Economic and Social Survey of Asia and the Pacific 2025* are based on data and information available up to 10 March 2025.

Groupings of countries and territories/areas referred to in the present issue of the *Survey* are defined as follows:

- ESCAP region: Afghanistan; American Samoa; Armenia; Australia; Azerbaijan; Bangladesh; Bhutan; Brunei Darussalam; Cambodia; China; Cook Islands; Democratic People's Republic of Korea; Fiji; French Polynesia; Georgia; Guam; Hong Kong, China; India; Indonesia; Iran (Islamic Republic of); Japan; Kazakhstan; Kiribati; Kyrgyzstan; Lao People's Democratic Republic; Macao, China; Malaysia; Maldives; Marshall Islands; Micronesia (Federated States of); Mongolia; Myanmar; Nauru; Nepal; New Caledonia; New Zealand; Niue; Northern Mariana Islands; Pakistan; Palau; Papua New Guinea; Philippines; Republic of Korea; Russian Federation; Samoa; Singapore; Solomon Islands; Sri Lanka; Tajikistan; Thailand; Timor-Leste; Tonga; Türkiye; Turkmenistan; Tuvalu; Uzbekistan; Vanuatu; and Viet Nam.
- Developing ESCAP region: ESCAP region, excluding Australia, Japan and New Zealand.
- Developed ESCAP region: Australia, Japan and New Zealand.
- East and North-East Asia: China; Democratic People's Republic of Korea; Hong Kong, China; Japan; Macao, China; Mongolia; and Republic of Korea.
- North and Central Asia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Uzbekistan.
- Pacific: American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.
- Pacific island developing economies: All those listed above under "Pacific" except for Australia and New Zealand.
- South and South-West Asia: Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Maldives, Nepal, Pakistan, Sri Lanka and Türkiye.
- South-East Asia: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste and Viet Nam.
- Least developed countries: Afghanistan, Bangladesh, Cambodia, Kiribati, Lao People's Democratic Republic, Myanmar, Nepal, Solomon Islands, Timor-Leste and Tuvalu. Note: Bhutan, Maldives, Samoa and Vanuatu were least developed countries prior to their graduation in 2023, 2011, 2014 and 2020, respectively.
- Landlocked developing countries: Afghanistan, Armenia, Azerbaijan, Bhutan, Kazakhstan, Kyrgyzstan, Lao People's Democratic Republic, Mongolia, Nepal, Tajikistan, Turkmenistan and Uzbekistan.
- Small island developing States: American Samoa, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Maldives, Marshall Islands, Micronesia (Federated States of), Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Singapore, Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu.

Owing to the limited availability of data, selected small island developing States are excluded from the analysis. For the purpose of this *Survey*, Singapore is not considered to be a small island developing State due to its high level of development and high-income status.

Bibliographical and other references have not been verified. The United Nations bears no responsibility for the availability or functioning of URLs.

Many figures used in the *Survey* are on a fiscal year basis and are assigned to the calendar year which covers the major part or second half of the fiscal year.

Growth rates are on an annual basis, except where indicated otherwise.

References to dollars ($) are to United States dollars, unless otherwise stated.

The term "billion" signifies a thousand million. The term "trillion" signifies a million million.

In the tables, two dots (..) indicate that data are not available or are not separately reported; a dash (–) indicates that the amount is nil or negligible; and a blank indicates that the item is not applicable.

In dates, a hyphen (-) is used to signify the full period involved, including the beginning and end years, and a stroke (/) indicates a crop year, fiscal year or plan year.

# Acronyms

| | |
|---|---|
| AAL | average annual loss |
| ADB | Asian Development Bank |
| AI | artificial intelligence |
| AMRO | ASEAN+3 Macroeconomic Research Office |
| ASEAN | Association of Southeast Asian Nations |
| CBA | cost-benefit analysis |
| CBAM | carbon border adjustment mechanism |
| CEA | cost-effectiveness analysis |
| CEIC | CEIC Data, part of ISI Emerging Markets Group |
| COVID-19 | coronavirus disease 2019 |
| ESCAP | United Nations Economic and Social Commission for Asia and the Pacific |
| EU | European Union |
| EU ETS | European Union Emissions Trading System |
| EV | electric vehicle |
| FAO | Food and Agriculture Organization of the United Nations |
| FDI | foreign direct investment |
| GDP | gross domestic product |
| GHG | greenhouse gas |
| GNI | gross national income |
| GVC | global value chain |
| IAEA | International Atomic Energy Agency |
| IEA | International Energy Agency |
| ILO | International Labour Organization |
| IMF | International Monetary Fund |
| IOM | International Organization for Migration |
| IPCC | Intergovernmental Panel on Climate Change |
| IRENA | International Renewable Energy Agency |
| MCDA | multi-criteria decision analysis |

## Acronyms *(Continued)*

| | |
|---|---|
| ND-GAIN | Notre Dame Global Adaptation Initiative Country Index |
| PEFA | World Bank Public Expenditure and Financial Accountability |
| PPP | purchasing power parity |
| PV | photovoltaic |
| R&D | research and development |
| RDM | robust decision-making |
| TFP | total factor productivity |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UNICEF | United Nations Children's Fund |
| UNCTAD | United Nations Conference on Trade and Development |
| WTO | World Trade Organization |

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## List of tables

# 1 MACROECONOMIC PROSPECTS, CHALLENGES AND POLICIES FOR ASIA AND THE PACIFIC

# 1. Introduction

Asia-Pacific developing economies remained resilient amid multiple headwinds in 2024, outperforming all other developing regions in the world and contributing about 60 per cent to global economic growth. Such resilience was supported by strong export performance and, to a lesser extent, by strengthened public investment, which helped offset the impact of softened private consumption and investment. Nevertheless, economic growth in Asia-Pacific developing countries moderated in 2024 compared with 2023 and remained below the pace recorded prior to the COVID-19 pandemic. On the bright side, the region's average inflation rate steadily decreased in 2024 amid lower global commodity prices and reduced currency depreciation pressure. However, a combination of slower economic growth, high cost of living and job market disruptions, especially for youth, exerted drags on poverty reduction.

In this context, the chapter provides an overview of the region's macroeconomic performance with more detailed discussions on its five subregions in section 2. Section 3 seeks to shed light on the near-term macroeconomic outlook for the region in 2025 and 2026, with an analysis on major uncertainties that may cause deviations from the baseline. Section 4 discusses three priority policy considerations for Asia-Pacific developing countries in anticipation of near-term macroeconomic challenges and uncertainties. Section 5 concludes.

# 2. Recent macroeconomic trends and near-term outlook

## 2.1. Global economic developments

### 2.1.1 Global economic performance exceeded expectations, marked by broad-based reduction in inflation and recovery in global trade

**Global economic growth proved resilient in 2024 amid ongoing trade and geopolitical tensions and high interest rates.** It stabilized at 3.2 per cent during the year (IMF, 2025), slightly lower than the 3.3 per cent in 2023. This resilience was supported by robust performance of developed economies. In the United States of America, strong consumer spending and low unemployment supported above-trend economic growth. In the European Union, the economy registered a modest recovery from that of 2023. It benefited from stronger private consumption due to steady employment and rising wages amid falling inflation yet suffered from drags of elevated energy costs and growing foreign economic competition. In Africa, Latin America and the Caribbean and Western Asia, economic growth also moderately strengthened (figure 1.1), although country-level disparities and, in some parts, public debt distress challenges persisted.

This chapter was prepared by Zheng Jian (jianz@un.org) and Kiatkanid Pongpanich (pongpanich@un.org), with research assistance from Nixie Abarquez.

**Inflation pressure eased worldwide, opening space for gradual monetary easing.** Since the peak in late 2022 and early 2023, inflation has continued to decline in 2024 in response to swift and significant interest rate hikes introduced by central banks around the world (figure 1.2a and 1.2b). The normalization of pent-up demand after an initial surge in the post-pandemic period, further easing of supply-chain bottlenecks and continued decline in international food and energy prices (figure 1.3), also contributed to this momentum,[1] providing central banks with confidence to start cutting interest rates gradually in 2024.

**Global trade, especially merchandise trade, picked up in 2024.** Total global trade value is estimated to have increased by 3.3 per cent in 2024, reaching $33 trillion.[2] Services trade continued to outperform merchandise trade, registering 7.0 per cent growth and accounting for close to half of the total net gain in global trade value. Merchandise trade recovered from a dip around the turn of the year and grew by 2 per cent in 2024 (figure 1.4). Much of this turnaround can be attributed to strong trade growth in information and communications equipment and electronics, whereas trade values for road vehicles, textiles, metals and energy declined. The swift expansion of artificial intelligence (AI) applications and investments in digital infrastructure are among the main drivers of this latest development. For instance, AI investments by "Big Techs" alone have totalled $170 billion in the first three quarters of 2024, registering an impressive 56 per cent year-on-year growth rate.[3] The result is a surge in trade of semiconductors by 19 per cent in 2024, totaling $627 billion.[4]

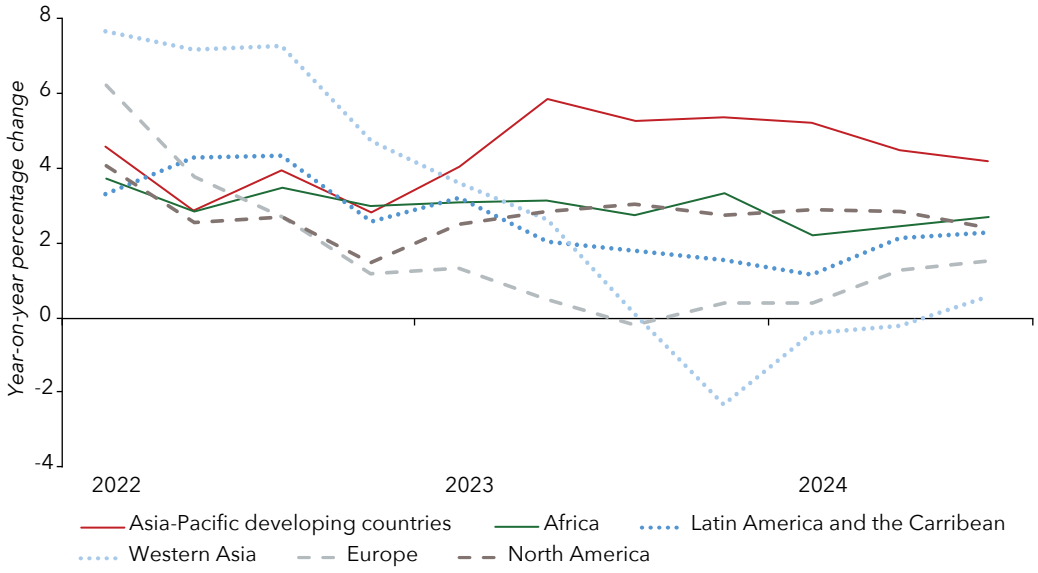
1 Immigrant inflows may have also helped to cool labour markets in the United States and Europe.

2 *UNCTAD Global Trade Update, December 2024.*

3 As reported by Forbes, available at www.forbes.com/sites/bethkindig/2024/11/14/ai-spending-to-exceed-a-quarter-trillion-next-year/.

4 As reported by World Semiconductor Trade Statistics, available at www.wsts.org/76/Recent-News-Release.

## Figure 1.1 Percentage quarterly GDP growth, by region, year-on-year

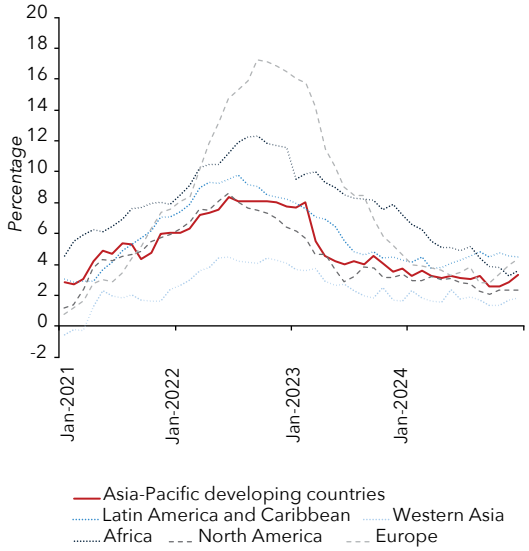



*Source*: ESCAP, based on CEIC. Accessed on 10 March 2025.

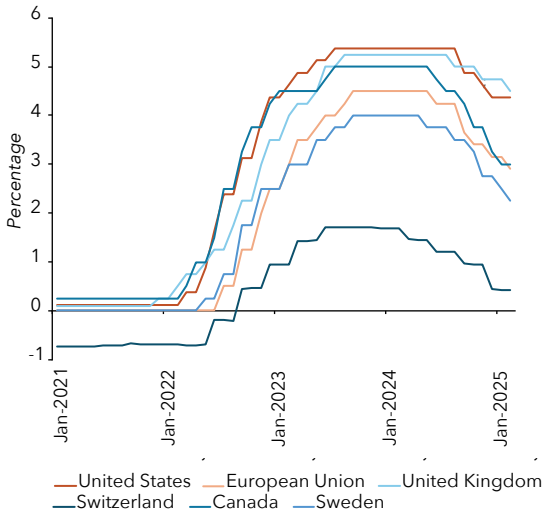
*Note*: Regional averages are weighted averages. Western Asia is comprised of Bahrain, Israel, Jordan, Kuwait, Qatar, Saudi Arabia, State of Palestine and United Arab Emirates.

## Figure 1.2 Global inflation trend and policy rate changes in developed economies

### A. Monthly inflation, year-on-year

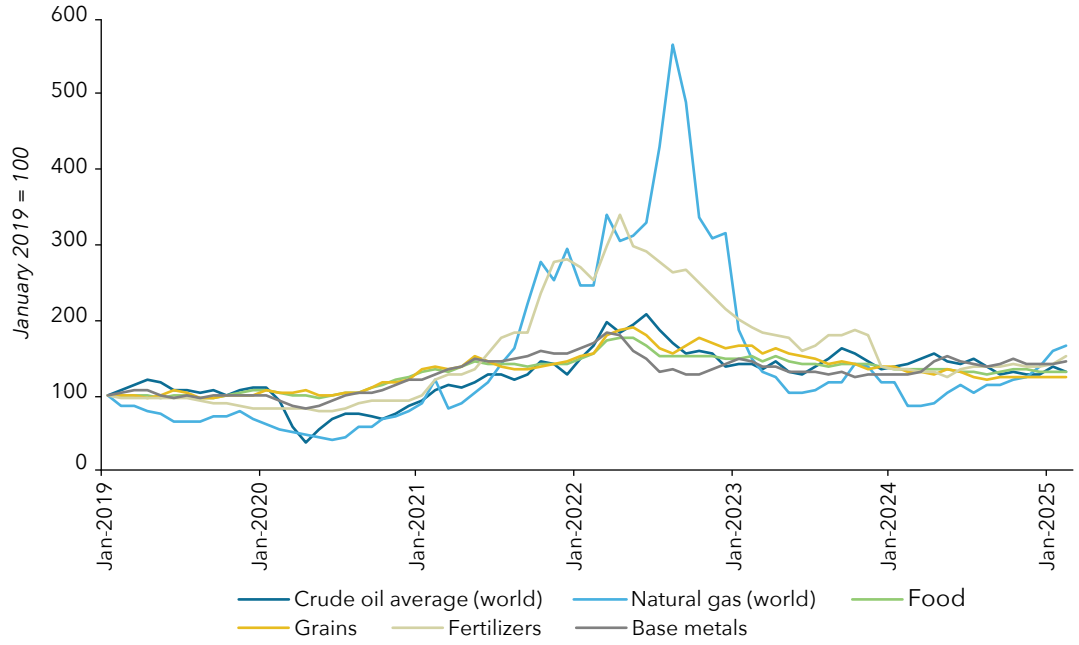



### B. Policy rates in selected developed economies



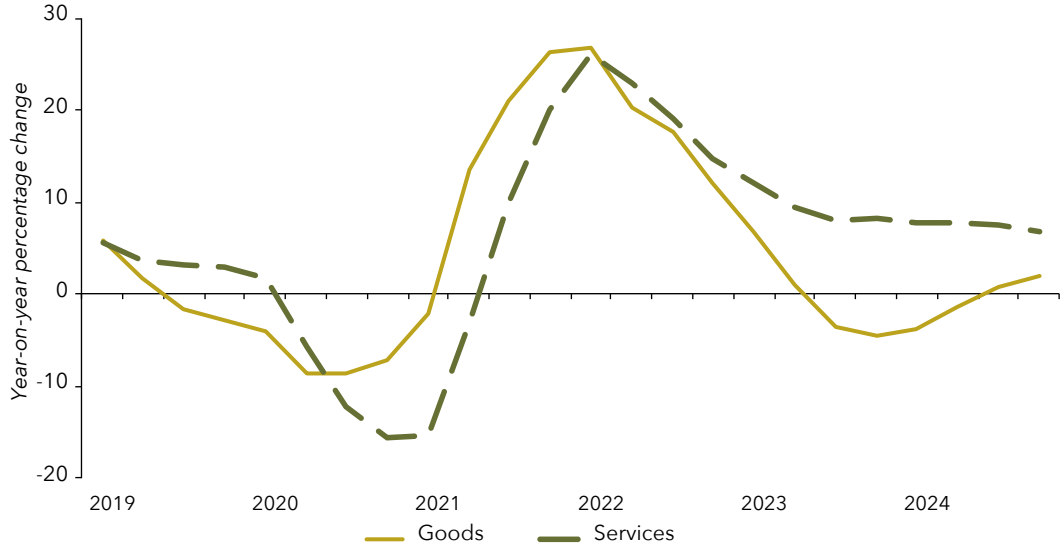

*Source*: ESCAP, based on CEIC. Accessed on 10 March 2025.

## Figure 1.3 Price indices of selected energy, food and resource items (January 2019 = 100)




*Source*: ESCAP, based on CEIC. Accessed on 10 March 2025.

## Figure 1.4 Percentage global growth in value of trade in goods and services, year-on-year




*Source*: UNCTADstat calculations, based on national statistics.

*Note*: Calculated as a trade-weighted moving average over the past four quarters. Figures for Q4 2024 are nowcasts as of 26 November 2024.

## 2.2. Recent economic performance in Asia-Pacific developing economies

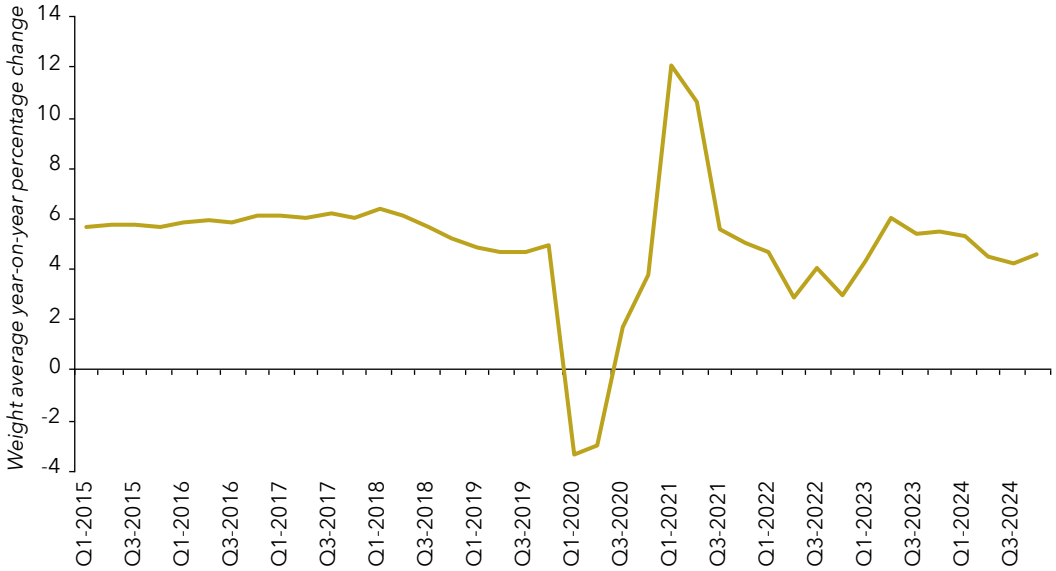
### 2.2.1 Economic growth in Asia-Pacific developing countries moderated in 2024, but remained the fastest growing in the world

**Average economic growth in Asia-Pacific developing countries moderated to 4.8 per cent in 2024,** in comparison with 5.2 per cent in 2023 and 5.5 per cent during the five years prior to the COVID-19 pandemic (figure 1.5). Despite this slowdown, the region remained economically resilient, outperforming all other developing regions in the world and contributing about 60 per cent to global economic growth in 2024.

**Strong merchandise exports and, to a lesser extent, strengthened public investment sustained the region's economic growth in 2024** (figure 1.6). Merchandise export value from Asia-Pacific developing countries increased by 3.4 per cent in 2024 after a contraction of 0.9 per cent in 2023 (ESCAP, 2024a). Rising global demand for electronics and AI-related semiconductors was notable, primarily benefiting countries deeply integrated into global electronics value chains (figure 1.7). Meanwhile, accelerated public investment in infrastructure and productive capacities helped offset some aggregate demand impact of weaker private consumption and investment in several major economies in the region, while further boosting economic growth in many others.

**As in 2023, Asia-Pacific countries in special situations underperformed regional peers in economic growth in 2024.** The least developed countries and small island developing States both grew by 3.7 per cent in 2024, below the regional average of 4.8 per cent. For the least developed countries, it is also substantially lower than the 7 per cent economic growth target set in Sustainable Development Goal 8. Several factors weighed on the economic performance of countries in special situations in 2024. Among others, commodity exporting countries in special situations faced lower global demand, while many least developed countries and small island developing States continued to be confronted with high debt burdens, small capital investments and macroeconomic instability concerns.

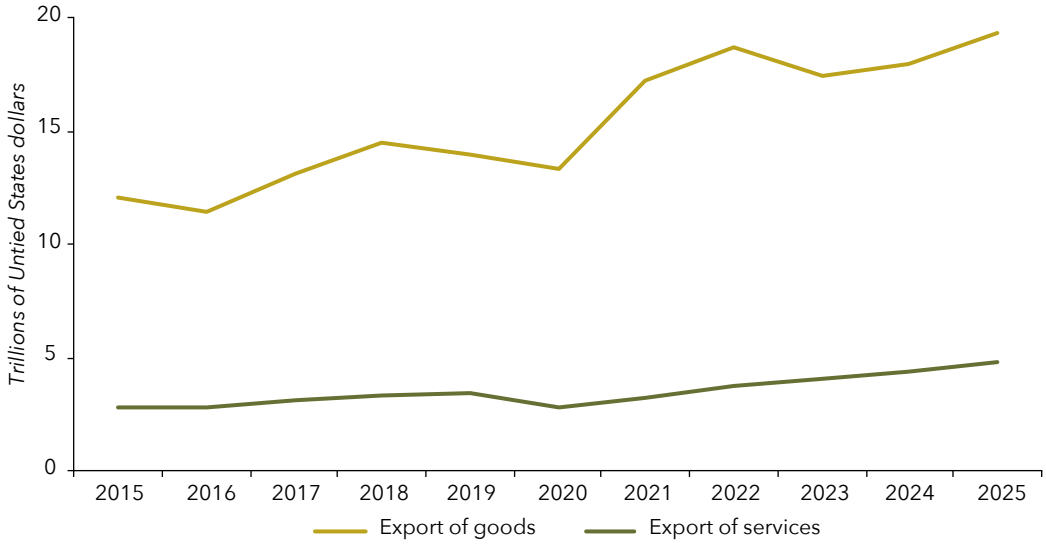
Figure 1.5 Percentage real GDP growth of Asia-Pacific developing economies, weighted average, year-on-year




*Source*: ESCAP, based on CEIC. Accessed on 10 March 2025.

*Note*: Calculated as weighted average of the Asia-Pacific developing countries in the region, which comprises 28 economies. Data for 2024 exclude the Islamic Republic of Iran and Kazakhstan.

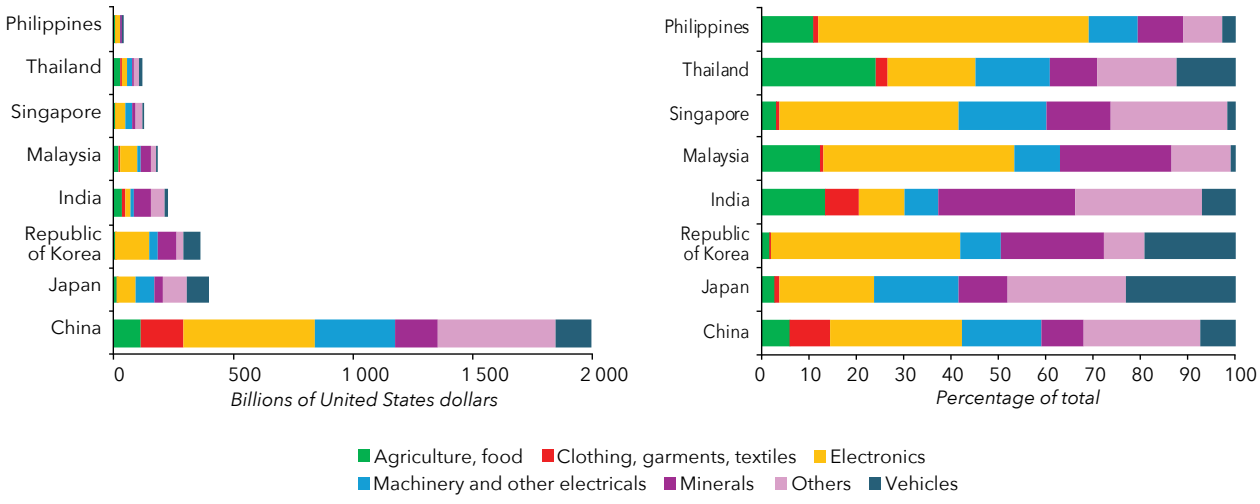
Figure 1.6 Exports of Asia-Pacific developing economies




*Source*: ESCAP (2024a).

*Note*: Year 2025 numbers are projections.

Figure 1.7 Exports by major product items, January to July 2024

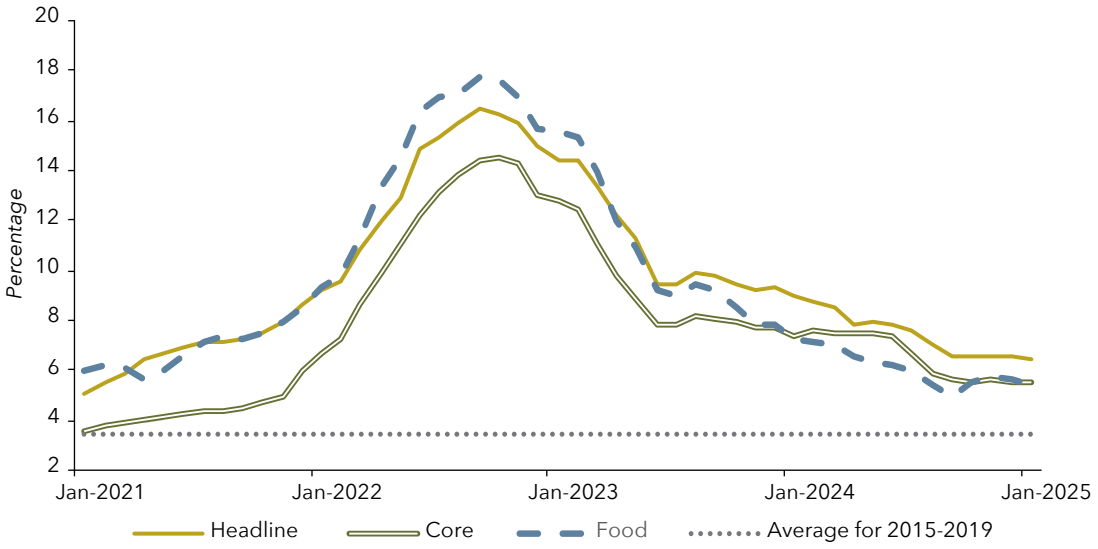



*Source*: ESCAP, based on International Trade Centre and CEIC. Accessed on 10 March 2025.

### 2.2.2 Both inflation and currency depreciation pressures declined substantially, opening space for monetary easing

**Average headline inflation eased further in Asia-Pacific developing countries to 5.0 per cent in 2024.** While this is a notable drop from 5.4 per cent in 2023 and 7.7 per cent in 2022 (figure 1.8), it is still substantially higher than the pre-pandemic average of 3.4 per cent between 2015 and 2019. Nevertheless, across the region, inflation in more than half of the countries is now below official targets or within the target range (figure 1.9). The decrease in global commodity prices contributed to this trend. The international food price index, for instance, dropped by about 20 per cent from 2022, while oil prices dropped by 2.3 per cent over the past year. The easing of global supply chain bottlenecks, the gradual normalization of consumption demand after the COVID-19 pandemic, a softening in the Chinese economy and the tight monetary policy stance earlier also played a role in bringing down inflation.

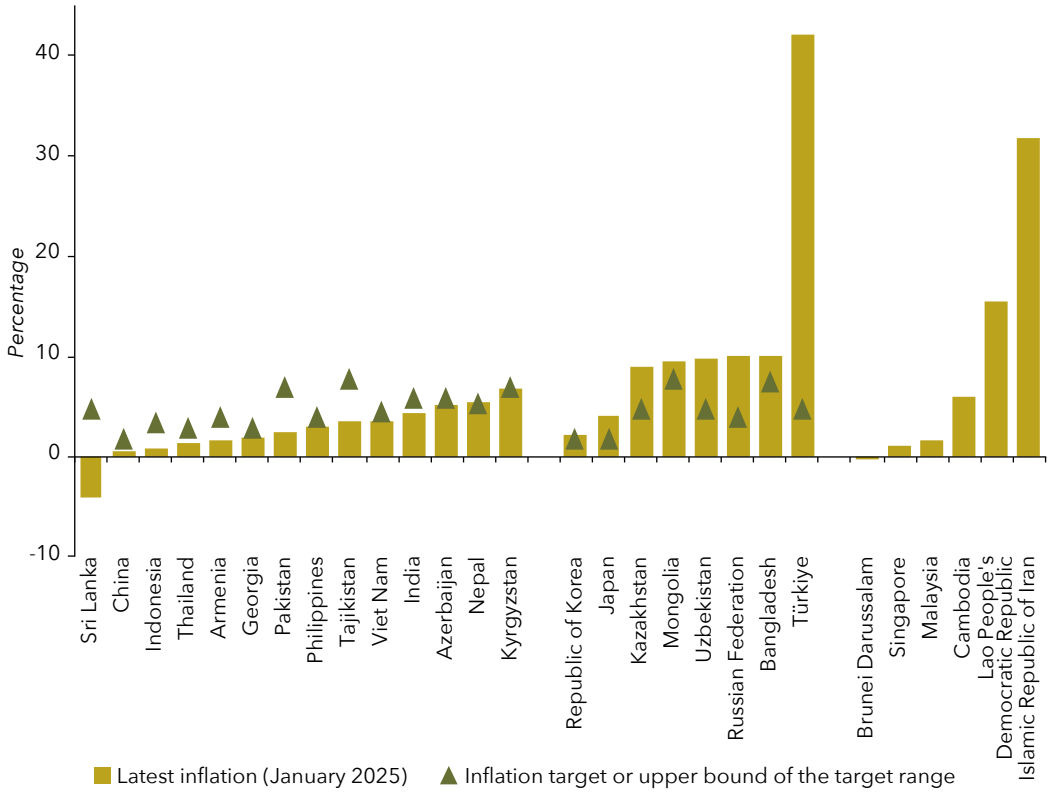
## Figure 1.8 Average headline, core and food inflation in Asia-Pacific developing countries




*Source*: ESCAP, based on CEIC. Accessed on 10 March 2025.

*Note*: Calculated as simple averages. The headline inflation average covers 30 countries (excluding Myanmar from April 2024 onward), while core and food inflation covers 28 and 16 countries respectively.

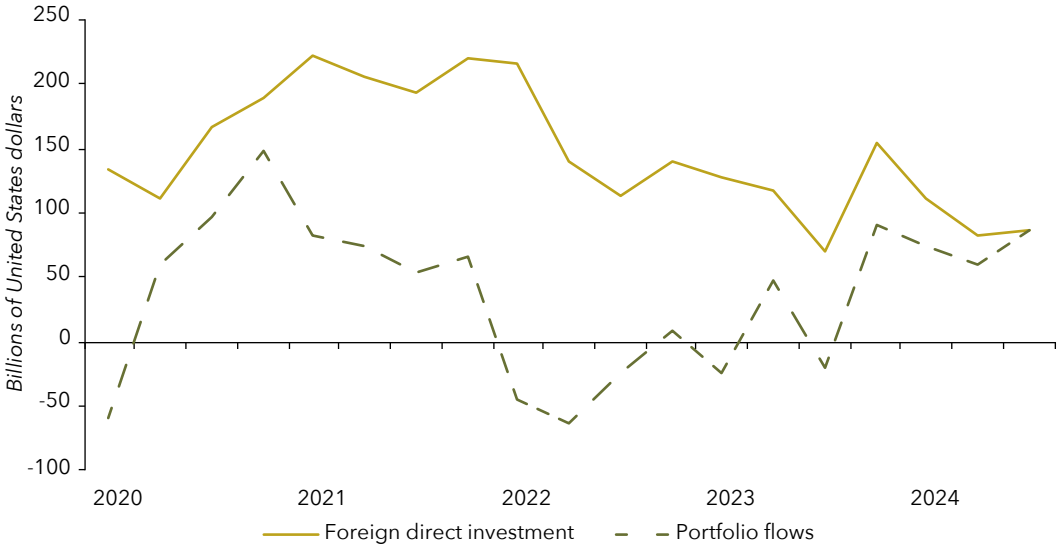
## Figure 1.9 Current headline inflation vs. official targets in selected countries




*Source*: ESCAP, based on CEIC. Accessed on 10 March 2025.

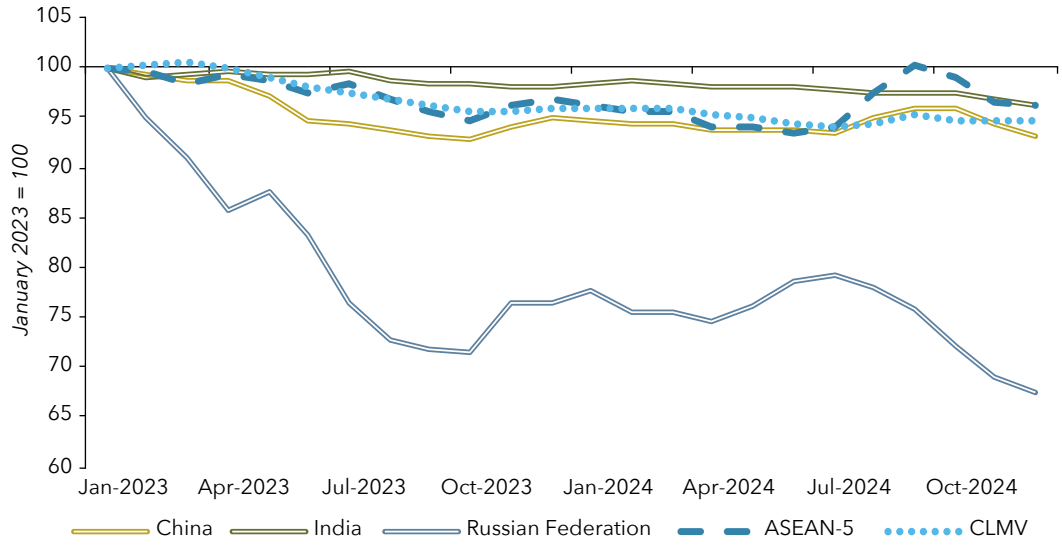
**Capital inflows and currency appreciation helped as well.** Benefiting from interest rate reductions instituted by the European Central Bank and the United States Federal Reserve respectively in June and September 2024, net capital inflows to Asia-Pacific developing economies picked up, consolidating the recovery after years of decline (figure 1.10). This stabilized and, in some cases, pushed up exchange rates of local currencies, which had been under immense pressure in the past two years (figure 1.11). Such improvement in purchasing power of local currencies in the international market reduced imported inflation and benefited economies that were struggling with balance of payment challenges.

**Figure 1.10 Net capital inflows in Asia-Pacific developing countries**




*Source*: ESCAP, based on CEIC. Accessed on 10 March 2025.

**Figure 1.11 Exchange rate movement of local currencies against the United States dollar (January 2023=100)**




*Source*: ESCAP, based on CEIC. Accessed on 10 March 2025.

*Note*: ASEAN-5 (Indonesia, Malaysia, Philippines, Singapore and Thailand) and CLMV (Cambodia, Lao People's Democratic Republic, Myanmar and Viet Nam) are calculated as simple averages of the changes in bilateral exchange rates against the United States dollar.

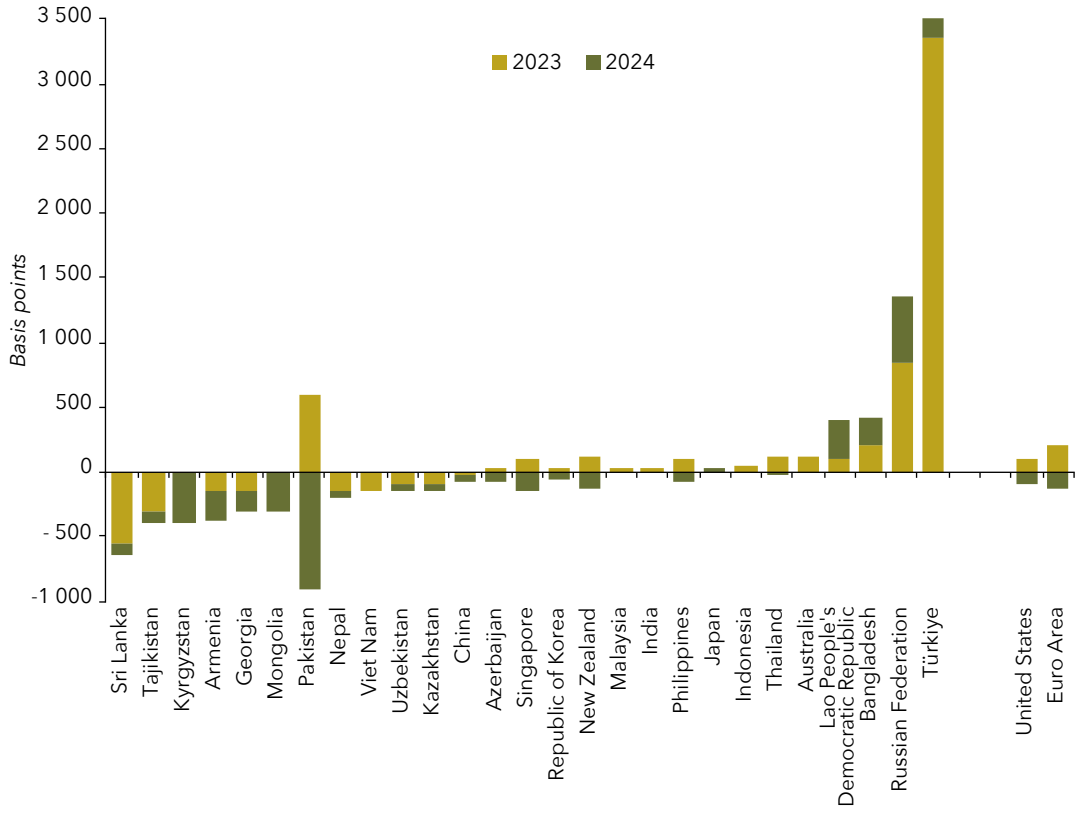
**In this context, monetary policy stance in Asia and the Pacific became more accommodative in the second half of 2024** (figure 1.12). For instance, China, Nepal, Pakistan, the Philippines, Sri Lanka and Thailand have all introduced policy rate reductions since July 2024, while economies in North and Central Asia had already begun to lower interest rates since mid-2023. For many of them, this marked the first reduction in interest rates in several years and could provide a new impetus to domestic demand in the region.

**The reduction in inflation, however, is not universal and, in a few cases, it remains stubbornly high.** In the Lao People's Democratic Republic, for instance, inflation has remained above 20 per cent since 2022 due to currency depreciation, limited foreign exchange reserves and high external debt service obligations. In the Islamic Republic of Iran, inflation averaged between 30 and 45 per cent in the past 5 years, when economic sanctions and domestic structural difficulties continued to weigh on the local economy and international balance of payments. In India, vegetable prices surged by almost 30 per cent in June 2024 due to a heat wave. Such episodes of high inflation, among other factors, have pushed up the cost of living for the poor and eroded progress towards poverty reduction. Even in places where inflation has subsided, the cost of living stays high. For example, the overall price level shot up by 34 per cent in Asia-Pacific least developed countries, 1.6 times in the Islamic Republic of Iran and 3.2 times in Türkiye between 2021 and 2024.

### 2.2.3 Economic growth moderation and high inflation in 2023 and 2024 have adversely affected employment and poverty

**Although overall unemployment stayed stable at 4.2 per cent in both 2023 and 2024, low-skilled workers and young people are confronted with higher risks of being left behind.** Total employment in manufacturing and hospitality (accommodation and food services), two sectors hiring many low-skilled workers, only just surpassed their pre-pandemic levels by 0.5 and 1.0 per cent respectively as of mid-2024. In contrast, this figure for the information and communications technology sector was much higher at 18.6 per cent. Youth unemployment also became a pressing issue, especially in East Asia (ILO, 2024). For instance, the combined effect of slower economic growth, the scarring effect of COVID-19 and structural and skill mismatches in the labour market pushed up youth unemployment in China

Figure 1.12 Policy interest rate changes in selected Asia-Pacific economies




*Source*: ESCAP, based on CEIC. Accessed on 10 March 2025.

*Note*: 100 basis points is 1 per cent.

to a peak of 18.8 per cent in August 2024,[5] before moderating to 15.7 per cent in December. Meanwhile, young women in Asia and the Pacific suffered greater and longer-lasting negative employment shocks from the COVID-19 pandemic, due to their higher exposure to vulnerable jobs. As of 2023, the unemployment rate of young women in the region still stayed 1 percentage point above the level in 2019, when this figure for young men had already dropped below the 2019 level a year earlier.

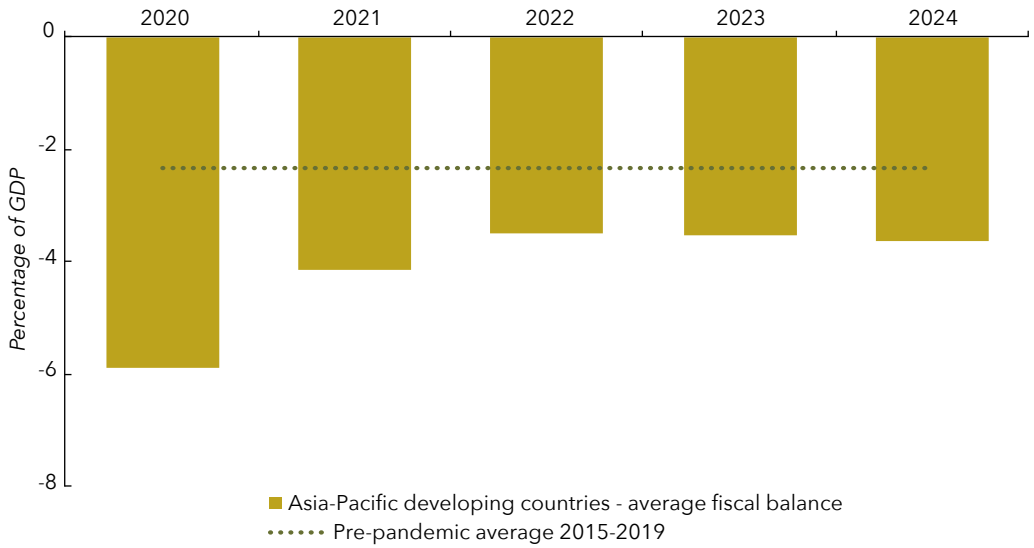
**Progress towards eradicating poverty has experienced a setback due to high inflation in recent years.** A survey conducted in mid-2024 in the Lao People's Democratic Republic showed that up to 63 per cent of low-income households have reduced their food consumption due to high inflation. Further, about one third of the households surveyed reported spending cuts on either education or health care. This is a clear reminder that, even when average incomes keep rising due to economic growth, the situation of the poor may not improve if their purchasing power is eroded due to high and volatile inflation, especially for daily necessities. Similarly in the Philippines, although the poverty rate dropped to 15.5 per cent in 2023 from 18.1 per cent in 2021, relatively high inflation in 2023 prevented more people from escaping poverty.

### 2.2.4 Elevated public debt servicing pressure due to high interest rates threatens to crowd out productive public investments

**Fiscal policies in most Asia-Pacific developing economies remained expansionary in 2024 while Governments explored measures to enhance fiscal space.** After the COVID-19 pandemic, most countries shifted their policy focus from addressing the sudden shock towards supporting economic development. The average fiscal deficit in the region is estimated to have remained stable at 3.2 per cent of GDP in 2024 (figure 1.13), coming down from a peak of 5.8 per cent in 2020 but still above the pre-pandemic average of 2.1 per cent. In most countries, fiscal deficits stayed above pre-pandemic levels (figure 1.14). Part of the fiscal deficit increase in recent years can be attributed to public spending to protect people's well-being from high cost of living; public investment in infrastructure development; slower economic growth which undermines government revenue collection; and larger sovereign debt servicing burden amid higher public debt and interest rate levels. In some cases, countries tapped into cash buffers or resource revenue reserves to fund budget deficits without incurring additional public debt.

**To enhance fiscal space, several Governments have focused on improving spending efficiency and revenue enhancement.** Examples of measures undertaken include reducing unproductive subsidies, rationalizing public spending and increasing taxes. For example, Malaysia shifted away from blanket subsidies to targeted subsidies on fuel and social support to improve spending efficiency and effectiveness. Fiji and Sri Lanka increased the value added tax rate from 15 to 18 per cent, while Viet Nam raised its corporate tax rate from 5 to 15 per cent on 122 multinational companies in 2024.

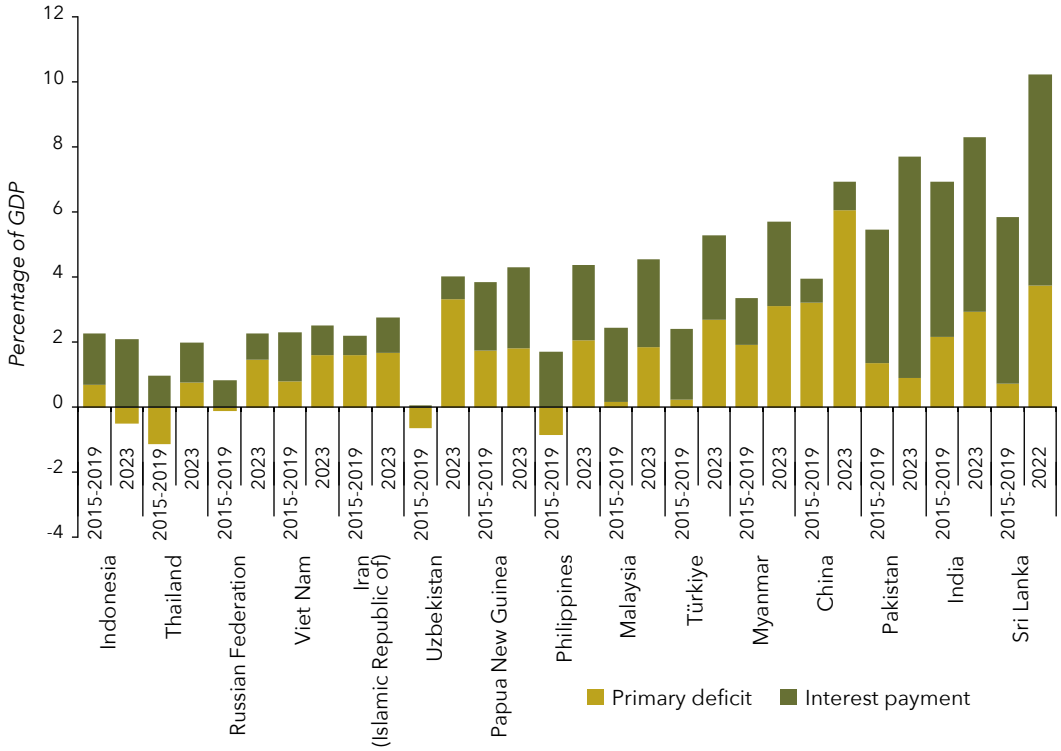
Figure 1.13 Fiscal deficit in Asia-Pacific developing countries




*Source:* ESCAP, based on IMF Fiscal Monitor October 2024: Putting a Lid on Public Debt.

5 By the revised methodology that excludes students currently enrolled in educational institutions.

Figure 1.14 Breakdown of fiscal deficits in selected Asia-Pacific countries in 2023 vs. average for 2015-2019




*Source*: ESCAP, based on IMF Fiscal Monitor October 2024: Putting a Lid on Public Debt.

Indonesia also imposed higher taxes on entertainment-related sectors and e-cigarettes, while the Lao People's Democratic Republic increased excise tax rates on vehicles, beverages and gaming devices. Meanwhile, the Russian Federation introduced a new progressive tax regime on personal income and increased taxes on corporate profits. In Singapore, carbon tax was hiked from S$ 5 to S$ 25 per ton.

**Yet, elevated public debt servicing pressure due to high interest rates in the last few years is still squeezing fiscal space in several countries.** Although the average public debt-to-GDP ratio in the region was stable at 53.8 per cent in 2024, it was still 13 percentage points above the average level in the five years prior to the pandemic. Moreover, four out of five countries in the region have experienced an increase in the interest payment burdens on public debt (figure 1.15). Median public debt interest payments as a share of public revenue increased by 1.3 percentage points as of 2023 compared with the pre-pandemic average during the period 2015-2019. The average shot up by 3.6 percentage points in this comparison, indicating that countries already heavily burdened by public debt were disproportionately affected. Indeed, the interest payment to public revenue ratio shot up by 37 percentage points in Sri Lanka (standing at 77.8 per cent in 2023) and by 27.7 per cent in Pakistan (standing at 59.5 per cent in 2023).

Such significant costs on public debt are diverting valuable fiscal resources away from more productive investments in human capital, public infrastructure and services and economic upgrading, putting a drag on long-term economic growth. If the current situation of elevated borrowing costs continues, especially in countries with shallow domestic financial markets and reliance on external borrowing, the threat of public debt distress may affect more countries and for longer time horizons. Indeed, all the 11 countries in Asia and the Pacific rated by IMF and the World Bank as being in debt distress or having a high risk of debt distress are countries in special situations.[6]

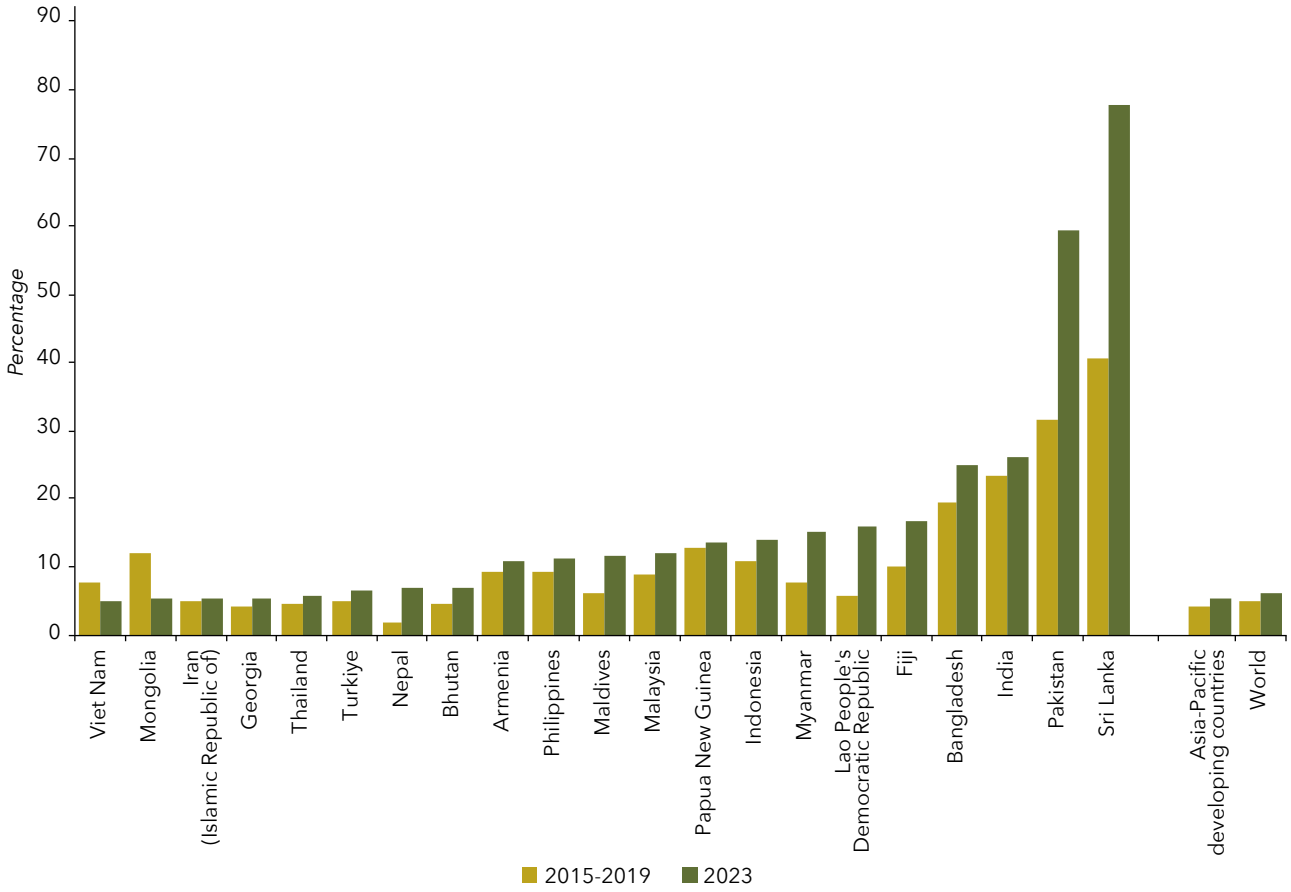
## 2.3. Subregional economic highlights

### East and North-East Asia

East and North-East Asian economies (excluding Japan) grew by 4.7 per cent in 2024. Weak domestic consumption and economic confidence primarily drove this below-trend performance, despite robust exports and resilient investment.

6 Afghanistan, Kiribati, the Lao People's Democratic Republic, Maldives, Marshall Islands, Papua New Guinea, Samoa, Tajikistan, Tonga, Tuvalu and Vanuatu, according to the World Bank. For more information, see www.worldbank.org/en/programs/debt-toolkit/dsa.

Figure 1.15 Interest payments on public debt as a share of public revenue in 2023 vs. average for 2015-2019




*Source*: ESCAP, based on UNCTAD Debt Dashborad and IMF Public Finances in Modern History database. Accessed on 21 December 2024.

*Note*: For Asia-Pacific developing countries and world, the median number is reported.

Economic performance in China in 2024 was mixed, with some challenges persisting along with promising new developments. GDP growth moderated to 5.0 per cent in 2024 from 5.2 per cent in 2023, despite a rebound in the fourth quarter. Property sector contraction, weak consumer and investor sentiments, as well as debt burdens of local governments, corporates and households remain near-term headwinds. Property investment declined by 10.6 per cent in 2024, largely offsetting investment growth in other sectors. Lower home prices, which had recorded negative year-on-year growth for 21 consecutive months as of March 2025, weighed on household consumption through the wealth effect.[7] This, compounded by moderating household income growth, subdued consumer confidence and retail sales throughout the year, with private consumption's contribution to annual GDP growth dropping from 80 per cent in 2023 to less than a third in 2024.

On the other hand, exports rebounded strongly in 2024, registering a growth rate of 7.1 per cent in the first 10 months. The recovery in global demand, depreciation of the renminbi and front-loading inventory build-up ahead of anticipated tariffs may have contributed to this growth. More importantly, the high-technology and automotive sectors, domestic private firms and growing trade ties with several developing economies led this export expansion. For instance, exports of integrated circuits and automobiles expanded by more than 20 per cent. Domestic private firms reinforced their dominance in trade, accounting for more than four fifths of the export growth. Many of the Belt and Road Initiative trading partners continued to absorb China's growing incremental exports and imports.[8]

7 Real estate properties account for about 60 per cent of Chinese urban households' total assets (Li and Zhang, 2021).

8 For details of China's export trends for the period 2024-2025, see www.china-briefing.com/news/china-import-export-trends-2024-25-the-first-10-months/.

The ongoing transformation in China to complement old growth engines, such as urbanization and production expansion, with new growth drivers, such as sectoral upgrading, technological innovation, domestic consumption and more economic integration with other developing economies, may take time to bear fruit. In the meantime, proactive policy support could help sustain near-term economic growth and expedite the change. In this context, a series of stimulus measures announced by the Chinese Government towards the end of 2024 pledged a more proactive fiscal stance and moderately loose monetary stance, and focused on subsidizing consumption, reducing debt and interest payment burdens on local governments and households, and supporting investments in new high-quality productive forces. These measures are expected to stabilize and inject new momentum into the economy.

Mongolia's economy showed resilience in 2024, benefiting primarily from its strong mining sector. It grew by 4.9 per cent in 2024 and is projected to grow by 6.3 per cent in 2025. The Oyu Tolgoi copper-gold project in particular is making significant progress. It has achieved 58 per cent of overall progress in underground mining operations as of August 2024, which will increase output substantially in coming years. The project is expected to become the world's fourth-largest copper mine by 2030 and will help Mongolia diversify its resource economy from the primary dominance of coal. On the other hand, severe winter weather conditions caused massive livestock losses and a 28.7 per cent contraction in agriculture, severely affecting the livelihoods of farming households.

The economy of the Republic of Korea grew by 2.0 per cent in 2024, up from 1.4 per cent in 2023. Strong exports, particularly in semiconductors, and robust manufacturing investment supported the rebound. However, further softening domestic private consumption and construction investment drove a downward trend in quarterly economic growth throughout the year, with the figure moderating to 1.2 per cent year-on-year in the fourth quarter. Political instability towards the end of the year cast additional clouds over the economy while effective policy measures would help restore domestic demand.

### North and Central Asia

Economic growth in North and Central Asia accelerated slightly to 4.5 per cent in 2024. It is supported by resilience of the Russian economy despite international sanctions and the ongoing military conflict as well as decent economic performance in all other economies in the subregion. The Russian Federation, the largest economy in the subregion, sustained a 4.1 per cent economic growth rate in 2024 with strong public spending and investments, recovering industries and booming private consumption. Swift fiscal expansion[9] played a key role in boosting domestic demand and reviving industrial production. This is supported by comprehensive tax reforms,[10] a surge in oil and gas revenues[11] and a gradual drawdown on the National Wealth Fund.[12] Together with a strong labour market, government social transfers to military personnel and their families funded by the newly introduced progressive personal income tax and higher corporate profit tax helped boost private consumption. However, with significant resources being diverted away from civil investments to fund military actions together with declining fossil fuel exports measured in Euro terms,[13] the Russian economy is increasingly exposed to inflation and currency depreciation pressures despite the central bank making three consecutive interest rate hikes to 21 per cent. The economy already showed signs of deceleration in the second half of 2024.

Economic developments in the Russian Federation have extensively affected neighbouring countries primarily through trade and remittance channels. For instance, trade between the Russian Federation and Armenia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan grew by more than 20 per cent in the first 2-3 quarters of 2024, on top of a high 2023 base. The tight Russian labour market also boosted remittances into Kyrgyzstan, Tajikistan and Uzbekistan, despite stricter Russian migration rules that came into effect in the third quarter of 2024.

9 With an estimated 21 per cent increase in actual expenditure and 24 per cent actual increase in revenue, according to www.osw.waw.pl/en/publikacje/osw-commentary/2024-11-22/russias-budget-2025-war-above-all.

10 Primarily the introduction of higher progressive income taxes on the rich and a 5 per cent increase in tax on corporate profits, according to the Schneider Group (https://schneider-group.com/en/news/countries/tax-reform-in-the-russian-federation/).

11 By 25.7 per cent in the Russian rouble, according to Xinhua News, citing the Russian Finance Ministry (https://english.news.cn/europe/20241210/7e4936b173954fc6a5f0e3e606764792/c.html).

12 Total assets of which decreased from 9 per cent of GDP in December 2023 to 6.8 per cent of GDP in December 2024.

13 For more information, see https://energyandcleanair.org/november-2024-monthly-analysis-of-russian-fossil-fuel-exports-and-sanctions/.

Meanwhile, Kyrgyzstan and Uzbekistan benefited significantly from a tourism boom, following earlier success in Armenia and Georgia. Improved logistics, proactive promotion and better tourist services supported the emergence of this new growth driver. In addition, the recovery in agriculture in Kazakhstan and more vibrant domestic investment and production in the subregion in general also supported the subregion's robust economic performance.

**The Pacific**

Economic growth in Pacific small island developing States recovered further to 3.6 per cent in 2024 while inflation was stable at 3.4 per cent. Papua New Guinea, which accounts for about three quarters of the subregion's total economic output, benefited from the reopening of the Porgera gold mine in December 2023. Increased government capital spending and potential easing of foreign exchange restrictions after a credit agreement with IMF[14] may further boost the economy. However, moderation in its extractive sector outputs in the first half of 2024 and social unrest in January dented this momentum. In Solomon Islands, output gains in logging and fishing in the first half of 2024 were offset by moderation in gold and crop production and notable reductions in government expenditures.

Tourism continued to recover in the Pacific, albeit at a slower pace after the strong bounce-back in 2022 and 2023. Fiji, Palau, Samoa and Tonga saw significant growth in international tourist arrivals in the first half of 2024, surpassing pre-pandemic figures by substantial margins. Tourists from Australia and New Zealand drove this latest recovery, more than compensating for the reduction in Chinese tourists.[15] Samoa and Tonga also benefited from expanded seasonal worker programmes in Australia and New Zealand. Vanuatu, in contrast, suffered an economic setback – suspension of major airline operations due to financial difficulties.

Elevated public debt remained a foremost economic challenge in many Pacific small island developing States in 2024, with seven of them rated by IMF in late 2024 as facing high risk of debt distress. These include Kiribati, Marshall Islands, Papua New Guinea, Samoa, Tonga, Tuvalu and Vanuatu.[16] The debt challenge confronting Pacific small island developing States is closely associated with their vulnerability to natural disasters and climate change, including storm surge and drought in Marshall Islands and the earthquake and landslide in Papua New Guinea in 2024.[17] The subregion's ability to cope with external shocks is also limited. Often the only available fiscal and financial resources are diverted towards emergency shock mitigation and away from the much-needed long-term adaptation, perpetuating the debt cycle.

**South and South-West Asia**

Average economic growth in South and South-West Asia declined from 6.9 per cent in 2023 to 5.1 per cent in 2024, but it remains one of the fastest-growing areas worldwide. The Indian economy cooled, with GDP growth declining to 6.5 per cent from a high 9.2 per cent in 2023. Both household consumption and private investment softened, while public capital expenditure faced delays. However, the economy showed signs of a pickup in the last quarter of 2024, with GDP growth rebounding to 6.2 per cent year-on-year from a low of 5.6 per cent in the third quarter. Inflation dropped to below 5 per cent in January 2025. A doubling in public expenditure growth, double-digit growth in exports and a modest increase in private consumption growth supported this turnaround, while the central bank maintained a relatively tight monetary stance.

Economic deceleration was also observed in Bangladesh, Maldives and Türkiye in 2024. In Bangladesh, recent political difficulties disrupted the economy. Restoring market sentiments amid high inflation and public debt pressure is important. In Maldives, austerity measures and higher taxes to reduce fiscal deficits have exerted a drag on the economy. In Türkiye, economic growth moderated to a post-pandemic low of 3.2 per cent primarily due to high inflation and a high policy rate of 50 per cent that the central bank maintained from March to December in 2024.

Meanwhile, Pakistan and Sri Lanka began to recover from their debt distress and inflation challenges. Industrial production picked up in both countries, with support from more accommodative monetary policies, improved access to external finance and greater macroeconomic stability. In Bhutan and Nepal, lower interest rates and higher tourist arrivals contributed to slightly stronger economic growth in 2024. The economy of the Islamic Republic of Iran remained resilient in 2024, wherein a booming manufacturing sector helped shore up the economy despite persistent challenges from external sanctions and

14 For further information, see www.imf.org/en/News/Articles/2024/10/08/pr24359-papua-new-guinea-imf-reaches-sla-rsf-arrangement-3rd-rev-ecf-eff.

15 For a fuller picture, see https://thedocs.worldbank.org/en/doc/a5b8c7736456d316592033d45c0b3486-0070062024/original/Pacific-Economic-Update-Full-Report-October-2024.pdf.

16 For details, see www.worldbank.org/en/programs/debt-toolkit/dsa

17 Data are available from the International Disaster Database (EM-DAT database).

domestic imbalances. Afghanistan's economy also showed modest signs of recovery amid significant challenges in 2024, benefiting from partial recoveries in private consumption[18] and improving food security.[19]

**South-East Asia**

South-East Asian economies had a strong economic performance and grew on average by 4.8 per cent in 2024, up from 4.1 per cent in 2023. Exports contributed significantly to this economic expansion, with merchandise exports registering a 6.1 per cent growth rate in the first 10 months of 2024. Malaysia, Singapore, Viet Nam and, to a lesser extent, Indonesia capitalized on the growing demand for electronics and semiconductors. Several others, most notably Cambodia and Thailand, benefited from recovering tourism. Meanwhile, domestic consumption remained a strong growth driver across the subregion. Investment also strengthened in Indonesia, Malaysia and Timor-Leste, fuelled by large public infrastructure development, mega industrial projects and an influx of foreign direct investments (box 1.1).[20] Inflation moderated substantially, allowing room for monetary policy easing.

At the country level, higher public spending, ongoing investments in Nusantara (the future capital city) and robust merchandise exports supported economic growth in Indonesia. However, falling global commodity prices drove down total export revenues. Brunei Darussalam benefited from a newly operational offshore oil and gas field while Timor-Leste received higher remittance inflows. In both countries, greater public investment in infrastructure and oil and petrochemical production facilities was another boost.

Three key subregional economies in global electronic value chains, Malaysia, Singapore and Viet Nam, all registered strong economic performance in 2024. Apart from the upturn in exports, Malaysia and Singapore also benefited from sizable digital infrastructure investments, serving as regional hubs for data centres. In Malaysia, digital infrastructure investments reportedly reached $31.6 billion in the first 10 months of 2024,[21] generating some 40,000 new jobs.[22] The easing inflation[23] also created policy space for more proactive infrastructure investments. Meanwhile, economic growth in the Philippines was sustained by public

**Box 1.1 Strong foreign direct investment inflows injected new economic momentum into South-East Asian economies**

Based on ASEAN and UNCTAD (2024), inward FDI in South-East Asia has shown strong momentum after a temporary dip in 2020, hitting historical highs when global FDI flows kept declining. Excluding ad hoc fluctuations, such as a doubling of FDI from the United States in 2023, 90 per cent of which was concentrated in Singapore and 70 per cent going to the finance sector, sectoral focus of inward FDI increasingly shifted from finance to manufacturing, with the latter accounting for 66 per cent of all greenfield FDI announced in 2023. Driven by the AI boom, the subregion's strategic position in global value chains and its commitment to economic cooperation in an increasingly fragmented global economy, South-East Asia is also emerging as a hub for professional, scientific and R&D activities. Inward FDI in this sector saw a surge between 2022 and 2023 from $0.3 billion to $21 billion, spreading across Indonesia, Malaysia, Singapore and Thailand.

Green economy supply chains also emerged as a fast-growing sector in attracting FDI, which now accounts for about one quarter of all announced greenfield FDI investments in the subregion. Green supply chain FDI has to date been concentrated in exploiting critical minerals for green sectors and renewable energy generation. Together, they accounted for about three quarters of the total value of newly announced greenfield FDI projects in green supply chains in 2022 and 2023. FDI in green manufacturing, including battery supply chains, electric vehicles and clean technology, also saw significant growth. Electric vehicle-related greenfield FDI jumped from $506 million in 2020 to more than $9 billion in 2022 and $6.5 billion in 2023.

18 For more information, see www.worldbank.org/en/news/press-release/2024/12/04/afghanistan-economy-shows-modest-growth-after-two-years-of-severe-contraction-but-recovery-remains-fragile.

19 For details, see https://reliefweb.int/report/afghanistan/wfp-afghanistan-situation-report-october-2024.

20 In 2024, foreign direct investment in the subregion reached a new record high of $235 billion, marking a modest 2 per cent gain over 2023.

21 For details, see www.mingtiandi.com/real-estate/data-centres/malaysia-crowned-se-asias-top-data-centre-hub-of-2024/#:~:text=Malaysia%20Crowned%20SE%20Asia's%20Top%20Data%20Centre,data%20centre%20hub%2C%20according%20to%20Knight%20Frank.

22 For further information, see https://restofworld.org/2024/malaysia-data-center-jobs-environment/.

23 And the removal of fossil fuel subsidies in the case of in Malaysia.

spending, continued infrastructure investments and steady workers' remittances. In Cambodia, the growth drivers were exports of garments and footwear, along with a healthy recovery in tourism and public infrastructure spending.

Economic growth in Thailand was weaker amid fragile business and consumer sentiments, structural changes in its sizeable auto industry and delayed budget disbursements, which affected infrastructure projects. While one-off cash handouts may boost consumer spending in the short run, Thailand still faces a large household debt burden, averaging close to 90 per cent of GDP.

The economies of the Lao People's Democratic Republic and Myanmar were confronted with several domestic challenges. High inflation, currency depreciation and high public debt weighed on the Lao economy, despite decent growth in hydropower exports, tourism, transport and logistics. High external debt servicing costs (more than 40 per cent of government revenue) continue to constrain economic expansion. In Myanmar, ongoing conflict and domestic instability exert a drag on the economy, compounded by large currency depreciation and soaring inflation.

## 3. Near-term macroeconomic outlook and associated uncertainties

### 3.1. Baseline projections for 2025 and 2026

A stable global economic outlook is projected for 2025 and 2026 as a baseline. The global economy is expected to remain stable and grow by 2.8 per cent in 2025 and 2.9 per cent in 2026. This is almost unchanged from the situation in 2024 but still modest compared with the more than 3 per cent pre-pandemic growth rates (United Nations, 2025). This projection is based on two key assumptions. First, the United States economy is expected to slow to a growth rate of 1.9-2.1 per cent during the period 2025-2026 from 2.8-2.9 per cent during 2023-2024. On one hand, it is expected to be supported by a continuing investment boom and productivity growth driven by the AI revolution[24] as well as dividends from potential economic deregulation and tax cuts. On the other, the economic performance may be dragged down by intensified and broader trade tensions and stricter immigration policies. Second, economic growth in European economies is expected to stabilize at 1.3 per cent in 2025 and recover marginally to 1.5 per cent in 2026 on the back of declining inflation, rising real wages and stronger monetary and fiscal policy support. Nonetheless, such challenges as elevated energy costs, geopolitical tensions and growing external competition will continue to weigh on the economic prospects for Europe. Meanwhile, global inflation is projected to continue to decline and return to official targets in most economies by 2025, primarily due to reduced supply constraints together with weaker aggregate demand.

**The near-term economic outlook for Asia-Pacific developing countries points to cautious optimism.** This is based on several baseline assumptions, including: (a) the Chinese economy will remain resilient with sizeable policy support in 2025 and 2026 as already announced by the Government; (b) the Indian economy will maintain strong macroeconomic fundamentals although economic growth may stay closer to the long-term trend than above trend; (c) South-East Asian economies continue to outperform in 2025 and 2026 benefiting from continuing value chain adjustments and booming demand for electronics; (d) economic challenges in the Russian Federation eventually hold back economic growth, which also would affect neighbouring countries; and (e) disruptions from further escalation in trade tensions will exert a drag on economic growth but remain largely manageable in the near term.

**Average economic growth in Asia-Pacific developing countries is projected to remain steady at 4.5 per cent in 2025 and 4.4 per cent in 2026, albeit varying across the subregions.** In East and North-East Asia, the Chinese economy, which accounts for 46 per cent of economic output of the developing economies in Asia and the Pacific, is projected to trend down slightly as it navigates through structural transitions and adjustments. It is expected to remain steady though, bolstered by new and strong stimulus measures. China's economic growth is projected to be 4.8 per cent in 2025 and 4.6 per cent in 2026. The strong economic performance of South-East Asia is expected to continue, benefiting from ongoing manufacturing value chain diversification, a boom in global demand for electronics and semiconductors and robust domestic consumption. The South and South-West Asian subregion is likely to see modest economic acceleration despite slower expansion of the Indian economy due to deceleration in household consumption and capital

24 The productivity impact of AI remains debatable. Most studies suggest a significant boost to labour productivity by AI. For example, Goldman Sachs (2023) estimated generative AI could raise annual labour productivity growth in the United States by just under 1.5 percentage points following widespread adoption and eventually increasing annual global GDP growth by 7 per cent. McKinsey (2023) estimated that AI and automation of work activities could provide an annual boost to productivity in the United States of 0.5-3.4 per cent from 2023 to 2040. Montpellier and Fechner (2023) expected AI to boost annual worker productivity by 0.1-0.5 per cent initially but have a more substantial impact within 10-15 years. In contrast, Acemoglu (2025) suggested that the productivity impact of AI could be highly limited, accruing to just 0.71 per cent over the next decade, although this finding could be driven more by the assumptions used in the approach (Smith, 2024).

## Table 1.1 Real GDP growth and inflation in Asia and the Pacific

| | Real GDP growth | | | | Inflation[a] | | | |
|---|---|---|---|---|---|---|---|---|
| **Region, subregions, countries and areas** | **2023** | **2024** | **2025[b]** | **2026[c]** | **2023** | **2024** | **2025[b]** | **2026[c]** |
| | *(Percentage)* | | | | | | | |
| **Total ESCAP region** | **4.6** | **4.0** | **4.0** | **3.9** | **5.1** | **4.6** | **4.1** | **3.5** |
| **Asia-Pacific developing economies[d]** | **5.2** | **4.8** | **4.5** | **4.4** | **5.4** | **5.0** | **4.4** | **3.7** |
| **Asia-Pacific developed economies[e]** | **1.9** | **0.3** | **1.4** | **1.3** | **4.0** | **2.8** | **2.6** | **2.1** |
| | | | | | | | | |
| **East and North-East Asia[f]** | **4.4** | **3.8** | **3.8** | **3.7** | **1.1** | **0.9** | **1.8** | **1.9** |
| **East and North-East Asia (excluding Japan)[f]** | **5.0** | **4.7** | **4.5** | **4.3** | **0.6** | **0.4** | **1.6** | **1.8** |
| China | 5.2 | 5.0 | 4.8 | 4.6 | 0.2 | 0.2 | 1.6 | 1.8 |
| Democratic People's Republic of Korea | .. | .. | .. | .. | .. | .. | .. | .. |
| Hong Kong, China | 3.2 | 2.5 | 2.4 | 2.5 | 2.1 | 1.7 | 2.2 | 2.3 |
| Japan | 1.9 | 0.1 | 1.1 | 0.9 | 3.3 | 2.7 | 2.3 | 2.0 |
| Macao, China | 75.1 | 8.8 | 7.5 | 5.0 | 0.9 | 0.7 | 1.1 | 2.1 |
| Mongolia | 7.4 | 4.9 | 6.3 | 6.1 | 10.3 | 6.8 | 7.2 | 6.5 |
| Republic of Korea | 1.4 | 2.0 | 1.7 | 2.1 | 3.6 | 2.3 | 1.9 | 2.0 |
| | | | | | | | | |
| **North and Central Asia[f]** | **4.1** | **4.5** | **2.7** | **2.5** | **7.3** | **8.1** | **6.5** | **4.8** |
| **North and Central Asia (excluding Russian Federation)[f]** | **5.4** | **5.7** | **5.3** | **4.9** | **11.1** | **7.4** | **6.5** | **5.7** |
| Armenia | 8.3 | 6.1 | 5.0 | 4.5 | 2.0 | 0.3 | 2.2 | 2.3 |
| Azerbaijan | 1.4 | 4.1 | 3.0 | 2.5 | 9.0 | 2.0 | 4.0 | 3.7 |
| Georgia | 7.5 | 9.6 | 6.5 | 6.0 | 2.5 | 1.1 | 2.3 | 1.9 |
| Kazakhstan | 5.1 | 4.8 | 5.2 | 4.6 | 14.7 | 8.7 | 6.5 | 6.3 |
| Kyrgyzstan | 7.5 | 9.5 | 5.7 | 4.5 | 10.9 | 5.0 | 5.0 | 4.0 |
| Russian Federation | 3.6 | 4.1 | 1.8 | 1.7 | 5.9 | 8.4 | 6.5 | 4.5 |
| Tajikistan | 8.3 | 8.3 | 6.0 | 5.5 | 3.5 | 3.4 | 3.6 | 3.6 |
| Turkmenistan | 6.3 | 6.3 | 6.0 | 5.5 | 9.1 | 8.0 | 6.8 | 5.4 |
| Uzbekistan | 6.3 | 6.5 | 5.8 | 5.9 | 10.0 | 9.6 | 9.0 | 7.0 |
| | | | | | | | | |
| **Pacific[f]** | **2.0** | **1.0** | **2.2** | **2.4** | **5.6** | **3.2** | **3.3** | **2.5** |
| **Pacific island developing economies[f]** | **3.1** | **3.6** | **4.3** | **3.9** | **3.3** | **3.4** | **3.9** | **3.6** |
| Cook Islands | 14.0 | 15.0 | 7.5 | 7.5 | 13.2 | 4.5 | 4.0 | 4.0 |
| Fiji | 7.5 | 3.8 | 3.4 | 3.0 | 2.3 | 4.5 | 3.0 | 2.5 |
| Kiribati | 4.2 | 5.8 | 4.1 | 3.2 | 9.3 | 4.0 | 3.3 | 2.9 |
| Marshall Islands | -0.6 | 2.0 | 3.0 | 2.8 | 7.3 | 5.8 | 4.6 | 3.5 |
| Micronesia (Federated States of) | 0.8 | 3.1 | 3.5 | 3.0 | 6.2 | 4.1 | 3.5 | 3.0 |
| Nauru | 1.6 | 2.0 | 2.5 | 2.5 | 5.2 | 5.0 | 3.5 | 3.0 |
| Palau | -0.2 | 6.5 | 8.0 | 6.5 | 12.4 | 5.5 | 1.0 | 1.0 |
| Papua New Guinea | 2.0 | 3.2 | 4.5 | 4.1 | 2.3 | 3.0 | 4.2 | 4.0 |
| Samoa | 8.0 | 11.0 | 8.0 | 6.0 | 12.0 | 3.6 | 3.2 | 3.0 |
| Solomon Islands | 3.0 | 2.5 | 2.5 | 3.0 | 5.1 | 4.1 | 3.4 | 2.9 |
| Tonga | 2.2 | 2.6 | 2.3 | 2.0 | 9.7 | 4.6 | 4.2 | 4.0 |
| Tuvalu | 3.9 | 3.5 | 2.7 | 2.5 | 7.2 | 2.5 | 3.0 | 3.0 |
| Vanuatu | 1.0 | 1.9 | 2.4 | 2.6 | 11.3 | 3.5 | 2.6 | 2.2 |
| **Developed countries in the Pacific subregion[f]** | **2.0** | **1.0** | **2.2** | **2.4** | **5.6** | **3.2** | **3.3** | **2.5** |
| Australia | 2.0 | 1.1 | 2.3 | 2.4 | 5.6 | 3.2 | 3.5 | 2.6 |
| New Zealand | 1.8 | 0.0 | 1.5 | 2.2 | 5.7 | 2.9 | 2.1 | 1.9 |

Table 1.1 *(continued)*

| Region, subregions, countries and areas | Real GDP growth | | | | Inflation[a] | | | |
|---|---|---|---|---|---|---|---|---|
| | 2023 | 2024 | 2025[b] | 2026[c] | 2023 | 2024 | 2025[b] | 2026[c] |
| | (Percentage) | | | | | | | |
| South and South-West Asia[f,g] | 6.9 | 5.1 | 5.1 | 5.3 | 21.5 | 20.4 | 13.7 | 10.3 |
| Afghanistan | 2.7 | .. | .. | .. | -7.7 | .. | .. | .. |
| Bangladesh | 5.8 | 4.2 | 4.5 | 5.0 | 9.5 | 10.3 | 10.0 | 6.5 |
| Bhutan | 4.9 | 5.2 | 7.1 | 6.5 | 4.2 | 4.0 | 3.8 | 3.6 |
| India | 9.2 | 6.5 | 6.5 | 6.6 | 5.7 | 5.0 | 4.3 | 4.0 |
| Iran (Islamic Republic of) | 5.1 | 3.8 | 3.2 | 3.3 | 44.4 | 32.5 | 29.5 | 27.0 |
| Maldives | 4.7 | 5.1 | 4.6 | 4.5 | 2.9 | 1.4 | 2.2 | 2.2 |
| Nepal | 2.0 | 3.9 | 4.5 | 5.2 | 7.1 | 5.8 | 4.6 | 4.0 |
| Pakistan | 0.0 | 2.5 | 3.0 | 3.5 | 30.8 | 23.8 | 9.3 | 14.6 |
| Sri Lanka | -2.3 | 5.0 | 5.0 | 4.5 | 16.5 | 1.6 | 3.0 | 3.0 |
| Türkiye | 5.1 | 3.2 | 3.0 | 3.5 | 53.9 | 58.5 | 35.0 | 20.1 |
| | | | | | | | | |
| South-East Asia[f] | 4.1 | 4.8 | 4.7 | 4.6 | 4.2 | 2.7 | 2.7 | 2.6 |
| Brunei Darussalam | 1.1 | 4.2 | 3.0 | 3.1 | 0.4 | -0.4 | 0.7 | 1.0 |
| Cambodia | 5.0 | 5.7 | 5.9 | 6.2 | 2.1 | 0.8 | 2.1 | 3.0 |
| Indonesia | 5.1 | 5.0 | 5.1 | 5.1 | 3.7 | 2.3 | 2.5 | 2.5 |
| Lao People's Democratic Republic | 4.2 | 4.1 | 3.7 | 4.0 | 31.2 | 23.1 | 19.7 | 21.0 |
| Malaysia | 3.6 | 5.1 | 4.7 | 4.5 | 2.5 | 1.8 | 2.5 | 2.3 |
| Myanmar | 3.3 | 1.0 | 1.1 | 1.3 | 28.1 | 22.0 | 15.0 | 10.0 |
| Philippines | 5.6 | 5.6 | 6.1 | 6.3 | 6.0 | 3.2 | 3.3 | 3.5 |
| Singapore | 1.8 | 4.4 | 2.6 | 2.5 | 4.8 | 2.4 | 1.6 | 1.5 |
| Thailand | 2.0 | 2.5 | 2.9 | 2.8 | 1.2 | 0.4 | 1.1 | 1.3 |
| Timor-Leste | 2.3 | 3.0 | 3.1 | 3.2 | 8.4 | 3.4 | 2.9 | 2.2 |
| Viet Nam | 5.0 | 7.1 | 6.5 | 6.3 | 3.3 | 3.6 | 3.0 | 3.0 |
| | | | | | | | | |
| Memorandum items: | | | | | | | | |
| Least developed countries | 4.9 | 3.7 | 4.0 | 4.4 | 11.9 | 11.1 | 9.8 | 6.9 |
| Landlocked developing countries | 5.0 | 5.2 | 5.0 | 4.7 | 11.6 | 7.8 | 6.8 | 6.1 |
| Small island developing States | 3.3 | 3.7 | 4.3 | 3.9 | 3.4 | 3.1 | 3.6 | 3.4 |

*Source*: ESCAP estimates and forecasts.

*Note*:
a. Changes in the consumer price index.
b. Estimates.
c. Forecasts.
d. Asia-Pacific developing countries consist of all countries and areas listed in the table, excluding Australia, Japan and New Zealand.
e. The group of Asia-Pacific developed economies consists of Australia, Japan and New Zealand.
f. Regional and subregional growth rates and inflation rates were calculated as averages using GDP in 2015 United States dollars as weights.
g. The estimates and forecasts for countries relate to fiscal years. These are defined as follows: 2024 refers to the fiscal year spanning the period from 1 April 2024 to 31 March 2025 in India; from 21 March 2024 to 20 March 2025 in Afghanistan and the Islamic Republic of Iran; from 1 July 2023 to 30 June 2024 in Bangladesh, Bhutan and Pakistan; and from 16 July 2023 to 15 July 2024 in Nepal.

investment growth. Output growth in such countries as Bhutan, Nepal and Pakistan is expected to pick up in 2025. North and Central Asia, in contrast, is anticipated to face economic headwinds, most notably due to an expected decline in economic growth in the Russian Federation amid rising inflation and high interest rates, constrained non-military investment and production and currency depreciation. Economic growth in the Pacific subregion is projected to rise amid continued increases in tourist arrivals and remittance inflows.

**Average headline inflation in Asia-Pacific developing countries is projected to ease further to 4.4 per cent in 2025 and 3.7 per cent in 2026,** from 5.0 per cent in 2024. As high inflation in the region over the past few years was driven primarily by supply-side factors (Kho, Chong and Tsang, 2024), lower global food and energy prices and stable

currencies are likely to reduce inflation. After a 5.8 per cent decline in 2024, the global energy price index is projected to decrease further by 6.2 per cent in 2025 (World Bank, 2024a). Prudent and tight monetary policies adopted by several economies to tackle inflation also play a role. On the other hand, disinflation will be slower in North and Central Asia given stronger wage growth. Currency depreciation is expected to keep inflation persistently high in Bangladesh, the Islamic Republic of Iran, the Lao People's Democratic Republic and Türkiye.

## 3.2. Major uncertainties for economic prospects

**The baseline outlook is subject to several uncertainties, both in terms of fundamental economic factors and policies.** Among others, three main uncertainties may notably affect the macroeconomic performance of Asia-Pacific developing countries in 2025 and 2026.

**First, higher-for-longer global costs of capital.** Despite the continuing decline in global inflation, including in Asia and the Pacific, and the beginning of worldwide monetary easing in the latter part of 2024, a sustained easing in global costs of capital cannot be taken for granted for two reasons.

One, the downward trend of global inflation is subject to several uncertainties. Multiple key policy changes in the United States, including increased tariffs on imports, additional trade restrictions and stricter immigration policies, can be inflationary. Potential escalation of geopolitical conflicts in Europe and the Middle East may again cause fluctuations in global energy and food prices and disrupt key shipping routes. Extreme weather events may also disrupt production, especially agricultural production, causing price hikes. If such scenarios materialize, central banks globally may shift their policy focus from supporting economic growth to controlling inflation by delaying policy rate reductions. Two, even if global inflation continues to moderate, accelerated productivity growth driven by the AI boom[25] may push up the natural interest rate[26] in the United States and enable the Federal Reserve to maintain a precautionary high interest rate without sacrificing employment. The nearest benchmark would be the first wave of the Internet revolution between 1995 and 2000, when the Federal Reserve maintained the policy rate above 4 per cent over six years.

In such a scenario, Asia-Pacific developing countries would find themselves in a different global financial environment compared with the 2010s, which was a period marked by easy access to relatively cheap foreign capital to finance domestic development. The cost of sustaining and refinancing high levels of external debt may increase persistently in the near future and exceed debtor countries' ability to generate adequate domestic economic returns needed to service the debt. Higher capital returns in the United States and other leaders in the AI revolution may also attract valuable finance away from developing countries and compel central banks in Asia and the Pacific to maintain a tighter-than-warranted monetary stance to reduce currency depreciation and capital flight pressures.

**Second, rising trade protectionism.** Strong exports contributed significantly to economic resilience in Asia-Pacific developing countries in 2024, and this momentum is likely to continue on the back of strong industrial competitiveness of regional value chains and booming global demand for electronics and semiconductors.

However, this rather optimistic outlook is subject to a downside risk of rising trade protectionism. Globally, restrictive trade measures have already precipitated a new spike in 2024, exceeding that during the peak of China-United States trade tensions between 2018 and 2020 (figure 1.16). According to the World Trade Organization,[27] the growing stockpile of effective import restrictions imposed by the G20 affected a total trade amount of $2.3 trillion in 2024, equivalent to 9.4 per cent of global imports. Trade protectionism may further intensify in 2025 and 2026. If the tariff hikes announced by the United States are fully implemented, these measures and the anticipated retaliations may cause significant disruptions in regional value chains and expose several Asia-Pacific economies to substantial economic shocks, with negative spillovers to their regional neighbours (see box 1.2).

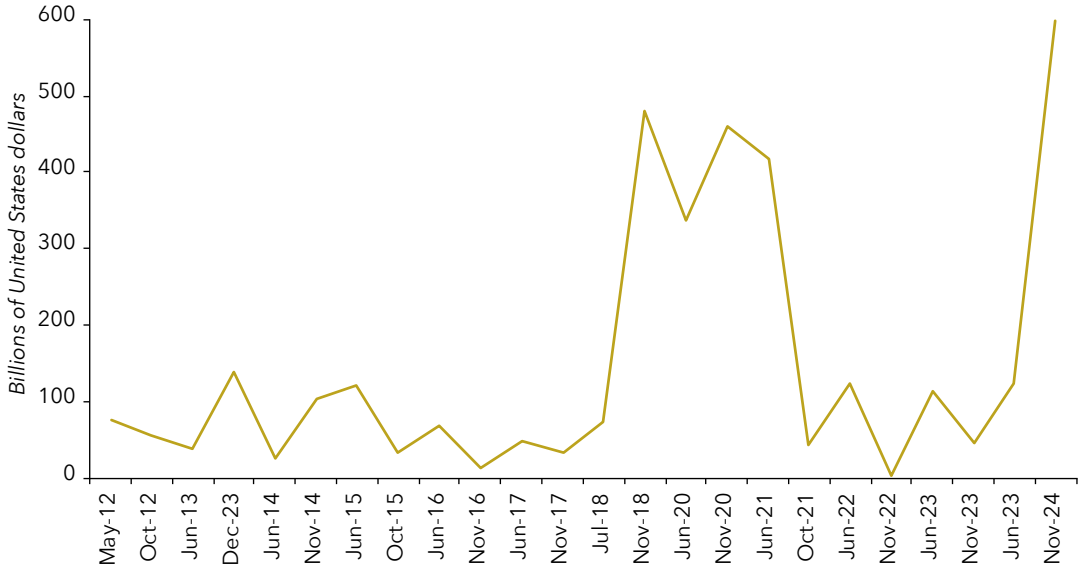
**Third, changes in the Chinese economy.** The Chinese economy has been under growing pressure in recent years due to domestic structural difficulties and an increasingly challenging external economic environment. Chinese consumers and businesses have been adapting to these developments, which have notable implications for

25 Although evidence on the actual scale of productivity boost from AI applications remains inconclusive, strong economic growth of the United States despite high interest rates in 2024 and anecdotal cases of substantial economic efficiency and productivity enhancement brought about by AI in various industries indicate that this possibility should be considered.

26 It refers to the theoretical level of the interest rate at which an economy is growing at its potential growth rate, with stable full employment and stable inflation close to the central bank's target.

27 For details, see www.wto.org/english/news_e/news24_e/trdev_13nov24_e.htm.

Figure 1.16 Trade coverage of new import-restrictive measures




*Source*: ESCAP, based on WTO Trade Monitoring Database. Accessed on 14 December 2024.

## Box 1.2 Potential impacts of renewed tariff hikes on Asia-Pacific economies

During the period 2018-2019, the United States imposed additional tariffs of up to 25 per cent on about three quarters of all imported products from China and on specific products from Canada, Mexico and the European Union, aiming for trade rebalancing and manufacturing onshoring. These tariffs and subsequent retaliations by the affected countries triggered structural shifts in trade patterns between Asia and the Americas as well as within the Asia-Pacific region. Most notably, the composition of United States trade deficits increasingly shifted from China to other East and South-East Asian economies and Mexico, while China strengthened its trade and economic ties with these economies (figure A). Much of the change has been driven by value chain diversification from China to these economies, with China as the main investor and supplier of intermediary inputs for production.

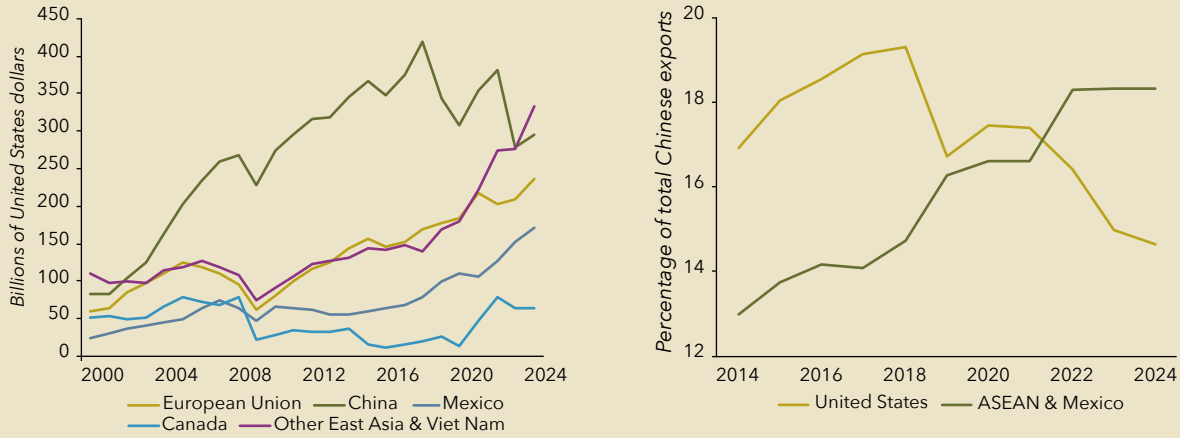
The overall impact of the 2018-2019 tariff hikes on the economic performance of Asia and the Pacific was generally milder than expected. Arguably, the overall competitiveness of Asia-Pacific regional value chains was further strengthened by the subsequent structural shifts. Nevertheless, a new round of tariff hikes by the United States can be different in nature. To date, new tariffs hikes alluded to by the United States range from a 20 per cent additional tariff on imported Chinese products to a universal 10-20 per cent additional tariff on all United States imports plus a 25 per cent tariff on imports from Mexico and Canada, 60 per cent tariff on imports from China and 100 per cent tariff on Chinese electric vehicles.

Such threats of universal tariffs could expose many Asia-Pacific developing economies to significant macroeconomic disruptions, including output growth stagnation, higher unemployment, currency depreciation and higher living costs. At the aggregate level, Asia-Pacific merchandise exports to the United States stood at about $1.36 trillion in 2024, with a corresponding trade surplus exceeding $750 billion, according to the United States Census Bureau. China remains the largest source of United States trade deficits, while India, Thailand and Viet Nam also enjoy substantial trade surpluses against the United States (figure B). However, countries with the highest trade exposure to the United States relative to their GDP would actually be the most vulnerable to the tariff hikes. For example, exports to the United States accounted for 27 per cent of Viet Nam's GDP and 21 per cent of Cambodia's GDP in 2023, while this figure was above 10 per cent for Thailand and Malaysia (figure B). In contrast, direct exports to the United States accounted for only 2.8 per cent of China's GDP in 2023.

## Box 1.2 *continued*

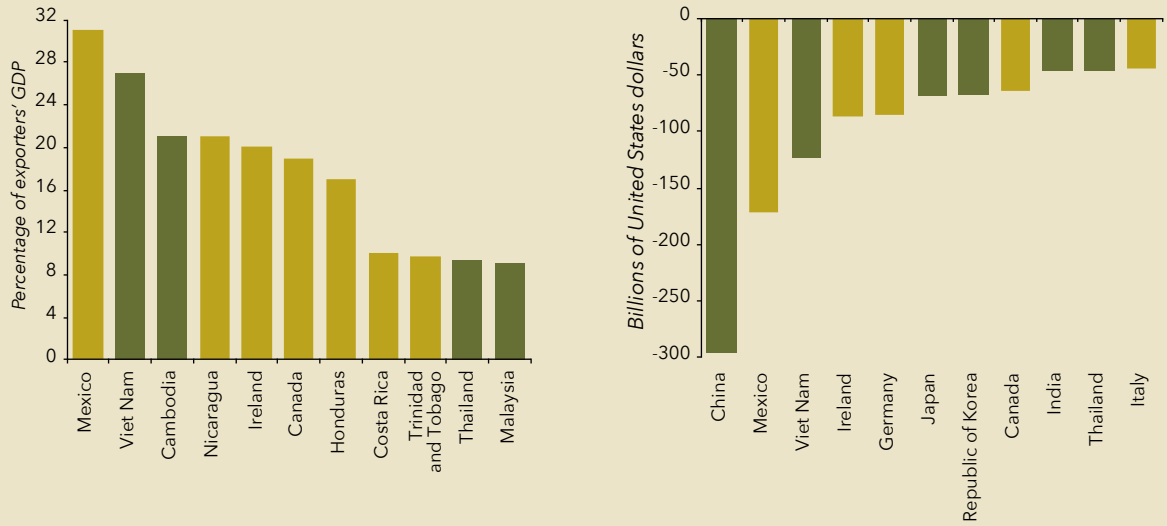
It remains to be seen if the above new tariff measures will be implemented in full, given their potential disruptions to the global economy. However, the policy intention to compel businesses to transfer production and therefore jobs back to the United States and reduce the country's trade deficits is clear. This intended reversal of globalized production constitutes a threat to all export-oriented economies in the Asia-Pacific region in coming years. It will test the resilience and competitiveness of value chains in the region against domestic production protected by high tariffs and other trade barriers in major traditional export markets.

**Figure A United States trade deficit, by trading partners, and Chinese exports, by destination**




*Source*: ESCAP, based on data from the United States Census Bureau, CEIC and Statista.

**Figure B Exports to United States and annual United States trade deficits with selected economies in 2024 or the latest year available**




*Source*: ESCAP, based on data from the United States Census Bureau, CEIC, Trading Economics, Scotiabank and Observatory of Economic Complexity.

close economic partners in the region. Encouragingly, China has significantly increased its industrial investments in neighbouring manufacturing hubs to bypass trade barriers and nurture new markets. In the process, it is also collaborating extensively with neighbouring countries on infrastructure and connectivity. To balance its trade, China is also promoting imports from its trading partners. However, slower income growth has reduced household spending on imported consumer products and international tourism.

Meanwhile, domestic bottlenecks and technological decoupling tend to impede sectoral upgrading in China. China has achieved success in sunrise sectors, such as renewable technology, battery manufacturing and electric vehicles. However, it has yet to penetrate more high-value-addition industries and still retain sizeable traditional export sectors for jobs, which may cause a race-to-the-bottom competition with similar industries in other regional peers.

In going forward, there is a broad consensus that strong fiscal measures and supportive monetary measures are needed. What remains less clear is the focus, pace and magnitude of these measures. These factors will shape the momentum of the Chinese economy, with implications for other regional economies and beyond.

## 4. Near-term policy considerations

**Prudent and nimble policies will be necessary for countries to navigate the growing macroeconomic uncertainties in the near term.** Ongoing trade and geopolitical tensions, associated reconfiguration of global value chains, continuous threats of natural and climate shocks, structural gear-shifting in China and significant policy adjustments in the United States towards domestic and international economic development all point to high risks of deviations from past norms and the baseline macroeconomic outlook. In anticipation of such immense uncertainties, Asia-Pacific developing countries should stay prepared to cope with potential difficulties and challenges that may arise in order to sustain robust economic progress. More specifically, countries can consider policy measures on the following three fronts.

**First, exercise prudence in monetary and fiscal policies and maintain a healthy policy space for countercyclical interventions when necessary.** Despite substantial declines in global inflation and the beginning of monetary easing by central banks around the world, the battle against inflation and high interest rates should not be considered as already won. As noted in section 3.2, multiple factors may drive a resurgence of global inflation or keep international borrowing costs high in 2025 and 2026. If materialized, these headwinds would simultaneously hurt the economy and erode monetary and fiscal policy space in many Asia-Pacific developing countries. Countries that exhausted their monetary and fiscal manoeuvering space prematurely may thus find themselves less ready in such circumstances. The efficient and productive use of public funds, especially borrowed funds, and effective public debt management become even more important at these times, to generate additional margins for development financing when overall borrowing capacity becomes more stringent to safeguard debt sustainability.

**Second, deploy timely and flexible support for domestic industries and value chains in case of new trade tensions.** Although the actual scope and level of additional new tariffs imposed by the United States would be subject to specific circumstances and negotiation outcomes between the parties concerned, it cannot be ruled out that most Asia-Pacific economies with a sizeable trade surplus against the United States may all be adversely affected by the tariff threat in one way or another (box 1.2). In this scenario, global and regional value chains may experience another round of disruptive adjustments and reconfiguration. Empirical evidence on the 2018 tariff war between China and the United States revealed the remarkable resilience of global trade (Fajgelbaum and others, 2024), regional value chains (Freund and others, 2024) and complete pass-through of the tariffs onto prices of products concerned in import-country markets (Amiti, Redding and Weinstein, 2019; Fajgelbaum and others, 2020). However, this may not be the case when smaller Asia-Pacific developing countries are exposed to similar tariffs, as they are much more vulnerable due to the lack of a competitive edge to retain high-value-addition segments of the value chains locally and the economic scale to absorb potential shocks. Therefore, timely and flexible support for domestic industries and value chains amid new trade tensions would be essential for mitigating their disruptive impact on the local economy. For countries standing to gain from a new round of value chain reconfiguration, such policy support would also help them fully capture the opportunities that emerge.

**Third, strengthen regional economic cooperation as a buffer against external uncertainties.** Cross-border economic openness and linkages serve as an important source of not only economic efficiency but also resilience. A clear example is the post-2018 global value chain (GVC) reconfiguration, when GVCs began to diversify away from a sole concentration in China to circumvent tariffs and enhance supply robustness. South-East Asian economies, leveraging their close economic partnership with China, managed to attract sizeable

proportions of the relocated GVCs and gained significantly through trade and investment channels. China also gained in the form of economic resilience by retaining some high value-addition segments of the reallocated GVCs while diversifying the production process to neighbouring countries. Together, this helped keep economic outputs, jobs and corporate profits within the Asia-Pacific region. In anticipation of further escalation in trade tensions and economic competition in the coming years, continued commitment to regional economic cooperation and partnerships is likely to provide countries with a much-needed buffer against such external shocks.

## 5. Conclusions

**Developing economies in the Asia-Pacific region demonstrated remarkable resilience in 2024 amid multiple headwinds** of high global inflation and interest rates, ongoing trade and geopolitical tensions and softened domestic consumption demand.

**The macroeconomic outlook for 2025 and 2026 is cautiously optimistic.** The region's GDP growth is likely to remain largely stable at lower inflation rates despite growing external pressures and continuing internal structural challenges. **However, this outlook is subject to significant uncertainties,** most notably a possible resurgence of global inflation and higher-for-longer international borrowing costs as well as a rise in global economic protectionism and further escalation of trade tensions. Meanwhile, the overall structural and growth-boosting effects of broadly anticipated stimulus and reform policies of China in the near term can also be uncertain.

**Macroprudence, nimble policy support and strengthened regional economic cooperation are advised** for countries to navigate the above uncertainties. Maintaining a healthy space for monetary and fiscal policies will enable Governments to deploy countercyclical stimulus measures in response to unexpected macroeconomic shocks, rather than being caught off guard. In anticipation of new trade tensions, especially tariff hikes on Asia-Pacific exports, timely and flexible policy support for domestic industries and value chains will help mitigate the negative impact and, in some cases, enable countries to effectively tap into economic opportunities that emerge from a new round of GVC reconfiguration. Regional value chains and close cross-countries economic partnerships proved effective buffers against these shocks in East and South-East Asia in the aftermath of the trade tensions in 2018. It is important for countries to continue to commit to this spirit of economic cooperation and partnerships in order to weather new storms ahead.


23.94
37.93

# 2 THE FUTURE OF ECONOMIC GROWTH IN ASIA-PACIFIC DEVELOPING COUNTRIES

## 1. Introduction

**Asia-Pacific developing economies have been on a remarkable journey of economic rejuvenation.** From earlier economic successes of Japan and the "Asian Tigers" to the more recent economic take-off of China and India, the Asian and Pacific region has successfully been transformed from a poor and backward region into one known for economic vitality and innovation. The result of this economic success is the world's greatest reduction in poverty – more than 1.5 billion people have been lifted out of extreme poverty over the past four decades – as well as the world's greatest income convergence since the "great divergence" of the eighteenth and nineteenth centuries that propelled the West significantly ahead of the rest of the world in terms of per capita income (Grinin and Korotayev, 2015). As noted by Chancel and others (2022), global income inequality between countries dropped sharply from its peak in 1980 and was driven primarily by the economic catching-up of Asia-Pacific developing countries.

**This economic rise of Asia and the Pacific has been underpinned largely by three main strategic forces,** although other factors also contributed. First, **structural transformation**, a process through which labour is reallocated from low-productivity agriculture-based rural sectors to high-productivity industrial and urban sectors, served as a core engine of economic growth. This process created jobs, led to income growth and generated increasing demand for all sorts of goods and services. Second, **an outward-oriented economic strategy** enabled Asia-Pacific developing economies to leverage globalization and global value chains for access to foreign capital and markets, for learning by doing and for large-scale absorption of technology and know-how from more advanced economies. Reasonably skilled and effectively organized labour forces facilitating the use of modernized production processes, together with focused and forward-looking Governments providing necessary market and physical infrastructure to foreign investors, were key ingredients of this strategy as well. Third, **exceptionally high rates of private and public savings and investment**, which supported rapid infrastructure development and production expansion, further accelerated economic growth in the region. Much of this can be attributed to a virtuous cycle between productive use of capital, rapid economic growth and high investment returns, but cultural factors and deliberate government policies to increase private savings also played a role.

**However, all these three engines of economic growth may lose steam or encounter substantial challenges in the coming years.** The developing Asian and Pacific region has experienced a general deceleration in labour productivity growth and income convergence to the global economic frontier since the 2008 global financial crisis. The growth-boosting effect of domestic fixed capital formation also declined in many parts of the region during this period, reflecting weaker growth-sustaining capacity of traditional labour-intensive sectors and a gradual manifestation of the so-called middle-income trap. The external environment for the region's economic development also deteriorated. Rising protectionism and strategic economic competition increasingly erode mutually beneficial economic integration and cooperation in this "post-globalization" era, rendering export-led economic growth and global value chain-based industrialization less effective in supporting economic growth and productivity progress. To overcome these challenges, more proactive and well-targeted policy effort will be necessary. Meanwhile, the growing urgency of achieving green economic transformation further complicates policymaking, when a difficult trade-off between environmental and economic gains persists and equally pressing environmental investment needs and socioeconomic investment needs compete for the limited resources.

In this context, **the chapter explores the prospect of future economic growth in Asia-Pacific developing economies.** In section 2, it examines three major challenges that confront Asia-Pacific developing countries in their pursuit of higher income levels: slower productivity growth and income convergence; increasing difficulties of economic upgrading into higher-productivity sectors; and policy dilemmas relating to green economic transformation. In section 3, three potential policy responses are highlighted: reviving the "developmental State" to support sectoral upgrading; capitalizing on green value chains as a future source of economic growth; and embracing inclusive regional economic cooperation for shared prosperity. Section 4 concludes.

## 2. Future economic growth in Asia-Pacific developing countries: an analysis of three trends and challenges

**Providing higher income and better living standards for its citizens remains a primary development objective for most Asia-Pacific developing countries.** Table 2.1 provides a sample of countries with specific medium-to-long-term economic growth and income objectives in their national development strategies or plans. Together, they represent roughly five out of every six people in the region.

This chapter was prepared by Zheng Jian (jianz@un.org), with research assistance from Philip Schmid.

**Yet, the validity of past and current economic development approaches and the sustainability of the region's future economic growth are increasingly being tested.** On one hand, the usual growth challenges that confront middle-income countries, such as diminishing productivity gains from intersectoral labour reallocation[1] and fading advantages of backwardness,[2] become more pronounced as countries

**Table 2.1 Economic and income targets in strategic national development plans of selected countries**

| Country | Plan name | Time frame | Economic/income target |
|---|---|---|---|
| Bangladesh | Perspective Plan | 2021-2041 | Become an upper-middle-income country by 2031 and a high-income country by 2041 |
| Bhutan | 13th Five Year Plan | 2024-2029 | Become a high-income country driven by innovation and sustainability by 2029 |
| Cambodia | Vision 2030 and Beyond | Until 2030 | Become an upper middle-income country by 2030 and high-income country by 2050 |
| China | 14th Five-Year Plan and Long-range Objectives Through the Year 2035 | 2021-2035 | Become a "moderately developed" economy by 2035 |
| India | Strategy for New India @ 75 | Until 2022-2023 | Achieve an annual rate of growth of 9 per cent by 2022-2023 (essential for generating sufficient jobs and achieving prosperity for all) |
| Indonesia | National Long-Term Development Plan 2025-2045 | 2025-2045 | Achieve economic transformation through: (a) sustaining an average annual economic growth rate of 6-7 per cent, (b) raising middle class income by 80 per cent, and (c) increasing renewable energy share to 70 per cent, to become a high-income country |
| Kazakhstan | National Development Plan until 2029 | Until 2029 | Overcoming the "middle-income trap" and creating a strong institutional and socioeconomic foundation for securing Kazakhstan among high-income countries are the main development goals for the medium term |
| Mongolia | Sustainable Development Vision 2030 | 2016-2030 | Increase GNI per capita to US$17,500 and ensure average annual economic growth rate of not less than 6.6 per cent through 2016-2030 |
| Malaysia | 12th Malaysia Plan | 2021-2025 | Achieve GDP growth of 4.5 to 5.5 per cent per annum and raise GNI per capita to Malaysian Ringgit 57,882 (equivalent to about US$13,000) |
| Nepal | 16th Five-Year Plan | 2024-2029 | Achieve an annual economic growth rate of 7.3 per cent and increase per capita income to US$2,413 |
| Philippines | Philippine Development Plan | 2023-2028 | Achieve upper-middle-income country status by 2025 and maintain annual economic growth rate between 6.5 and 8.0 per cent from 2024 to 2028 |
| Tajikistan | National Development Strategy 2030 | Until 2030 | To increase GDP per capita 2.7-fold |
| Timor-Leste | Strategic Development Plan 2011–2030 | 2011-2030 | Transition from a low-income to upper-middle-income country by 2030 |
| Uzbekistan | Development Strategy for 2022-2026 | 2022-2026 | Increase per capita income to US$2,800 by 2026 and US$4,000 by 2030, to become an upper-middle-income country |
| Viet Nam | Resolution of the 13th National Party Congress | 2021-2045 | Become a developing country with a modern industrial base among the upper-middle-income countries by 2030 and achieve the status of a developed, industrialized country with a high income by 2045 |

1 This happens when a country approaches the Lewis turning point at which the large initial labour productivity gaps between rural and urban sectors largely disappear.

2 A concept popularized by Gerschenkron (1962), which refers to a less-developed country's opportunity to accelerate its economic growth by learning and absorbing existing knowledge, technology, management modalities and practices from more advanced economies.

move closer to high-income status and technological frontiers. In East and North-East Asia and South-East Asia, rapid population ageing puts additional stress on productivity growth, investment returns and fiscal sustainability. On the other, the international and technological landscape for future economic development is also changing rapidly. Elevated focus on national interests and geopolitical confrontation have taken the shine off globalization and are pushing policy balance increasingly towards national security over economic prosperity. At the same time, new technological trends have raised concerns over future modalities of production, international division of labour and cross-country distribution of income. On top of this, green economic transformation is becoming increasingly urgent in view of the mounting socioeconomic threat of climate change.

## 2.1 General deceleration in economic convergence and productivity growth

**Per capita income convergence between Asia-Pacific developing countries and global frontier economies has decelerated in recent years.** Median per capita income peaked in South-East Asia in 2013, and in North and Central Asia and South and South-West Asia in 2014, when measured as a share of per capita gross national income of the United States[3] (figure 2.1a). Similarly, while per capita income in China and India have continued to grow relative to that of the United States, the pace of convergence seems to have moderated. Moreover, such economic convergence is not broad-based. Among 44 Asia-Pacific developing countries, less than half have managed to reduce their per capita income gaps with the United States between 2010 and 2024, and less than a third have managed to achieve a modest 1 per cent convergence rate per annum (figure 2.1b).

**This trend in income convergence is closely associated with a broad-based deceleration in labour productivity growth** since the 2008 global financial crisis. In most parts of the region, labour productivity growth peaked prior to 2008 and decelerated after the crisis (figure 2.2). The COVID-19 pandemic has further subdued labour productivity growth, even when the two worst affected years of 2020 and 2021 are excluded from the analysis. Such post-crisis productivity growth deceleration is not an isolated phenomenon in developing economies in Asia and the Pacific, but instead part of a broader global trend. As noted by Dieppe (2021), global labour productivity growth experienced its "steepest, longest and broadest" decline during this period.

**Growth accounting analysis for Asia and the Pacific suggests that most of the deceleration can be attributed to a sharp drop in total factor productivity (TFP) growth.** Growth in TFP (box 2.1) declined by almost two thirds during the period 2011-2019 compared with the pre-crisis level between 2000 and 2007 and can be observed in all subregions[4] except for South and South-West Asia (figure 2.3). This decline alone explains reduced labour productivity growth by 1.4 percentage points annually. Similarly, the level of economic growth that can be sustained by a specific level of gross investment has also declined (figure 2.4). For instance, the level of economic growth that an investment equivalent to 1 per cent of GDP could sustain dropped by 0.13 percentage points in China, 0.3 percentage points in North and Central Asia, 0.06 percentage points in South-East Asia, and 0.07 percentage points in South and South-West Asia, excluding India, despite higher gross fixed capital formation in these economies post-crisis. Only the Pacific subregion showed the opposite, where gross fixed capital formation declined but with greater impact on GDP growth.

**While it is difficult to pinpoint specific underlying issues behind decelerating productivity growth and the smaller impact of investment on economic growth, several potential factors can be highlighted.** First, countries in the region are increasingly confronted with the middle-income trap,[5] whereby productivity gains and growth stimulus effects of simple capital accumulation gradually diminish. Technological infusion and innovation beyond additional investment play a greater role in injecting new momentum into the economy (World Bank, 2024b). Second, rapid population ageing in some large Asia-Pacific countries is probably another key factor (Adler and others, 2017; Park and Shin, 2023), whereby a shrinking labour supply erodes economic growth potential (Lee and Shin, 2021), and innovation takes a slower pace in an increasingly aged work force (Liang, Wang, and Lazear, 2018; Engbom 2019). Third, firm-level empirical evidence reveals sizable and persistent intrasectoral productivity differences in developing economies in Asia and the Pacific, implying substantial presence of labour and capital misallocation in the economy (Hsieh and Klenow, 2010; Duranton and others, 2016; Konté, Kouame and Mensah, 2021). Total factor

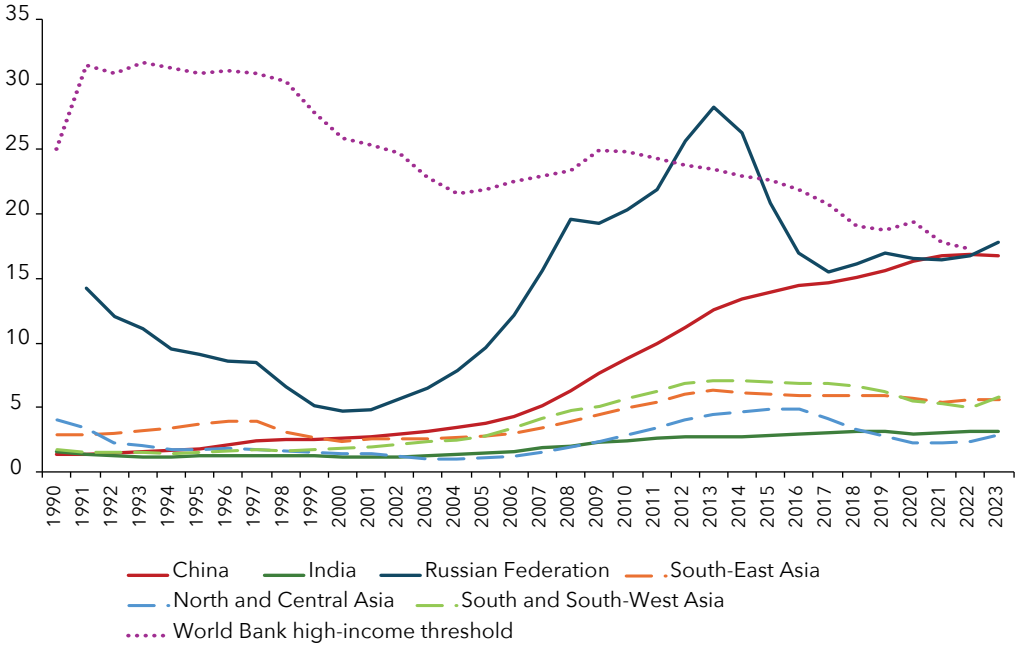
3 Here, it is treated as a benchmark for international income and productivity frontier.

4 No data are available on Pacific island States.

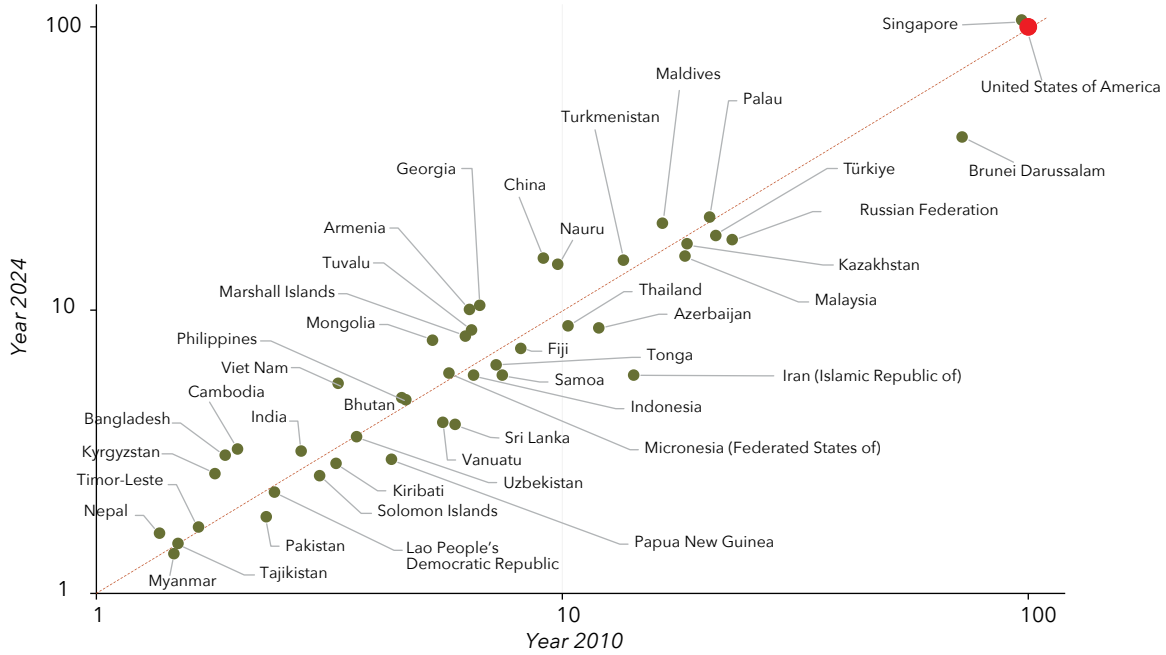
5 A term popularized by Gill and Kharas (2007) to describe sudden growth deceleration and prolonged economic stagnation experienced by economies that were "squeezed between the low-wage poor-country competitors that dominate in mature industries and the rich-country innovators that dominate in industries undergoing rapid technological change".

**Figure 2.1 Percentage gross national income per capita (median if for subregions) relative to that of the United States**

**a. Changes over time**




**b. 2010 vs. 2024**



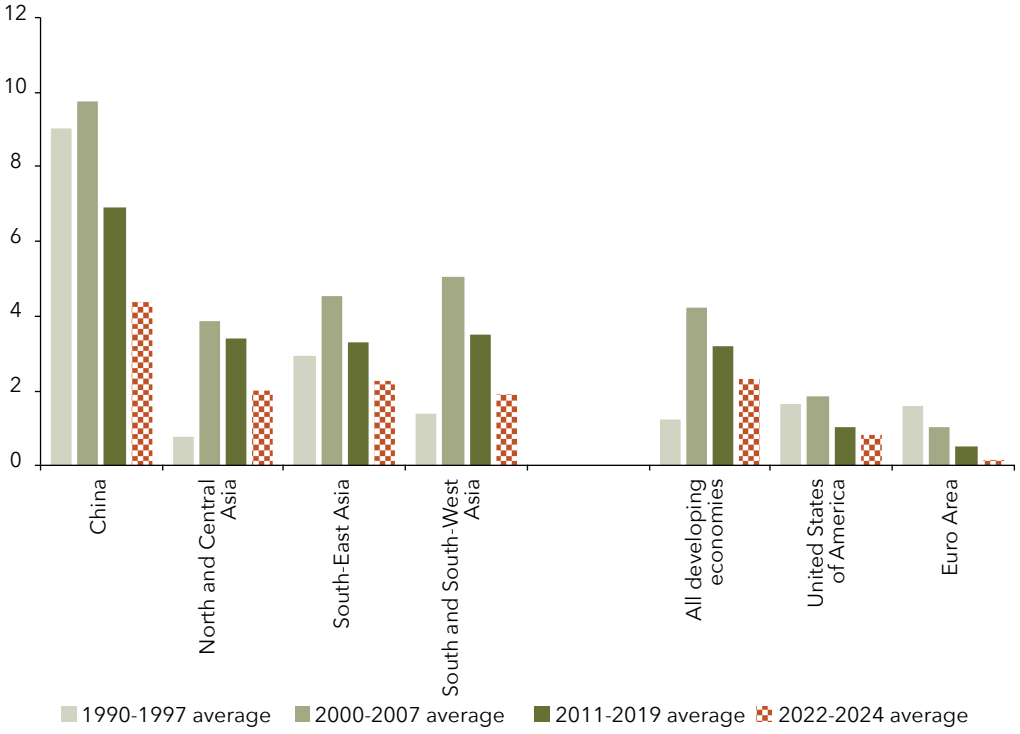

*Source*: ESCAP, based on data from World Bank World Development Indicators. Accessed on 16 November 2024

productivity losses due to such misallocation inefficiency could have exceeded 1 percentage point in China and 4 percentage points in other developing economies between 2000 and 2019 (IMF, 2024). Last but not least, the broad-based deceleration in global productivity growth may also have weighed on productivity growth in developing economies in Asia and the Pacific.[6]

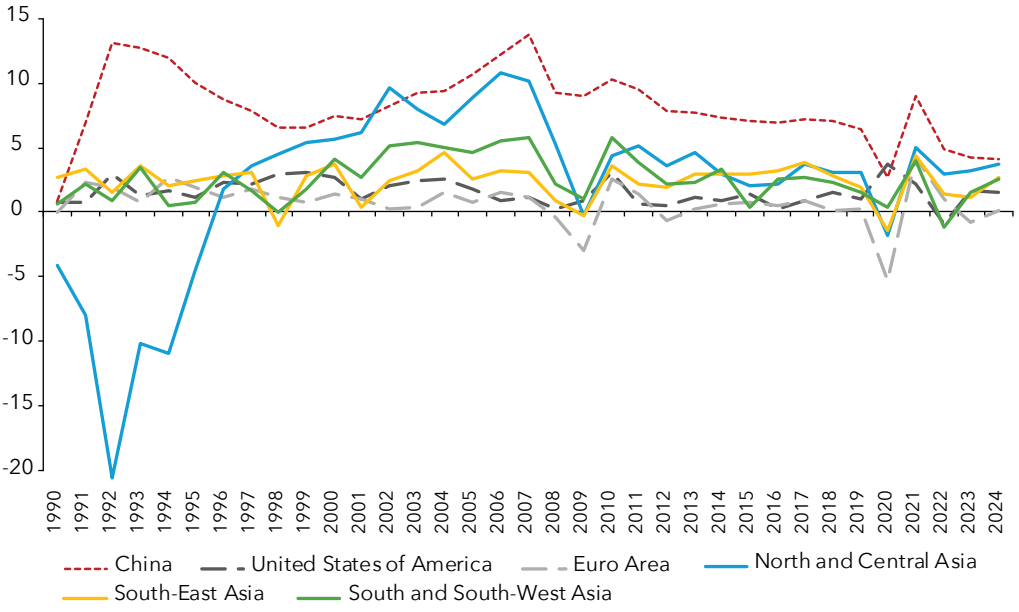
6 Global development and adoption of new technologies may have temporarily slowed during the post-crisis decade (Brynjolfsson, Rock, and Syverson, 2017) with also reduced marginal economic impact (Gordon, 2012; Gordon and Sayed, 2019). Subdued aggregate demand associated with slower population growth and declining relative price of capital goods may have also resulted in a secular stagnation in advanced countries (Summers, 2015).

Figure 2.2 Percentage labour productivity growth in Asia-Pacific developing economies and comparator economies

**a. Averages in selected periods**




**b. Changes over time**



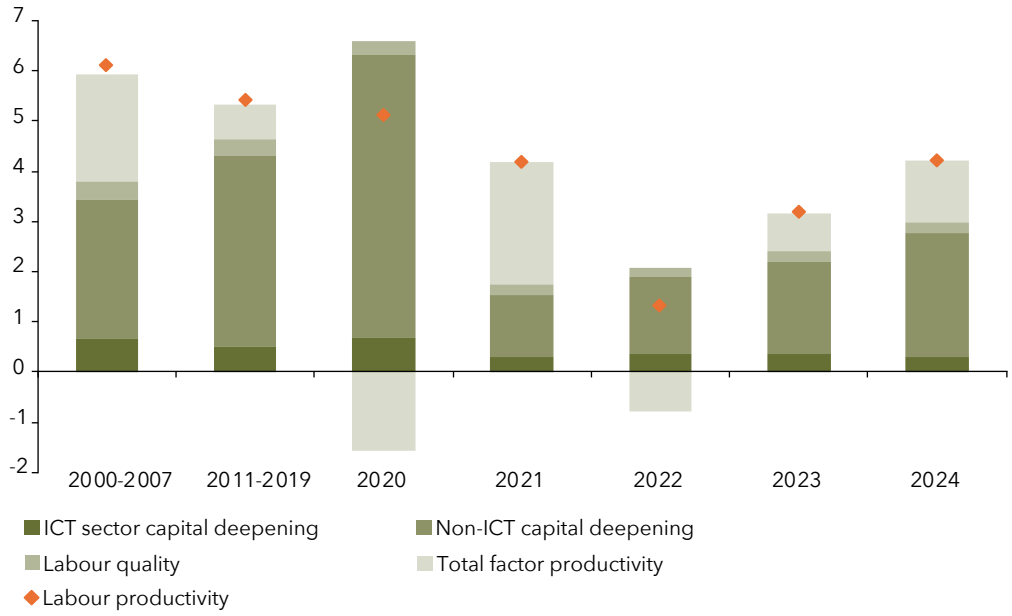

*Source*: ESCAP, based on The Conference Board Total Economy Database. Accessed on 16 November 2024.

## ❮Box 2.1 Growth accounting and total factor productivity❯

Growth accounting is a quantitative assessment of contributions to GDP growth by direct productive inputs, such as capital, labour quantity and labour quality, as well as production amplifiers, such as technology, management and any other factors affecting overall productive efficiency. This last factor, which is estimated as the residual after accounting for the contributions of measurable direct inputs, is referred to as total factor productivity (TFP). Although it is often interpreted as an indicator of overall technological level or efficiency of the economy, many other factors can also contribute to its fluctuations over time. For instance, the underutilization of productive capacity during the COVID-19 pandemic was a main driver behind the TFP plunge in 2020.

Although growth accounting is widely employed to provide quantitative insights into underlying drivers of economic and productivity growth, it has several limitations (Felipe, 1999). For example, the analysis hinges upon key mathematical assumptions for simplicity, such as the independence of technological progress from capital accumulation and Hicks-neutrality, which assumes independence of relative marginal productivity of labour and capital from technological changes. Their validity can be questionable in reality. In addition, inaccurate measurement of actual quantity and quality of inputs, the presence of complementary inputs or imperfect substitution between inputs can cause significant errors in the estimation. Market failures, which are not uncommon in developing countries, can also distort market prices, which are used to calibrate the production function used for the analysis.

## Figure 2.3 Percentage decomposition of labour productivity growth in Asia-Pacific developing economies, 2000-2024

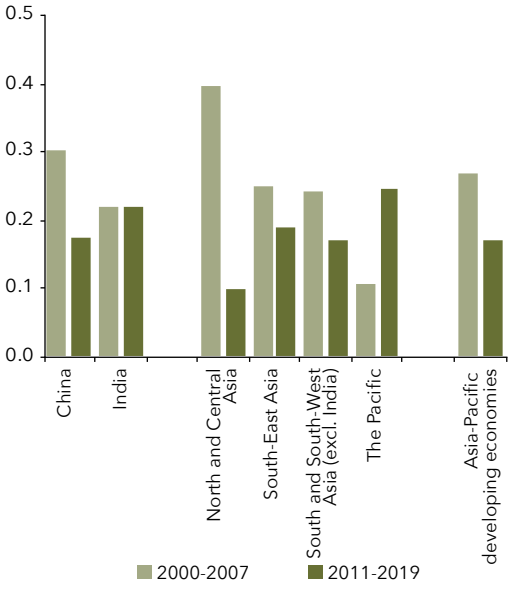



*Source*: ESCAP based on The Conference Board Total Economy Database. Accessed on 16 November 2024.

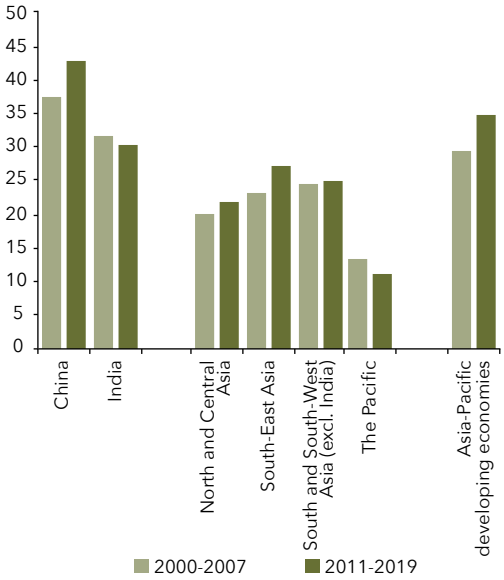
*Note*: ICT stands for information and communications technology.

Figure 2.4 GDP growth and gross fixed capital formation, 2000-2007 vs. 2011-2019

**a. Economic growth sustained by gross fixed capital formation equivalent to 1 per cent of GDP (percentage)**




**b. Gross fixed capital formation (percentage of GDP)**




*Source*: ESCAP, based on World Bank World Development Indicators. Accessed on 16 November 2024

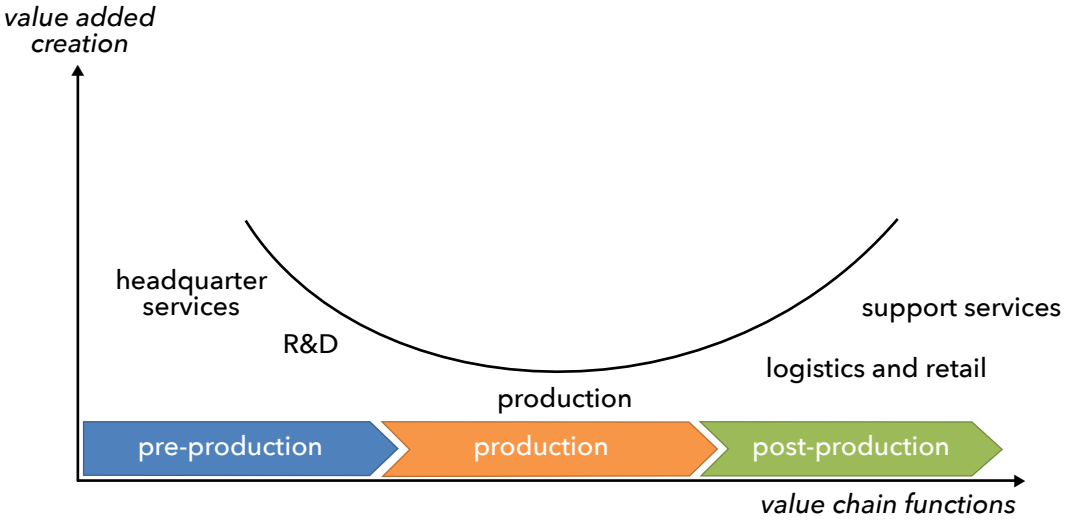
## 2.2 Deteriorating external environment for sustained economic growth

Asia and the Pacific's economic success in the past four decades has relied heavily on its cooperation and integration with the global economy. Access to foreign capital and markets was a precondition for the region's export-led development strategy. Participation in the global division of labour created valuable opportunities for the region's entrepreneurs and workers to improve their skills. The emergence of regional manufacturing value chains strengthened not only economic ties between economies in the region but also their collective economic competitiveness and resilience, leveraging agglomeration gains. However, **several new developments in globalization and technological advancements pose challenges to an accommodative and inclusive global economic environment,** which is necessary for sustained economic growth in developing economies in Asia and the Pacific.

**The first and more pressing challenge is the deepening of the "smile curve"**. This term, coined in the late 1990s, describes a phenomenon of skewed distribution of value addition along global value chains (figure 2.5). It shows that value creation has increasingly shifted towards upstream and downstream ends of value chains, wherein developed countries and multinational companies dominate headquarters services and research and development (R&D) activities at one end, and logistics, marketing and retailing at the other. Meanwhile, developing countries remain trapped in middle-stream production functions at the bottom of the value chains, which have the lowest value addition and share of income. Ample empirical evidence supports this observation as a stylized fact (Mudambi, 2008; Shin, Kraemer and Dedrick, 2012; Ye, Meng and Wei, 2015; Stöllinger, 2021). Such functional specialization along value chains has only grown in recent years (Stöllinger, 2019; Baldwin and Ito, 2021).

**This has aggravated the middle-income trap faced by many Asia-Pacific developing economies.** For example, ESCAP (2022) shows that the contribution of manufacturing to output growth and non-agricultural employment growth has declined since the global financial crisis of 2008, which coincides with the post-crisis labour productivity deceleration in the region. Although many factors may have contributed to this change, external downward pressure on value addition, profit margins and labour absorption capacity of the manufacturing sector likely have played a non-neglectable role. The region's dependence on manufacturing for exports further exposes it to this challenge, as value addition in exports has largely shifted from the manufacturing sector to service sectors (Baldwin and Ito, 2021). Moreover, developing countries have reduced their own-sourcing service

Figure 2.5 An illustration of the "smile curve"




*Source*: Mudambi (2008). Location, control and innovation in knowledge-intensive industries.

value-added share in their exports, while developed countries maintained their relatively high levels of own-sourcing service value-added share. In going forward, this implies that Asia-Pacific developing economies are likely to encounter greater downward pressures on their manufacturing profits and wages and would see diminishing local value addition in their exports, unless they can effectively diversify into the higher-value-addition services-based segments of global value chains.

**Nevertheless, moving up the global value chains is an increasingly challenging task in the current global economic environment.** Rising trade protectionism is limiting access to developed markets by developing countries. International technological competition has also intensified and involved more economic sectors. The strategic importance of emerging technologies, such as next-generation telecommunications and artificial intelligence for both national economic competitiveness and national security, suggests that further technological competition and decoupling are likely. This would undermine technology diffusion and innovation in going forward.

**In addition, the so-called fourth industrial revolution, which is primarily based on data, next-generation communications and artificial intelligence (AI), may further reinforce an existing skill bias in favour of highly skilled workers at the cost of moderately skilled workers.** Past evidence of automation suggests that moderately skilled workers in routine jobs are likely to be exposed to replacement risks first, which does not bode well for most Asia-Pacific developing countries which on average are moderately skilled and concentrate on routine labour-intensive jobs. An even greater challenge may come from the fusion between AI and robotic technologies, which could undermine the competitive strength of Asia-Pacific economies in labour-intensive manufacturing or services.

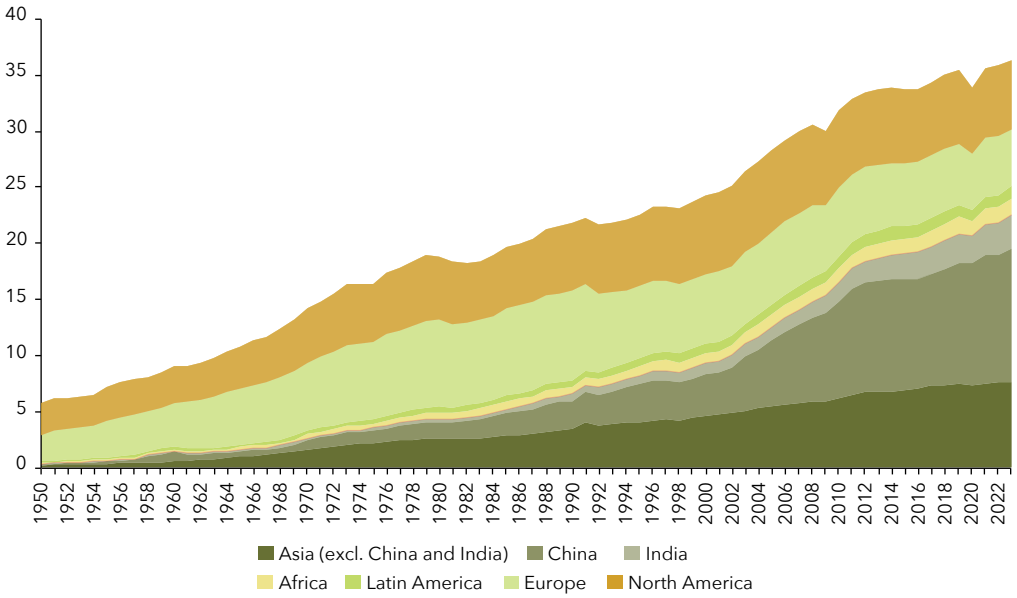
## 2.3 Policy dilemmas for green economic transformation

**The third challenge relates to a policy dilemma in terms of pursuing traditional macroeconomic objectives, such as economic growth, while fostering green economic transformation.** As a vast and populous region, Asia and the Pacific is the world's largest carbon emitter, accounting for about 60 per cent of total global carbon emissions (figure 2.6a). Although per capita emission levels in most Asia-Pacific developing economies remain much lower than those in developed economies, these figures are catching up fast (figure 2.6 b) due to heavy industrialization and high energy and carbon intensity (figure 2.7a and b).

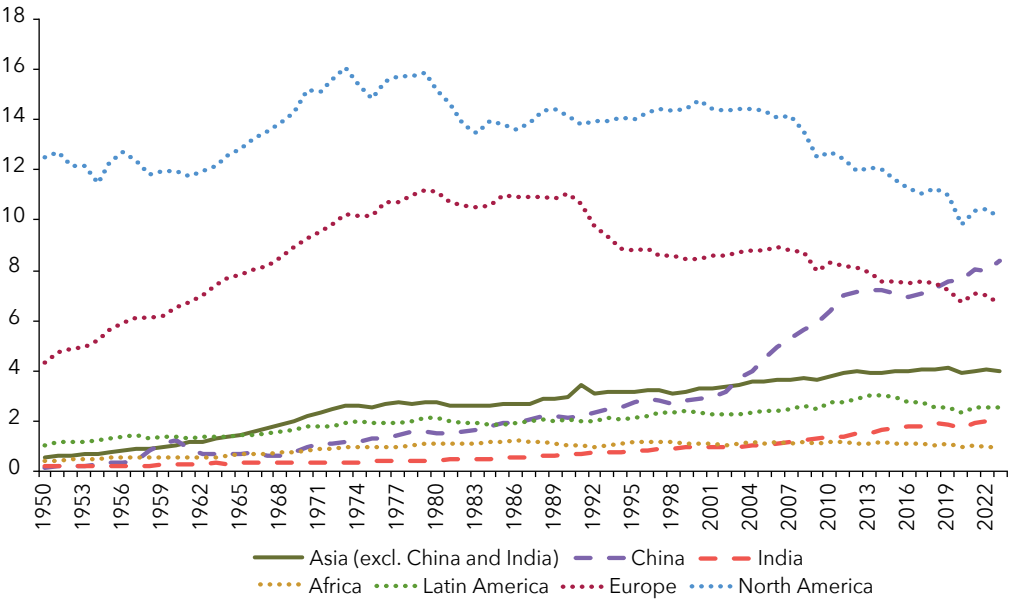
**The continuing industrial ambitions of Asia and the Pacific are adding to the urgency of green economic transformation.** While the region is increasingly relying on modern services rather than manufacturing for economic growth and creation of productive jobs, manufacturing and other energy- and emission-intensive industrial sectors are likely to remain a central part of many economies in the region. As other

## Figure 2.6 Carbon emissions, total and per capita, 1950-2023

### a. Total carbon emissions (billion tons of carbon dioxide)



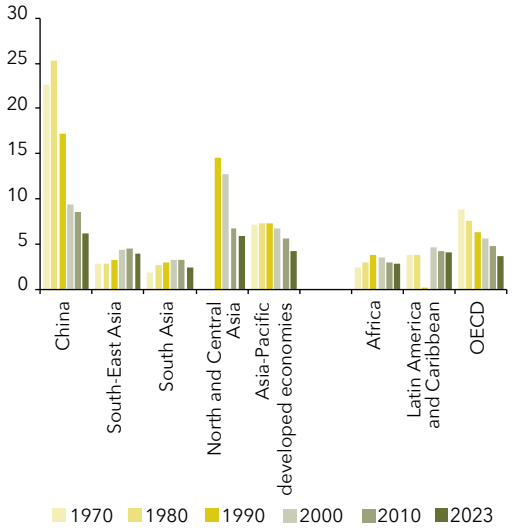

### b. Per capita carbon emissions (tons of carbon dioxide)



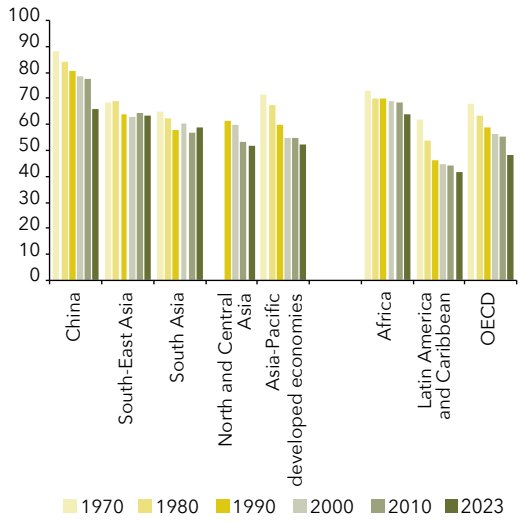

*Source*: ESCAP calculations based on Our World in Data and Global Carbon Budget 2024 (https://globalcarbonbudget.org/gcb-2024/). Accessed on 24 November 2024.

Figure 2.7 Energy intensity and carbon intensity in developing economies in Asia and the Pacific

**a. Energy intensity of GDP (megajoules per United States dollar)**




**b. Carbon intensity of primary energy consumption (tons of carbon dioxide per exajoule)**




*Source*: ESCAP calculations based on Energy Institute data. Accessed on 24 November 2024.

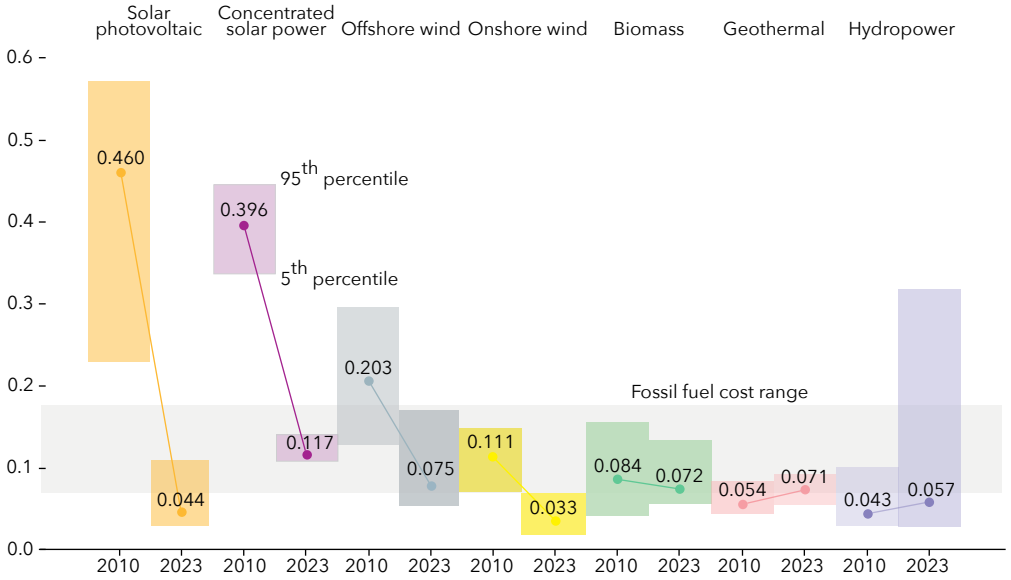
large and populous countries in the region become new "world factories", a population larger than that of China's could experience a period of rapid industrialization in the coming decades. China produced more than 1 billion tons of crude steel and consumed close to 5 billion tons of coal in 2023. Similar numbers in India in the same year were roughly one tenth those of China. If India were to experience a sustained period of rapid urbanization, manufacturing growth and infrastructure development and become another "world factory" at even half the speed or scale as that achieved by China, it could add significant carbon emissions in the region in the coming decades, unless the country embarks on an ambitious green economic transformation simultaneously.

**Green economic transformation can be desirable from a domestic economic perspective, although it faces several policy dilemmas.** Apart from direct economic gains of green measures, such as enhancement of energy efficiency, green economic transformation also prepares Asia-Pacific developing economies for the potential proliferation of carbon taxes or green requirements on their exports. A notable example is the European Union's Carbon Border Adjustment Mechanism (CBAM), which was rolled out in 2023; essentially, it is a border carbon tax on imports to address carbon leakage and ensure fairer competition between European Union industries and foreign producers. During the transition period of 2023-2025, importers are mandated to report carbon emissions embedded in the imported goods. From 2026 onward, however, importers will need to purchase CBAM certificates for such embedded emissions at a price equivalent to the carbon price paid by European Union producers under the European Union Emissions Trading System (EU ETS). This sets up a precedent and it is likely that other major global markets, which also have ETSs at home, would replicate such practices in the not very distant future. When carbon taxes or other green requirements on imports become a common global practice, exporters not complying with green production requirements will be forced to pay the cost of green transformation, not at home but in their export markets. This could create a strong incentive to charge a fair price on carbon emissions at home and spend the revenue at home for domestic green economic transformation.

Such considerations, together with the ambition to capture the fast-expanding market and growth potentials of the green economy, have propelled some Asia-Pacific economies, such as China, to lead the world in green economic transformation. However, **the majority of developing economies in the region are still confronted with policy dilemmas in their effort towards achieving green economic transformation.** For instance, despite remarkable cost decreases in recent years, renewables are not yet universally economically competitive compared with fossil fuels (figure 2.8). In countries with large fossil fuel reserves and stronger mining capacity in particular, fossil fuels may remain the most cost-efficient way to deliver affordable energy.[7] In this context, ambitious green economic

7 In this calculation, environmental costs of fossil fuels are not accounted for, given the absence of effective mechanisms to price in such global externalities.

Figure 2.8 Global levelized costs of energy, by primary energy source, 2010 and 2023 (United States dollars per kilowatt hour)




*Source*: Renewable Power Generation Costs in 2023, International Renewable Energy Agency. Available at www.irena.org/Publications/2024/Sep/Renewable-Power-Generation-Costs-in-2023.

*Note*: The thick lines indicate the global weighted average levelized cost of energy values of newly commissioned, utility-scale primary energy by source. The grey band represents the fossil fuel-fired power generation cost in 2023, while the bands for each technology and year represent the 5th and 95th percentile bands for renewable projects.

transformation would inevitably divert additional resources away from other pressing socioeconomic development priorities at home, creating a difficult choice for policymakers between longer-term global economic and environmental dividends and immediate domestic socioeconomic rewards. In cases where Governments fail to adequately subsidize renewables to completely level the economic cost of energy generation, these additional costs will be reflected in higher energy bills, resulting in higher cost of living and a cost disadvantage for domestic production.

**In addition, most developing countries still rely on imported green technology, green equipment and sometimes maintenance services to implement their green economic transformation.** Solar and wind power equipment, battery manufacturing and electric vehicles are all sophisticated industrial sectors that are high-technologies, require strong industrial capacity and enjoy an increasing return to scale. High demand of solar and wind on electricity grid resilience and management, and the necessity for complementary power sources to smooth the overall energy supply further complicate the technical challenge. Until now, the overwhelming majority of green technologies and supply capacity are concentrated in just a handful of industrialized economies. In developing countries, a green economic transformation driven by imported technology, capital goods and services can have adverse impacts on current account balances, foreign exchange reserves and external debt, especially when global affordable climate financing persistently underperforms expectations. In the absence of linkages with and dividends for the local economy, it will also be more difficult for import-led green economic transformation to rally public and political support.

## 3. Policy considerations for future economic growth

As highlighted in section 2, future economic growth in developing economies in Asia and the Pacific is likely to encounter several headwinds in the coming years. However, according to economic theories and mainstream discussions, **there is in general a lack of standard international playbooks that countries can call upon for guidance to effectively navigate these challenges and break through the so-called middle-income trap.** For example, Gill and Kharas (2015) noted that understanding the drivers and mechanisms of sustained income convergence to the global economic frontier in middle-income countries remains a missing link in mainstream economics. Parrique and others (2019) noted that a positive synergy between economic growth and green transformation can prove difficult to accomplish. Adjusting to a global economic environment increasingly characterized by protectionism and cross-country competition for economic and technological dominance remains a new policy question to be addressed.

In contrast, **the Asia-Pacific region's own development experience offers rich policy insights on all three fronts.** On sustained income convergence, East Asian economic miracles suggest that a successful transition to high-income status and to a growth model of advanced countries can be deliberately and skillfully engineered, following a "developmental State" approach (Routley, 2012; Hauge, 2020). On green economic development, some Asia-Pacific countries have successfully emerged from being followers just a decade ago to being global leaders today in green economic transformation and green economic sectors. In terms of global economic cooperation, the region has also proved to be a force of stability through reaffirmed commitment to economic openness and further deepening in economic integration within the region.

Building on such unique and valuable policy experiences in the Asia-Pacific region itself, **this section explores three priority areas for actions to sustain future economic growth in the region.**

## 3.1 Revive the "developmental State" to champion sectoral upgrading

**A proactive and central role of the State and a consistent focus on sectoral upgrading have been two central features of promoting economic development and breaking the middle-income trap by many Asia-Pacific economies.** Sectoral upgrading guides and drives technological upgrading, creates higher-productivity jobs and demands for skilled talents, and enhances domestic value addition. It serves as an end purpose of technological advancement and educational progress, a primary channel for sustained productivity enhancement and a place where economic value addition is eventually realized.

**Proactive State interventions through industrial policies and collaborative partnerships with the private sector can play a central role in engineering sectoral upgrading** (box 2.2). Such a developmental State needs to perform multiple key functions simultaneously to effectively support the emergence of new economic sectors that are of higher productivity and value addition (see figure 2.9 for a visual illustration and box 2.3 for two concrete examples). First, it needs to conduct thorough industrial and market analysis to identify potential

### Box 2.2 Rationale for developmental State and industrial policies

**Address economic externalities**

- Learning externalities - R&D activities and learning-by-doing in high-productivity sectors contribute to collective knowledge and overall workforce skills, thus generate positive spills to other parts of the economy.
- Cost discovery externalities - Early entrants in new industries generate valuable information on market conditions and production costs of emerging economic sectors, which later entrants can leverage.
- National security externalities - Reducing dependence on foreign supplies enhances national security.
- Good-jobs externalities - Creating well-paying, stable jobs strengthens social cohesion and reduces societal challenges.
- The State can support such economic activities with positive externalities through direct subsidies or other support measures.

**Address coordination failures**

- High-productivity high-value-addition sectors often require simultaneous investments in various upstream and downstream supply chains and complementary industries to be locally viable and profitable. When scale economy is involved, single private investors may also lack the capacity to fund the entire investment alone. Both scenarios will result in underinvestment in these sectors.
- States can work with the private sector to overcome these coordination challenges and steer investments into these sectors.

**Provide activity-specific public inputs**

- Private production relies on such public goods as infrastructure, education and regulation. However, the needs of industries are often highly specific. Governments must decide whether to prioritize certain public investments, such as building a port to serve a steel complex or investing in training programmes tailored to a specific sector.
- This "doomed to choose" scenario inherently involves State intervention and industrial policy.

**Infant industry promotion**

- Temporary protection or support for nascent domestic industries against foreign competition can be essential for these industries to eliminate their experience and capability gaps with foreign competitors over time, given the unequal head start of the foreign incumbents.
- Temporary protection for nascent domestic industries may also encourage technological or production experimentation, especially in the case of high-technology industries wherein innovation through "trail and fail" is crucial for such industries to gain an initial footing in international competition.

*Note*: Based on Juhász, Lane and Rodrik (2023).

Figure 2.9 Five key functions of the developmental State


## <Box 2.3 How does the developmental State work in reality?>

**Steering sectoral upgrading into electronics in the Republic of Korea**

Around the mid-1960s, the Republic of Korea identified electronics as a new high-productivity high-value-addition sector for upgrading. To turn this vision into reality, the Korean Government first conducted several rounds of market and feasibility research studies and undertook extensive consultations with domestic private enterprises as the implementation party. This due diligence work was provided with an adequate budget and was led by renowned external experts in the electronics industry, rather than government officials. The expert team conducted extensive analysis of foreign electronics industries and markets, tasked the Korea Institute of Science and Technology for local industrial surveys and organized a field trip for Korean business leaders to visit the United States and observe the development and potentials of the electronics sector. The result was a thorough assessment of the sector and opportunities for the Republic of Korea and a detailed action plan for implementation, which totaled some 1,000 pages.

Based on this initial due diligence, two government blueprints for electronics sector development were developed in 1969, namely the Electronics Industry Promotion Law and the Basic Plan for Electronics Industry Promotion. They identified specific electronic products and subsectors for prioritization, encouraged localization and exports, promoted foreign investments and technology transfers, and specified policy instruments to support domestic electronics industries combining incentives and protection with various performance requirements. The Government also created industrial complexes of electronics for agglomeration benefits, and provided quality control, R&D and market development support through public institutions. Partnerships between domestic universities and the private sector were promoted as well to purposefully align education with sectoral demands.

❮Box 2.3 continued❯

This State-led strategy in the early phase of domestic electronic sector development best leveraged administrative and institutional powers of the State and its comparative strengths in information acquirement, market awareness, planning, coordination and risk absorption, when the domestic private sector remained small, fragile, inadequately informed and ill-equipped technologically and financially. As the Republic of Korea's domestic private sector became better resourced and more familiar with the electronics sector, the State increasingly assumed a supportive rather than driver role in the later development of the sector (Kim and Kim, 2006).

**Creating a competitive electronics sector in Chongqing city of China**

In the late 2000s, the inland city of Chongqing, China's largest metropolitan jurisdiction, was confronted with an urgent and challenging task of transforming its local economy characterized by ageing heavy industries and remoteness to major seaports for access to international markets.

Piggybacking on the central Government's grand initiative to revive China's non-coastal regions, the Chongqing government conducted market investigation and set its eyes on electronics as a strategic sector for local economic upgrading. However, Chongqing was confronted with high entry barriers and serious logistical cost disadvantages being inland, which deprived the city of any competitive or even comparative edge in the electronics sector.

In this context, the Chongqing government adopted a three-pronged strategy to penetrate electronics manufacturing:

1. *Creating cost-efficient rail connection and simplified customs clearance to access European markets.* The Chongqing government, working closely with Chinese central Government, negotiated with six Eurasian countries for streamlined logistics and simplified customs along the China-Europe railway linking Chongqing to Duisburg, Germany. Customs clearance was reduced from six times to only once, total freight time was reduced from more than a month to 14 days and freight fees were almost halved in this process. It secured Chongqing stable and cost-competitive logistical access to Europe as an inland export hub.

2. *Shortening value chains and targeting higher-end electronics to further reduce logistical disadvantages.* Chongqing strategically focused on higher-end electronic products, which are less sensitive to freight costs. The local government also made extra efforts in attracting upstream and downstream segments of related value chains, from raw materials and components to trade settlement and financial services beyond typical labour-intensive processing. Together, these shortened value chains retained some 70 per cent of the total value addition of the final products locally, in contrast to just 15-20 per cent in typical processing trade in China's coastal provinces. They also significantly reduced the amount of shipping needed for the same amount of local value addition.

3. *Partnering with the private sector to overcome entry barriers.* The Chongqing government played a central coordinator's role from the beginning to overcome typical coordination failures in the private economy and reap the efficiency dividends of industrial conglomeration. It coordinated synchronized investments by five international brands, six main producers and more than 860 component suppliers in the city. Through them, Chongqing penetrated about 90 per cent of the global market, created a cost-edge despite being inland and generated additional local demands for upstream and downstream services. Risk and cost-sharing between the Chongqing government and the private sector was also indispensable, when private firms found the scales of investment needed exceeding their fund-raising capacity and risk appetite. This took various forms, including equity investments by local State-owned enterprises, dedicated investment funds set up by the government and coordination with large financial institutions for loans.

*Source*: Lim (2016) and various news reports and remarks by the then mayor of Chongqing, China.

sectors that can deliver economic and productivity benefits, have adequate global market space for the country's entry and are within domestic technological and capacity reach. Economic statistics are crucial for such an analysis, and economic intelligence on potential foreign partners or markets can also be helpful. Second, it needs to work in close collaboration with the domestic private sector to conduct feasibility studies, facilitate coordinated investments and negotiate specific policy support for the domestic private sector for effective implementation. In cases where the private sector lacks necessary capacity or commitment, State-owned enterprises may also be given the task under proper performance safeguards. Third, the State needs to provide targeted and prudently conceived incentives and protection to the implementing entities during the sector's infancy stage, including typical industrial policy interventions. Fourth, it needs to create a conducive environment in general for the sector's development. Concrete measures may range from necessary legislation, development and enforcement of sectoral standards, public R&D support and facilitation of technology transfers, and education system adjustments to supply adequate skills and talents for the sector's development, among other things. Fifth, it needs to set specific performance or socioeconomic contribution targets for the implementation entities to guarantee that key objectives, such as local value addition, international competitiveness, or productivity enhancement, are achieved. Last but not least, the State needs to set up proper monitoring and evaluation mechanisms with credible exit plans in case of unsatisfactory performance.

**Government capability and accountability will be key determinants of the level of success regarding productivity enhancement, supported by a developmental State approach.** When the Government falls short of due diligence in any of the above functions, it creates risk of failures, resulting in lost time, resources and public confidence. When accountability and transparency cannot be guaranteed, or when the Government is susceptible to lobbying and political influence, political capture and rent-seeking can highjack the initiatives and turn a development strategy into constant waste of public resources and additional distortions in the domestic market. Moreover, even well-designed and duly implemented sectoral upgrading initiatives can still be risky endeavors; thus, the Government needs to be prepared for potential failures. Iterative learning and a portfolio approach can be two responses to this challenge. In this case, policymakers should treat sectoral upgrading initiatives as portfolio investments, allowing for failures as long as overall benefits exceed costs, and keep adapting based on lessons learned (Juhász, Lane and Rodrik, 2023).

**The relevance of the productivity-focused, developmental State approach has increased in the current international economic context.** In Asia and the Pacific, there have been several successful cases of State-led sectoral upgrading. In the Republic of Korea, consistent State support to national champions in electronics and semiconductor manufacturing has solidified its position in related global value chains and secured it a favourable footing in the ongoing sectoral boom led by AI development. In China, the Government successfully negotiated market-for-technology deals with global leaders in the high-speed rail sector and cultivated its own high-speed rail industry that is today internationally competitive. Strategic planning, temporary subsidy protections and R&D support also propelled China to the leading role in many green economy sectors within just a decade. Industrial policies are also finding their way back into the most advanced economies in the world, which are rolling out growing numbers of supportive or protective measures for their own strategic sectors amid intensifying technological competition and growing numbers of unilateral tariffs and non-tariff trade barriers that bend the rules of the World Trade Organization (WTO). Even within the WTO framework, developing countries can still leverage measures, including joint ventures, technology transfer agreements and targeted subsidies for R&D or development of disadvantaged regions for sectoral upgrading at home.

## 3.2 Capitalize on green economic transformation and green value chains as a future source of economic growth

**Balancing economic development and environmental sustainability is a central macroeconomic challenge confronting Governments worldwide, keeping in view the 2030 Agenda for Sustainable Development.** On one hand, sustainable development underscores higher quality and more robust economic progress rather than stagnation. On the other, empirical evidence points to a difficult trade-off between economic and environmental objectives.

**Asia and the Pacific, however, is uniquely positioned to capture value addition potentials of the green economy and achieve synergy between economic development and green transformation.** Unlike fossil fuel industries, which are resource-based with limited linkages to other segments of the local economy, renewables and green technology sectors are typical manufacturing sectors, which are not geographically confined by natural endowments, enjoy positive economic returns to scale and benefit from agglomeration effects through extensive linkages with existing industrial and manufacturing bases. Being considered as the world's factory, the Asia-Pacific region already enjoys significant advantages in capacity and cost-efficiency to become a global hub of green economic sectors. This ability to retain green sectors and associated jobs and economic dividends locally

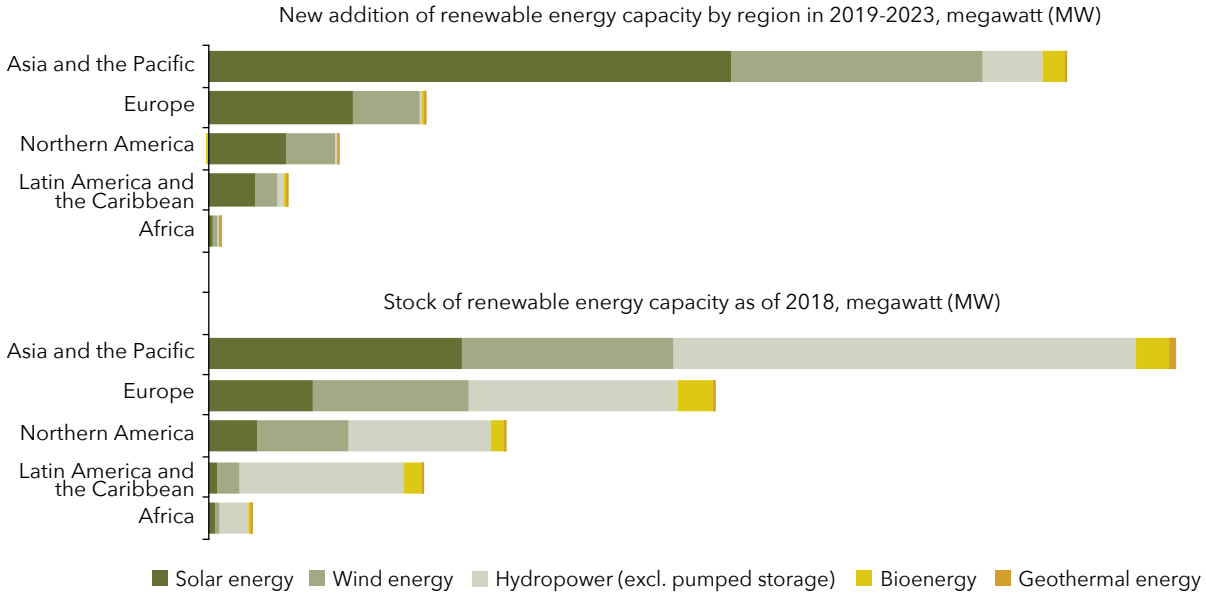
and capture part of the growing international market for green technology, products and services is thus a unique strength of the region to sustain swift economic growth while embarking on ambitious green transformation. If manufacturing's positive socioeconomic spillovers[8] and green sectors' natural synergy with economic digitalization[9] are also taken into account, a green economic transformation supported by local industries may even further boost economic growth in ideal scenarios.

**Indeed, Asia and the Pacific's competitive strength in the green economy is evident in its dominance in global renewable energy development and green value chains.** As of 2018, the region already topped the world in renewable energy capacity, while in the subsequent five years, between 2019 and 2023, it more than tripled its solar capacity and more than doubled its capacity in the other forms of renewables (figure 2.10). During this period, it accounted for some two thirds of the world's additional capacity in solar, wind and geothermal power, more than three fifths of the world's additional capacity in hydropower and more than five sixths of the world's additional capacity in bioenergy.

**More importantly, the region has emerged as a global leader in renewable and green technology value chains,** with China playing a central role while other economies in the region are participating extensively (figure 2.11). Up until the mid-2010s, China was behind in renewable and green product manufacturing. However, it has emerged as a global leader in just a decade, leveraging deliberate policy support, coordinated public investments and manufacturing competitiveness. As of 2021, in almost all renewable and green technology manufacturing sectors and subsectors, China has become the largest supplier in the world, with the rest of the region following behind as either the second or the third largest supplier. The region has been strengthening its positions in other segments of global green value chains beyond manufacturing as well. For example, Australia, China, India, Indonesia, Myanmar, Papua New Guinea, the Philippines, the Republic of Korea, the Russian Federation, Sri Lanka, Thailand, Türkiye and Viet Nam all rank among key suppliers of critical minerals for renewable and green technology development (figure 2.12). China, Japan and the Republic of Korea all occupied the top three places in the filing of green technology patents worldwide between 2019 and 2023 (figure 2.13).

**Asia and the Pacific should leverage its favourable position in green value chains to inject new momentum into its economic growth prospects, with support from accelerated green transformation at home.** In 2023, clean energy alone added about $320 billion

## Figure 2.10 Renewable energy capacity worldwide (Megawatts)

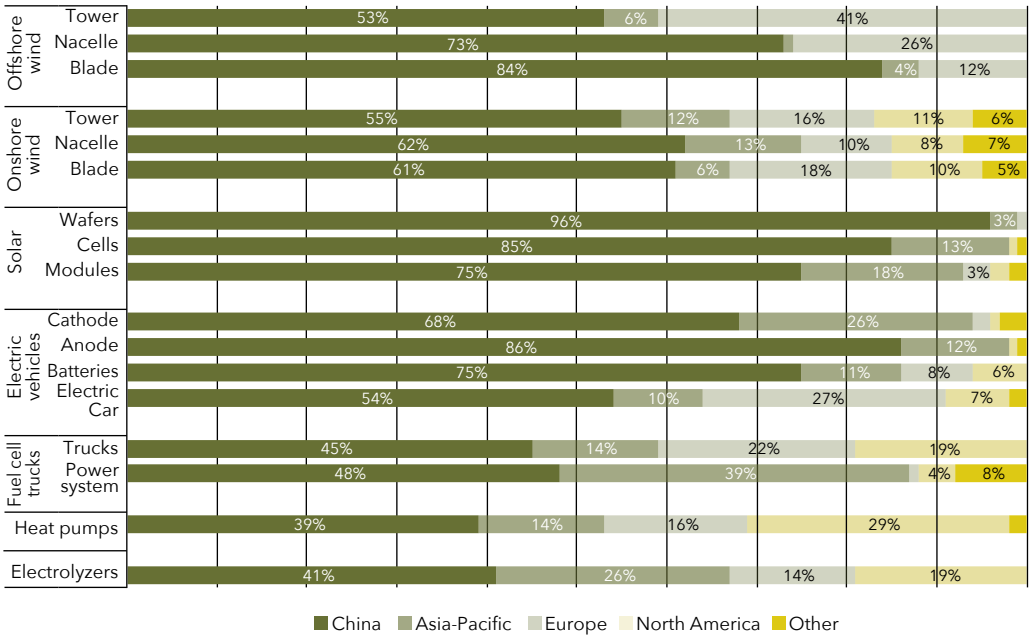



*Source*: ESCAP, based on IRENASTAT. Accessed on 9 January 2024.

8 Such as provision of formal jobs, accelerated diffusion of know-how and innovation spillovers.

9 For instance, renewable energy generation and transmission via the grid requires much more automated control than traditional forms of energy, and the digitalization of electric vehicles is far more advanced than in combustion-engine vehicles.

Figure 2.11 Share in different global green manufacturing sectors, by country and region, 2021




*Source*: ESCAP, based on Oğuz (2023) and IEA (2023a).

to the global economy, representing 10 per cent of global GDP growth (Cozzi and others, 2024). In the coming decade, global solar photovoltaic (PV) and battery energy storage markets are projected to grow by at least 20 per cent annually, the global electric vehicles market by 13.8 per cent annually and the global wind turbine market by 7.4 per cent annually (figure 2.14). These sectoral growth rates far exceed the average economic growth rate of 4-5 per cent in Asia and the Pacific in the past decade. If the region is to maintain its global market share, renewables and green value chains can provide an important new engine for its future economic growth.

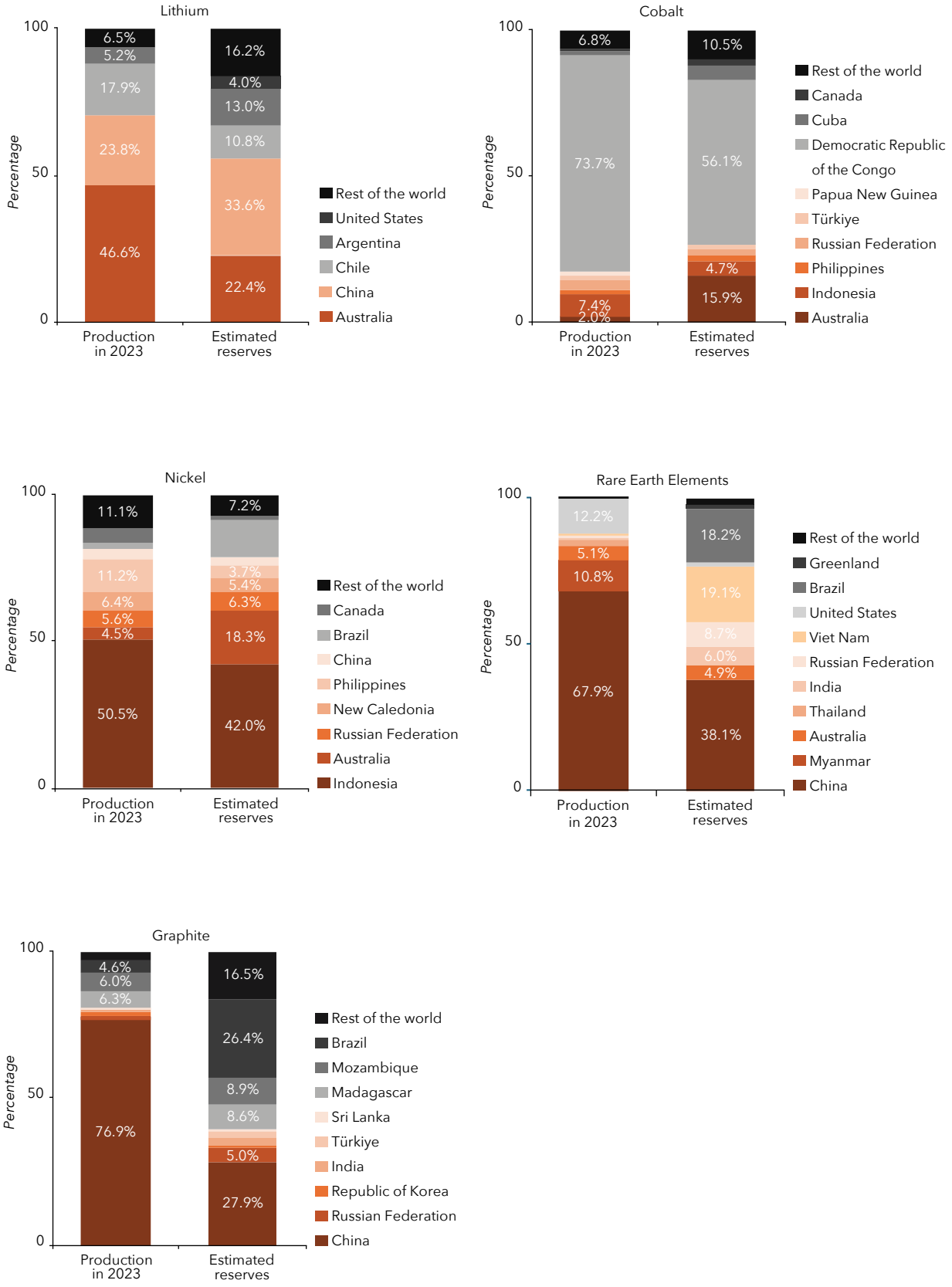
**Meanwhile, further extension in regional green value chains will play a crucial role to reinforce the region's competitive strength, foster a win-win partnership between countries and better serve global collective interests.** Just as regional value chains have enhanced the region's competitive edge and resilience in manufacturing, extended regional green value chains will also enable the region to capitalize on its unparalleled scale and industrial strength for competitiveness in renewables and green technology sectors. Rising global protectionism over green industries, especially in the Asia-Pacific region's traditional export markets, such as Europe and North America, also requires countries in the region to fully explore the integrated regional markets for the development of domestic green sectors. Ensuring a fair share of economic dividends of green sectoral development will be essential to preserve economic openness and cultivate further mutually beneficial economic cooperation. Interest-sharing and division of labour through regional green value chains is a more natural channel to achieve this objective.

**It is encouraging to observe that green value chains have already extended beyond East and North-East Asia and landed in South-East Asia and South and South-West Asia.** In solar PV module production, Viet Nam, India, Thailand and Malaysia occupied the second, third, fourth and sixth places worldwide respectively following China and together took a 10.5 per cent global market share in 2023.[10] In electric vehicle (EV) manufacturing, India, Indonesia, Thailand and Türkiye all view it as a strategic "sun-rise" sector and have deployed targeted support. Tariff cuts on imported EV components are commonly adopted to enable domestic firms to fully explore EV value chain advantages of the region for domestic production. Foreign direct investment is also an effective channel for creating local EV manufacturing capacity as in the case of Thailand's and Türkiye's cooperation with Chinese EV manufacturers.[11] The lithium battery industry, as an important upstream sector of EV value chains, also received broad attention. China and the Republic of Korea, two global

10 *Source*: Statista, www.statista.com/statistics/668749/regional-distribution-of-solar-pv-module-manufacturing/.

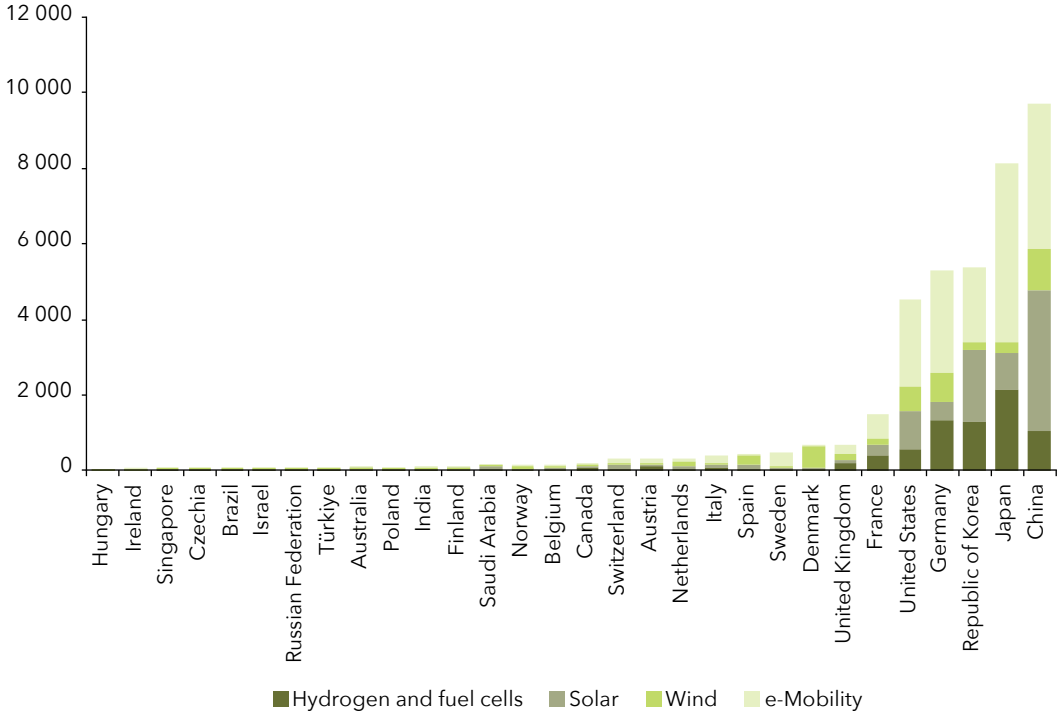
11 *Financial Times*. BYD agrees $1bn deal to build electric vehicle plant in Turkey. Available at www.ft.com/content/248743c8-0f97-4d26-85c5-28ebbf9bc327?utm_source=chatgpt.com.

## Figure 2.12 Leading suppliers of critical minerals for green economic sectors as of 2023



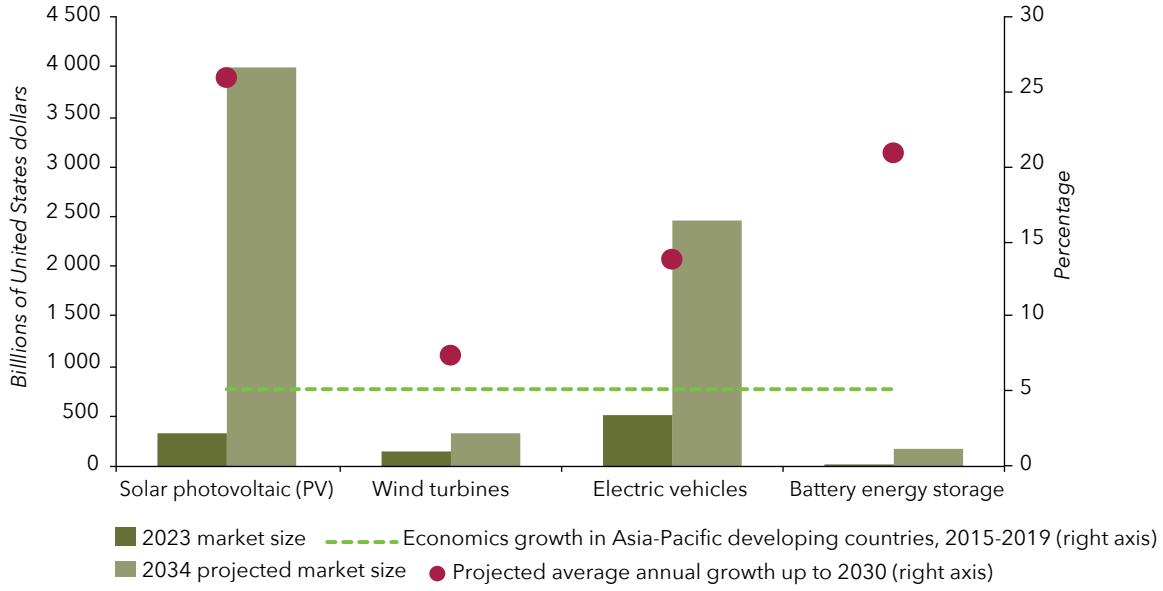

*Source*: National Minerals Information Center (2024). U.S. Geological Survey Mineral Commodity Summaries 2024 Data Release (ver. 2.0, March 2024): U.S. Geological Survey data release.

## Figure 2.13 List of countries by number of green technology patents, 2019 - 2023




*Source*: ESCAP, based on IRENASTAT. Accessed on 9 January 2024.

## Figure 2.14 Market size of different green manufacturing sectors, 2023 actual and 2034 projection




*Source*: ESCAP estimates based on Fortune Business Insights (2025a, 2025b, 2025c) and Global Market Insights (2024).

leaders in the sector, have both extended their EV battery value chains into neighbouring countries. Examples include the joint venture between Indonesia Battery Corporation and a Republic of Korea consortium led by LG Energy to build Indonesia's first EV battery plant, and planned EV battery investments by Chinese EV manufacturers in Thailand (AMRO, 2023). In addition, hydropower export also plays a significant role in Bhutan and the Lao People's Democratic Republic, respectively accounting for some 40 and 20 per cent of total exports and 20 and 9 per cent of the local GDP.

## 3.3 Embrace inclusive regional economic cooperation for shared prosperity

**Mutually beneficial economic cooperation, through trade, investment and technology transfers, has been an indispensable element in the region's economic success.** The early "Asian Tigers" benefited immensely from investments and technology transfers from Japan as the region's economic pioneer and other advanced countries from outside the region. The next wave of economic successes in Bangladesh, China and ASEAN countries also relies on an open international economic order shaped by globalization and deepened regional economic cooperation through regional manufacturing value chains. All sides benefited from this cooperation, with less developed countries leveraging foreign capital, technology and markets for domestic economic progress and sectoral upgrading while advanced countries are securing new markets for their more sophisticated products and services, receiving investment returns from abroad and reaping consumer benefits through cheaper imports.

**Such cooperation at the regional level is becoming even more valuable in the context of a backlash against globalization and intensifying competition over strategic technologies and sectors.** Broad-based "protectionist and isolationist shifts in electorates, legislatures, and executives" since the mid-1990s and a noticeable protectionist shift in trade policy since the 2007-2008 global financial crisis have been observed in advanced countries (Colantone, Ottaviano and Stanig, 2022). Structural labour market shocks from exposure to foreign imports in advanced countries (Autor, Dorn and Hanson, 2016 and 2021; Galle, Rodríguez-Clare and Yi, 2023); the framing of trade imbalances as a source of economic inequalities[12] and class struggles within countries (Klein and Pettis, 2020) partly fueled[13] this momentum. Meanwhile, technological competition and associated competition for the dominance of strategic sectors[14] also added additional urges to the shift towards trade protectionism. When access to finance, technologies and markets outside the region becomes more costly and uncertain, an integrated and stable regional market and mutually beneficial productive cooperation are likely to play a more essential role in the development of Asia-Pacific countries.

**Indeed, the region has maintained strong commitment to economic openness and strengthened regional economic cooperation and integration in recent years, against the international tide.** For example, the Regional Comprehensive Economic Partnership (RCEP) of 15 Asia-Pacific countries was signed in 2020, becoming the world's largest free trade block covering some 30 per cent of the global population and GDP. China and Indonesia submitted their formal membership applications to the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) respectively in 2021 and 2024, which currently features 7 Asian countries among its 12 members. ASEAN and China also commenced negotiations on the upgrading of the ASEAN-China Free Trade Area to version 3.0 in 2022, while Malaysia and Singapore agreed in 2024 to establish the Johor special economic zone. Empirical evidence also suggests that the region's integrated production network and competitive value chains have withstood recent trade tensions. The additional tariffs imposed on the region's products completely passed through back onto the importing countries (Amiti, Redding and Weinstein, 2019; Fajgelbaum and others, 2020; Fajgelbaum and Khandelwal, 2022), while production of the targeted products largely stayed within the extended regional value chains (Freund and others, 2024).

**In going forward, an inclusive approach will become increasingly important for economic cooperation and regionalism to continue to thrive in an adverse global environment.** To achieve this, two strategic balances need to be maintained. First, regional economic cooperation should serve development aspirations of both developing and advanced countries. More advanced countries in particular need to assume greater responsibilities as initiators and

12 Even though new evidence suggests that the overall distributional effect of trade is rather neutral in advanced countries (Borusyak and Jaravel, 2021).

13 Technological change, crisis-driven fiscal austerity, immigration and cultural concerns have also been key drivers of the protectionist-isolationist shift (Colantone, Ottaviano and Stanig, 2022).

14 Sectors that are natural international oligopolies or have significant positive socioeconomic spillovers, as stipulated in strategic trade theory (Brander, 1995).

drivers of cross-border economic relationships. Only when they can consistently foster innovations and drive sectoral upgrading at home would they be able to sustain high standards of living through creating new values, new sectors and new jobs rather than seeking prolonged monopoly over existing sectors and jobs. This would serve as an economic foundation for a constructive mindset of "shared prosperity" through willing transfers of technologies, know-how and value chains to less developed countries, as opposed to narrow self-interests of "winners take all and keep all". Second, domestic policies should play a much more proactive role to offset structural labour market disruptions of economic openness and ensure a fair sharing of the economic dividends among the local people. Inadequate public interventions to redistribute the gains from economic openness and provide necessary support to those whose jobs are reallocated broadly due to international division of labour have been a major source of globalization backlash in recent years. It is thus paramount to ensure a "win-win" among people at home, in addition to a "win-win" across countries, to preserve economic openness and a spirit of cooperation.

## 4. Conclusions

**Clouds are gathering over the longer-term macroeconomic prospects of developing countries in the region.** First, the region has experienced a general deceleration in labour productivity growth and income convergence to the world's frontier countries since the 2008 global financial crisis. Diminishing returns on investment in its growth-boosting effect, an ageing population and sizeable and persistent inefficient allocation of productive factors across economic sectors and firms may have been the main drivers behind this trend. Second, the external economic environment deteriorated when an unfavorable shift in manufacturing's share of value addition along global value chains and rising trade protectionism eroded chances of productivity enhancement and sectoral upgrading. Last but not least, the region is also increasingly caught in a macroeconomic dilemma in a trade-off between environmental sustainability and economic growth when green production remains mostly cost-uncompetitive in the absence of uniform global carbon pricing.

**Three strategic adjustments in the development mindset and approaches are needed for the region to sustain high-quality economic growth against these headwinds.** First, countries need to recognize that sustained productivity improvement is the very foundation of economic progress, and to achieve this, deliberate policy interventions in a "developmental State" style with a focus on sectoral upgrading will become increasingly necessary. Second, the Asian and Pacific region is ideally positioned for synergies between green transformation and economic development, given its exceptional competitiveness in green economic sectors and being the world's manufacturing hub. The region should build on its existing lead and seek to capture green manufacturing and green economic transformation as a new engine for future economic growth, especially through an extension of green value chains from East Asia to other parts of the region. Third, the region should adopt an inclusive approach in regional economic cooperation, which balances the development aspirations of both developing and advanced countries and ensures an inclusive sharing of the gains from economic openness among the people at home.

# 3 MACROECONOMIC AND CLIMATE CHANGE NEXUS IN ASIA AND THE PACIFIC: UNDERSTANDING THE CONTEXT

## 1. Introduction

**Despite notable efforts and some progress, the world is not doing enough on climate action.** With regard to climate mitigation, the continuation of current policies is expected to lead to a temperature rise of up to 3.1 degrees Celsius over the course of the century (UNEP, 2024a). To achieve the target of holding the increase in the global average temperature to 1.5 degrees Celsius above pre-industrial levels, annual greenhouse gas (GHG) emissions must decline by 42 per cent by 2030 compared with 2019 levels. Meanwhile, a minimum sixfold increase in mitigation investment is needed to achieve net-zero transition, with higher impacts in investment areas, such as deployment of solar photovoltaic technologies and wind energy, forestation and fuel switching in buildings, transport and industry sectors. With regard to climate adaptation, the gap between adaptation finance needs and flows remains enormous at $187-359 billion per year (UNEP, 2024b), although international public adaptation finance flows to developing countries increased from $22 billion in 2021 to $28 billion in 2022, the largest annual increase since the Paris Agreement in 2015. More innovative approaches to mobilizing additional financial resources, capacity-building and technology transfer are needed.

**Progress on climate action is also limited in Asia and the Pacific.** The region has consistently exhibited a regressing trend in achieving Sustainable Development Goal 13 on climate action (ESCAP, 2024b). Other environment-oriented Goals also show limited progress, such as sustainable cities and communities (Goal 11), responsible consumption and production (Goal 12), life below water (Goal 14) and life on land (Goal 15). Stronger climate action is needed to cope with the increasing frequency and severity of climate-induced climate shocks. As the most disaster-prone region in the world, more than 140 disasters that occurred in Asia and the Pacific in 2022 led to more than 7,500 deaths and affected at least 64 million people (ESCAP, 2023a).

**Nevertheless, the world's determination to combat climate change remains high.** In looking forward, almost 90 per cent of the global economy now has targets to achieve net-zero GHG emissions, while 171 countries worldwide have at least one national adaptation policy, strategy or plan in place (UNEP, 2024b). At the Summit of the Future held in New York in September 2024, global leaders committed to strengthen actions to address climate change, including through phasing out fossil fuel subsidies, transitioning away from fossil fuels in energy systems, tripling renewable energy capacity by 2030, accelerating low-emission technologies, such as renewables and nuclear, halting and reversing deforestation and enhancing multilateral cooperation on climate finance.[1] Moreover, at the United Nations Climate Change Conference held in Baku in November 2024, developed economies committed to triple climate finance for developing economies to $300 billion annually by 2035. That amount is still considerably low, however, compared with what is needed.

**As the world experiences more climate disasters and steps up climate action, there will be significant implications for economies and macroeconomic outcomes.** Changing climate conditions, whether in the form of sudden disaster shocks (such as storms and floods) or slow-onset events (such as rising temperatures and sea levels) are already having wide-ranging, notable impacts on economies and societies. These include the agricultural, energy and tourism sectors, people's education and health conditions, and forced migration and conflicts. Together with climate adaptation and mitigation policies, these developments influence key macroeconomic outcomes, such as economic growth, inflation, employment, public debt, financial stability and productivity, as well as macroeconomic policy effectiveness. Importantly, this macroeconomic-climate nexus is taking place amid uncertain economic prospects and tighter public debt positions in Asia and the Pacific, as highlighted in chapter 1. Thus, whether the region's economies are ready to cope with the macroeconomic implications of climate change is a critical question.

**This introductory chapter provides the context for the macroeconomic and climate change nexus in Asia and the Pacific.** Section 2 highlights key arguments why macroeconomic policymakers should be concerned with climate change. Section 3 highlights that many fiscal and monetary authorities in the region already have official missions to promote sustainable economic growth or development. Section 4 briefly outlines macroeconomic policy options to cope with and address climate change, highlights some policy examples in Asia-Pacific countries and notes key considerations for policymakers in going forward. Finally, section 5 provides a glimpse of the macroeconomic-climate toolkit being developed by ESCAP to

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1 For further information, *see Pact for the Future, Global Digital Compact and Declaration on Future Generations. Summit of the Future Outcome Documents. September 2024.* Available at www.un.org/sites/un2.un.org/files/sotf-pact_for_the_future_adopted.pdf

support a more systematic and coherent macroeconomic analysis and policy conduct amid climate change.

**Following the broad context laid out in this chapter, the two subsequent chapters provide an in-depth discussion and analysis on different aspects of the macroeconomic-climate nexus.** Chapter 4 provides a critical discussion on the macroeconomic implications of climate change and related policies in the Asia-Pacific context. Informed by this discussion, chapter 5 conducts a data-driven analysis to assess the extent that Asia-Pacific developing countries are ready to cope with climate change and low-carbon transition from a macroeconomic perspective. Building on this research in 2025, ESCAP intends to examine the theme of macroeconomic and climate change further in the 2026 edition of the *Economic and Social Survey of Asia and the Pacific* as well.

## 2. Why should macroeconomic policymakers be concerned with climate change?

**Traditionally, addressing environmental or climate challenges is not the task of macroeconomic policymakers.** While varying across countries, the traditional goals of ministries of finance and economy are to achieve rapid and sustained economic growth, stable or full employment and sustainable fiscal and public debt positions. For monetary authorities, the goals often include price, financial and exchange rate stability.

**Yet, macroeconomic policymakers should be concerned with climate change for at least two reasons.** First, it is increasingly evident that climate change can undermine the ability of macroeconomic policymakers in meeting their official goals and targets. Second and perhaps less widely discussed, macroeconomic policy outcomes[2] can have significant direct and indirect impacts on the environment and climate conditions. Macroeconomic policymakers should be aware of and manage the impacts – not always intended – of their policy actions on environmental sustainability.

**Climate change has direct, notable impacts on macroeconomic conditions, thus affecting policymakers' ability to meet macroeconomic goals and targets.** In the developing countries in the Asia-Pacific region, the average annual gross domestic product (GDP) losses due to climate hazards could amount to $980 billion per year in a worst-case scenario (ESCAP, 2023a), while another estimate suggests that climate change could lead to a GDP loss of 24 per cent by 2100 (ADB, 2023a). Beyond the output impacts, large-scale climate shocks can increase public indebtedness owing to large fiscal needs for reconstruction, cause inflation persistence and volatility amid losses in agricultural output and production facilities, and weaken financial stability due to increases in default loans and private insurance payouts. Altogether, these conditions weaken macroeconomic fundamentals, thus raising sovereign credit risks and borrowing costs and potentially triggering fiscal consolidation that could undermine employment and provision of basic public services. For the financial sector, more frequent disaster shocks also reduce credit availability (Sugiarto, Puspani and Trisilia, 2023).

**If not managed well, the ongoing and much needed low-carbon transition could also jeopardize the attainment of macroeconomic goals.** A Government's decision to drastically accelerate the transition to meet its nationally determined contributions after years of delay could push up inflation, undermine export competitiveness and increase the fiscal costs of unemployment benefits. The spillover macroeconomic impacts of a low-carbon transition in large economies (such as China) on smaller countries relying on fossil-fuel-based exports (such as Mongolia) can also be significant. Meanwhile, when such transition advances at a faster-than-expected pace due to new technologies and unexpected shifts in consumer preferences, this could sharply reduce public revenue from fossil-based activities and result in financial bailouts for State-owned enterprises.

**On the other hand, macroeconomic policy outcomes, which are largely driven by macroeconomic policy conduct, also affect the environment and thus climate conditions.** An obvious case is a goal to maximize economic growth without duly considering its environmental impacts, which have led to higher GHG emissions, natural resource depletion, pollution and biodiversity loss. For example, rapid economic growth and energy consumption are the main factors that drove up GHG emissions in 17 Asia-Pacific countries in the past six decades (Rahman and Alam, 2022). However, beyond the environmental impacts of economic growth, there are other aspects which are less widely studied.

- **Interest rates.** A sustained period of high interest rates, which can be due to stubbornly high domestic inflation, further reduces the viability of green projects as they usually offer lower returns than fossil fuel investments. For example, studies show that high interest rates hold back sustainable energy transitions in developing economies (Egli, Steffen and Schmidt, 2018; Schmidt and others, 2019). High interest rates, as observed in recent years, also push up public borrowing costs, thus weakening Governments' ability to pursue climate action.

2 In this context, macroeconomic policy outcomes refer to prevailing macroeconomic conditions, such as a prolonged period of high interest rates. These outcomes are largely shaped by policy conduct, although external shocks can also play a role, at least temporarily.

- **Exchange rates.** Exchange rate volatility makes the import costs of climate technologies and the financial returns of foreign investment less predictable, as is evident in Indonesia (Hartono and Resosudarmo, 2006). This is important for the Asia-Pacific region, which still relies on foreign technologies and investment for climate action.
- **Energy prices.** While a rise in global oil prices, often driven by collective action by major oil producers, reduces GHG emissions in oil-importing countries, the emissions by oil-exporting countries increase (Mohamued and others, 2021). Meanwhile, fossil fuel subsidies that helped keep domestic energy prices at a low level significantly pushed up carbon emissions in 20 Asian oil-producing countries during 2010-2018 (Husaini, Lean and Ab-Rahim, 2021).
- **Fiscal positions.** Limited fiscal space constrains public investment in climate action, which is especially needed for less commercially viable projects. In response, countries with limited fiscal space or high fiscal deficits are more likely to rely on green financial policies to mitigate climate risks (Gupta, Cheng and Rajan, 2023).
- **Economic volatility and uncertainty.** Economic instability has discouraged the adoption of green technologies in top carbon-emitting countries, thus further increasing carbon emissions (Anser, Apergis and Syed, 2021). Similarly, economic policy uncertainty has held back investments in green technologies and transitions (Al-Thaqeb, Algharabali and Alabdulghafour, 2022). In contrast, geopolitical stability enables the adoption of clean and renewable energy technologies in developing countries (Alsagr and van Hemmen, 2021), including in South-East Asia (Islam and others, 2022) and Pakistan (Ali and others, 2021).

## 3. To what extent are macroeconomic policymakers in Asia and the Pacific mandated to pursue sustainable economic development?

**As public entities, fiscal authorities are often tasked to support a Government's climate action, but their mandate on this is not always explicit.** Ministries of finance in many Asia-Pacific countries oversee national budget planning and allocation, thus playing a role in shaping financing for ministries working on climate change, environmental protection and natural resources. Fiscal authorities also implement a range of fiscal policy tools, such as taxes, subsidies and spending, to promote green activities and discourage those harmful to the environment. Yet, despite these important roles, it is not always clear if fiscal authorities have explicit missions to support climate action. Having such a clear mandate can be useful when fiscal authorities face conflicting goals, such as boosting household incomes and promoting environmental sustainability, including through fossil fuel subsidy removal.

**A preliminary review by ESCAP suggests that several fiscal authorities in the region have an explicit mission to promote a sustainable economy.** Unlike the case for central banks, there seems to be no systematic stocktaking of fiscal mandates across Asia-Pacific developing countries, probably because fiscal missions tend to change regularly due to shifts in direction of government policies. According to available information on their websites and annual reports, ministries of finance in such countries as Fiji, Kiribati, Malaysia, Pakistan and Samoa have references to sustainable economy, economic growth or development in their vision, mission or function statements. Moreover, in Maldives, the ministry of finance's mission statement refers to the use of "sustainable, non-inflationary fiscal policy".

**Some fiscal authorities in the region have been tasked to play a leading role on certain aspects of national climate action.** In Australia, the Department of Finance leads the Australian Public Service Net Zero by 2030 commitment by reporting GHG emissions of Australian government operations and has introduced climate disclosure requirements for government entities. In Solomon Islands, the climate finance unit within the Ministry of Finance and Treasury supports the accessibility and management of climate and disaster risk financing and coordinates climate finance activities with the civil society and the private sector. Finally, in New Zealand the Treasury is developing reporting processes to enhance public transparency around government spending to address climate change.

**Despite some debate on whether central banks should seek to promote greener development,[3] central bankers increasingly view climate change and sustainable finance as a critical area.** A review of 169 legal frameworks of central banks worldwide revealed that 73 per cent of them support Governments' development or economic functions, although it can be unclear whether climate action is part of Governments' "economic" functions (Tamez, Weenink and Yoshinaga, 2024). In another survey of central banks worldwide, more than 60 per cent of the respondents stated that they believe there is scope to incorporate climate issues more explicitly into their

3 For example, Issing (2019) noted that the responsibility for addressing climate change should be handled by governments as publicly elected entities. Others point out that, as with climate change, events such as social unrest and territorial wars can pose a systemic risk to financial stability, but it is not possible to justify central banks' active engagements in all these events.

risk management framework and monetary policy framework (NGFS, 2023). Central banks that have engaged with climate issues cited underlying reasons, such as contributing to a country's net-zero transition, managing own balance sheet risks, or aligning with other regulatory initiatives. For Asia and the Pacific, almost 90 per cent of the respondents in a survey of 18 central banks believed that financing the low-carbon transition has become an important focus area (Durrani, Volz and Rosmin, 2020). One third of them have issued policy statements on climate change and green finance, while 39 per cent have set up a special taskforce or unit on climate action and green finance.

**Many central banks in Asia and the Pacific have official missions to promote sustainable economic growth.** According to Dikau and Volz (2021) and additional review of central bank websites and annual reports by ESCAP, at least 16 central banks in the region have missions to promote sustainable economic growth or development (table 3.1). Of these central banks, 10 have an explicit mission, while the remaining 6 support government policies without compromising the central bank's own mandates. In addition, based on Lim and Sirimaneetham (2022) and more recent information, at least 17 more central banks in the region are carrying out activities to promote green development. These activities may be based on their strategic focus areas or policy priorities, which tend to evolve more rapidly than the official missions. Recent examples include the central banks in Uzbekistan and Tajikistan which joined the Network for Greening the Financial System in 2022 and 2024, respectively.

**<Table 3.1 Central banks in Asia and the Pacific that foster sustainable economic growth>**

| With an explicit mission on sustainable economic growth or development | Supporting government policies without compromising the central bank's mandate |
|---|---|
| Fiji | Afghanistan |
| Georgia | Bhutan |
| Malaysia | Cambodia |
| Nepal | Indonesia |
| Pakistan | Myanmar |
| Philippines | Türkiye |
| Russian Federation | |
| Singapore | |
| Sri Lanka | |
| Thailand | |

*Source*: ESCAP and Dikaau and Volz (2021).

*Note*: Compared with Dikau and Volz (2021), Pakistan, Sri Lanka and Thailand are added in the first column, and Afghanistan and Bhutan in the second column.

## 4. Towards macroeconomic policymaking amid climate change

**Macroeconomic policymaking amid climate change is aimed at achieving two broad goals: coping with climate-induced economic risks and supporting national climate action.** These two tasks are related. More climate-aligned fiscal and monetary operations and management help ensure macroeconomic policy space and stability amid climate change, which enable policymakers to undertake climate adaptation and mitigation measures more forcefully and effectively.

### *Fiscal authorities*

**There are various policies and practices that help fiscal authorities manage climate-induced fiscal risks.** Examples include: (a) assessing the impacts of climate risks on public revenue and expenditure, fiscal needs and gaps, sovereign debt and contingent liabilities;[4] (b) making public investment informed by climate risks, such as investing in climate-resilient public infrastructure; and (c) exploring innovative financing modalities, such as catastrophe insurance, that would help reduce fiscal burdens in the event of infrequent, large-scale disaster shocks.

**A wide range of fiscal policy tools are also available to support a country's low-carbon transition.** To influence business decisions and people's behaviours, fiscal authorities can introduce: (a) carbon pricing schemes, including considering how to use the revenue these schemes generate; (b) fiscal incentives to promote green technologies and private green investment; and (c) fiscal disincentives and regulations to deter environmentally harmful economic activities. For their own operations including State-owned enterprises and sovereign wealth funds,

4 For example, ESCAP (2023b) proposed a long-term approach to public debt sustainability analysis that considers a country's investment needs for achieving the Sustainable Development Goals (including in climate areas), as well as fiscal risks (e.g. contingent liability) and opportunities (e.g. carbon tax revenue) brought about by climate change.

fiscal authorities can step up public investment on climate adaptation (such as early warning systems), adopt green budgeting processes and follow green public procurement guidelines.

**Asia-Pacific economies have adopted many of these desirable policies and practices** (figure 3.1).[5] With regard to assessments to better understand and manage climate-induced fiscal risks, Indonesia examines the fiscal impacts of early retirement of coal-fired power plants; the Lao People's Democratic Republic assesses the impacts of post-disaster needs on GDP and public expenditures; the Philippines integrates climate issues in evaluating public-private partnership projects, while Australia includes environmental and climate dimensions in cost-benefit analyses. Maldives also adopted flexible fiscal rules in the event of disaster shocks. To reduce carbon emissions, Singapore has introduced a carbon tax in phases, while Thailand provides fiscal incentives for the manufacture and purchase of electric vehicles. Finally, examples of fiscal operations to support national climate action include climate budgeting in Bangladesh, Indonesia, Nepal and the Philippines; green public procurement in Malaysia; and public finance laws that integrate green practices in New Zealand.

**Figure 3.1 Examples of climate-related macroeconomic policies and practices adopted by Asia-Pacific countries**

| Policy goal | | By fiscal authorities | By monetary authorities |
|---|---|---|---|
| Understanding and coping with climate-related macroeconomic risks | | Examine the fiscal impacts of early retirement of coal-fired power plants and post-disaster needs | Issue guidance on assessing climate vulnerability and ensure transparent disclosures of climate risks |
| | | Consider climate issues in evaluating public-private partnership projects and conducting cost-benefit analyses | Monitor the environmental strategies of major non-financial companies |
| | | Adopt flexible fiscal rules in the event of disaster shocks | Release sustainable central banking strategies, including approaches to climate change |
| Supporting climate action | Influencing firms and consumers | Introduce carbon taxes | Develop sustainable finance taxonomies and frameworks |
| | | Provide fiscal incentives for the manufacture and purchase of electric vehicles | Boost sustainable finance by providing concessional financing and promoting the issuance of sustainable bonds |
| | Adjusting own policy frameworks | Adopt climate budgeting | Include green bonds and loans as eligible assets for lending facilities |
| | | Green public procurement | Increase the proportion of green assets in official reserves |

*Source*: ESCAP.

5 See, among others, ADB (2024a, 2024b).

### *Monetary authorities*

**Central banks can undertake various actions to better understand and manage climate risks faced by the financial system.** This involves identifying, quantifying and disclosing climate risks faced by individual financial (bank and non-bank) institutions and financial systems including central banks.[6] There is also a need to assess and enhance the ability of financial institutions to cope with climate risks, including through stress testing and monitoring climate risk management strategies of financial institutions. Beyond financial risks, central banks should also assess the potential impacts of climate change and related policies on inflation and exchange rates.

**Similarly, to support national climate action, many sustainable central banking policies are available.** At a fundamental level, central banks can work with other policymakers and stakeholders to develop a national sustainable finance taxonomy and road map. Central banks can also seek to increase the availability and affordability of sustainable finance through various initiatives, such as introducing collateral frameworks that exclude asset classes harmful to the environment, setting the minimum allocation of credits for green sectors, applying differentiated interest rates and reserve requirements based on climate-related criteria and providing loan guarantees conditional on carbon emission reduction. For their own operations, central banks can invest a portion of official reserves in green assets and follow green procurement guidelines.

**There are several examples of initiatives by central banks in Asia and the Pacific to manage climate-induced financial risks** (figure 3.1). In Malaysia, the central bank and the Securities Commission have established the Joint Committee on Climate Change, which works with the financial industry to ensure transparent climate disclosures. Similarly, in the Russian Federation, the central bank prepared sustainability disclosure recommendations for financial institutions, while also monitoring the environmental strategies of major Russian non-financial companies in sectors such as oil and gas, chemicals and transport. Australia's central bank also issued guidance on assessing climate vulnerability for commercial banks and insurance companies. More broadly, Japan's central bank issued a strategy that outlines its stance and approach to climate change, including disclosures on governance, strategy and risk management. The Philippines's central bank also released a strategy on sustainable central banking, which covers the conduct of climate-related vulnerability assessments of the economy and financial system, mandatory disclosure of climate risks and guidance on mandatory climate stress testing.

**Central banks in the region have also adopted initiatives to promote sustainable finance and pursue climate action.**[7] At the national level, central banks, such as those in Maldives and Thailand, have led or contributed to such initiatives as green finance taxonomies, and a sustainable finance framework in the case of Georgia. To encourage green financing, examples of central bank initiatives include refinancing schemes to foster green transformation in Bangladesh, no-interest loans to commercial banks for green lending in Japan, relaxation of limits for green financing for green property and electric vehicles in Indonesia, priority sector lending, including renewable energy in India, and schemes to promote the issuance of sustainable bonds in Bangladesh and Singapore. In China, the central bank has adjusted its monetary policy frameworks to include green bonds and loans as eligible assets for its lending facilities, limit its investments in high-carbon assets and increase the proportion of green bonds in foreign exchange reserves. The central bank in the Republic of Korea has also increased its investments in assets aligned with environmental, social and governance considerations.

### *Ways forward*

**A limited yet growing literature suggests that green macroeconomic policies have contributed to better environmental outcomes in Asia and the Pacific.** In China, the removal of fossil fuel subsidies (Jiang and Lin, 2014) as well as green finance development and green technology innovation (Chen and Chen, 2021) have helped reduce carbon emissions. More broadly, fiscal policy to support climate mitigation finance has notably cut ecological footprints in the region (Khan and others, 2021).

**Despite this encouraging evidence and notable actions by macroeconomic policymakers in the region, formulating and implementing climate-aligned fiscal, monetary and financing policies is still a relatively new endeavor.** In going forward, there are various interconnected considerations that policymakers should keep in view.

- **First, realizing more climate-aligned macroeconomic policies requires that many new elements must be put in place,** such as changes in laws and regulations, innovative financing, additional technical knowledge and experiences of policymakers, as well as consultations with and buy-in from different and more diverse stakeholders. In considering these vast requirements, the technical capacity of economic policymaking entities in carrying out these changes

6 Evidence suggests that countries that are more vulnerable to climate change are more likely to implement green macroprudential policies, such as stress testing and climate-related disclosure requirements for listed companies and financial institutions (Rajan and Park, 2023).

7 Based on an ESCAP review and Kearns, Park and Alim (2023).

varies notably in Asia and the Pacific. Several less developed countries will benefit from more knowledge-sharing and support from multilateral development partners.

- **Second, as many policy options are available and some fit certain country contexts more than others, policymakers need to identify priorities which may evolve over time.** At a broad level, policymakers may choose priorities that are aligned with their national development plans. The criteria at the level of policy instruments may vary. For example, policymakers who aim to maximize positive spillover impacts may prioritize policies to de-risk private investment in climate action to leverage large financial resources available.

- **Third, policy packages should be coherent within policymaking entities and within a country.** In some countries, ministries of finance simultaneously offer fossil fuel subsidies and tax exemptions for electric vehicles, which have conflicting environmental impacts. Moreover, public investment planning handled by line ministries often feeds into the budget process for national adaptation plans managed by centralized agencies, resulting in two different public investment planning tracks (ADB, 2024b). Similarly, without a national sustainable finance taxonomy, sectors that are eligible for tax holidays may differ from those eligible for concessional financing schemes operated by central banks. Uncoordinated climate policy actions may send wrong signals to market participants and discourage their contribution to national climate action.

- **Fourth, there is a need for new thinking on policy tools and approaches and adoption of second-best solutions.** Since coping with and addressing climate change are not traditional macroeconomic goals, the effectiveness of long-standing policies that serve traditional goals is sometimes questioned. For example, if climate change results in a prolonged period of low economic growth and high inflation (or "stagflationary" supply shocks), monetary policy may not be able to fully reverse this shock because it typically focuses on managing aggregate demand to control inflation over a short period while climate change tends to persist for a long time (Kearns, Park and Alim, 2023).

- **Fifth, policymakers should be mindful of unintended adverse social impacts of climate-aligned macroeconomic policies.** Policies that promote environmental sustainability and climate resilience can increase poverty and income inequality, if not managed properly. A well-known example is carbon pricing schemes that do not use part of additional government revenue to financially support the poor and vulnerable population amid higher domestic energy prices. It is important to strike a balance between achieving climate goals, ensuring macroeconomic stability and public debt sustainability and supporting those adversely affected by low-carbon transition.

## 5. A macroeconomic-climate toolkit: prologue

**Considering these ways forward, ESCAP is developing a macroeconomic-climate toolkit to support policymakers in carrying out macroeconomic analysis and conducting macroeconomic policy amid climate change.** The toolkit is aimed at helping ministries of finance and central banks in the region to think through how to cope with climate-related risks, leverage related opportunities and support national climate action in a more coherent and systematic manner, given country-specific situations and challenges. It will also guide users to resources produced by ESCAP and others with regard to recent literature, data sources, analytical tools[8] and training opportunities.

**The toolkit comprises three building blocks.[9]**

- **Building block 1: Understanding the macroeconomic implications of climate change and related policies.** This building block will begin with some basics on climate change, such as widely accepted climate scenarios, different forms of climate change (e.g. sudden shocks versus slow-onset events) and how they pose both physical risks (e.g. agricultural output losses due to floods) and transition risks (e.g. job losses amid closure of coal-based power plants) to an economy. It will then discuss the wide-ranging channels on how climate change and related policies affect societies (e.g. health conditions, education, displacement and migration of people) and economies (e.g. agricultural, energy and tourism sectors and coastal economies), which are reflected in

8 Examples include the IMF Climate Macroeconomic Assessment Program and a climate risk analysis as part of the Financial Sector Assessment Program, World Bank Fiscal Sustainability Analysis and ADB country diagnostic toolkit for assessing enabling environments for disaster risk financing. See Edelman (2024) for more details.

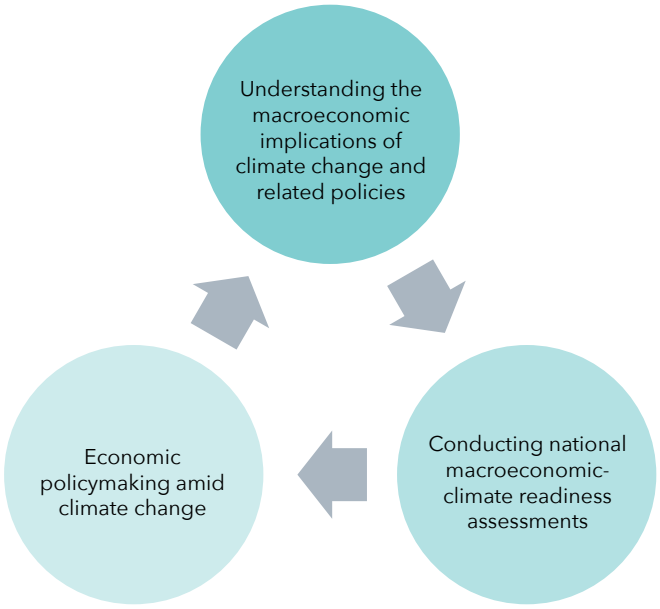
9 As ESCAP continues to develop this toolkit based on additional consultations with experts and national policymakers, its underlying ideas and technical details are evolving.

macroeconomic indicators (e.g. economic output, employment, inflation, productivity, fiscal positions and financial stability). Chapter 4 provides a critical discussion of these impact channels from both conceptual and empirical perspectives.

- **Building block 2: Conducting national macroeconomic-climate readiness assessments.** This building block will contain a data-driven analytical framework aimed at assessing the extent to which an economy is ready to cope with multifaceted macroeconomic impacts of climate change. An economy is considered vulnerable to climate risks if it is highly exposed to the potential impacts of climate shocks (e.g. relying on a more climate-prone agricultural sector) and to low-carbon transition (e.g. dominance of carbon-intensive sectors), as well as having weak economic coping capacity (e.g. limited fiscal space to support post-disaster reconstruction and social protection for just transition). Chapter 5 provides an example of such readiness analysis at the regional level in Asia and the Pacific, while noting that country-level analysis would benefit from a more tailored selection of exposure and coping ability indicators.
- **Building block 3: Economic policymaking amid climate change.** As a foundation for effective policymaking, this building block will first highlight the importance of an information portal on national climate goals and climate action, which tend to evolve rapidly, as well as understanding the socioeconomic and financial costs of climate action versus inaction. Partly informed by the readiness analysis in building block 2, this building block will then (a) discuss desirable shifts in internal operations and policies that can help economic policymakers better assess and manage climate-induced fiscal, monetary and financial risks; (b) provide an overview of economic and financing policy options to cope with and address climate change; and (c) guidelines on how to design and implement comprehensive, coherent and feasible policy packages that fit specific country contexts and situations. This analysis will be undertaken as part of the research for the 2026 edition of the *Economic and Social Survey of Asia and the Pacific*.

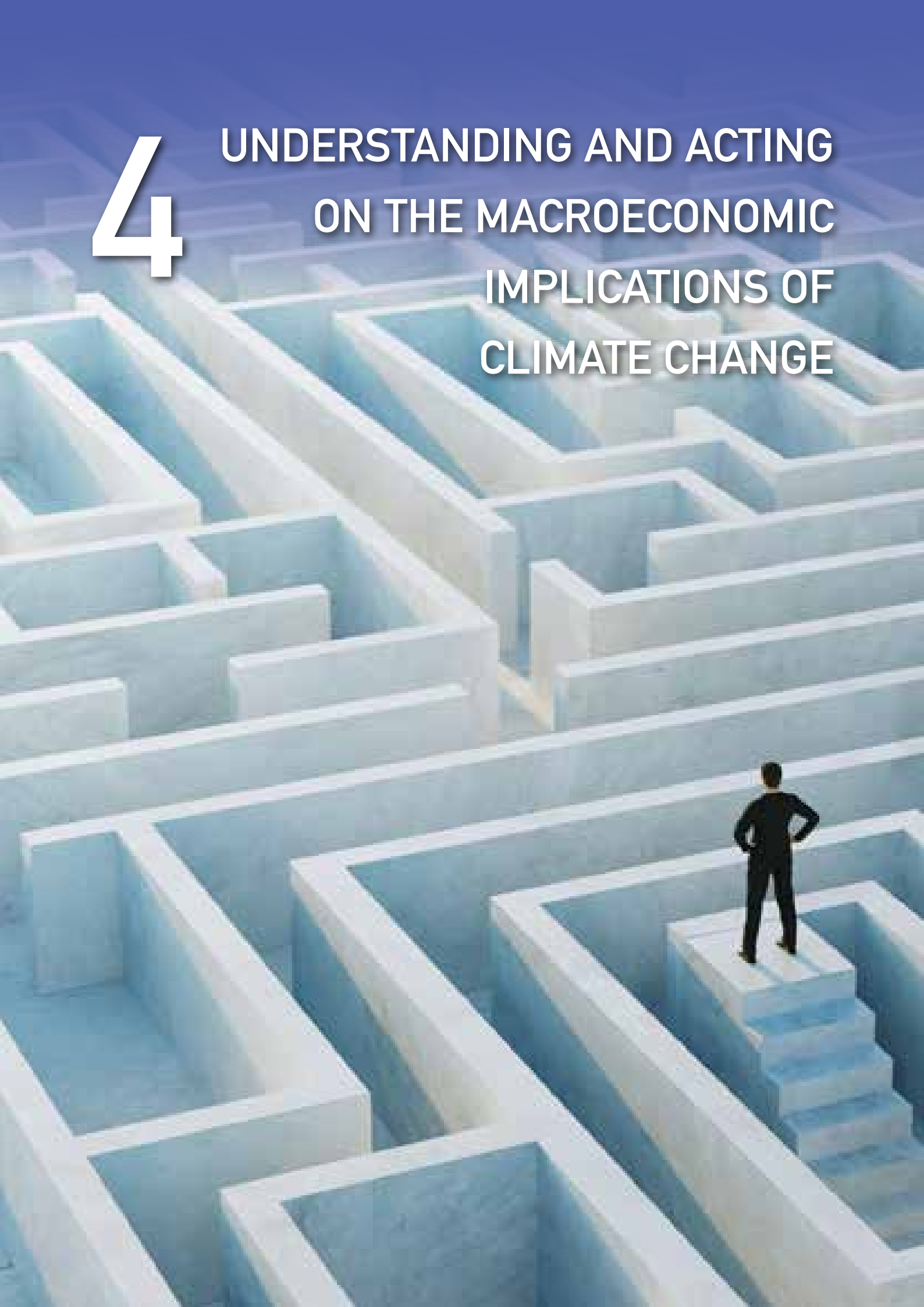
**The development and use of this macroeconomic-climate toolkit is a continuing process** (figure 3.2). For example, as new or updated climate scenarios become available, existing estimates on the macroeconomic impacts of climate change as well as the scope, pace and magnitude of required climate action may also change. This in turn affects a country's degree of exposure to climate risks and calls for review of the most effective and feasible policy packages to cope with and address climate change in each economy.

**Figure 3.2 Macroeconomic-climate toolkit: three building blocks**




*Source*: ESCAP.

# 4 UNDERSTANDING AND ACTING ON THE MACROECONOMIC IMPLICATIONS OF CLIMATE CHANGE



## 1. Introduction

**Policymakers face a question on how to act on climate change in an efficient way that optimizes costs and impacts of climate action along with the socioeconomic well-being of people.** Economics is one of many disciplines that helps to achieve this goal. In this regard, economic data and related macro indicators are the tools of choice in climate action design, implementation and decision-making. However, climate change and climate action have impacts on economies and societies through a wide range of channels and feedback loops; economic indicators reflect only a part of this impact. Therefore, they should be used only as an assist, not instead of thorough analysis of climate change impacts on individual economic sectors. This entanglement and interdependence of economic sectors also urges for coherence in policymaking.

**In the above context, this chapter takes a bottom-up approach outlining the causal nexus chains between climate change, climate policy impacts on the economy and their reflection in macroeconomic variables.** This framework aids in interpreting climate-induced shifts and further integrating macroeconomic indicators into policymaking. The discussion highlights the significant uncertainty surrounding climate impacts and macroeconomic methodologies, which often complicate their representation through macroeconomic indicators. Notably, the region's inadequate climate action (Sustainable Development Goal 13), driven by simplified approaches, also heightens such risks and vulnerabilities (ESCAP, 2024d). After outlining the above-mentioned limitations, the discussion delves into their mitigation.

**Various decision-making strategies enable policymakers to navigate the uncertainties of climate action.** Under time pressure, policymakers must design and implement policies with incomplete information, with many climate impacts absent or only partially reflected in economic data. Emerging research also continuously reveals previously overlooked impact channels, often after policies are already in place (IPCC, 2022). Furthermore, policymakers also frequently lack prior expertise in climate issues. To address these limitations, the chapter presents strategies for managing risk and uncertainty in policymaking and notes the role of macroeconomic research in policy design. It underscores the need for policy innovation, continuous learning and challenging the status quo to uncover new solutions, as well as effective communication between scientists, economists and policymakers as key insights are often slow to cross disciplinary boundaries (IPCC, 2014a).

**The chapter is organized as follows.** Section 2 first analyses the physical impacts of climate change on economic sectors, and then examines the economic effects of climate adaptation and mitigation policies and their socioeconomic feedback loops. This helps to better understand section 3, which explores how and to what extent these diverse climate impact channels are reflected in macroeconomic variables. Section 4 discusses decision-making strategies and provides some policy recommendations. Section 5 provides concluding remarks.

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## 2. Climate-economy nexus: growing insights yet unanswered questions remain

Observed climate changes are more nuanced than commonly understood and anticipated, even counterintuitive, and often entail economic impacts that are insufficiently researched. For example, while Japan has not experienced an overall increase in precipitation, there are more days with heavy rainfall. Wind speeds across Asia have been declining since the 1950s, and there has been no increase in weak to medium-strength tropical cyclones over the past 70 years. However, tropical cyclones are now reaching farther north towards previously unreachable areas, and there are more extremely destructive tropical cyclones causing more damage, such as in the Philippines. Dust storms have increased in frequency in the West and Central Asia but decreased in the Inner Mongolia Autonomous Region of China and parts of the Middle East. Coral islands in the Indian and Pacific oceans are not only exposed to sea level rise, but are also shifting in location and shape, challenging urban planning and coastal management (IPCC, 2022; Webb and Kench, 2010; Duvat, 2018). Overall, climate change manifestations are highly heterogeneous, still insufficiently researched, yet pervasive and impactful.

**The economic impacts of climate change are becoming increasingly complex, with many aspects still unknown.** These impacts are shaped by evolving slow onset[1] and extreme weather events, human perceptions, mitigation and adaptation strategies, and broader cultural and political contexts (table 4.1). The multifaceted dimensions of these impacts are concurrent, overlapping, interactive and tend to amplify one another. This dynamism highlights the need for a continuous push for deeper understanding of these dynamics by economists, policymakers and the public.

1 Slow onset events include: increasing temperatures, sea level rise, salinization, ocean acidification, glacial retreat, land degradation, desertification and loss of biodiversity.

<Table 4.1 Examples of impact of climate change on the economy>

| | A. Capital stock | B. Labour supply | C. Total factor productivity |
|---|---|---|---|
| Long-run climate change (slow-onset events) | 1. Loss and decrease in productivity of agricultural land due to higher temperatures, water stress and salinification of soil.<br>2. Disruptions of economic activity in coastal areas.<br>3. Shifts in tourism flows.<br>4. Loss of biodiversity and destruction of ecosystems.<br>5. Losses in energy and transport infrastructure due to heat.<br>6. Accelerated depreciation of infrastructure due to adverse climate conditions. | 1. Higher rates of mortality and sickness.<br>2. Higher structural unemployment due to changes in tourism, agriculture and fisheries.<br>3. Climate and disaster-induced migration. | 1. Reduced labour efficiency due to higher temperatures, including fewer hours worked.<br>2. Capital invested in adaptation is less productive in aggregate and diverts resources away from innovation. |
| Extreme weather and climate events | 7. Destruction of capital stock in disasters.<br>8. Opportunity to replace old, destroyed capital with newer, more technologically advanced capital.<br>9. Greater uncertainty and volatility that reduce willingness to invest over the long term. | 4. Loss of education and skills. | 3. Disaster-induced bankruptcies and localized reductions in access to finance cause reallocation between firms, for better or worse.<br>4. Rebuilding process distracts management, reducing overall productivity. |
| Climate policies and green transition | 10. Increase in stranded assets.<br>11. Higher energy costs due to carbon taxes, which reduce funds for investment. | 5. Skills mismatches increasing structural unemployment. | 5. Reallocation of output between firms within sectors may prove more or less efficient.<br>6. Environmental regulation reduces productivity, perhaps (more than) offset by innovation.<br>7. Reduced impact of supply shocks arising from use of fossil fuels. |

*Source*: ESCAP, based on Parker (2023).

**Many climate risks and impacts cannot be quantified, creating significant uncertainty in analysing socioeconomic manifestations of climate change and related policies.** Although uncertain, underresearched and unknown, these risks influence economic activity. While the scientific community recognizes these challenges, they are often overlooked in economic policy and decision-making. Delays in translating scientific knowledge into economic research, spatial and temporal variations in impacts, risk interactions, feedback loops and diverse warming scenarios complicate economic analysis and policy (Rising and others, 2022). For example, ignoring spatial and temporal variability in some commonly used climate models may underestimate climate costs by one third (Estrada, Tol and Botzen, 2024). Similarly, intrinsic uncertainty concerning the path of climate change is illustrated by multiple warming scenarios (IPCC, 2021). Therefore, discussion on climate change impact reflections in macroeconomic variables benefits from a step-by-step

bottom-up approach. First, sectoral analysis of climate change and climate policy impact portrays mechanisms of impact, feedback loops and co-dependencies. Then, analysis of macroeconomic variables presents a quantitative dimension of these impacts.

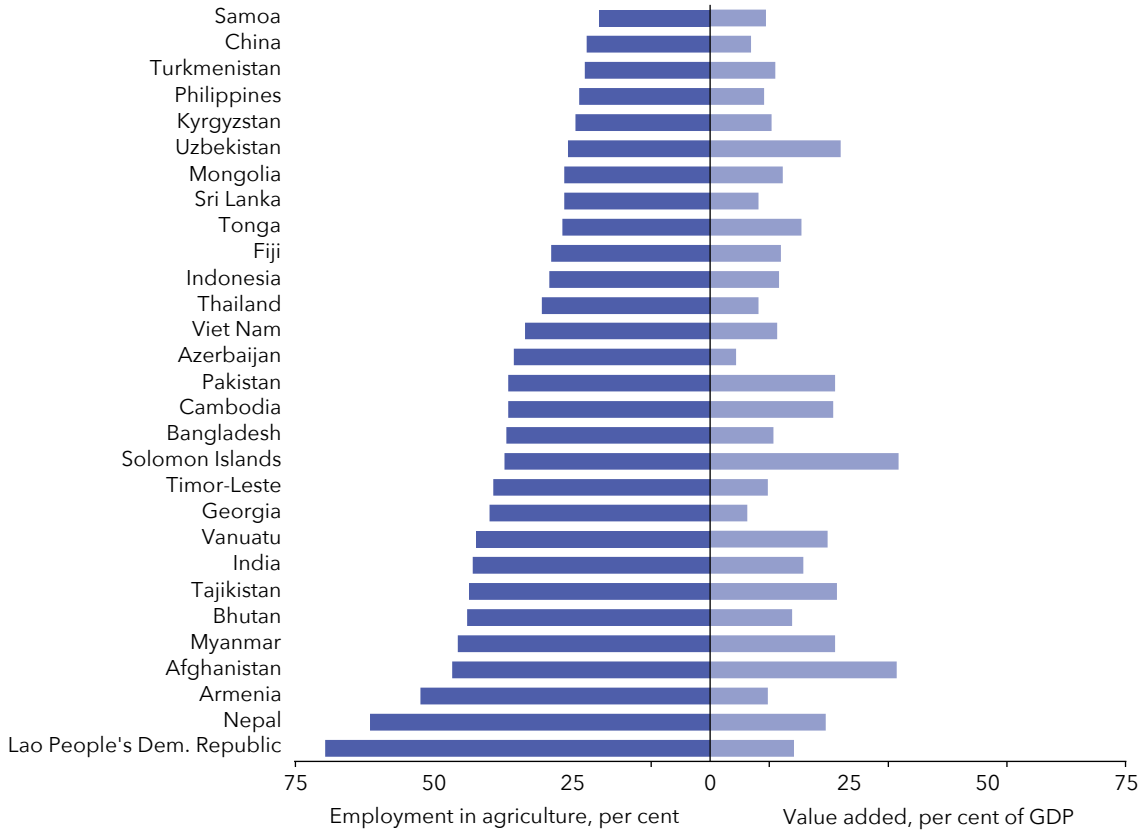
## 2.1 The socioeconomic impacts of climate change

**This section outlines biophysical channels through which climate change has impacts on the economy and relates them to macroeconomic indicators.** The analysis presents how various indicators grab or miss capturing these impacts, thus aiding in their further use in policy design. The discussion adopts a policymaker's perspective, analysing economies through key socioeconomic sectors, such as agriculture, tourism and health care.

### *2.1.1 Agriculture*

**A relatively low contribution to GDP masks the importance of the impact of climate change on agriculture, which is the most climate-sensitive economic sector** (box 4.1). For example, in the Lao People's Democratic Republic, India and China, agriculture accounts for 70, 43 and 23 per cent of total employment, respectively, while contributing only 15, 17 and 7 per cent to GDP, respectively (figure 4.1). Furthermore, agricultural workers, often at the bottom of the income ladder, are also among the most vulnerable to climate change impacts, thus the need for extensive climate adaptation support (FAO, 2023).

**Figure 4.1 Percentage employed in agriculture out of total employment, and value added as percentage of GDP, 2022**




*Source*: Data from World Bank (2024c).

*Note*: Data years: New Zealand (2021); Tonga (2021); Vanuatu (2018). Value added for agriculture, forestry and fishing.

## Box 4.1 Climate change impact on agriculture in Asia and the Pacific

**Irregular rainfall, rising temperatures and extreme weather events pose major threats to agriculture in the region.** For example, Thailand has seen rising average temperatures since the mid-twentieth century, a factor particularly impactful on tropical agriculture (Pimpa, 2024). Rainfall has also increased, elevating the risk of floods in a country already among the most flood-prone globally (World Bank and ADB, 2021a). In China, extreme rainfall has reduced rice yields by 8 per cent over two decades (Fu and others, 2023). Myanmar, with 70 per cent of its rural population reliant on agriculture, fishing and aquaculture, faces growing cyclone frequency – a nearly annual occurrence since 2000, compared with once every three years previously, endangering millions of livelihoods (Eckstein, Künzel and Schäfer, 2021). For example, Cyclone Nargis had adverse impacts on 60 per cent of Myanmar's rice producing area in 2008 (USDA, 2008). Cyclones and extreme weather events are expected to intensify, further harming agriculture (MONREC, 2019). Finally, lack of resilient practices and insufficient climate education exacerbates the above-mentioned impacts as farmers lack adaptation techniques (Rahman and others, 2023).

**Adverse developments in the agricultural sector and land use due to climate change harm broader macroeconomic stability in addition to undermining employment prospects and poverty.** For example, becoming a net food importer can strain the current account, exchange rate, debt sustainability and inflation (IPES, 2023). Similarly, food insecurity and malnutrition reduce economic output and increase health-care costs, as well as social protection and assistance costs. Thus, sustainable, resilient agriculture is essential to support overall economic stability.

### *2.1.2 Energy sector*

**Energy production is heavily influenced by climate and environmental factors.** These include temperature, precipitation and extreme weather, all of which can damage energy infrastructure. Transportation networks, such as roads, railways and storage facilities are critical for the delivery of fuels but are vulnerable to floods and fires. Permafrost thawing in northern Asia is leading to road and pipeline sinking. Changes in precipitation affect hydropower, while higher temperatures reduce transmission line efficiency and increase power plant cooling demand, straining energy systems and risking blackouts, with broad economic impacts.

**Water scarcity poses a major risk to electricity generation.** In India, more than 80 per cent of electricity comes from water-intensive thermal power plants and 10 per cent from hydropower, making the sector highly vulnerable to water shortages. Between 2011 and 2016, freshwater consumption rose by 43 per cent due to a 40 per cent increase in thermal energy generation, producing adverse impacts on agriculture and other sectors. From 2013 to 2016, water shortages cost India's 20 largest thermal utilities $1.4 billion in lost revenues and accounted for 2 per cent of outages (Luo, Krishnan and Sen, 2018).

**As the energy sector has strong backward and forward linkages with the entire economy, a shift to green energy is reshaping other economic sectors.** The current fossil-fuel based energy sector has relatively high multiplier effects on economic output due to such factors as broad supplier networks, high demand for materials, high capital spending and large pools of highly skilled workers (WEF and IHS CERA, 2012). Similarly, moving away from fossil fuels has far-reaching intersectoral impacts on employment, partly offset by creation of new jobs in the renewable energy sector (section 3.1). The observed revival of nuclear energy is also likely to bring opportunities for high-skilled jobs (box 4.2).

## Box 4.2 Global revival of nuclear power

**Fossil fuels still dominate the global energy supply, maintaining around 80 per cent share for decades; they are projected to drop to only 70 per cent by 2030** (IEA, 2023b). This slow transition leaves decarbonization goals under the Paris Agreement out of reach (UNEP, 2022). Therefore, the IAEA 2022 Energy Compact highlights nuclear energy, combined with renewables, as key to achieving affordable, reliable and resilient energy systems (IAEA, 2022). Regionally, China has 28 reactors under construction, India 7, the Russian Federation and Türkiye, 4 each, while Bangladesh, Japan, and the Republic of Korea have 2 each, adding to the global number of 62 (IAEA, 2025).

**The major shift initiated by the 2022 Energy Compact has been unexpectedly accelerated by AI-driven energy demand.** Global technological companies started to invest in such sources of nuclear power as small modular nuclear reactors and the revival of dormant nuclear reactors (Google, 2024; Microsoft, 2024; Amazon, 2024).

### *2.1.3 Health*

**Climate-induced rising illness and mortality rates directly harm economies, exacerbating health-care challenges and well-being.** Climate impacts from slow-onset changes and extreme weather events affect health conditions both directly (e.g. heat stress) and indirectly (e.g. undernutrition from agricultural losses). New risks, such as climate-linked malaria and dengue, are expanding, with dengue spreading from South Asia to East Asia and highland areas in Nepal. These risks are expected to intensify under higher warming scenarios (Nepal, Ministry of Forests and Environment, 2021; Wang and others, 2023; Jing and others, 2024).

**Worsening health due to climate factors reduces well-being, productivity and economic output while increasing health-care costs.** Impacts include higher morbidity, mortality, productivity losses (section 2.1.3) and excessive deaths. Education also suffers from increased absenteeism, climate-induced poverty and undernourishment (section 2.1.4). Fiscal policies face growing strains in attempting to address these challenges. While some impacts, such as productivity loss and health-care costs, are quantifiable in monetary terms, others, such as the "cost" of excessive deaths, are more difficult to measure leaving macroeconomic analysis often disadvantaged compared with quantitative analysis and priority selection.

### *2.1.4 Education*

**Climate change disrupts education through such direct impacts as extreme weather events and indirect socioeconomic factors.** For example, in Nepal, floods, landslides and strong winds damage school infrastructure, while classrooms often lack air conditioning. Children from low-income families face additional challenges, such as inadequate clothing for extreme temperatures. Climate-sensitive agriculture, on which many rely, worsens coping ability, further jeopardizing education and future income prospects. Irregular attendance causes lifelong skill and income losses, while vulnerable families resort to negative coping strategies, such as child migration or children joining the labour force and marriage, leading to dropping out of school (Kagawa, 2022). Furthermore, climate-induced health issues, such as air pollution and disease, also harm education. Polluted air, especially severe in South Asia, damages children's lungs and brain tissue, impairing cognitive development and their ability to pursue education and productive futures (Marin, Schwarz and Sabarwal, 2024; UNICEF, 2017; UNICEF India, 2017).

**While climate change harms the education of children, progress in socioeconomic development reduces this negative impact.** Investments in resilient infrastructure, digitalization and improved electricity and Internet access reduce disruptions. However, the long-term benefits of education take years to materialize, creating a mismatch with short-term macroeconomic metrics, such as GDP or employment. Alternative indicators may better guide climate-education policies.

### *2.1.5 Blue economy and coastal areas*

**Global mean sea level is rising at an accelerating rate,** from 1.4 millimetres per year during the period 1901–1990 to 3.6 mm per year from 1993 to 2015. It is projected to rise by an additional 400 – 800 mm in total by 2100 and is likely to continue increasing beyond that. Regional variations of up to 30 per cent are expected due to such factors as ocean temperatures (IPCC, 2019a).

**Human activities, such as infrastructure development and resulting environmental degradation, have masked the economic impact of sea level rise, which is underestimating its consequences.** Natural barriers, such as mangroves and dunes, can partly adapt to sea level rise and protect coasts, but human-induced degradation weakens these defences. Over time, such barriers are unlikely to withstand continuous rises, posing severe risks to coastal areas, especially Pacific island economies (IPCC, 2019a).

**Low-elevation coastal zones[2] face the brunt of climate change impacts.** In East Asia and the Pacific, 40 and 48 per cent of the population and urban residents, respectively, live in these zones. In South Asia, both figures are about 35 per cent. In all areas these numbers are rising (Barbier, 2015). Low-income populations in these areas are particularly vulnerable to biodiversity loss, including coral reefs and seagrass destruction, which harms the blue economy. Rising seas, stronger cyclones, floods and erosion further damage infrastructure, housing and inland activities. Under high-emission scenarios, flooding is expected to have significant impacts on Asian cities in such coastal areas (IPCC, 2022).

**Rural coastal communities reliant on ecosystems, such as fisheries, aquaculture and tourism, are highly vulnerable to climate change.** Their dependence on the blue economy makes them directly vulnerable to ecosystem changes. Limited financial and institutional resources hinder adaptation efforts. In some areas, hard adaptation limits have already been reached, with population loss, species extinction and ecosystem collapse, including mangroves and coral reefs. Higher warming scenarios will further strain water, health and energy-dependent sectors, increasing migration pressures from such areas (IPCC, 2022).

**Adverse impacts caused by migration from coastal areas due to climate change are likely to increase.** Temporal, cyclical and long-term migration has been observed already in China, Pakistan, the Philippines and Sri Lanka. This trend is expected to rise alongside more frequent extreme weather and slow-onset events (ADB, 2012; IPCC, 2022). Estimates of climate-induced migration by 2050 range from 25 million to 1 billion people (Heslin and others, 2019), with a growing consensus that climate change is increasingly influencing migration patterns, including beyond coastal areas (IOM, 2024).

**Seal level rise losses heavily depend on climate change adaptation policies.** Without adaptation, high sea level rises could cost up to 4 per cent of global GDP over a century. In contrast, with adaptation, under all warming scenarios, the impact could drop to 0.15 per cent of GDP (Schinko and others, 2020). However, adaptation incurs significant costs, reducing resources available for health care, education, infrastructure and climate change mitigation.

**Asia-Pacific urban areas face the highest global average annual losses from flooding.** Such losses depend on coastal proximity, urban protection and population vulnerability. For example, in Amsterdam , strong flood defences limit its realized average annual losses to $3 million relative to potential losses of $83 billion. In contrast, in Guangzhou, China, the realized losses are much higher at $687 million or about 1.3 per cent of Guangzhou's GDP despite lower potential losses of $38.5 billion. Other Asia-Pacific megacities affected by such losses include: Ho Chi Minh City, Viet Nam, with realized losses of 1.2 per cent of GDP; Zhanjiang, China, 0.5 per cent of GDP; Mumbai, India, 0.5 per cent of GDP; Khulna, Bangladesh, 0.4 per cent of GDP; Palembang, Indonesia, 0.4 per cent of GDP; and closing the global list at tenth place is Shenzhen, China, at 0.4 per cent of GDP. By 2050, such cities as Sapporo and Ningbo, Japan; Shanghai and Fuzhou, China; and Jakarta, may see average annual loss exposure increase to between 0.4 and 0.7 per cent of their GDP. At the same time, without adaptation, global flood losses could soon reach $1 trillion annually – more than 1 per cent of global economic output (Hallegatte and others, 2013).

**Biodiversity loss and ecosystem destruction across Asia and the Pacific threaten the blue economy.** Since the 1980s, harmful algal blooms have increased, particularly in densely populated coastal areas of China, from Bohai Bay to the Pearl River Delta. These blooms, with rising algae species and toxicity, have caused over three decades nearly $1 billion in losses in the fisheries and tourism sectors (IPCC, 2019a; He and others, 2021; Yan and others, 2022). Similar impacts are observed in India (Vaisakh, 2024). Furthermore, the blooms are increasingly observed in freshwater systems (lakes and rivers) across the world, including in the Asia-Pacific region (Rex and Climatewire, 2013).

### *2.1.6 Tourism*

**Climate change also has adverse impacts on tourism, with losses in both revenue and direct damage.** For instance, in Thailand, floods in 2011 caused $47 billion in losses, mostly in accommodation, transport and restaurants, while recovery costs reached $50 billion over five years. Although tourism is largely privately owned, recovery often relies on public support through credit assistance, debt restructuring, or tax relief, which strains public finances (UNDP, 2024a; World Bank, 2012).

**Mountain tourism faces significant climate change impacts, including reduced snow cover, route safety issues, more rain than snow and diminished aesthetic appeal.** In Japan, skiing will be severely affected under warming scenarios above 2°C as snowmaking becomes less viable (IPCC, 2019a). China, heavily investing in its skiing industry, recorded 20 million skier visits across 876 resorts in 2022 and $78 billion in revenue during the 2023/24 winter season (Vanat, 2023; China, The State Council, 2024). However, climate change is expected to shorten skiing seasons and shift the industry geographically, with northeastern and northwestern regions

2 Elevation of fewer than 10 metres above sea level.

becoming less affected than central, eastern and southwestern areas. This shift may lead to a currently unquantifiable amount of stranded assets, internal migration and environmental pressure in colder regions. Similar trends are anticipated in Central and South Asia (Deng and others, 2023; Fang, Scott and Steiger, 2024), although they are all invisible in current macroeconomic indicators, and almost impossible to model for the distant future.

## 2.2 The socioeconomic impacts of climate policies

**Climate change and climate action influence each other through feedback loops.** Climate action alters the impact channels between climate change and the economy, shaping both future climate impacts and subsequent policies. Climate adaptation policies in particular reduce the negative impact of climate change. For example, flood barrier construction reduces future flood risks. However, while climate action can have positive effects, poorly designed or timed policies can worsen climate impacts and create new challenges. For instance, focusing solely on green energy without investment in flood infrastructure in high-flood-risk areas could have adverse consequences. Additionally, climate action carries significant costs and opportunity losses, making policy trade-offs a crucial consideration.

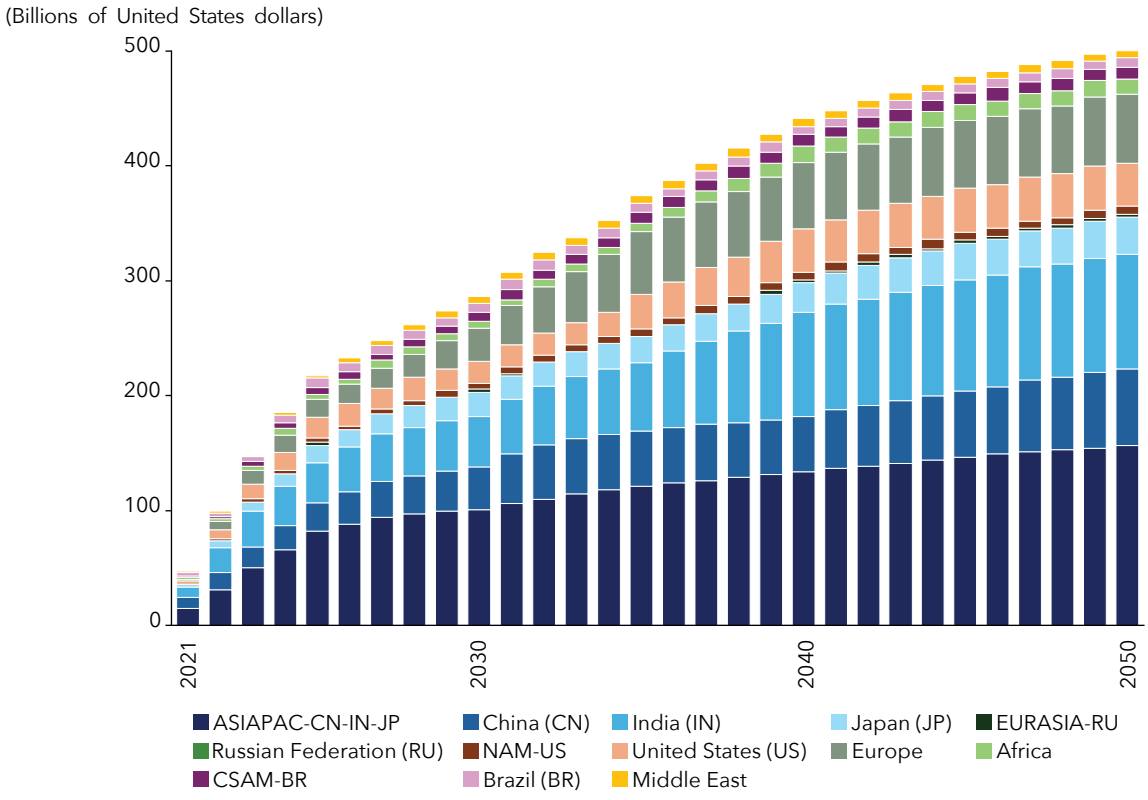
### *2.2.1 Decarbonization path and transition plans*

**Decarbonization path and transition plans, including the timing and scale of investments in renewable and clean energy sources, can have considerable impacts on the economy.** The primary goal is to prevent further global warming, as it cannot be reversed with current technology. Preventing additional warming is critical, as its negative effects will increase exponentially with rising temperatures. Another goal is to reduce air pollution, which offers immediate health and productivity benefits. Further economic research that analyses the socioeconomic impacts of climate policies can help identify optimum transformation paths, balancing resource use with climate and environmental trade-offs.

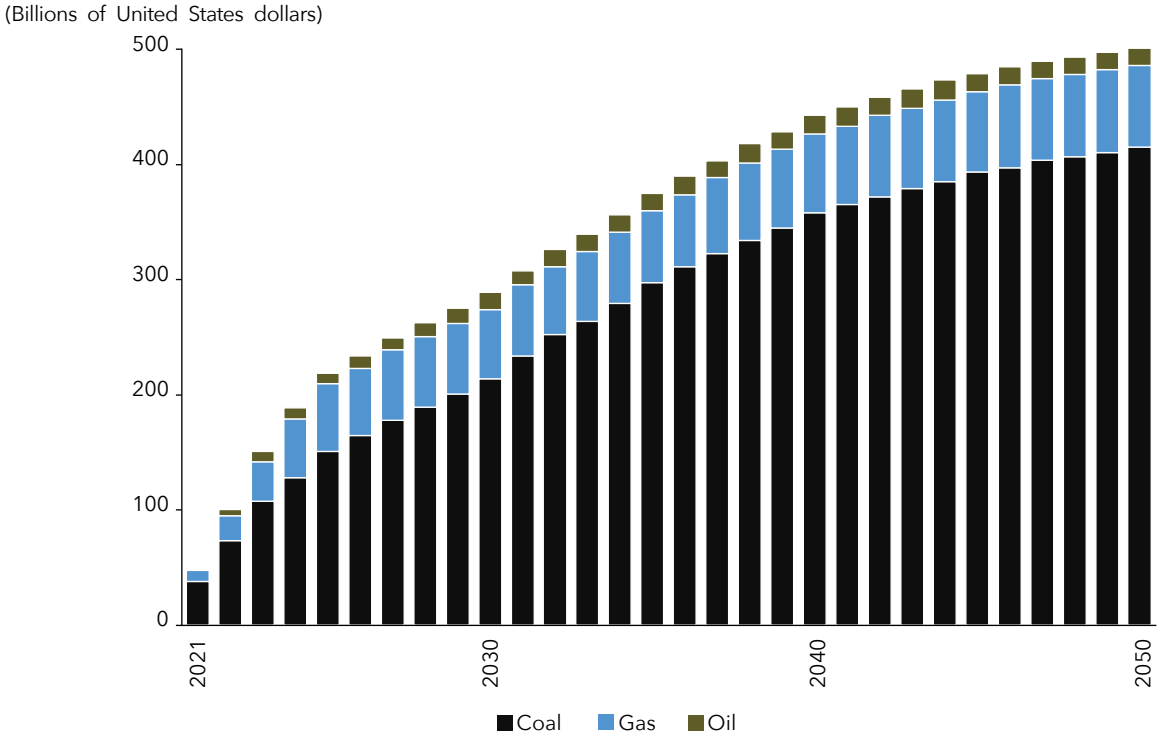
**The issue of stranded assets is a risk to the real economy, financial and fiscal stability, as well as the pace of green transition.** Asset stranding, a risk tied to technological progress or disruptive policies (Schumpeter, 1943), makes certain assets obsolete or less profitable, although not always causing major economic shocks. However, a rapid shift to a low-carbon economy could lead to significant transition risks. Climate policies that facilitate a move away from fossil fuels may result in $0.5-

Figure 4.2 Stranded asset estimates, by region and type of fuel, 2021-2050

**(a) Country or region**



**(b) Type of fuel**



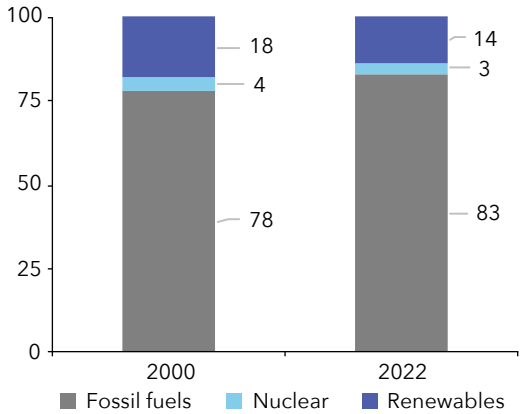

*Source*: ESCAP, based on von Dulong, 2023.

*Note*: Abbreviations in the legend are (in order) as follows: CSAM-BR (Central and South America, excluding Brazil); NAM-US (North America, excluding the United States); EURASIA-RU (Eurasia, excluding the Russian Federation); ASIAPAC-CN-IN-JP (Asia-Pacific region, excluding China, India and Japan).

1 trillion in stranded assets globally[3] (figure 4.2). The Asia-Pacific region would bear about 70 per cent of the global losses, with significant concentration in a few activities, such as India's $100 billion loss in coal plants. This would delay the transition due to concentrated fossil fuel ownership (von Dulong, 2023; Semieniuk and others, 2022). Moreover, a rising share of fossil fuel use that indicates an overall lack of progress in green energy transition in Asia and the Pacific (figure 4.3a) together with further investment in carbon assets creates more stranded assets and will slow the green transition. For example, India plans to open 45 new coal mines within the next five years (Anand, 2024). Two thirds of world's new coal power plants have been constructed in China, leading to a 2 per cent increase in global coal capacity in 2023 (figure 4.3b) (Global Energy Monitor, 2024).

**Figure 4.3 Fossil fuel energy production in Asia and the Pacific**

**(a) Percentage energy supply, by source, 2000-2022**

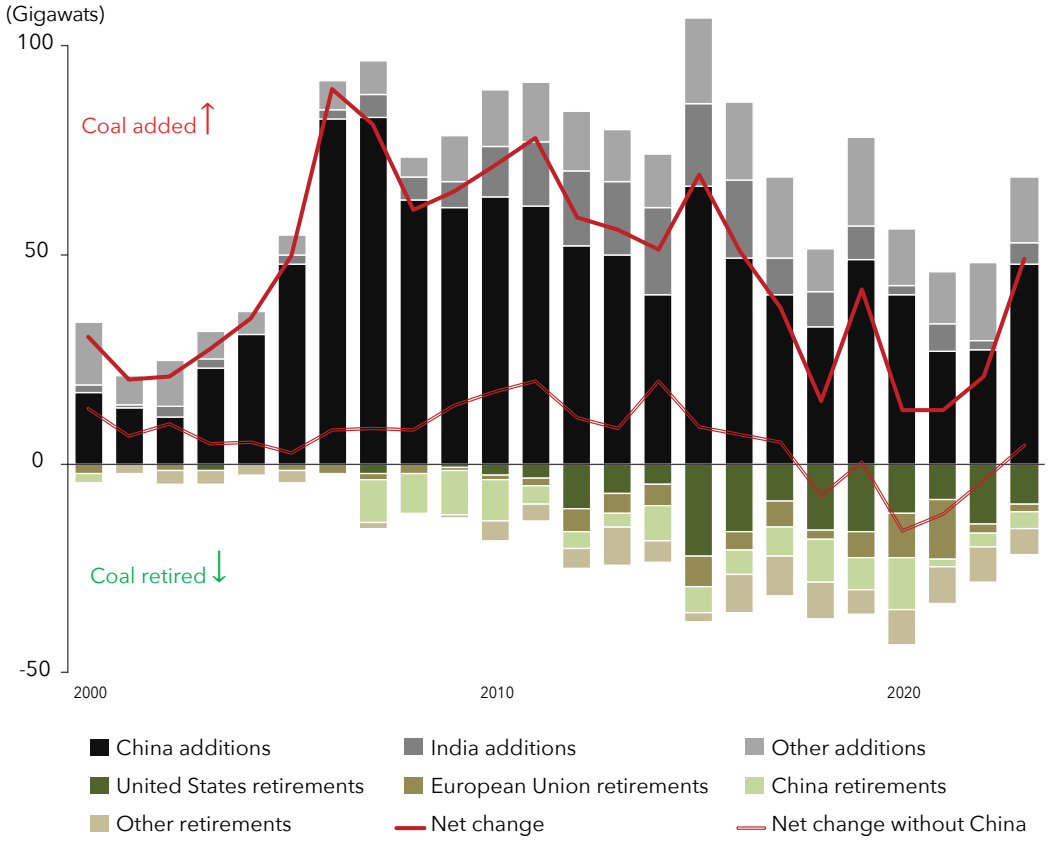



*Source*: ESCAP, based on data from the International Energy Agency (2025).

**Economic structure and technological advancements also influence decarbonization paths and transition plans.** In China, the construction sector accounts for about half of national emissions, making it a priority for carbon reduction. With a carbon-neutrality goal for 2060 (United Nations, 2021), some models suggest emissions should peak by 2030, compared with 2041 under the business-as-usual scenario. The transition could cost 1.5 per cent of GDP with optimum construction technologies and carbon reductions across the building lifecycle. However, using less efficient technologies and slower implementation could increase costs to 5.3 per cent of GDP, highlighting the risks of suboptimum climate policies (Li, Zhang and Etienne, 2024).

3 Present value of future lost profits in the upstream oil and gas sector based on global equity network of 1.8 million companies.

**(b) Annual changes in coal power plant capacity, in gigawatts**




*Source*: ESCAP, based on Global Energy Monitor (2024).

### *2.2.2 Environmental regulations*

**Environmental regulations are necessary for effective climate action but tend to push up production costs.** Regulations compel companies to phase out more polluting technologies and invest in greener alternatives, whether through bans or quotas. However, this process can lead to asset stranding and divert investment from other areas, thereby raising costs.

**The impact of environmental regulation on total factor productivity is uncertain, depending on industry-specific and external factors.** The Porter hypothesis suggests that strict regulations drive innovation, which could compensate for costs and boost productivity (Porter and Linde, 1995). Other research, however, shows mixed results. Fabrizi and others (2024) argued that the Porter hypothesis holds only for well-designed policies. Benatti and others (2024) found no crowding out of non-clean innovation in the European Union, which could offer a model for the Asia-Pacific region. However, they found that environmental regulations initially harm high-polluting firms, and only larger firms enjoy long-term increases in their productivity due to easier access to technology and financing.

**Misinformed policies can have unintended adverse climatic, environmental and socioeconomic impacts.** Poorly designed or implemented environmental regulations may harm capital allocation and productivity. For example, the costly withdrawal from nuclear energy in Germany, which led to €696 billion in expenditures and subsidies on green transformation between 2002 and 2022, serves as a cautionary tale for Asia and the Pacific. If Germany's nuclear energy had been maintained and expanded, emissions could have been reduced by 73 per cent or more at half the cost (Emblemsvåg, 2024).[4] Similarly, the biofuels boom driven by policy shifts around 2004 in the European Union and United States sparked a massive production boom across Asia for both domestic use and exports (Yan and Lin, 2009). However, with higher pressure on land demand, such climate mitigation policies are partly offset by their negative environmental impact through deforestation, desertification and food insecurity (IPCC, 2019b). Similarly, emission reductions could be delayed in such industries as cement, steel and chemicals, as companies may prefer to buy offsetting carbon credits instead of investing in innovation for technically

4 The return to nuclear energy has been strongly promoted by IAEA and observed a drastic push in the last two years (box 4.2).

difficult-to-replace technologies (Höglund, Mitchell-Larson and Delerce, 2023). There are also challenges in the optimum split of subsidies between green energy production, storage and electric vehicles. Regarding the air traffic sector, some analysts advocate "avoid" over "substitute" policies (Dobruszkes, Mattioli and Gozzoli, 2024). For instance, banning short flights (under 500 kilometres) may be ineffective, as they account for 27 per cent of all flights but consume only 5 per cent of fuel in the industry.

### *2.2.3 Environmental taxes*

**Environmental taxes raise the cost of harmful goods and services, thus encouraging companies to adopt sustainable technologies.** While this increases production costs and causes stranded assets, it being in favour of the Porter hypothesis also fosters efficiency and creates positive externalities that are difficult to estimate and account for (section 2.2.2).

**Carbon taxes can increase fiscal revenues and have positive climate-environment externalities.** This makes them an attractive option for Governments looking to expand their tax base. However, in addition to requiring enforcement costs, carbon taxes can impose notable long-term economic drag by reducing consumer spending, capital investment, economic growth and international competitiveness. They can lower wages and returns on capital and increase prices for goods and services (Williams, 2015).

**Mitigating and compensating measures are needed to channel part of carbon tax revenues back into the economy.** These include green energy subsidies, lump-sum transfers, reductions in personal and corporate income taxes, and coordinated international efforts, such as border carbon tax adjustments to offset lost competitiveness (Cuervo and Gandhi, 1998; Goulder and Hafstead, 2013; Williams, 2015). Policymakers must balance these opposing forces (table 4.2). For example, estimates show that increasing a carbon tax from $10 to $37 per ton between 2013 and 2040 could result in a 1.5 per cent annual GDP loss. Depending on how revenues are spent, this loss could be smaller at 0.24-0.56 per cent (Goulder and Hafstead, 2013).

Table 4.2 Carbon tax impact channels are complex, and net impact depends on other policies

| Direct negative impacts | Positive implications and externalities |
|---|---|
| - Increase in prices of goods and services (greenflation)<br>- Lower consumer spending<br>- Increase in inequalities<br>- Lower private sector profits and less capital available for investment<br>- Asset stranding<br>- Decrease in competitiveness | - Less environmental pollution<br>- Improved health<br>- More fiscal resources<br>- Less long-term negative climate change impact losses<br>- Incentive for innovation |

**Balancing measures**

- Recycling the carbon tax
- Low-income household energy subsidies
- Personal income tax or corporate income tax breaks
- Government expenditure on health care, education and social policies
- Government investment
- Border carbon tax adjustments
- Carbon tracing and fair pricing

**NET IMPACT**

*Source*: ESCAP.

### *2.2.4 Regulatory uncertainty*

**Ensuring that policies, regulations and subsidies along with their implementation, reviews and updates are all predictable and consistent improves the impact of climate action.** Frequent and substantial changes in the above add to business and financial market uncertainty. This poses a significant threat to climate action, as businesses and households cannot effectively plan their investment and consumption (IPCC, 2014a). For example, subsidy programmes, such as those for green energy, help mitigate market risks and encourage investment but are difficult to get guaranteed as they are subject to fiscal conditions and political views of incumbent Governments. These uncertainties may shift investment focus towards short-term projects, create investment gaps and add volatility to business cycles tied to subsidy cycles (IPCC, 2014a). Furthermore, regulatory and subsidy uncertainty can reduce incentives for technological innovation, as investors cannot estimate their potential long-term returns on relatively risky R&D that requires large upfront investments. Therefore, policymakers should ensure clarity, reliability, predictability and stability of regulations, sending trusted signals to markets and investors who make the long-term investments necessary for climate action (ESCAP, 2023c).

**Regulatory uncertainty reduces the effectiveness of market-based climate policy instruments, such as carbon pricing and investment in decarbonization projects.** With carbon taxes sharing a substantial part of future goods and services costs, companies cannot forecast their market prices, face high profitability uncertainty or even liquidity challenges. As investors neither know the quantities of carbon emission quotas to be issued by regulators nor their market prices for either purchase of additional emission rights or selling of unused certificates, they are unable to estimate the profitability of investments and commit to them (Fuchs, Stroebel and Terstegge, 2024; World Bank, 2023). For example, the high uncertainty surrounding long-term carbon prices has limited the positive impact of the European Union's Emission Trading System on long-term green investments (IPCC, 2014a). These experiences serve as a cautionary tale for Asia-Pacific countries considering or implementing carbon pricing schemes. Furthermore, as Governments in the region are still deciding between emission trading systems and carbon taxes or international carbon trading, they create a highly fragmented investment landscape with fast-changing regulations. This uncertainty already undermines and hinders large-scale green investment and private sector involvement (Abatable, 2023).

## 3. Impacts of climate change on key macroeconomic indicators: basics are known but not the nuances

**The macroeconomic impacts of climate change are generally well understood.** Broad consensus points out that climate change negatively affects the economy and the people, and that climate-induced supply shocks are pro-inflationary. Studies have also identified various aspects of climate action that support or undermine output growth, and the associated policy trade-offs. Moreover, macroeconomic indicators already help to guide climate action policymaking, particularly in assessing the costs and benefits of adaptation policies under different climate change and climate policy scenarios.

**However, not all climate change impacts are well reflected in macroeconomic indicators.** In some cases, macroeconomic variables offer less information for policymakers than deep understanding of climate impact channels complimented with rational and logical reasoning as presented in the previous section. The following are some of the main caveats.

**First, as macroeconomic indicators are meant for short to medium-term policy design, they often fail to capture such long-term impacts as climate change.** For example, while extreme weather events cause measurable setbacks expressed in percentage of GDP loss, slow-onset events have lasting effects that may not be duly reflected in macroeconomic indicators for decades.

**Second, climate change is one of the many factors influencing macroeconomic indicators, making it difficult to isolate and quantify its specific impacts.** The complexity of factors influencing these indicators, along with the non-linear nature of climate change, challenges models based solely on past data. Additionally, the variety of estimation methods complicates interpretation of the outcomes (Duan and others, 2019; Tol, 2024).

**Third, macroeconomic metrics usually fail to capture the irreversible degradation of the natural environment.** For example, GDP may show economic growth despite environmental destruction. Development of macro indicators that includes the environmental impact, for example net domestic product (GDP minus depreciation and environmental costs), would partly address this issue (UNEP, 2023). Therefore, aiming to ensure that economies do not develop at the expense of the environment, macroeconomic variables will need to capture environmental impact assessments and include them into policymaking.

**This section investigates the above shortcomings and research gaps with the aim of policy design and implementation support.** Discussion starts with an analysis of the impact of climate change and climate policies on employment, productivity, savings, investment and consumption, and then

analyses the impact of all these indicators on GDP. The section also outlines climate change macroreflections through the prism of fiscal and monetary policy.

## 3.1 Employment

**Climate change and climate action reshape labour markets.** Climate change causes job losses in such sectors as agriculture and tourism, while climate policies reduce jobs in carbon-intensive industries and create new ones in more sustainable sectors, such as renewable energy.

**Impacts of climate change on employment follow an inverted U-shaped path.** Productivity and output, and thus employment, tend to rise initially along with average temperature and precipitation until they reach a tipping point beyond which they fall rapidly.[5] Multiple areas of the Asia-Pacific region have already crossed this tipping point and therefore experience negative climate change impacts on employment. Palagi and others (2022) argued that this inverted U-shaped relationship is stronger for countries with a large agricultural sector, such as those in South-East Asia (Kok and Munir, 2019).

**The withdrawal from the oil and gas sector will disrupt labour markets but also create new opportunities.** With large capital investment and highly paid workers who contribute to household consumption, the fossil fuels sector generates significant employment effects and economic activity (table 4.3). Fossil fuel withdrawal can therefore lead to job losses across many other industries. Nonetheless, depending on labour market policies, laid-off workers could remain in the job market through reskilling, such as in renewable energy.

**Table 4.3 Selected employment multipliers**

| Sector | Employment multiplier |
|---|---|
| Agriculture, forest, fishing and hunting | 2.3 |
| Mining | 3.9 |
| Oil and gas extraction | 5.4 |
| Coal mining | 5.0 |
| | |
| Construction | 2.3 |
| Construction of new power generation facilities | |
| Solar PV (photovoltaics) | 3.3 |
| Wind | 2.0 |
| | |
| Durable manufacturing | 7.4 |
| Non-durable manufacturing | 5.1 |
| Retail trade | 1.2 |
| Information | 5.7 |
| Health and social assistance | 2.1 |

*Source*: Bivens (2019); WEF and IHS CERA (2012).

*Note*: These are United States economic multipliers; multipliers in other economies may be lower/higher due to shortage of supply materials and lack of local expertise that drive up import needs.

5 Increase in average temperatures initially tends to increase economic output due to improvement in agricultural conditions, reduction of energy demand for heating, increase in outdoor productivity and stimulation of some services sectors, such as tourism. These factors reverse beyond certain temperature tipping points where temperatures that are too high undermine agricultural and other economic activity. Similarly, increased precipitation has a favourable impact on agriculture until a tipping point is reached.

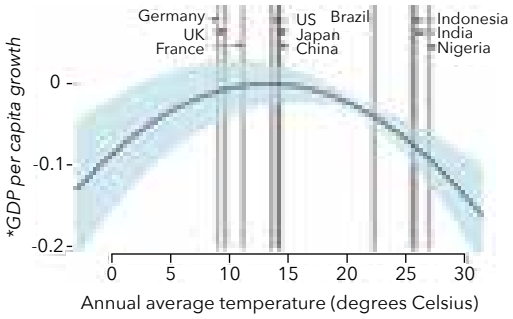
**Job creation amid the green transition could offset losses in fossil fuels and related sectors.** The green transformation could lead to net job creation and labour reallocation, particularly with increases in construction, manufacturing and renewables. However, the net employment increase under the 2°C warming threshold is estimated at only 0.3 per cent, much smaller than the overall annual employment growth rate of 1.5 per cent during the period 2005-2017. The impact also varies by country, depending on economic structure, industrial base, local green equipment production and fossil fuel dependence. For example, net employment is estimated to rise by almost 0.9 percentage points in Indonesia and at a lower rate of 0.3-0.4 percentage points in China and the Republic of Korea, and 0.1 percentage point in India (Montt and others, 2018).

## 3.2 Productivity

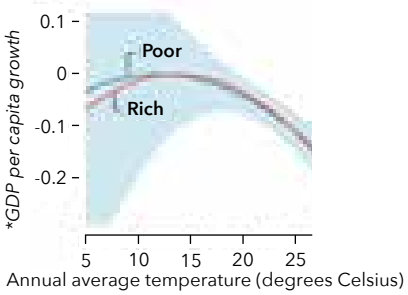
**Rising temperatures and precipitation are expected to have negative impacts on productivity; there is consensus on their harmful effects beyond a certain tipping point.** Manufacturing is particularly vulnerable to temperature increases (Zivin and Neidell, 2010), which is critical for developing countries reliant on labour-intensive manufacturing. A study based on data from half a million manufacturing plants in China over the period 1998-2007 confirmed the existence of a U-shaped relationship which showed that, without climate adaptation, higher temperatures could lead to a 12 per cent annual output loss in China (Zhang and others, 2018). Hoang and others (2024) estimated that an increase of temperature by 1°C could reduce economic growth at the global scale by 0.5-0.8 percentage points. Kotz and others (2021) noted further that even an increase in variability in day-to-day temperatures has negative impacts on economic growth. Burke, Hsiang and Miguel (2015a) estimated that this temperature tipping point was an annual average temperature of 13°C. They found the relationship globally generalizable based on a 166-country sample, virtually unchanged during the 1960-2010 period, and relevant for agricultural and non-agricultural sectors in both rich and poor countries (figure 4.4). Other studies found similar

Figure 4.4 Impacts of temperature on productivity and GDP growth

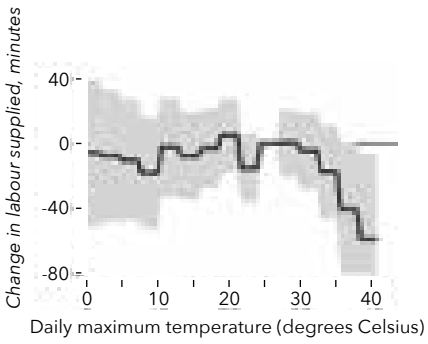
**(a) Global non-linear relationship between annual average temperature and change in log gross domestic product (GDP) per capita (thick black line, relative to optimum) during 1960–2010, 90 per cent confidence interval (shaded).**




**(b) Agricultural GPD in countries with below global median GDP (poor) and above (rich).**




**(c) Estimates of changes in labour supply with daily maximum temperature.**




*Source*: Burke, Hsiang and Miguel (2015a).

*Note*: *Change in natural logarithm (ln) of GDP per capita which is approximately GDP per capita growth; shaded area in panel (c) represents 95 per cent confidence intervals.

relationships between economic output and temperature. These findings also highlight the potential benefits of climate adaptation, as well as the costs of inadequate mitigation policies, providing key insights for decision-making.

**Extreme weather events, natural disasters and increases in daily precipitation reduce productivity.** In 2022, such extreme weather events caused $80 billion in economic losses in Asia and the Pacific (Aon, 2023). Wu and others (2023) estimated that extreme precipitation may lower industrial output in China by 1.2 per cent, with greater impacts on high-income regions, foreign and low-technology firms and the manufacturing sector. The decline stems from such logistical challenges as traffic jams, accidents and commuting delays, leading to absenteeism, longer working hours, higher transportation costs and larger inventories. Increased humidity also lowers human performance, raises machine failure rates and reduces capital productivity.

## 3.3 Savings, investment and consumption

**By having adverse impacts on productivity and output, climate change can reduce household incomes. It can also raise consumption needs, leading to lower savings.** Awaworyi Churchill, Trinh and Danquah (2023) found that each day above 30°C temperature in Viet Nam decreases agricultural production and thus agricultural household income and savings by 6.3 per cent, and increases household borrowing by 1.4 per cent. Trinh and others (2024) observed similar effects in Australia, with temperature shocks making people less future-oriented and further lowering savings rates.

**Lower economic output and constant investment rates lead to reduced future production and consumption.** Frankhauser and Tol (2005) noted that, without climate action and with a constant savings rate, climate-induced output declines would result in lower savings, and thus investment. In contrast, scenarios with climate action show smaller output losses, and therefore retain higher savings and investment.

**Climate change reduces returns on capital, limiting investment in economic growth and climate action.** Tsigaris and Wood (2019) noted that climate-induced capital destruction and increased maintenance costs lower returns. For instance, commercial real estate operators in South and South-East Asia reported higher depreciation and maintenance costs due to energy and water insecurity (Venugopal and others, 2010). Parker (2023) also highlighted that capital for climate adaptation is less productive, diverting resources from innovation. As a result, more capital is needed for investment, reducing resources for consumption.

## 3.4 Gross domestic product

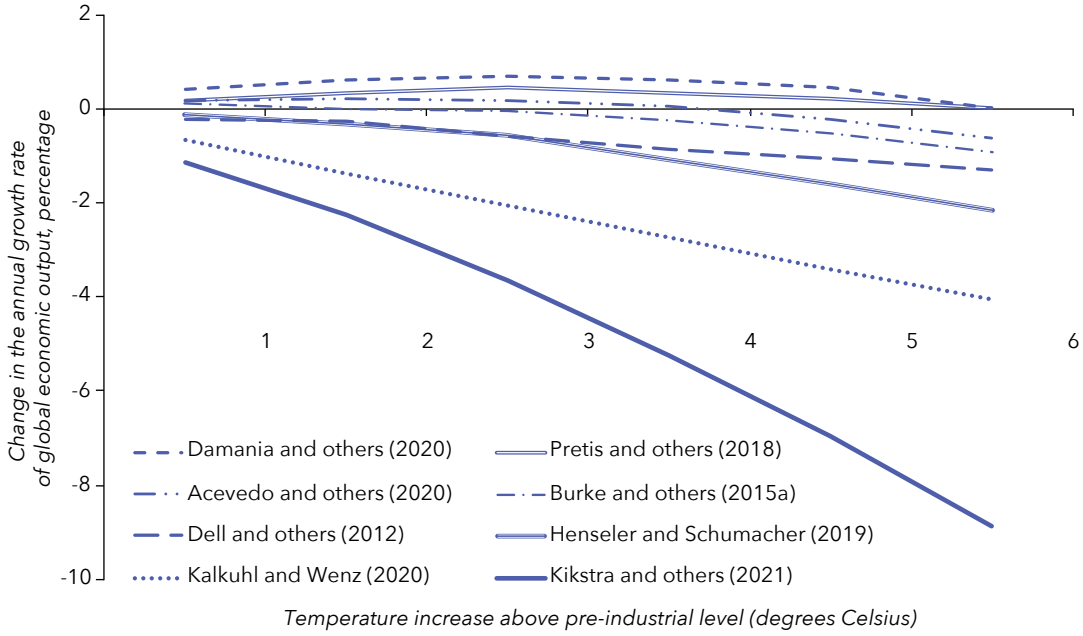
**Estimates of climate change's impact on GDP generally fall into two categories: short-term, focused on one-off events, such as weather shocks, and long-term, addressing slow-onset impacts.** The first category helps inform short- to medium-term policymaking, especially for climate adaptation, while the second helps quantify climate mitigation policies, such as optimum emission reduction paths, by comparing long-term benefits with the costs of inaction (Piontek and others, 2021; Tol, 2024). For instance, the 2011 floods in Thailand caused $47 billion in damage, or 12.4 per cent of the country's GDP (World Bank, 2024c), while the 2022 floods in Pakistan resulted in losses of 4.8 per cent of GDP (Government of Pakistan and others, 2022). These estimates help policymakers make decisions on climate adaptation and resilience investments.

**The average estimate of the impact of climate change on economic output, based on multiple estimates, is always negative, although the exact scale remains inconclusive** (figure 4.5). For instance, under a 2.5°C warming scenario, studies in the last 20 years show estimates ranging from 0 per cent impact (Mendelsohn, Schlesinger and Williams, 2000; Maddison, 2003) to 2 per cent negative impact (Dellink, Lanzi and Chateau, 2019), with earlier estimates as high as 5.2 per cent (Schauer, 1995). On average, estimates suggest an annual loss of 1.7 per cent of economic output per capita, with impacts significantly lower under a 1.5°C scenario than in higher warming scenarios (exponential impact). There is broad agreement on the high likelihood of negative surprises, such as more extreme weather events, with poorer countries being the most vulnerable (Tol, 2024). However, as noted by the United Nations Intergovernmental Panel on Climate Change (IPCC, 2022), there is no consensus on the exact magnitude of this negative impact.

**Estimating impact of climate change on national or global economies is complex not least because of methodological challenges.** Methodological limitations and varied assessment approaches result in inconclusive GDP impact predictions (Piontek and others, 2021; Tol, 2024). Modelling the long-term effects of climate change, which affects nearly all socioeconomic activities, is difficult due to limited data, high uncertainty in climate projections and unclear economic feedback loops. In summary, current models provide valuable insights for short-term, localized shocks (e.g. oil price changes) but struggle with long-term, macroregional and global estimates (e.g. long-term impact of climate change). They are, however, useful for informing on the direction of change (box 4.3).

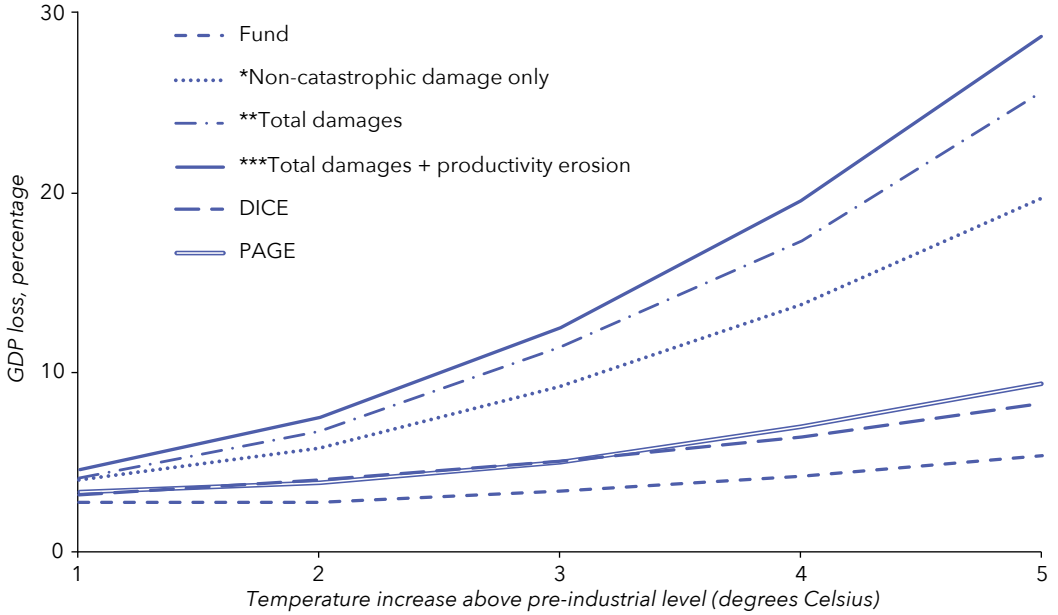
## Figure 4.5 Selected estimates of global warming impacts on GDP

**(a) Estimates delivered by different researchers.**




*Source*: ESCAP, based on Tol (2024).

**(b) Estimates delivered by different models.**




*Source*: Piontek and others (2021).

*Note*: Models with aggregate damage functions that include *only impact of non-catastrophic damage; **additionally impact of catastrophic damages; *** additionally impact of climate change on productivity. For details see Howard and Sterner (2017).

### ❮Box 4.3 Methodological limitations of economic modelling❯

**Modelling tools for assessing the impact of shocks on economies are far less efficient and accurate than commonly understood.** They struggle with large data sets and data quality issues. Impact aggregation often overlooks interactions and feedback effects, such as the role of climate adaptation policies. Robustness of model parts that estimate climate induced damage (damage functions) is often questionable. Exponential impacts, such as climate tipping points, are often not accounted for. Models also fail to adequately capture inequalities at national and international levels, which affect exposure to and vulnerability from climate impacts. Furthermore, there is also a broad disagreement among researchers on the impact on GDP of temperature change versus the absolute temperature level and the impact of variability of climate on output growth, which undermines model-building.

**Damage functions poorly estimate impacts of climate change.** Market impacts, such as income loss or infrastructure damage, are easier to quantify. However, non-market impacts, such as ecosystem services, health effects or environmental losses, lack market values and are often subjectively estimated or omitted. For example, health impacts are typically approximated by health-care spending. Global models also struggle to account for heterogeneity of economic input factors, such as land, labour and capital, but fail to reflect regional differences or the long-term scope of damage, such as from sea level rise.

**Furthermore, there is limited reliable long-term information on geopolitical shocks and the long-term impact of technological advancements.** Consequently, the models extrapolate historical responses to future actions. The net impact must factor in some positive impacts of climate change, such as reduced costs of heating, lower mortality due to cold weather and carbon dioxide fertilization.

*Source*: Chang, Mi and Wei (2023); Piontek and others (2021); Tol (2024).

## 3.5 Monetary policy

**Climate change and climate action affect monetary policy by influencing inflation, interest rates and exchange rates.** The impacts can be short term, such as extreme weather events, or long term, such as slow-onset changes and climate policies reshaping the economy. These effects can be categorized as climate-disruption and (policy-induced) carbon constraints. From a policy design perspective, central banks' efforts to control inflation and stimulate output are always interconnected, making it more difficult to measure, model and find suitable monetary policy responses to climate change (McKibbin and others, 2020).

### *3.5.1 Inflation*

**Inflation induced by climate change comes from two distinct channels of climateflation and greenflation.** Climateflation is caused by climate-related supply shocks, while greenflation is driven by mitigation and adaptation measures that reduce supply and increase demand.

**Climateflation is significant in several Asia-Pacific economies.** Extreme weather causes localized supply shocks, while slow-onset events reduce long-term productivity. Such sectors as agriculture are particularly affected, and disruptions to trade and tourism, such as air traffic, contribute to inflation. Heatwaves increase electricity demand, raising prices across sectors (United Nations, 2024). The El Niño Southern Oscillation variability is expected to increase due to climate change (Cai and others, 2021; Cai and others, 2022). Sharples and others (2023) estimated that past El Niño effects have added 3.9 percentage points to non-energy commodity price inflation and 3.5 percentage points to oil inflation, with strong impacts on GDP growth in Australia, India and other vulnerable countries. In Thailand, El Niño raised headline inflation by about 0.2 and 0.4 percentage points in 2023 and 2024, respectively, mainly through food price channels (BoT, 2023). El Niño has been also driving up agricultural raw material prices such as for natural rubber in South-East Asia (Baffes and Temaj, 2024; Liem, 2024; del Rosario and Koh, 2024). Overall, climate change is projected to raise food inflation by 0.9-3.2 percentage points annually until 2035 (Kotz and others, 2023).

**Greenflation, a new area of economic research, primarily stems from decarbonizing the energy sector and the rising costs of capital and labour due to stranded assets and environmental taxes.** These factors lead to economy-wide supply constraints and higher prices. Unlike demand-driven inflation, supply-driven inflation is more difficult for monetary policy to manage.

**Some central banks are tracking climateflation and greenflation to manage inflation expectations.** For example, in November 2024 the Bank of Japan maintained a 2 per cent inflation target despite risks of steeper price increases due to climate shocks and the Government's green transition strategy financed by fiscal stimulus of 3 per cent of GDP over the next 10 years (Kihara, 2024). The central banks in India and Thailand also highlighted the contribution of the green transition to price increases (Reserve Bank of India, 2024; Disyatat, 2024).

### *3.5.2 Interest rates*

**Net impact of climate change on natural interest rate[6] varies depending on the significance of individual impact channels.** These impact factors are often already derivatives of climate change and climate action impact that is non-linear and economy specific. For example, decline in productivity lowers investment and thus capital demand, and consequently has impacts on interest rates. Loan interest rates are also likely to diverge, being lower for non-polluting enterprises, while rising for polluting ones that will be more exposed to the impact of carbon taxes and environmental regulation that will raise their default risk (Meng, Wang and Ding, 2023). Given this complexity, research findings based on different modelling approaches and assumptions also allow for significant biases and shortcomings (box 4.3).

**Factors that may lower interest rates tend to be linked to the destructive nature of climate change and climate policy risks because of higher risk aversion and an increase in precautionary savings.** Climate change-induced decline in productivity discourages investment and thus also increases savings that exert downward pressure on interest rates (Mongelli, Pointer and End, 2023; 2022). Subdued investment may also prompt central banks to initiate stimulation through the lowering of interest rates. Reallocation of economic activities led by the green transition and related policy action increases uncertainty and thus may also lead to investment aversion (Donadelli, Grüning and Hitzemann, 2019), lower capital demand and downward pressure on interest rates. Cantelmo (2020) notes that even the risk of natural disasters (ex ante) may put downward pressure on interest rates through the lower capital demand side, with impacts growing non-linearly in the case of increased disaster frequency.

**Factors that may increase interest rates are heavily dependent on the design and implementation of climate action policies.** The push for green transition causes higher government investment, and innovation linked to higher expected returns leads to higher private investment. Taken together, they increase capital demand and put upward pressure on interest rates (Mongelli, Pointer and End, 2023; 2022). Motl (2024) noted that as the green transition puts upward pressures on inflation, this may lead central banks to consider a higher interest rate environment that is aimed at inflation reduction.

**Additionally, climate-linked impact factors overlap with a downward secular trend of declining interest rates.** Over the last four decades, interest rates have been on a downward trajectory (figure 4.6), driven by lower inflation risk premiums due to long-term declining inflation expectations, a decline in the real-term premium[7] driven by increases in global demand for safe and liquid assets, such as sovereign bonds, and lower expectations for short-term real interest rates. In this scenario, lower interest rates reduce savings and thus limit capital for investment, and discourage the process of withdrawal from unproductive assets in favour of investment in newer and more productive ones (Schumpeterian creative destruction) (Schumpeter, 1943), which stalls economic output (Constâncio, 2016).

**Overall, the relationship between climate change, climate action and interest rates remains underexplored, with significant research gaps.** This leaves policymakers with numerous potential impact scenarios. For example, a negative net impact combined with a secular decline in interest rates could severely limit the scope for monetary policy (Bylund and Jonsson, 2020), while expanding fiscal policy space. This uncertainty can be addressed through foresight analysis, which explores multiple future scenarios to help policymakers prepare flexible, economy-specific responses (section 4). Finally, the lack of consensus on future interest rates complicates the estimation of climate change impact costs, as robust interest rate estimates are essential to calculate the net present value of future losses (Bauer, 2021).

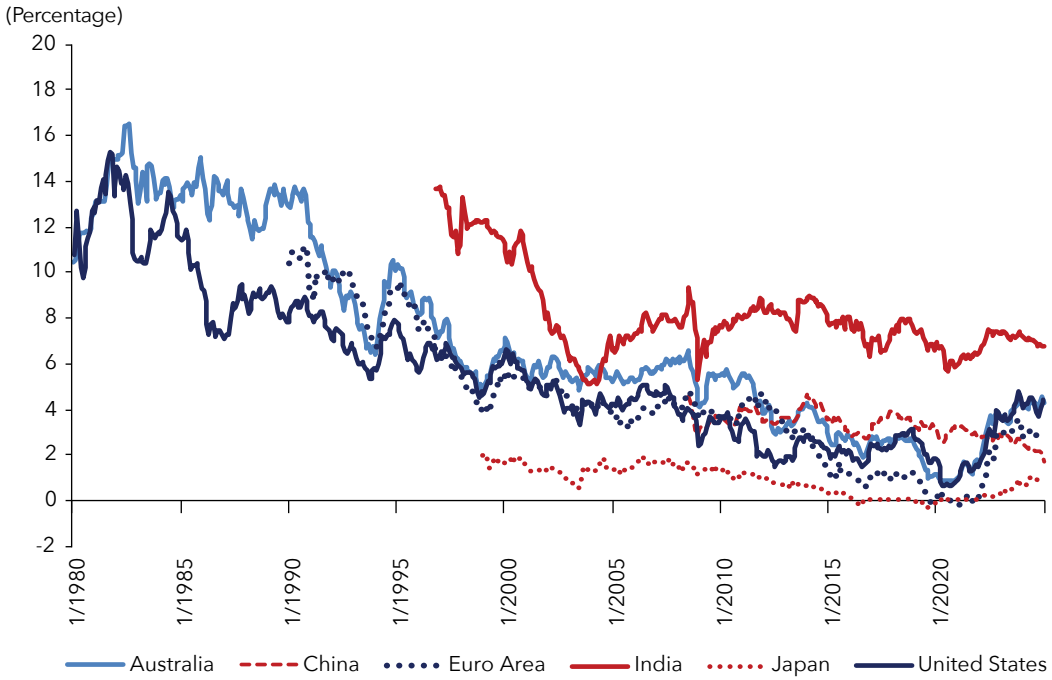
### *3.5.3 Exchange rates*

**Impacts of climate change on the real economy are also reflected in exchange rate changes.** Long-term effects stem from slow-onset events, including reduced productivity and output, as well as inflation and interest rate channels. More frequent and intense extreme weather events increase perceived economic risks, leading to persistent and likely small long-term currency depreciation (Hale, 2022). Yet, physical

6 A hypothetical short-term interest rate consistent with full employment and stable inflation. It is a theoretical equilibrium rate estimated by central banks to guide the monetary policy.

7 Compensation received by investors for holding longer-term investments and delaying consumption.

Figure 4.6 Long-term government bond yields




*Source*: CEIC data.

impacts are the primary depreciation driver compared with such market beliefs (Hale, 2024). Overall, long-term climate impacts on exchange rates are difficult to measure due to other overlapping factors. In contrast, the short-term changes, mostly linked to extreme weather events, are easier to identify. These findings are relevant for central banks as they have tools to address short-term currency volatility, in contrast to long-term fluctuations deriving from global risk perception, economic structure and productivity (Lee and others, 2022).

**Extreme weather events have impacts on exchange rates and income growth, particularly in developing or small economies and pegged exchange rate regimes.** Nguyen and Nguyen (2024) noted that disasters adversely affect balance of payments, infrastructure, supply chains, productivity, exports and tourism, and thus tend to depreciate currencies. There are also some offsetting factors with unclear net impact. For example, post-disaster recovery might boost import needs and lead to currency depreciation, while post-shock increases in workers' remittances support currency appreciation. Weather-driven exchange rate fluctuations are particularly impactful on small island developing States due to their high reliance on tourism and imports, especially those with non-pegged regimes with a potential 10 per cent currency depreciation within a year after such impacts. Elekdag and Tuuli (2022) found that not only do weather shocks shape exchange rates, but exchange rate regimes also are a factor in how weather shocks have impacts on income growth. They estimated that under the pegged regimes, a 1°C increase in temperature leads to a 1.4 percentage point decrease in per capita income growth compared with a 0.6 percentage point decrease under flexible regimes. This implies that flexible regimes partly mitigate negative impacts and support faster recovery.

## 3.6 Financial stability

**Financial stability risks depend on geographical location, economic development and capital market advancement.** Extreme weather events pose a greater threat than slow-onset events due to sudden destruction and loss of wealth. This leads to collateral loss, credit defaults, business disruptions and increased asset valuation volatility (Giuzio and others, 2019). Post-disaster capital replacement, insurance claims and real estate price changes further exacerbate risks, decreasing financial stability and complicating climate investment financing (Aon, 2023; Boustan and others, 2019; Panda, 2023; S&P, 2024).

**Physical and transition risks undermine the stability of financial institutions and financial systems** (BoJ, 2021). Physical risks from extreme weather and slow-onset events cause asset devaluation, lost profits and more non-performing loans, weakening systemic stability (Zhang and others, 2024). Transition risks, linked to asset stranding and structural changes from decarbonization, disrupt credit allocation and economic activity (BoC, 2021). For example, Meng, Wang and Ding (2023) warned that, as polluting

enterprises will face output declines due to higher production costs linked to carbon taxes and the green transition in China, they are more exposed to asset stranding and loan defaults, which pose a risk to financial stability and thus require supportive transition policies. Poor understanding of tail risks and disorderly transitions amplify these issues, destabilizing financial systems through unexpected asset valuation changes, accelerated depreciation and lower productivity (FSB, 2020).

**Certain geographic locations and assets may become increasingly uninsurable, threatening economic activity and financial stability.** Insurance pools losses among insured entities. Therefore, rising frequencies of destructive events are driving costs higher, potentially rendering insurance unaffordable or risks uninsurable (Kounis, 2023; O'Connor and others, 2023). Furthermore, while insurance distributes losses, it does not eliminate them. Even government fiscal measures to cover uninsurable losses to increase financial system stability (ECB and EIOPA, 2023) merely redistribute costs and do not eliminate them. They also reduce funding for other fiscal priorities. Therefore, frequent, severe losses could make certain areas economically unviable for insurance (ESCAP, 2024c).

## 3.7 Fiscal policy and public debt

**Changing climate increases fiscal expenditures and puts downward pressure on revenues.** Key expenditure categories linked to climate change include mitigation, adaptation and recovery from extreme weather events. The latter covers residual risks that cannot be avoided or reduced through adaptation, and risks that were accepted or are too expensive to reduce. Additionally, such sectors as education, health care, social protection and government investment increasingly include climate-linked costs. Furthermore, climate events erode economic activity and productivity, which can reduce government revenues. Overall, climate change has negative impacts on fiscal positions (box 4.4), although its long-term impacts depend on technological progress, adaptation investment and localized climate effects.

### *3.7.1 Fiscal space*

**The financial costs of climate action vary widely across economies and adaptation needs, often exceeding fiscal capacity of most developing countries.** Global estimates for climate adaptation by 2030 range around 0.25 per cent of GDP annually, but can reach 1 per cent for some developing countries and even exceed 10 per cent for some small island States vulnerable to extreme weather and sea level rise (Aligishiev, Massetti and Bellon, 2022; Edelman, 2024). Costs also depend on the scope and type of adaptation measures. For example, upgrading new investment projects for climate resilience in Asia and the Pacific would cost 0.7 per cent of GDP annually, while retrofitting existing public and private infrastructure would cost another 2.3 per cent of GDP annually over the 10-year period (Dabla-Norris and others, 2021).

**Fiscal expenditures on climate adaptation are particularly high for Pacific island developing States.** Coastal protection alone would cost 8-9 per cent of GDP annually, depending on risk tolerance. Total annual public sector

### Box 4.4 As windows get broken by natural disasters, so do fiscal expenditures

The impact of disasters, including those driven by climate change, on the economy has long been debated, including on whether they stimulate output growth and affect fiscal policy. Frédéric Bastiat addressed this in 1850 with his example of a broken window. He argued that, while repairing the window might create economic activity (e.g. the glazier earning *"six francs"*), it overlooks the opportunity costs – what could have been done with those resources otherwise. In today's context, fiscal spending on disaster recovery and climate adaptation may boost certain economic activities but does not account for the lost potential elsewhere.

> (...) [If] you come to the conclusion, as is too often the case, that it is a good thing to break windows, that it causes money to circulate, and that the encouragement of industry in general will be the result of it, you will oblige me to call out, "Stop there! your theory is confined to that *which is seen*; it takes no account of that *which is not seen*."
>
> *It is not seen* that as our shopkeeper has spent six francs upon one thing, he cannot spend them upon another. *It is not seen* that if he had not had a window to replace, he would, perhaps, have replaced his old shoes, or added another book to his library. In short, he would have employed his six francs in some way, which this accident has prevented (Bastiat, translated by P.J. Stirling, 1874).

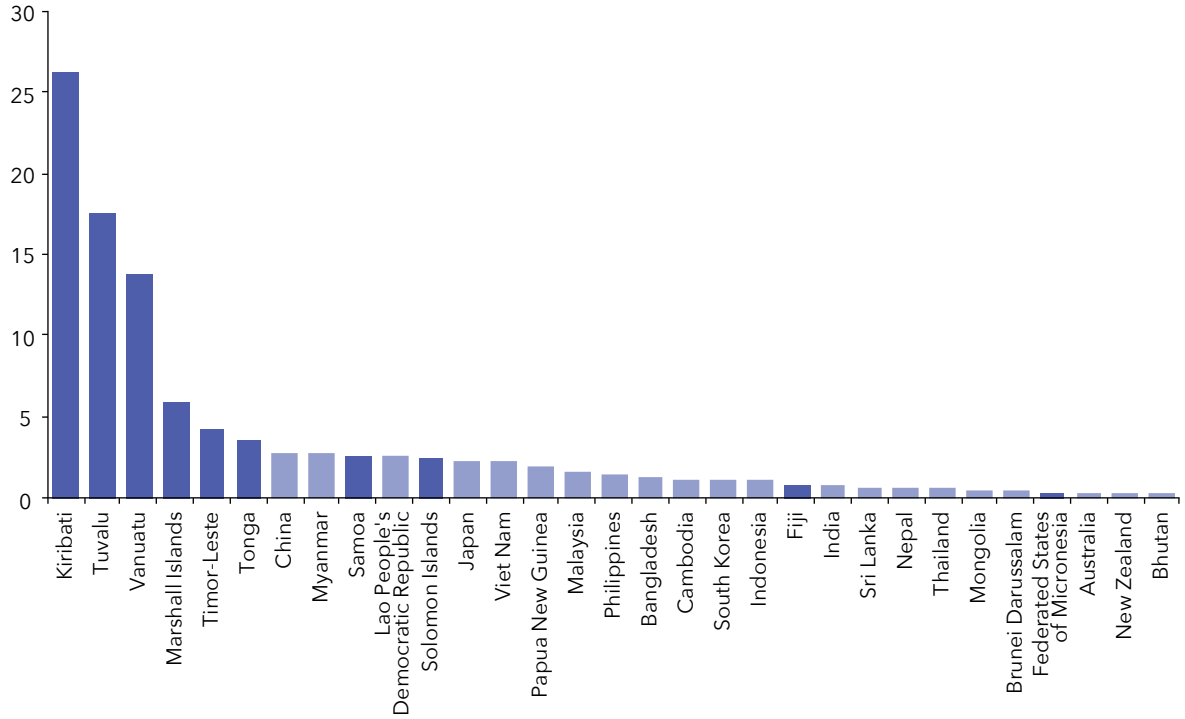
In summary, climate change destroys assets, contracts economic output, worsens external and fiscal balances and increases poverty (Rasmussen, 2006; ADB, 2024c). Therefore, economies that need to spend on rebuilding and recovery from disasters are in a relatively worse situation compared to economies which are spared from these, either by lower climate change exposure or investment in climate adaptation.

investment needs exceed 25 per cent of GDP for Kiribati, and about 15 per cent for Tuvalu and Vanuatu – far beyond fiscal capacity of these countries (figure 4.7).

**Extreme weather events decrease fiscal revenues because of declines in economic output.** For example, droughts can reduce fiscal revenues by 0.7 per cent of GDP in developing countries, mainly through the agricultural sector. This leads to a 1.5 per cent increase in primary fiscal deficit and 1.4 per cent rise in public debt. Also, the fiscal impact of natural disasters tends to last longer than the negative impact on economic growth. Notably, developed economies also experience similar revenue drops, highlighting the importance of climate adaptation, resilience and economic diversification (Fujie and others, 2023).

**Slow-onset events undermine economic performance, but their impact on fiscal revenues is difficult to measure due to their long time horizon.** Unlike extreme weather events, which are easier to quantify, the effects of slow-onset events on output and revenues are difficult to estimate. This assessment gap highlights the limitations of macroeconomic tools for cost-benefit analysis of policy action when it comes to addressing climate change, as well as the importance of further research on the impact of climate shocks on the real economy and sector-specific policy design.

Figure 4.7 Public climate change adaptation costs, percentage of GDP, annually




*Source*: Dabla-Norris and others (2021).

*Note*: The darker bars represent Pacific island States, and the lighter bars represent all other Asia-Pacific countries and areas. Bars correspond to the sum of upgrading and retrofitting costs in the public sector and coastal protection costs. The level of protection being costed corresponds to the protection that keeps average annual losses below 0.01 per cent of local GDP for protected areas.

**Environmental taxes can expand fiscal space and generate positive externalities.** These taxes can offset climate-related revenue declines. For example, Mercer-Blackman, Milivojevic and Mylonas (2023) estimated that South Asia could collect up to 1.3 per cent of GDP through carbon taxes, with a net positive impact on GDP through fiscal multipliers at 1.4 per cent, and with Gini coefficient decline of 1-5 per cent, depending on country and spending of carbon tax revenue.

### *3.7.2 Public debt sustainability*

**Debt sustainability concerns are increasingly becoming more pronounced due to progressing climate change.** Debt is sustainable as long as projects financed by debt bring higher financial returns than the cost of the debt. However, climate change reduces returns

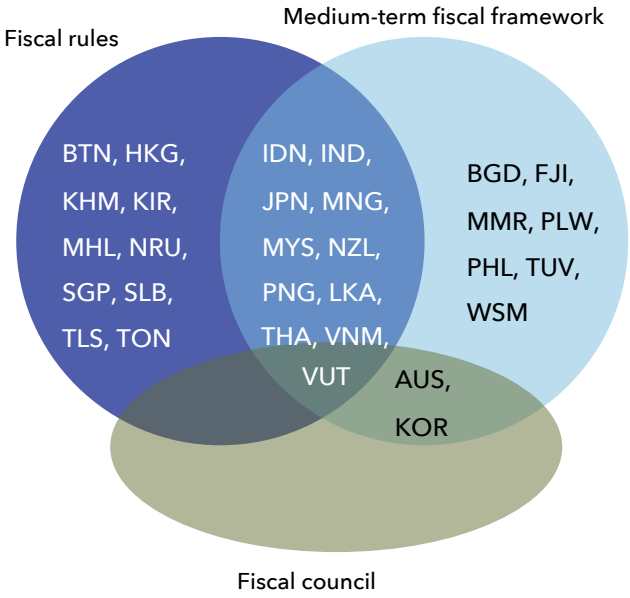
and raises costs. Slow-onset events accelerate capital depreciation, lowering returns, while climate adaptation and mitigation increase costs. Extreme weather events destroy infrastructure, eroding investments and reducing productivity. Finally, small developing economies, particularly Pacific island States, are especially vulnerable, with natural disasters linked to greater impact and economic output losses that undermine debt sustainability (IMF, 2019).

**Increased pressure on Governments to respond to climate change may weaken fiscal discipline, threatening public debt sustainability.** Asia-Pacific[8] economies use three types of fiscal frameworks: (a) fiscal rules that limit fiscal spending and deficits; (b) medium-term fiscal frameworks that set medium-term fiscal targets; and (c) fiscal councils that increase transparency, assess fiscal plans and monitor compliance while acting as independent institutions (figure 4.8). The extent of implementation of these frameworks can expose public debt sustainability to varying climate risks (Flores and others, 2024).

**Choices related to green transition paths can have significant impacts on public debt sustainability.** Public debt and fiscal revenues are the main investment financing sources for Governments; therefore, the pace, scale and financing sources of the green transition will affect debt levels. For example, Garcia-Macia, Lam and Nguyen (2024) estimated that, with carbon pricing and fiscal expenditure efficiency gains, the green transition may increase public debt by only 10 per cent of GDP by 2050. However, without carbon pricing, debt could rise by up to 50 per cent. These differences highlight the importance of fiscal revenue and expenditure reforms and policy choices for debt sustainability.

**Ambitious climate action now can reduce long-term investment costs and public debt.** Estimates suggest a 10-20 per cent cost reduction with ambitious climate action in the Asia-Pacific region now compared with delayed action beyond 2030 (ADB, 2023a). While public debt would initially rise, it would also decline in the long term relative to delayed transition scenarios (ESCAP, 2024c).

Figure 4.8 Fiscal frameworks in selected economies in Asia and the Pacific




*Source*: Flores and others, 2024.

*Note*: AUS – Australia; BGD – Bangladesh; BTN – Bhutan; FJI – Fiji; HKG – Hong Kong, China; IDN – Indonesia; IND – India; JPN – Japan; KHM – Cambodia; KIR – Kiribati; KOR – Republic of Korea; LKA – Sri Lanka; MHL – Marshall Islands; MMR – Myanmar; MNG – Mongolia; MYS – Malaysia; NRU – Nauru; NZL – New Zealand; PHL – Philippines; PLW – Palau; PNG – Papua New Guinea; SGP – Singapore; SLB – Solomon Islands; THA – Thailand; TLS – Timor-Leste; TON – Tonga; TUV – Tuvalu; VNM – Viet Nam; VUT – Vanuatu; and WSM – Samoa.

8 Pacific island States have been identified as those with particularly unique challenges for design and implementation of fiscal frameworks due to their capacity constraints, underdeveloped private sector, dependence on grants and donors, demographics and very high exposure to extreme weather and slow-onset events.

## 4. Foresight and decision-making strategies under high risk and uncertainty of climate change

**Policymakers face the challenge of addressing climate change and related issues efficiently, effectively and within available resources.** This requires understanding the impacts of climate change and climate policy, as outlined in section 2, and recognizing how climate action reflects in macroeconomic indicators, as discussed in section 3, while remaining mindful of their limitations. Crucially, policymakers must apply this knowledge to prioritize actions and design effective policies within resource constraints.

**This section discusses decision-making strategies to achieve these goals, focusing on the inherent uncertainties and risks of climate change.** The discussion points out that, often instead of relying on past data and experiences to predict the most probable future, policymakers should prepare for multiple potential scenarios. Such tools as strategic foresight and various decision-making strategies help mitigate climate action risks and uncertainties, fostering robust, impactful socioeconomic and climate policies for sustainable economic development. These strategies also address key limitations and constraints of climate action, highlighted below.

**First, the future does not repeat the past but reflects it with the addition of new factors.** It is therefore not possible to estimate one most likely scenario of the future. In contrast, "with escalating climate extremes, rapid technological advances and uncertain societal dynamics – including inequalities, growing divisions and polarization – we face a multitude of possible, probable and preferable futures that we need to anticipate, imagine and work towards" (United Nations, 2023).

**Second, insufficient data, research and understanding of the climate-economy nexus leads to decision-making under high uncertainty.** Policymakers often lack or do not reach out for adequate data to choose optimum paths that balance climate, economic and well-being goals.

**Third, climate adaptation and mitigation must consider the irreversibility of certain trends and the limits of adaptation.** For example, even with immediate and significant emission reductions, temperatures will rise until mid-century, potentially exceeding 1.5–2.0°C increases by century's end. Even halting all carbon dioxide emissions would only slow, but not reverse, climate change in this century. Similarly, sea level rise is irreversible over centuries (IPCC, 2021), necessitating long-term adaptation (IPCC, 2013). Policies must also acknowledge adaptation limits and structural causes of adaptation gaps (IPCC, 2022). For instance, not all areas can be protected from flooding at feasible costs.

**Fourth, policymakers in developing countries face higher risks of policy mismanagement than those in developed countries, which have more resources to offset errors** (IPCC, 2014a). Furthermore, many developing countries also face particularly challenging geographic locations that have harsher climate conditions. As a result, climate action is a risk management exercise where the impact of each climate policy is uncertain and varies in probability. Therefore, different decision-making approaches along with macro data are needed to enhance overall policy impact.

### 4.1 Climate change uncertainty and multiple possible futures

**Uncertainty regarding policy actions to tackle climate change stems from both the unpredictable physical impacts of climate change and from impacts of adaptation and mitigation policies.** First, unknown risks arise from extreme climate events that cannot be quantified using historical averages, thus challenging the incorporation of impacts of climate-induced disasters into policy decisions. Second, optimum economic decisions can be overshadowed by individuals' perceptions, which may exacerbate the impact of climate change and lead to misallocation of resources to less critical areas. Policymakers' limited capacity to process information further hinders effective prioritization (IPCC, 2014a), leaving unchecked adaptation, vulnerability, resilience and risk (IPCC, 2022).

**Uncertain climate warming paths and socioeconomic diversity complicate estimation of the costs of climate change impacts and policymaking.** For instance, Brown and others (2021) identified 150 potential cost estimates for sea level rise impacts on coastal areas, considering widely accepted five shared socioeconomic pathways[9] (IPCC, 2022), six warming scenarios (1.5 to 4.0°C) and five income groups. While such analyses help to develop various scenarios, their complexity and resource-intensity derived from staggering uncertainty regarding the climate change path also hinder effective climate action design. However, the opposite behaviour has also been observed. For example, Burke and others (2015b) found that most analyses overlook variations in warming paths and rainfall patterns, leading to misleading projections. Accounting for greater uncertainty would then sometimes better inform policymakers about worst-case scenarios.

9 SSP1: Sustainability ("Taking the Green Road"); SSP2: "Middle of the Road"; SSP3: Regional Rivalry ("A Rocky Road"); SSP4: Inequality ("A Road Divided"); SSP5: Fossil-fuelled Development ("Taking the Highway").

**Future climate-economy trajectories depend on current climate mitigation actions that are often held back by the inaction of stakeholders and externalities.** Conflicting priorities, power imbalances, social cues, narratives, cultures and vested interests, such as those of the fossil fuel industry, shape decisions. The global economy's interdependence, through such mechanisms as supply chains and financial markets, can obscure environmental dynamics, while subsidies may hide externality costs. Policymakers can understand these nuances better through macroeconomic data to develop localized policies, such as national green transition paths (Constantino and Weber, 2021).

**Uncertainty in climate action decision-making increases with longer implementation time frames.** Short- to medium-term policies involve lower uncertainty and risk, as the near-term future is more predictable and adaptation measures are easier to implement, reducing the margin for error. Tools, such as cost-benefit analysis (CBA), cost-effectiveness analysis (CEA), and expert advice are well-suited for these tasks. In contrast, long-term policies face greater uncertainty due to unknown factors that can distort outcomes. These require macroeconomic analyses of trade-offs among costs, benefits, and residual risks, foresight analysis, and support from decision-making strategies that account for high uncertainty, such as multi-criteria decision analysis (MCDA) or robust decision-making (RDM).

## 4.2 Limitations of commonly used decision-making frameworks for policy action

**In low-uncertainty environments, cost-benefit analysis (CBA) and cost-effectiveness analysis (CEA) and expert advice are typically the optimum methods for identifying the best solutions relative to the resources invested.** These fall into the "predict-and-act" category of decision-making, where low uncertainty allows for high likelihood of accurate prediction, effectively focusing on a single scenario in the future. However, as the number of input factors increases, uncertainties and the scope of macroeconomic and climate impact analysis expand creating a spectrum of possible future scenarios, hindering decision-making with the above methods.

**CBA and CEA analyses have limitations in decision-making for low-probability and high-impact events.** These are known as "fat tails", as described in Weitzman's "dismal theorem" (Weitzman, 2009). For example, investment in flood protection for a 1-in-100-year event may not be justified by CBA or CEA, as its low likelihood results in small expected annual loss estimates. Similarly, Anthoff and Tol (2022) argued that CBA may not be suitable for determining the intensity of reductions in greenhouse gas emissions. Furthermore, in countries with limited resources and multiple priorities, the required investments in climate adaptation may seem less justifiable by CBA loss estimates, leaving these countries exposed to often existential risks that would be highlighted as critical by other decision-making strategies.

**CEA may recommend aggressive greenhouse gas reductions as the most cost-effective strategy, but it overlooks long-term economic impacts.** By contrast, a more balanced approach, phasing out fossil fuels gradually, could avoid excessive costs. In some cases, the sunk costs of stranded assets may also outweigh the irreversible damage of climate change, making accelerated mitigation suboptimum for social welfare (IPCC, 2014a).

**Expert knowledge may strongly support climate action measures rejected by CBA or CEA, yet still focus on a single scenario in the future.** For example, Pakistan experienced severe flooding in 2010, 2011 and 2022, with the latter flooding claiming more than 1,700 lives, pushing about 9 million people into poverty, causing losses of approximately $30 billion (about 2.2 per cent of 2022 GDP), with an additional $16 billion needed for reconstruction (World Bank, 2022). In such cases, expert knowledge clarifies how climate change contributes to excessive rains, and how future investment in infrastructure and necessary policy changes can provide a shield from devastation of such low-probability yet high-impact events.

## 4.3 Strategic foresight and alternative decision-making strategies

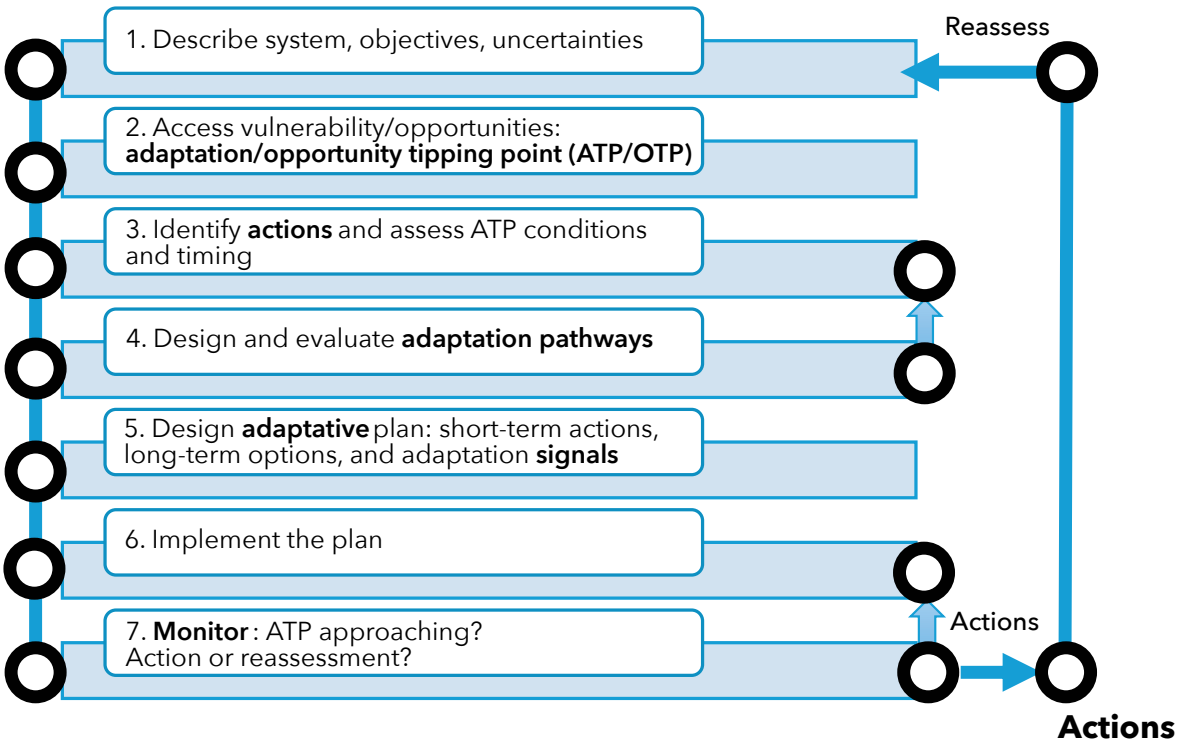
**Uncertainty and risk are inherent to decision-making, and policymakers must navigate these constraints using appropriate frameworks.** Fully implementing evidence-based policies or selecting optimum options via such tools as CBA and CEA is often unfeasible due to increasing climate and economic impact factors, poorly understood feedback loops and modelling limitations. Additionally, organizations and individuals often rely on suboptimum models and have differing perceptions of risks and time horizons, further compounding uncertainties (IPCC, 2014a). Furthermore, stakeholders often disagree on the problem's nature and potential solutions (Lempert and Turner, 2021), rendering such quantitative tools as CBA and CEA less effective. Finally, Lawrence, Haasnoot and Lempert (2020) warned that strategies that assign likelihood estimates to future scenarios give policymakers a false sense of certainty, and may result in costly policy adjustments if the estimates turn out wrong, making short-term flexible actions sometimes a more prudent choice (Hausfather and Peters, 2020). Therefore, policymakers often act within imperfect frameworks, as waiting for more data may not provide clarity, and delays may cause greater losses than acting with incomplete information. Acting despite uncertainty can also generate insights for improving future policies.

**Strategic foresight is a thinking framework promoted by the United Nations that "fosters sophisticated futures thinking to empower improved planning and cultivate better decisions amid uncertainty"** (United Nations, 2023). Strategic foresight explores various possible scenarios of the future that are later used in formulating various decision-making strategies (discussed below) and enable the building of institutional resilience against uncertainties and risks. Considering a range of possible scenarios, strategic foresight enables the identification of risks and opportunities embedded in various future scenarios, and therefore, pre-emptively warns policymakers on chances and threats. With an outlined spectrum of future scenarios, policymakers must then choose between decision-making strategies that enable the delivery of desired outcomes.

**Dynamic adaptable policy pathways** – a decision-making strategy focused on finding various possible policy actions forming a "pathways map". The map presents sequences of actions that can be taken depending on how future conditions evolve. Taking selected actions depends on adaptation tipping points, in which the current path (strategy) will not deliver expected objectives due to changes in environment, therefore indicating that alternative action is required. As such, policy paths evolve over time and address uncertainty through continuous learning and policy updates (figure 4.9) (Haasnoot and others, 2013).

**Multi-criteria decision analysis (MCDA)** – enables policymakers to rationally choose between multiple options addressing conflicting objectives or priorities, where decision criteria for each of them cannot be obviously compared, often cannot be monetized and where multiple stakeholder perspectives affect the decisions. MCDA complements CBA and CEA, in particular at earlier stages where policymakers decide on the broader direction of policy action and not on specific tools to achieve them (ONS, 2025). For example, the World Commission on Dams (2020) noted that MCDA embraces disaggregated information on social and environmental impacts into the decision analysis. They stressed that in using CBA: (a) project costs are systematically understated; (b) social and environmental impacts are not sufficiently included; (c) final design capacity was miscalculated regarding hydropower, irrigation and other benefits; (d) the uncertainties and irreversibility of investment were ignored; (e) wider economic impacts, such as economic multipliers, were omitted; and (f) it was not explicitly identified who gains and who loses from a project. In many of these dimensions, MCDA includes above criteria not expressed in monetary terms, such as environmental impact, compensating for shortages of monetary-based macroeconomic

Figure 4.9 Dynamic adaptive policy pathways




*Source*: Botzen and others (2019).

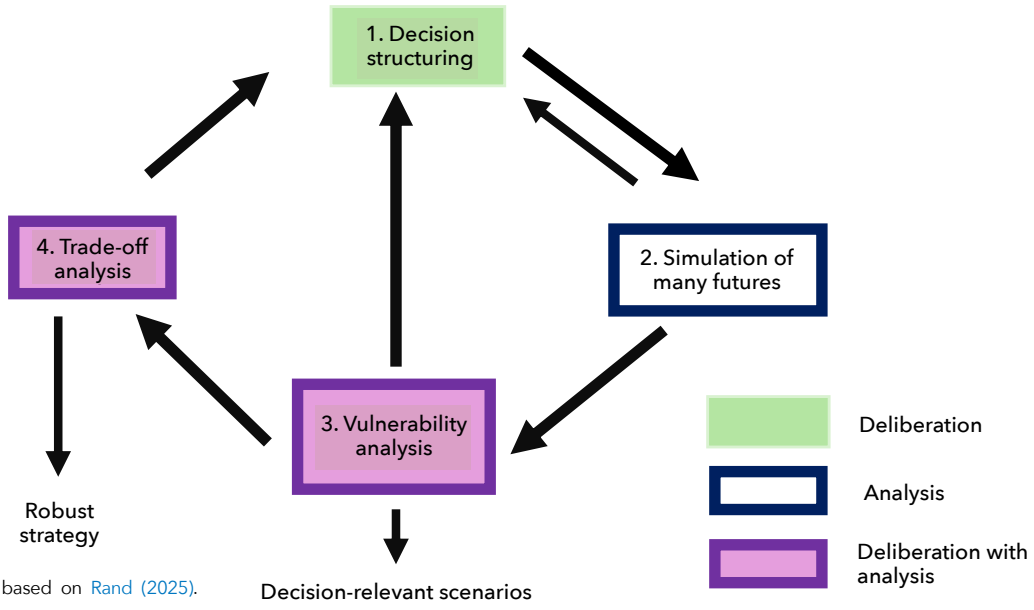
indicators. Abanda and others (2022) stressed the broad potential for application of MCDA in nationally determined contributions.[10] MCDA can help to prioritize energy technology choices, such as for the "Low Carbon, Green Growth" agenda in the Republic of Korea suggested by Lee, Mogi and Hui (2013), using key macroeconomic indicators, such as investment expenditure, energy prices and renewable energy choices, to maximize economic benefits while supporting sustainable development.

**Robust decision-making (RDM)** – this framework facilitates searching for a solution that performs well in various possible future scenarios linked to deep uncertainty, instead of a solution that performs best in a single most likely future scenario (figure 4.10). By identifying solutions that do not perform well, it also allows for improvements in robustness. RDM prioritizes "agreement-on-decision" with an intent of later evaluation and improvement, promoting learning, consensus and adaptation, and enables making "good decisions without predictions" on exact future (Lempert and others, 2013; Rand, 2025). RDM has been widely used in such areas as climate resilience, agriculture, water management, greenhouse gas emissions, investment, infrastructure planning, and carbon taxes and technology subsidy design. On the latter, for example, RDM enables finding a robust mix of the level of carbon tax and technology subsidies optimizing for GDP growth, social cost of carbon and technological progress, including design of safety valves and policies for times of recession (Kalra and others, 2014; Lempert, 2019; US CRT, 2025). Li and others (2024) noted also that RDM is an impactful tool for accelerating the progress of Sustainable Development Goal achievement in China in the face of multiple risks and uncertainties linked to pandemic impact, ageing and shrinking population, deglobalization, climate change and biodiversity loss. Policies for inclusive climate change adaptation and resource management in the Mekong Delta region also benefit from the use of RDM (Pottinger-Glass and others, 2022).

**Green defaults** – choices that promote sustainable choices as default options utilizing the behavioural impact where consumers tend to stick with default options. Green defaults are used in energy efficiency and renewable energy policies, recycling, promotion of public transportation or decreasing the environmental impact. Green defaults lead decision-makers towards environmentally and climate-desired options without reducing choice autonomy (IPCC, 2014a).

**No-regret options** – strategies or policies that bring benefits regardless of how uncertainties and risks unfold, for example those related to various economic conditions, climate changes, demographic trends, or technological advancements. They provide positive outcomes under a wide range of future scenarios, minimizing the risk of negative consequences. They enable Governments to achieve positive climate impacts at a net negative cost after inclusion of all costs and externalities. For example, markets are imperfect to a certain extent. Positive and negative externalities linked to climate action, or lack thereof, are often poorly linked to involved parties due to the lack of well-defined property rights. Therefore, there are policies whose benefits

Figure 4.10 Robust decision-making steps




*Source*: ESCAP, based on Rand (2025).

10 Commitment by each country to national climate action plans under the Paris Agreement.

outweigh implementation costs (IPCC, 2001; 2014a; IUCN, 2014). Examples include changes in consumer behaviour (e.g. electricity saving), improvement in resource use efficiency, scaling up proven technologies (e.g. energy storage in batteries) and coastal protection through the planting of mangrove forests (NEPC, 2021). Macroeconomic indicators support design of no-regret options through identification of positive externalities, economic trends and highlighting resource use inefficiencies (e.g. energy use per GDP unit) or monitoring of job creation through green transformation.

**Finally, postponing or cancelling policy actions may also be advisable when uncertainty is high, especially if decisions have irreversible consequences or lock-in effects** (IPCC, 2014a). For example, costly climate adaptation projects may become ineffective due to unexpected impacts of climate change, where even strategic foresight analysis cannot provide sufficient information on policy consequences in various future scenarios. In such cases, short-term flexible actions might be a more prudent choice (Lawrence, Haasnoot and Lempert, 2020), allowing more time for research or materialization of risks.

## 5. Conclusions

**Policymaking benefits through assessment of climate change impacts on macroeconomic indicators but has its limitations.** Macroeconomic data, estimations and forecasts are well suited for short- to medium-term guidance of socioeconomic policy choices supported by cost-benefit or cost-efficiency analyses. However, such approaches often do not provide sufficient guidance for long-term climate policy design and implementation. Macroeconomic indicators hardly capture the impacts of slow-onset climate events or do not reflect environmental degradation. Similarly, accuracy of long-term estimations and forecasts tends to fall rapidly with forecast horizon length. Therefore, economists and policymakers must look for new methods of estimation, as well as suggest new metrics that would better reflect unaccounted positive and negative externalities of climate change and policy action. Furthermore, being mindful of these limitations, policymakers should explore innovative and flexible decision-making strategies that limit uncertainty and risk impact.

**Climate change impact differs by economic sector, geographical location, level of socioeconomic development and policy environment, with nuances often well outlined in some macroeconomic indicators yet lost in others.** For example, the agricultural sector is especially vulnerable to climate change, exposing to climate risks large portions of employed populations in Asia-Pacific developing countries. These impacts are often lost in GDP estimates, but visible in employment, poverty and inflation indicators. The energy sector, indispensable for modern economic activity, is at high risk of weather-induced infrastructure damage and energy production setbacks due to limited availability of water. These impacts might be hidden for a long time, for example, within energy price influenced inflation indicators, yet well presented in damage estimates, stranded assets and depreciation estimates. Health-care costs are on the rise due to, among other things, spread of climate-related diseases and heat stress. Visible fiscal impact, however, underestimates long-term costs and losses that are hardly manifest in economic output or productivity changes, yielding to a qualitative approach. Similarly, education is disrupted by extreme weather, especially in countries with poor infrastructure, such as least developed countries, undermining the entire livelihoods of affected children thus future socioeconomic development prospects. Coastal areas, densely populated across Asia and the Pacific, face significant threats from sea level rise, biodiversity loss and extreme weather often quantified only through average annual losses, thus missing the broader economic impact and unquantifiable externalities. Tourism losses are presented in terms of damage to infrastructure and missed revenues, yet miss the strain put on public sector support for recovery at the cost of other sectors. All these impacts must be understood better locally and well communicated to ensure climate adaptation efficiency, impact and prioritization amid limited financial and human resources.

**Macroeconomic indicators support design of climate action that helps reduce impacts of climate change and avoid misinformed policies that may worsen the socioeconomic burden.** Decarbonization and green transition paths, environmental protection regulations, climate adaptation and carbon taxation are the main aspects of climate action. They have economic costs, bring returns and create positive or negative feedback loops, pointing to the need for their careful selection and prioritization. Decarbonization, linked to energy production and thus all aspects of the economy, is one of the most important examples of the climate policy and feedback loop conundrum. Therefore, the pace of decarbonization must be adjusted for country-specific energy mix and industrial profile, and balance climate priorities with related risks, such as asset stranding, structural unemployment and financial instability. So far, macroeconomic modelling delivers the best tools for selection of the optimum decarbonization path with respect to these conditions. Environmental taxes, such as carbon taxes, incentivize sustainable practices

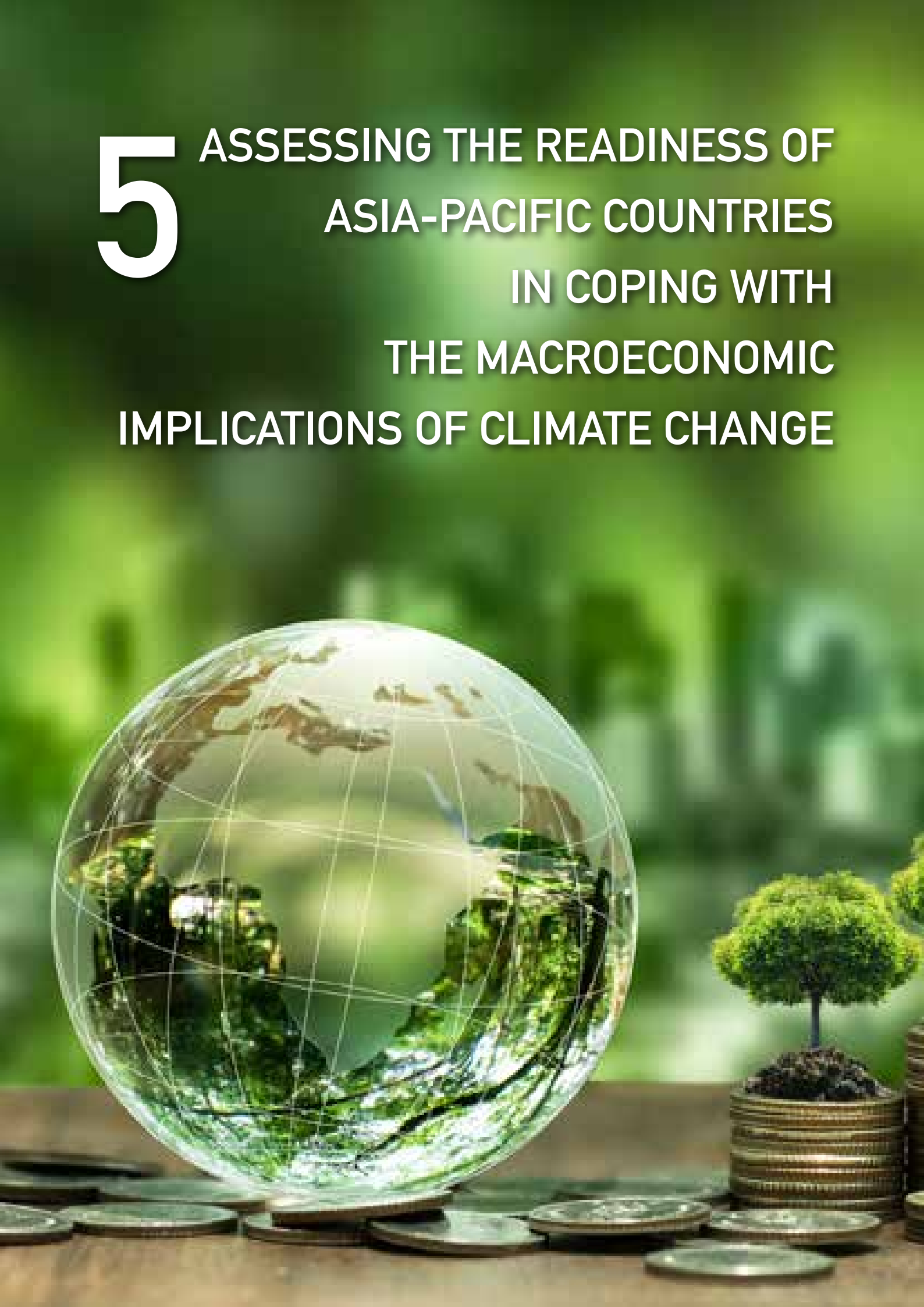
but may have negative impacts on economic growth and competitiveness, thus requiring such offsetting measures as subsidies and other tax reductions, which can be identified through changes in sectoral output and productivity. Environmental regulations, while indispensable, must also consider time frames for their implementation, hence affecting production costs and avoiding an excessive push towards asset stranding, especially in high-polluting industries. Furthermore, misguided policies can lead to substantial net socioeconomic losses, a situation that calls for selectiveness, prioritization and science-backed action choices. Finally, investment indicators point out that policymakers must lower green regulatory uncertainty as it deters companies from investment and innovation, thus also posing a significant threat to climate action.

**Fiscal policy faces increasing pressures from higher climate-related expenditures and reduced revenues; its data should be closely monitored for improved resource allocation.** Climate adaptation and mitigation expenditures are in fact unlimited. Therefore, policymakers need to balance between ambitious goals and risks that they are willing to accept, available human and financial resources and possible returns. However, policymakers must note how to interpret data. Low-probability, high-impact events, such as 1-in-100-year floods, require substantial climate adaptation expenditure with often long-unseen returns. Such decisions can often benefit from expert-led decision-making over pure cost-benefit analysis, or even more complex strategies that include multiple possible future scenarios. In contrast, climate mitigation policies are still often well informed by careful analysis of macroeconomic cost-benefit and efficiency scenarios yet require improved inputs from economic modelling. Furthermore, total climate action costs in vulnerable regions often exceed their fiscal capacities, increasing fiscal deficits and heightening debt distress risks. Given these constraints, small and vulnerable economies with a low carbon footprint, such as Pacific island States, may need to almost entirely prioritize climate adaptation over limited mitigation action, and thus use a different set of indicators than larger economies.

**Climate change has impacts on monetary policy considerations and financial stability risks through changes in inflation, interest rates, exchange rates and financial markets, creating a difficult to interpret mix of data for policymaking.** Risks arise from both climate disruptions and policies that limit carbon emissions. Inflation can result from "climateflation" (supply shocks due to weather) and "greenflation" (higher costs from climate mitigation). Long-term changes in productivity led by slow-onset events as well as short-term impacts due to extreme weather events produce adverse effects, particularly on exchange rates in developing countries. These risks complicate monetary policymaking and challenge financial stability. However, despite all being broadly known, there are large research gaps on more precise understanding of the exact contributions of climate change to observed variation in monetary indicators, thus in informing monetary policy decisions.

**Strategic foresight and various decision-making strategies for climate-oriented macroeconomic policy can help to internalize challenges posed by high risk, uncertainty, resource limitations and imperfect macroeconomic data.** Uncertainty in climate action arises from unpredictable climate impacts and complex socioeconomic feedback loops. Policymakers in developing Asia-Pacific countries also face compounded risks due to limited human, fiscal or natural resources and often harsh climate conditions. Therefore, climate action frameworks must be expanded to encompass benefits of adaptation and resilience investment, unaccounted vulnerabilities and risks, and be supported by new macroeconomic indicators that can account for externalities. To further limit uncertainties and risks, policies must be adaptive and flexible, enabling them to benefit from new information generated by prior policy action, account for feedback loop impact that may alter policy goals and paths for their achievement and relevant time frames, as well as new economic research. Strategic foresight is a framework that fosters such future thinking to enhance planning and decision-making amid uncertainty, allowing for flexible and informed policy action. By exploring various future scenarios, it helps build resilience, identifies opportunities and threats across scenarios and provides policymakers with pre-emptive insights. Policymakers can then apply this information to decision-making strategies to achieve desired outcomes. Finally, in very high-uncertainty situations, where macroeconomic data fail to inform decision-making, such strategies as precautionary principle or no-regret options often enable bypassing risks and uncertainties, while delivering necessary policy impact.

# 5 ASSESSING THE READINESS OF ASIA-PACIFIC COUNTRIES IN COPING WITH THE MACROECONOMIC IMPLICATIONS OF CLIMATE CHANGE



## 1. Introduction

**Climate change poses a significant threat to the macroeconomic stability and socioeconomic development of Asia-Pacific economies, with many of them being considered highly exposed to the impacts of climate change** (Climate Vulnerable Forum, 2022). As discussed in chapter 4, estimating the impact of climate change on various macroeconomic indicators is complex due to several reasons, including considerable uncertainty and modelling challenges. Nevertheless, the impacts are likely to be considerable. For instance, under a high-emissions scenario, GDP in Asia-Pacific countries is estimated to decline by 17 per cent by 2070 and by 41 per cent by 2100 (ADB, 2024d). As the impacts of climate change become increasingly apparent (IPCC, 2021; Kahn and others, 2021; Romanello and others, 2024; Dasgupta and Robinson, 2024), it is crucial to understand the macroeconomic exposure of Asia-Pacific countries to such risks and the extent to which those countries are able to cope with the implications of such risks.

The macroeconomic exposure channels, as expounded in chapter 4, are multifaceted, shaped not only by slow-onset and extreme weather events but also by climate mitigation and adaptation policies. Furthermore, the dimensions of climate change impacts are concurrent, interacting with each other, and often amplifying one another. Despite these challenges, climate-oriented macroeconomic policies undertaken by fiscal authorities and central banks can improve the coping capacity of countries to deal with macroeconomic implications of climate change. They can do this by, for instance, expanding tax revenues, improving a country's ability to mobilize climate financing, implementing climate-related financial policies and improving institutional readiness for climate change.

A data-driven comprehensive country-level analysis on macroeconomic exposure to climate change and coping capacities has not been conducted for the region yet. However, such an analysis is critical for economic policymaking and, given the cross-cutting nature of macroeconomic impacts, is necessary for holistic development planning.

**This chapter provides an assessment of the readiness of Asia-Pacific countries to cope with the macroeconomic implications of climate change.** It offers a holistic analysis of the region's exposure to climate-related risks and the capacity of countries to address these challenges. The chapter's value lies in its data-driven approach at the country-level for Asia-Pacific developing countries, examining both physical and transition risks across multiple indicators, and evaluating fiscal and financial coping mechanisms. Key findings reveal significant disparities in readiness across the region, with some countries facing high vulnerability due to their reliance on climate-sensitive sectors and carbon-intensive industries, while others demonstrate stronger resilience through robust fiscal resources and financial systems. The analysis underscores the urgent need for tailored policy responses, emphasizing the importance of strengthening fiscal space, enhancing use of green financial policies and improving institutional capacity to manage climate-related macroeconomic risks.

This chapter was prepared by Shuvojit Banerjee (banerjees@un.org).

The chapter is structured as follows. Section 2 provides a literature review of relevant approaches and studies to assess climate change readiness from a macroeconomic perspective. Section 3 examines the macroeconomic exposure of Asia-Pacific economies to climate change, while section 4 assesses the macroeconomic coping capacity of Asia-Pacific countries that are considered more exposed to climate change. Section 5 provides five country case studies on analysing their macroeconomic exposure and assessing their macroeconomic coping ability. Section 6 highlights policy implications, while section 7 provides concluding remarks.

## 2. Existing approaches to assess readiness from a macroeconomic perspective: a few examples

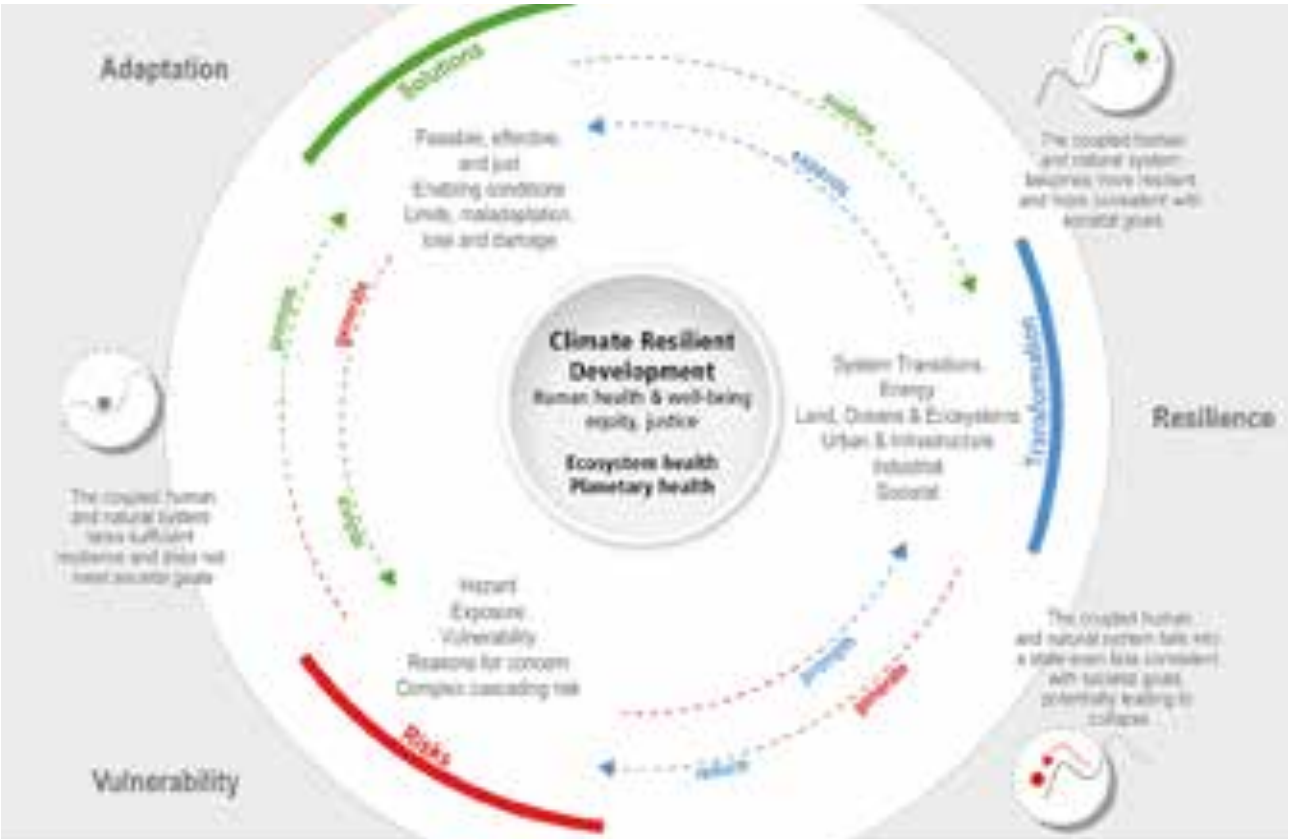
**Readiness to deal with climate change is often defined in terms of exposure and coping ability.** Exposure refers to the degree to which a system, such as countries and local communities, is subject to climate hazards, while coping ability encompasses the capacity to manage and adapt to these hazards (Adger and others, 2004). Exposure is typically measured by the frequency and severity of climate-related events, such as floods, droughts and heatwaves experienced by certain areas and economic sectors. Studies often use historical data on natural disasters and climate projections to assess the extent of exposure (IPCC, 2014b). In addition to changing climate conditions, major programmes of climate mitigation or adaptation, particularly those that involve transition in the energy sector and carbon pricing, also cause changes in key macroeconomic variables, such as GDP growth, employment, external account balance and inflation. Meanwhile, coping ability generally includes economic resilience and institutional capacity. Economic resilience is often measured by the stability of GDP per capita in the wake of various shocks, diversification of productive economic sectors and sustained financial stability. Institutional capacity is assessed through governance indicators, policy frameworks and disaster management systems (Yohe and Tol, 2002).

Given this context, IPCC defines climate vulnerability as a combination of exposure and sensitivity to climate impacts and the ability to cope and adapt to them. To illustrate the relationship between these terms – exposure, coping ability and vulnerability – figure 5.1 from IPCC (2022) provides a useful framework. The figure highlights the interplay between vulnerability, adaptation and resilience. It demonstrates how exposure leads to vulnerability and how adaptation and resilience are essential components in managing and reducing this vulnerability. Specifically, coping ability is reflected in the figure through the measures taken to enhance resilience and adapt to climate impacts. To address these vulnerabilities and enhance understanding of climate-related risks for the financial sector, the Task Force on Climate-related Financial Disclosures (TCFD) of the Financial Stability Board has developed reporting standards for climate-related financial risks, which consider both physical and transition risks as well as liability risks associated with climate change.

**Assessment of countries' vulnerability to climate change and their readiness to address and adapt to these impacts has generally been conducted by using certain indices.** One often-used index is the Notre Dame Global Adaptation Initiative Country Index (ND-GAIN) (Notre Dame, 2024). This index assesses countries' vulnerability to climate disruptions and their preparedness to attract public and private sector investment for climate action. It evaluates vulnerability across six sectors: food, water, health, ecosystem services, human habitat and infrastructure. The index also measures readiness to enhance resilience, focusing on economic, governance and social aspects. Figure 5.2 illustrates the comparative resilience of regional countries.

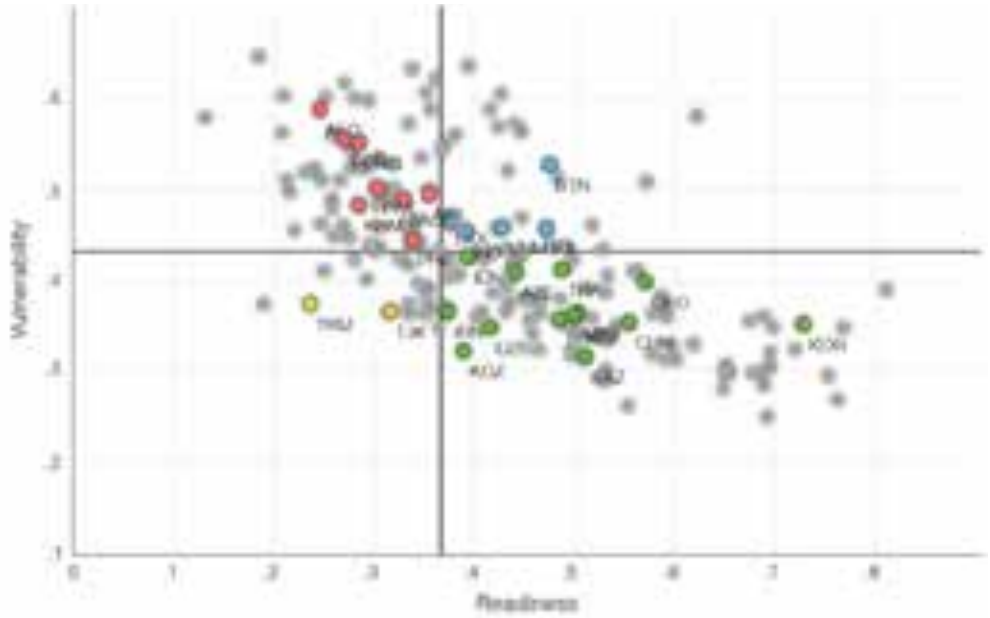
Based on the ND-GAIN index (figure 5.3) such Asia-Pacific countries as Bangladesh, Cambodia, Myanmar, Pakistan and the Philippines and numerous small island developing States face elevated socioeconomic risks from extreme weather events. In these countries, recovering from disaster-induced physical damage may be hindered by a limited capacity to quickly mobilize significant resources. For example, low readiness scores in the ND-GAIN index often reflect challenges, such as weak governance, inadequate infrastructure and limited access to technology, which can delay recovery efforts and exacerbate the socioeconomic impacts of climate-related disasters.

Figure 5.1 IPCC definition of vulnerability, adaptation and resilience



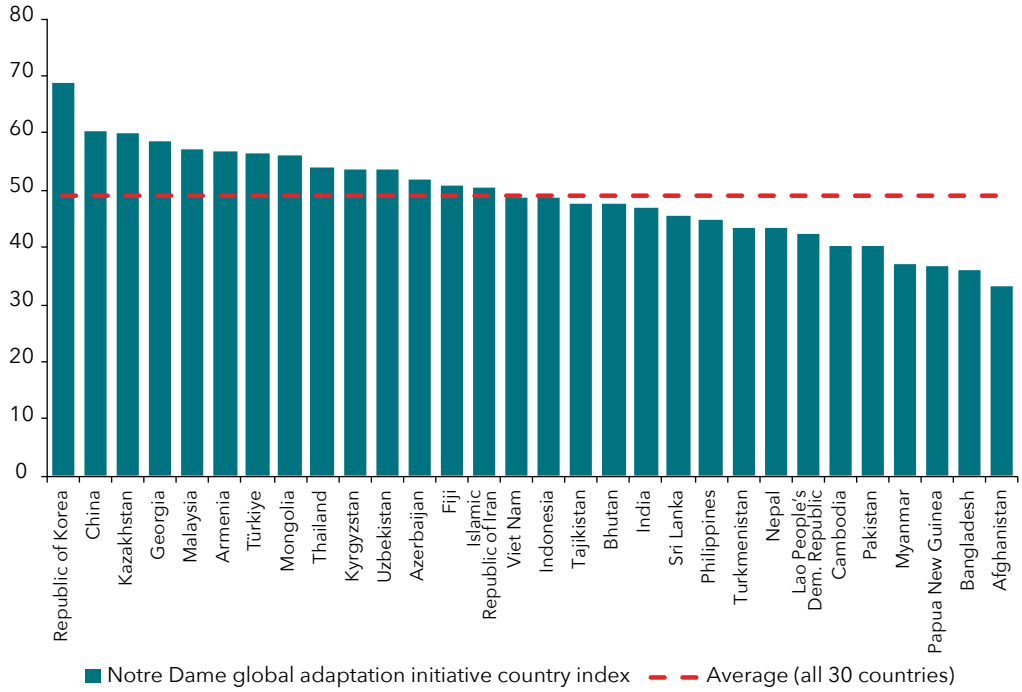

*Source*: IPCC Sixth Assessment Report (2022).

## Figure 5.2 ND-GAIN vulnerability vs. readiness in available Asia-Pacific developing economies




*Note*: The ND-GAIN Matrix of 2022. The vertical axis shows the vulnerability score and the horizontal axis shows the readiness score. Countries in the upper left quadrant (red) are those with a high level of vulnerability to climate change but a low level of readiness. Countries in the upper right quadrant (blue) are those with a high level of vulnerability to climate change and a high level of readiness. Countries in the lower right quadrant (green) are those with a low level of vulnerability to climate change and a high level of readiness. Country abbreviations are as follows: AFG (Afghanistan), ARM (Armenia), AZE (Azerbaijan), BGD (Bangladesh), BTN (Bhutan), CHN (China), FJI (Fiji), GEO (Georgia), IDN (Indonesia), IND (India), IRN (Islamic Republic of Iran), KAZ (Kazakhstan), KGZ (Kyrgyzstan), KHM (Cambodia), KOR (Republic of Korea), LAO (Lao People's Democratic Republic), LKA (Sri Lanka), MMR (Myanmar), MNG (Mongolia), MYS (Malaysia), NPL (Nepal), PAK (Pakistan), PHL (Philippines), PNG (Papua New Guinea), THA (Thailand), TJK (Tajikistan), TKM (Turkmenistan), TUR (Türkiye), UZB (Uzbekistan) and VNM (Viet Nam).

## Figure 5.3 ND-GAIN Index for available Asia-Pacific developing economies




*Source*: ND-GAIN Country Index. Available at https://gain.nd.edu/our-work/country-index/rankings/.

Another readiness assessment index to analyse overall vulnerability to climate change is the Scoring Climate Risk (Paun, Acton and Chan, 2018). This index evaluates vulnerability based on four key components: (a) physical impacts, which include temperature levels, water availability and extreme weather events; (b) sensitivity to extreme weather events, which measures the socioeconomic impacts of such events via costs of damage, number of people affected and fatalities; (c) transition risks, such as the dependency of countries on the fossil fuels used in their economies and energy systems; and (d) potential to respond, which considers the financial resources available to address physical impacts and transition risks, as well as the national governance indicators that show how well placed they are to build a response. It identifies Bangladesh, India, Pakistan, the Philippines and Sri Lanka as particularly vulnerable due to exposure to extreme weather events and limited fiscal capacity.

**Several other analyses also provide valuable insights into the macroeconomic implications of climate risks and readiness.** For instance, World Bank (2020) highlighted the examples of Bangladesh, India and the Philippines and noted that these countries face the "double jeopardy" of high climate vulnerability and significant macrofinancial risks, underscoring the need for integrated policy responses to enhance resilience. Together, these indices and studies provide an assessment of countries' vulnerabilities to climate change and their capacities to implement climate-oriented macroeconomic policies. They reinforce the importance of tailoring climate-oriented macroeconomic policies to address each country's unique risk profile and institutional readiness, and align closely with the aims of the readiness analysis in this chapter.

**Existing methodologies, however, often fall short in their applicability to Asia-Pacific countries due to several limitations.** First, they tend to focus on aggregate impacts of climate change, such as GDP losses, without adequately addressing the impacts on other macroeconomic indicators, such as inflation, sectoral disruptions and fiscal positions. For instance, such indices as ND-GAIN provide an overarching view of vulnerability and readiness but do not focus on macroeconomic components, such as inflation or government debt. Second, many studies do not comprehensively evaluate the interplay between physical and transition risks or fail to provide actionable insights tailored to the unique institutional and economic structures of Asia-Pacific countries.

This chapter addresses these gaps by employing a more nuanced approach and evaluates specific macroeconomic exposure channels and coping capacities. However, certain shortcomings remain, such as the lack of precise geolocated data for sector-specific vulnerabilities and limited availability of consistent long-term data sets across all countries in the region. These constraints highlight the need for further methodological advancements and data collection efforts to better inform policymaking in this critical area.

## 3. Macroeconomic exposure to climate change

### 3.1. Variables used in the assessment

This section is focused on the macroeconomic exposure of Asia-Pacific economies to climate change guided by a set of indicators that include average annual loss (AAL) as a share of GDP, the agricultural production share at risk to climate hazards, carbon intensity of GDP (carbon dioxide emissions per unit of GDP) and the inflationary impact due to climate change and climate action policies. The selection and grouping of these indicators reflect the need to balance analytical comprehensiveness with practical constraints, such as data availability and comparability across the region (see box 5.1). The indicators chosen represent important dimensions of exposure for both physical and transition risks and their associated macroeconomic implications. This distinction provides an analysis of both direct impacts, such as through natural disasters, and indirect effects, including disruptions to climate-sensitive economic sectors and inflationary pressures.

#### *3.1.1. Climate change and impacts on GDP*

Several Asia-Pacific countries frequently experience losses of GDP associated with extreme weather events. This section is focused on the quantification of these losses and thus provides insights into the impacts of climate change on economies. As discussed in chapter 4, climate change impacts on GDP can be categorized into immediate, event-driven losses and gradual, long-term changes. Here, we specifically examine the estimated average annual loss due to climate factors as a percentage of GDP.

**Climate shocks could lead to annual economic losses of at least 6 per cent in one third of Asia-Pacific countries** (figure 5.4). The ESCAP Asia-Pacific Risk and Resilience Portal provides information on AAL for economies of the region. AAL represents the estimated economic loss from disasters per year, based on probabilistic risk assessments of hazard frequency, intensity and exposure combined with vulnerability

### Box 5.1 Data limitations and choice of macroeconomic exposure indicators

Assessing macroeconomic exposure to climate change requires a comprehensive set of indicators that capture the various dimensions of climate-related risks. These indicators should reflect both direct impacts, such as damage from natural disasters, and indirect effects, including disruptions to economic activities and long-term fiscal implications. To provide a balanced analysis of short- and long-term impacts, it is important to distinguish between the effects of current weather variability and the expected changes in the frequency and intensity of climate-related shocks. This approach ensures a more nuanced understanding of how climate risks affect macroeconomic stability and resilience.

While the indicators identified below offer a robust framework to assess macroeconomic exposure to climate change, they face data limitations in the Asia-Pacific region. These data gaps, which are mentioned along with the description of the indicators below, prevent these indicators from being used consistently, necessitating reliance on proxies in this chapter. The data gaps also highlight the need for standardized data collection across the region to inform targeted cross-country policies. However, this analysis can be conducted at the country level where data are available.

**First, impact on sectoral output.** Such impact has been assessed for Indonesia and Thailand, using the value of agricultural production as a percentage of GDP at risk to climate hazards (ADB, 2017). In the absence of any adaptation or technological improvements, rice yields were estimated to decline by up to 50 per cent by 2100 relative to 1990 levels (ADB, 2009). This significant potential reduction underscores the severe risks posed by climate change to agricultural productivity in these countries. However, similar data are not available for most economies.

**Second, effects on the capital stock and capital formation through investment.** These impacts have been analysed, for example, for the Philippines, which reports annual infrastructure losses equivalent to 2.1 per cent of GDP (ESCAP, 2016), but comprehensive regional data sets are lacking.

**Third, impact on health and the ability of people to work, leading to lower labour input.** An available estimate for Viet Nam indicates a 5.6 per cent loss in working hours in the agricultural sector by mid-century (ILO, 2019), yet comparable data for other economies remain sparse.

**Fourth, impacts on poverty and inequality.** In Nepal, studies show how climate shocks exacerbate poverty (Dasgupta and others, 2021), but similar analyses are not widely available.

**Fifth, the insurance and banking sectors are faced with issues,** such as the accurate pricing of risks, the availability of capital after large loss events and an increasing burden of losses. In Fiji, insurers face significant difficulties in pricing post-disaster risks (Romanello and others, 2023), but systematic data across the region are absent.

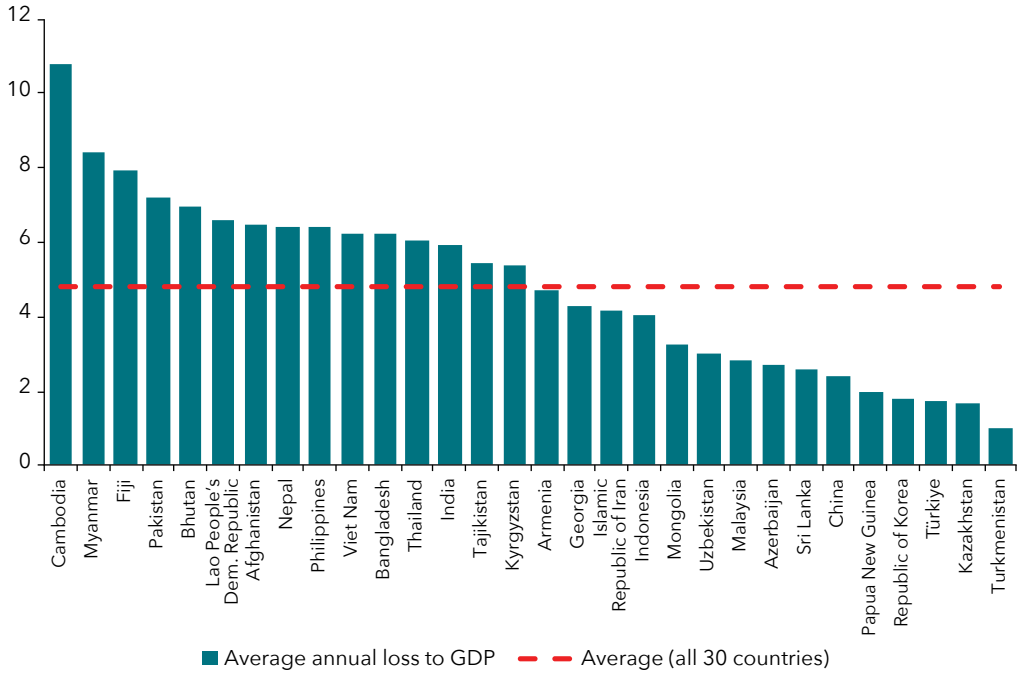
data. Historical data on disasters, such as earthquakes, tsunamis, floods and tropical cyclones, inform hazard frequency and intensity. Exposure data include information on assets at risk, such as buildings and infrastructure, while vulnerability data models potential damage under various disaster scenarios. Vulnerability functions, derived from historical data and research for the period 1995-2014, describe the probability of damage given a certain disaster intensity.

The estimates show that AAL as a share of GDP for the 30 sample countries in the ESCAP region is about 4.8 per cent. In Cambodia, AAL is almost 11 per cent of GDP, while in Fiji, Myanmar and Pakistan, it is at least 7 per cent of GDP (figure 5.4). These losses are closely associated with such factors as intensifying climate hazards; infrastructure vulnerability; economic and sectoral exposure, especially in agriculture, energy and manufacturing; and rapid urbanization and land-use changes. In terms of intensifying climate hazards, the increasing frequency and severity of extreme events, such as floods, droughts, heatwaves and tropical cyclones, are key contributors to economic losses. Cambodia's high AAL, for example, is driven by extreme floods and droughts impacting agriculture, while Fiji, Myanmar and Pakistan suffer from weak infrastructure that heightens disaster impacts. Viet Nam's exposure is worsened due to rapid urbanization and land-use changes, increasing vulnerability to coastal flooding and storms.

#### *3.1.2. Reliance on climate-sensitive sectors*

**Agriculture is a critical sector for many Asia-Pacific economies, contributing significantly to GDP, employment and food security.** However, the sector is highly vulnerable to climate change. While chapter 4 discussed the broad impact of climate change on agriculture, including on employment and broader economic stability, this section is focused on specific data-driven trends and vulnerabilities identified through agricultural value at risk. To quantify a

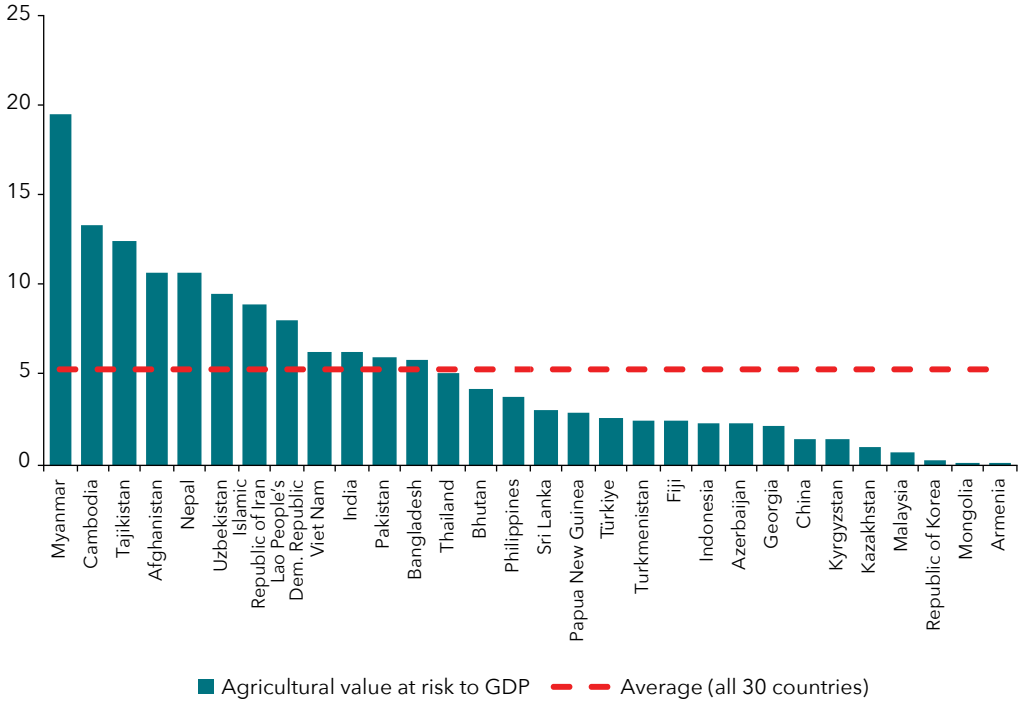
## Figure 5.4 Estimated average annual loss due to climate factors, percentage of GDP




*Source*: ESCAP analysis, based on ESCAP Asia-Pacific Risk and Resilience Portal for AAL data and World Bank for GDP data. AAL is based on the average annual losses from climate-related disasters, such as floods, tropical cyclones, earthquakes, tsunamis, droughts and biological hazards, during the period 1995-2014.

country's agricultural sector exposure to climate risks, this section employs the agricultural value at risk as a proxy. This approach offers a more precise assessment than agricultural employment data, which lacks the geospatial detail necessary to accurately identify areas most vulnerable to climate impacts. For countries with a high agriculture value at risk to GDP ratio, this result suggests that a substantial portion of agricultural employment is likely to be exposed to climate-related vulnerabilities. While there seems to be an overlap between this indicator and the AAL indicator analysed above, this indicator is distinct

## Figure 5.5 Agricultural production value at risk to climate hazards, percentage of GDP




*Source*: ESCAP analysis, based on ESCAP Asia-Pacific Risk and Resilience Portal for agricultural production exposure data and World Bank for GDP data.

in its purpose, as a proxy to infer potential impacts on agricultural employment, which differs from the aggregate economic losses captured by the AAL indicator.

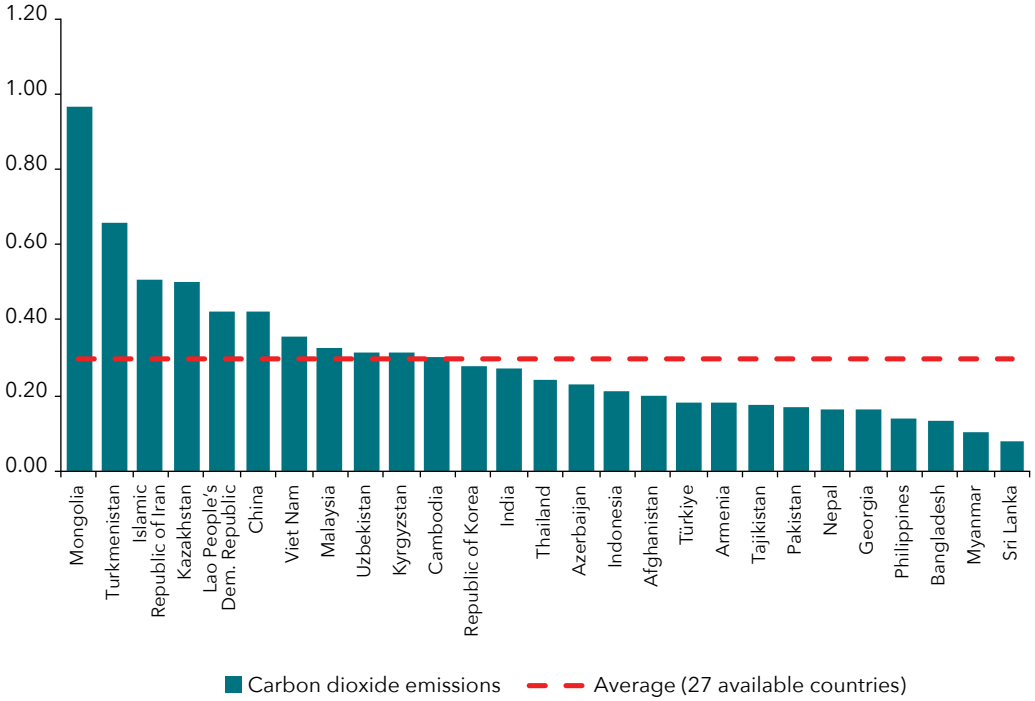
**Given the size of the agricultural sector, climate risks are quite pronounced in several Asia-Pacific economies** (figure 5.5). In Myanmar, almost 20 per cent of agricultural production value is at risk due to climate-related hazards. In Afghanistan, Cambodia, Nepal and Tajikistan, this impact is between 10 and 13 per cent. The high exposure to climate change in these countries stems from their heavy reliance on agriculture, particularly rain-fed crop production that is sensitive to changing rainfall patterns and extreme weather. Reduced crop yields can lead to lower export revenues (for example, nearly 40 per cent of Myanmar's total export revenue consists of agricultural products), volatile food prices and increased food insecurity. This, in turn, can affect economic growth (for example, the agricultural sector accounted for more than 20 per cent of Cambodia's GDP in 2022) and exacerbate poverty, particularly in rural areas where livelihoods are heavily dependent on agriculture. Another associated macroeconomic risk is the potential for inflationary pressures. As agricultural output declines, the reduced supply of food and raw materials can drive up prices, leading to higher inflation.

### *3.1.3. Dependence on carbon-intensive industries*

**Many Asia-Pacific economies rely on carbon-heavy industries for economic growth.** The global shift towards renewable energy and the implementation of decarbonization policies are leading to significant disruptions in carbon-heavy industries and exposing some countries to significant transition risks. Examples of risks include reduced economic growth, job losses, fiscal pressures, trade imbalances and challenges in accessing green technologies. The Paris Agreement is aimed at limiting global warming to well below 2°C above pre-industrial levels, which requires a substantial reduction in greenhouse gas emissions. While this has started to influence the demand for coal and oil to some extent, many countries continue to use these fuels in their industries; the full impact of the lower demand for fossil fuels may take several years to materialize.

**The carbon intensity of GDP is calculated by dividing annual carbon dioxide emissions by total annual GDP,** typically measured in kilograms of carbon dioxide per dollar of GDP (Friedlingstein and others, 2024).[1] Figure 5.6 shows carbon intensity for Asia-Pacific countries in 2022, highlighting considerable variation across economies. Figure 5.7 provides a gradient-coloured bar chart that

**Figure 5.6 Annual carbon dioxide emissions, kilograms per dollar of GDP in 2011 prices**



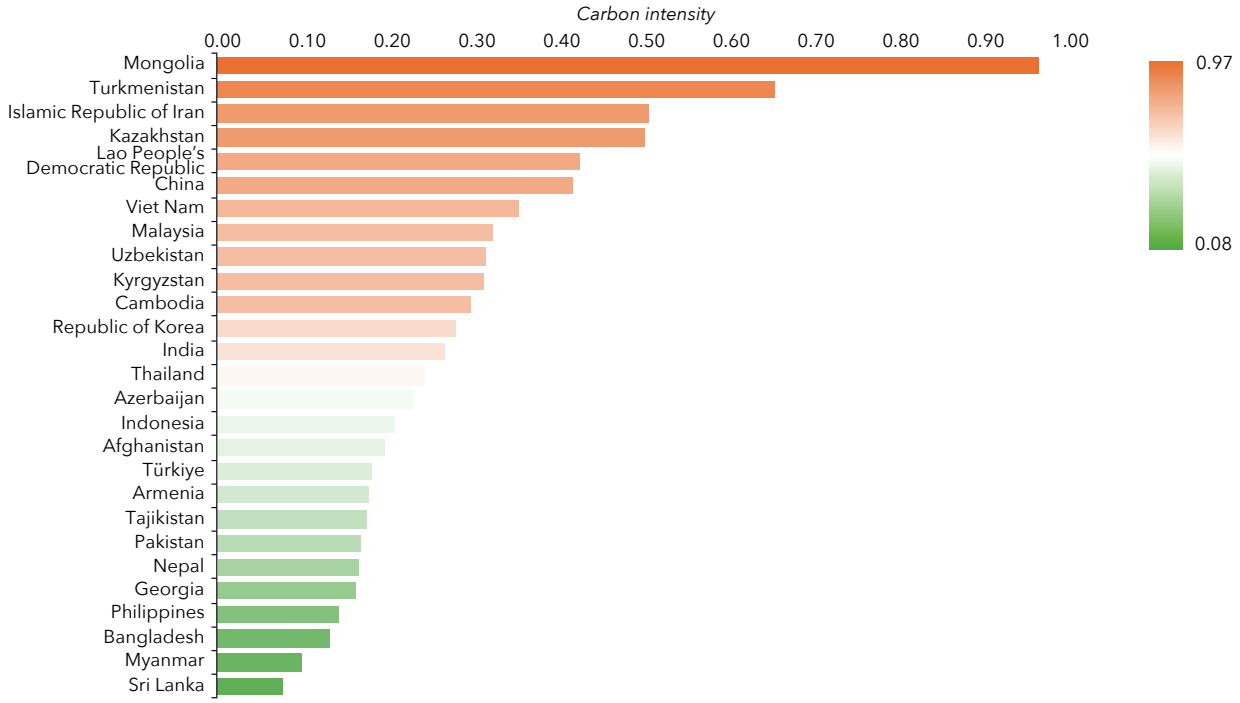

*Source*: Friedlingstein and others (2024); Bolt and van Zanden (2023) – with major processing by Our World in Data (https://ourworldindata.org/grapher/co2-intensity?tab=table).

*Note*: Among the 30 sample countries, data for Bhutan, Fiji and Papua New Guinea are not available.

1 This calculation includes emissions from fossil fuels and industry, but excludes land-use change emissions. GDP data are adjusted for inflation and differences in the cost of living between countries, expressed in international dollars at 2011 prices.

compares carbon intensity across different countries, offering a visual representation of regional and subregional differences. Figure 5.8 illustrates trends in carbon intensity of GDP from 2000 to 2022 for selected countries that had a carbon intensity exceeding the regional average in 2022. This selection criterion enables focusing on countries that are particularly relevant in the context of decarbonization efforts, providing insights into how these economies have evolved over time in terms of their carbon efficiency and thus how well positioned they are in terms of readiness for decarbonization efforts.

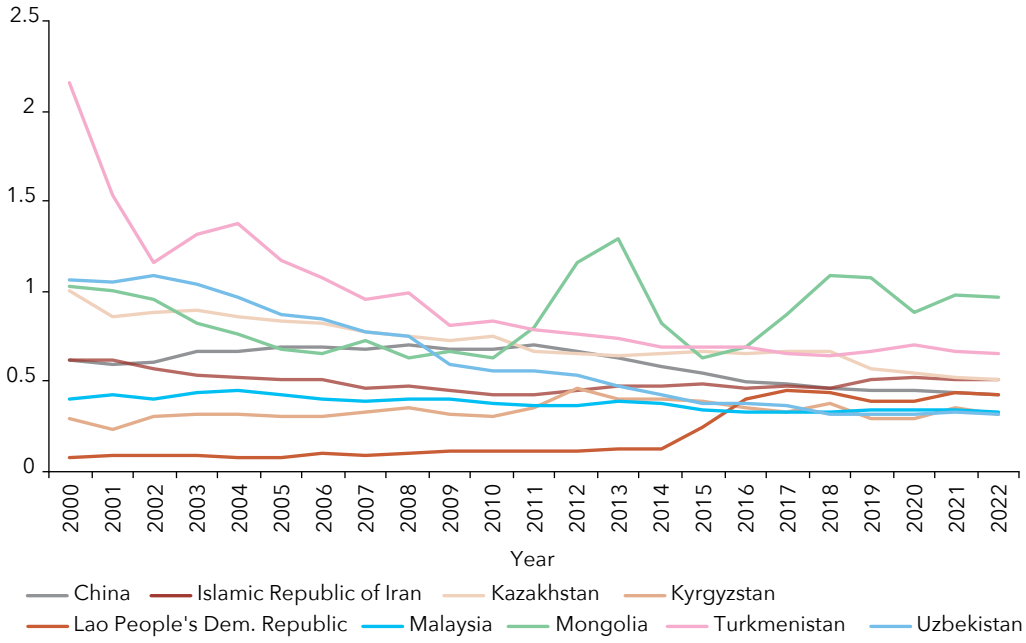
## Figure 5.7 Gradient-coloured bar chart of carbon intensity




*Source*: ESCAP analysis, based on the carbon intensity data processed by Our World in Data.

*Note*: This chart compares carbon intensity (kg $CO_2$ per dollar of GDP) across countries ranked vertically from highest to lowest intensity. Bar lengths represent absolute values, while the colour gradient (dark orange to deep green) reinforces the ranking hierarchy and highlights extremes (e.g., Mongolia: 0.97 vs. Sri Lanka: 0.08). The combination of vertical ranking and colour gradients aims to improve visual clarity of the carbon intensity variations across countries.

## Figure 5.8 Carbon intensity trend, kilograms per dollar of GDP in 2011 prices, 2000-2022




*Source*: ESCAP analysis, based on the carbon intensity data processed by Our World in Data.

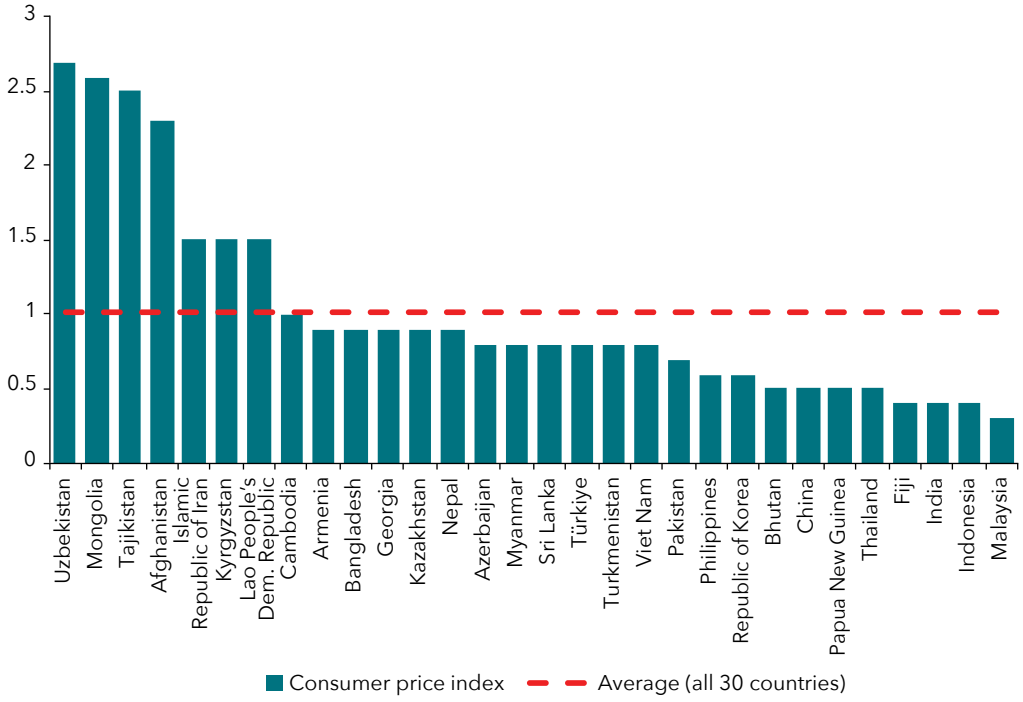
**Such countries as Mongolia and Turkmenistan, with high carbon intensities due to their reliance on fossil fuels, face higher vulnerability to decarbonization policies.** Mongolia's economy is notably carbon-intensive because of its heavy reliance on coal for power generation and heating (Ritchie, Rosado and Roser, 2020). Coal accounts for more than half of Mongolia's exports in 2022; a reduction in coal exports would lead to losses of up to 7.2 per cent in the country's GDP, while total employment could fall by up to 2.3 per cent (World Bank, 2024d). Similarly, Turkmenistan's high carbon intensity stems from its dependence on fossil fuel extraction and export, particularly natural gas and oil (UNECE, 2024). Although these dependencies drive economic growth, they also expose these countries to significant transition risks as global efforts to combat climate change intensify.

### *3.1.4. Inflationary impacts*

**The impacts of climate change and policies to mitigate its effects on agricultural output losses, productivity, energy prices, supply chain disruptions and labour markets can all contribute to inflationary pressures.** Extreme weather events can also disrupt energy production and distribution, leading to higher energy prices and overall inflation. Additionally, the transition to a low-carbon economy and the implementation of carbon pricing mechanisms, such as carbon taxes and emissions-trading schemes, can also lead to higher domestic energy prices and inflation.

Climate change is projected to push up inflation by more than 2 percentage points on average by the mid-twenty-first century in some Asia-Pacific economies. These countries include Afghanistan, Mongolia, Tajikistan and Uzbekistan (figure 5.9). Such countries as the Islamic Republic of Iran, Kyrgyzstan and the Lao People's Democratic Republic are also likely to experience inflationary impacts due to climate change of about 1.5 percentage points. These estimated inflation effects are based on countries' price index vulnerabilities to temperature and precipitation extremes, and stem from disruptions to agriculture, energy production and supply chains, as well as damage to infrastructure and industrial facilities caused by climate change. The variation among countries can be attributed to several factors. Countries with higher inflationary impacts, such as Uzbekistan, Mongolia and Tajikistan, often have economies that are heavily reliant on agriculture and fossil fuels, making them more susceptible to climate-induced disruptions. Limited economic diversification and reliance on imports from climate-vulnerable regions further exacerbate these pressures. For instance, disruptions in agricultural output due to extreme weather can lead to significant food price inflation in these countries. Without effective

**Figure 5.9 Basis point change in consumer price index due to expected climate change, by mid-century (2041-2060) with respect to 1995-2014 baseline**




*Source*: Climate Analytics, Climate Vulnerability Monitor 2022. Available at https://climatevulnerabilitymonitor.org/economics/download/.

*Note*: Countries' price index vulnerabilities to temperature and precipitation extremes are estimated and then applied to the projected climate change scenarios.

mitigation and adaptation strategies, these inflationary risks could undermine economic stability, exacerbate poverty and hinder sustainable development in the region. Conversely, countries with smaller projected inflationary impacts may benefit from more diversified economies and better infrastructure resilience. These countries often have a mix of energy sources and more robust policies to mitigate the effects of climate change, which can help reduce their overall vulnerability.

## 3.2. Assessing macroeconomic exposure to climate change

**Building on the discussion in the previous section, this section develops a heat map visualization to illustrate climate-related macroeconomic exposure across Asia-Pacific countries.** It focuses on four indicators: AAL as a share of GDP; geospatial agricultural production share at risk to climate hazards; carbon intensity of GDP (carbon dioxide emissions per GDP) and inflationary impact due to climate change and climate action policies. The selection of variables was notably influenced by availability of data to ensure adequate coverage across the region. Table 5.1 offers a classification of the indicators to better understand and address the different aspects of the impacts of climate change on economies. Specifically, physical risks arise from direct impacts of climate change on assets, infrastructure and economies, such as losses from extreme weather, and are proxied by AAL and agricultural production at risk. Transition risks, which involve financial changes associated with the shift towards low-carbon technologies and policies, are analysed through the carbon intensity of production systems. Inflationary impact, however, spans both categories. Part of the inflationary impact is due to physical risks, such as disruptions to agriculture and energy production caused by extreme weather events. Another part is due to transition risks, such as the implementation of carbon pricing mechanisms (e.g. carbon taxes and emissions trading schemes) and other policies aimed at reducing greenhouse gas emissions. Therefore, inflationary impact is categorized under dual risks.

The heat map, as seen in figure 5.10, offers a tool for comparative country analysis of macroeconomic exposure to climate change in Asia-Pacific countries. It employs a statistical threshold approach, utilizing red to indicate high exposure (values exceeding the 85th percentile) for an indicator, orange for medium exposure (values between the 65th percentile and 85th percentile) and white for low exposure (values below the 65 percentile). This classification method, based on the 65th percentile and 85th percentile, provides a comparative view of climate-related macroeconomic risks across countries in the Asia-Pacific region.[2]

**Table 5.1 Classification of variables according to physical risks and transition risks**

| Risk type | Variable | Description |
|---|---|---|
| Physical risks | Average annual loss (AAL) as percentage of GDP | Average annual loss due to multi-hazard risk as a share of GDP |
| | Agricultural value at risk as percentage of GDP | Agricultural value added at risk due to climate change as a share of GDP |
| Transition risks | Carbon intensity | Carbon dioxide emissions per dollar of GDP |
| Dual risks | Inflationary impact due to climate change | Inflationary impact due to temperature and precipitation extremes |

*Source*: ESCAP.

2 In selecting the thresholds for the heat map, several methodological approaches were considered. One alternative approach would be to set absolute thresholds for each indicator. Yet, this presents challenges in interpretation as there is no universally accepted benchmark to define what constitutes a "low" or "high" value for indicators, such as the AAL-to-GDP ratio. For this chapter, it thus was opted to use a relative assessment approach utilizing percentiles, which enables country classification to be based on the distribution of the data. While the choice of these specific percentiles (65th and 85th) may be viewed as somewhat arbitrary, the analysis also used other percentile values as alternative scenarios.

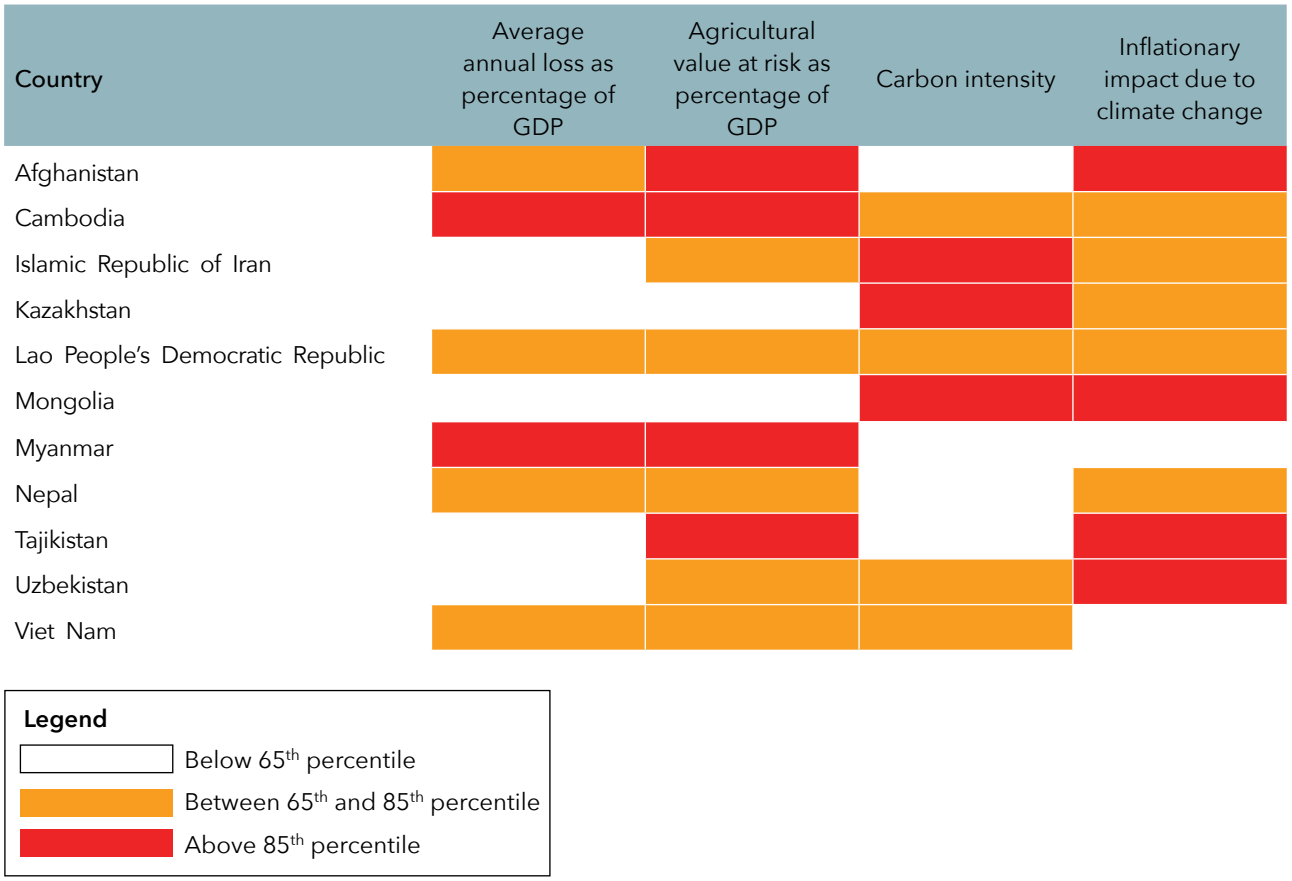
**Figure 5.10 Heat map of macroeconomic exposure to climate change for available Asia-Pacific developing economies**


*Source*: ESCAP analysis.

**The heat map underscores significant disparities in the macroeconomic exposure of Asia-Pacific countries to climate change, driven by distinct structural, geographic and economic factors.** A primary factor is the extent of reliance on climate-sensitive sectors, such as agriculture. Such countries as Cambodia, with high AAL levels and substantial agricultural value at risk, demonstrate significant exposure of the country to extreme weather and changing climate conditions. The heat map also reveals higher inflationary impacts in some countries, which can be attributed to weaker supply chain resilience, heavy reliance on imported essentials and inadequate infrastructure to mitigate price shocks emanating from climate-induced disruptions. This suggests that economic policies and structures play a crucial role in shaping a country's resilience to climate change. Furthermore, the carbon intensity of GDP (carbon dioxide emissions per unit of GDP) highlights variations in the efficiency of economic activities across countries. Higher carbon intensities may indicate greater vulnerability to future climate policies and international emission-reduction commitments, affecting long-term economic stability. These findings emphasize the interplay between economic structure, sectoral vulnerabilities and policy environments in determining disparities in exposure.

Figure 5.11 shows a subset of economies that are more exposed to the macroeconomic impacts of climate change, based on the heat map results from figure 5.10.[3] This subset includes countries that score at or above the 65th percentile for at least two indicators among the 30 countries analysed.[4] It is important to understand the limitations

**Figure 5.11 Heat map of more exposed countries, countries where at least two indicators are at the 65th percentile level or higher**




*Source:* ESCAP analysis.

3 While small Pacific islands are generally more exposed to climate change, this fact is not reflected in this analysis, mainly because only Fiji and Papua New Guinea (which are larger or more developed than other Pacific islands) are included here due to limited data availability on other islands.

4 Alternative thresholds were also considered to assess the robustness of the classification used above. Using a higher threshold — where countries must have at least two indicators above the 75th percentile—results in eight countries being classified as "more exposed," excluding Kazakhstan, Nepal and Viet Nam. Conversely, a lower threshold — where countries must have at least two indicators above the 50th percentile — expands the "more exposed" category to 19 countries, adding Bangladesh, Bhutan, India, Kyrgyzstan, Pakistan, the Philippines, Thailand and Turkmenistan.

and methodological considerations in this analysis. While reliance on climate-sensitive and carbon-intensive sectors is a significant factor contributing to higher categorization thresholds, it does not solely determine a country's overall exposure. Other variables, such as economic diversification, adaptive capacity and existing climate policies, also play essential roles. The selection of indicators, which includes losses to GDP and agricultural value added and impact of inflation, is not exhaustive. Additionally, data availability constraints mean that not all potentially exposed countries are represented as highlighted in chapter 4.

Despite these limitations, the analysis highlights key characteristics of countries' macroeconomic exposure to climate change relative to other countries in the region. The heat map highlights 11 countries: Afghanistan, Cambodia, the Islamic Republic of Iran, Kazakhstan, the Lao People's Democratic Republic, Mongolia, Myanmar, Nepal, Tajikistan, Uzbekistan and Viet Nam. These countries demonstrate varying degrees of vulnerability across different indicators, reflecting their diverse economic structures and climate-related challenges.

- First, some countries, such as Cambodia, Myanmar and Tajikistan, exhibit more pronounced physical risks. Cambodia is identified as more exposed, with an AAL-to-GDP of 10.8 per cent and an agriculture value at risk share of GDP of 13.4 per cent. These high figures can be attributed to Cambodia's extensive low-lying agricultural regions, which are particularly susceptible to flooding and extreme weather events. Similarly, Myanmar is also characterized by a relatively high AAL-to-GDP ratio of 8.4 per cent and agriculture value at risk of 19.6 per cent. Myanmar's exposure to climate-related disasters and disruptions to agricultural productivity is higher due to its extensive coastal zones and river deltas, which are prone to flooding and cyclones. Limited investment in climate-resilient infrastructure and disaster preparedness further compounds these vulnerabilities. Tajikistan displays relatively high agriculture value at risk of 12.6 per cent and inflationary impacts of 2.5 per cent. Tajikistan's mountainous terrain and dependency on hydropower make it susceptible to climate-induced water scarcity and extreme weather events, affecting both the agricultural and energy sectors.

- Second, some countries, such as Mongolia, the Islamic Republic of Iran and Kazakhstan, are more exposed to transition risks due to their reliance on carbon-intensive industries and their high emissions. For example, Mongolia demonstrates relatively high carbon dioxide emissions per GDP at 0.85 kg per 2017 PPP dollar of GDP and significant inflationary impacts of 2.6 per cent. Mongolia's reliance on carbon-intensive industries, such as mining and energy, contributes to its higher carbon intensity. As global decarbonization policies intensify, Mongolia's economic structure leaves it particularly vulnerable to economic shifts driven by these policies. The country's geographic isolation and sparse population distribution further challenge its ability to transition to a low-carbon economy.

Overall, these findings highlight the urgent need for customized climate adaptation and mitigation strategies across the Asia-Pacific region. This diverse risk landscape necessitates country-specific approaches to climate policy, ensuring that both immediate physical threats and long-term economic impacts are effectively incorporated. By targeting interventions to each country's unique challenges, policymakers can better safeguard economic stability and promote sustainable socioeconomic development in the face of climate change.

## 4. Coping capacity to respond to macroeconomic exposure to climate change

This section evaluates the ability of Asia-Pacific countries to cope with climate-related macroeconomic exposure. Three sets of factors are analysed for this purpose: (a) availability of fiscal resources; (b) ability of the financial sector to withstand physical and transition risks; and (c) institutional quality of fiscal authorities. The choice of indicators (see table 5.2) was guided by their relevance to assessing fiscal and financial preparedness, the governance quality of fiscal authorities and their applicability across diverse economic contexts in the region, ensuring practical insights while keeping data constraints in view (see box 5.2).

The availability of fiscal resources is critical for supporting recovery efforts, investing in resilient infrastructure and providing social safety nets during climate-induced disruptions. Indicators such as the tax-to-AAL ratio measure the extent to which tax revenues can cover annual losses from climate events, while climate finance mobilization, as a share of AAL, assesses the extent to which countries can attract and deploy climate-specific funding. Sovereign credit ratings provide insight into the overall financial stability and creditworthiness of a country, influencing its ability to borrow and manage debt under stress conditions, including due to impacts of climate change. Importantly, governance indicators, policy frameworks and disaster management systems are also integral to this assessment.

Countries with strong governance systems are more likely to have efficient tax collection mechanisms and transparent budget processes, ensuring that funds are allocated where needed most. Climate finance mobilization also reflects the effectiveness of policy frameworks in promoting sustainable investments.

**Table 5.2 Classification of coping capacity indicators according to fiscal and financial preparedness**

| Coping policy type | Indicator | Description |
|---|---|---|
| Fiscal resources | Tax-to-average annual losses | The share of tax revenue compared with annual average loss due to climate risks. |
| | Climate finance mobilization | Proxied with finance flows (domestic and international) for 2018 and 2019 as share of AAL, reflecting the extent to which a country secures climate financing from various sources, including the international development community, private sector and national initiatives, to address AAL-related risks. |
| | Sovereign debt ratings | Foreign currency long-term sovereign debt ratings. |
| Monetary and financial preparedness | Strength of banking sector (bank Z-scores) | Stability of the banking sector in absorbing economic shocks, including those from climate change. |
| | Financial development index | An indicator measuring financial development across both financial institutions and markets, constructed through a composite approach that normalizes and aggregates data into sub-indices assessing depth (size and liquidity), access (service availability) and efficiency (operational performance), providing a holistic measure of a country's financial system strength. |
| | Use of green financial policymaking | Mandatory or voluntary adoption of green financial policies by central banks and regulators. |
| | Ability to meet inflation targets | Gap between actual and target inflation, indicating monetary policy effectiveness in managing climate-related inflationary pressures. |
| Institutional quality | Government effectiveness | The quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation and the credibility of the Government's commitment to such policies. |
| | Public finance transparency | One of the PEFA (Public Expenditure and Financial Accountability) Framework Seven Pillars, measuring the comprehensiveness, consistency and accessibility of public financial management information. |
| | Policy-based fiscal strategies | One of the PEFA Framework Seven Pillars, assessing the alignment of fiscal strategy and budgeting with government policies and strategic plans, supported by robust macroeconomic and fiscal projections. |

Countries with robust policy frameworks and regulations are better positioned to attract international climate finance, integrate climate considerations into national budgets and implement projects that enhance resilience. Effective disaster management systems play a crucial role here, as they ensure that mobilized funds are used efficiently and transparently to mitigate and respond to climate risks. Strong governance and institutional capacity contribute to higher credit ratings, as investors and lenders consider such factors as regulatory quality, rule of law and transparency. Countries with well-developed disaster management systems are viewed as less risky, as they demonstrate an ability to manage and recover from climate-related shocks effectively.

## 4.1. Variables used in the assessment

### *4.1.1 Availability of fiscal resources*

**This section examines the coping ability of Asia-Pacific countries through fiscal resources to address the macroeconomic challenges posed by climate change.** This analysis is conducted through the lens of three key indicators, each highlighting a distinct aspect of fiscal preparedness. The first indicator, tax revenue as a share of AAL, captures what Governments can mobilize domestically to combat climate-related risks. The second indicator, climate finance mobilization as a share of AAL, evaluates the extent to which countries can secure funding from domestic and international sources to support their climate initiatives. Lastly, the sovereign credit rating score provides insight into a country's access to and cost of borrowing from financial markets, reflecting its ability to access additional funds when needed. Together, these indicators offer a comprehensive view of a country's fiscal capacity to cope with and respond to the economic pressures brought about by climate change.

## Box 5.2 Data limitations and choice of macroeconomic coping capacity indicators

Substantial changes in the structure of economies are needed to mitigate and adapt to climate change. The indicators outlined in this box represent an ideal framework for assessing macroeconomic coping capacity. However, there are significant challenges in measuring them consistently across Asia-Pacific economies. A major challenge is the lack of regional and country-specific data on the impacts of climate change on macroeconomic indicators, such as GDP per capita, labour productivity and inflation. Additionally, deep-dive studies on policy readiness to address macroeconomic risks induced by climate change are also lacking for the region. These data gaps highlight the need for standardized data collection across the region to inform targeted policies. However, this analysis can be conducted at a country level, where pertinent data are available.

**First, availability of credit for households and businesses to invest in adaptation measures. Such data face gaps as financial institutions often do not categorize loans for climate adaptation.** Although demand for such credit is growing in such countries as Bangladesh and the Philippines (UNFCCC, 2020), comprehensive data on the volume and accessibility of these loans are generally unavailable.

**Second, non-performing loans in climate-sensitive sectors are difficult to track comprehensively.** Globally, the share of non-performing loans in total assets is estimated to be about 1.2 per cent higher in countries that experienced a natural disaster between 1990 and 2018 (Feyen and others, 2020). Fiji offers a rare example, where the share of default loans rose by 2.3 per cent following Cyclone Winston in 2016 (World Bank, 2017). Available data show that the share of loans to climate-prone sectors is relatively high in Bangladesh and Cambodia where agriculture accounts for 19 and 24 per cent of total bank lending, respectively (IMF, 2023).

**Third, another possible indicator of coping capacity is the presence of a national adaptation plan or a green framework act.** However, not all countries have such plans or frameworks, and those that do often have different goals, timelines and complexities. These factors make it challenging to use national adaptation plans or framework acts as a systematic indicator for analysis. Nonetheless, in the subsequent case study section, a brief analysis is provided of national adaptation plans and green framework acts for selected countries.

### *Tax-to-AAL ratio*

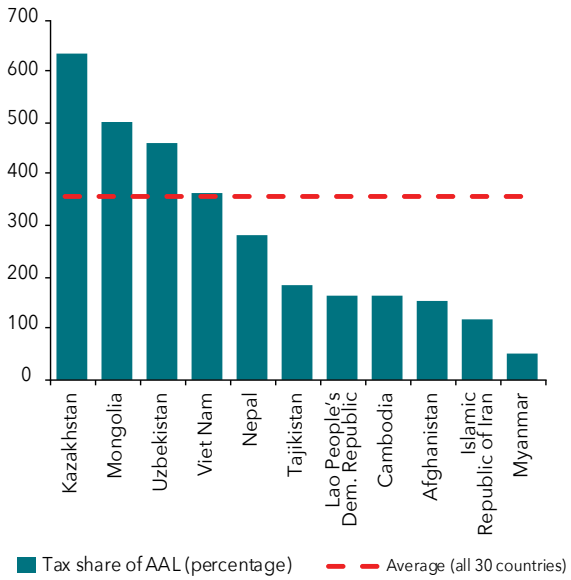
**A robust tax base is essential for financing climate change mitigation and adaptation efforts.** Strong tax bases enable countries to allocate resources towards climate initiatives without compromising other public services, especially in countries with high government debt levels. Improved tax collection enhances debt sustainability and reduces the risk of fiscal crises that could undermine implementation of climate policies. A stable fiscal position ensures consistent funding for long-term climate initiatives, such as reforestation, coastal protection and early warning systems. Adequate tax revenues provide the necessary resources for these public goods, crucial for building resilience against climate impacts.

**Compared with other exposed economies, Kazakhstan, Mongolia and Uzbekistan are in a stronger position to provide fiscal support to cover potential disaster-related losses.** Their tax revenue is at least 4.5 times AAL, which is higher than the average of Asia-Pacific developing countries (figure 5.12); this enables them to allocate more domestic tax revenues towards disaster-related losses. In other exposed economies, except for Myanmar, although their tax revenue is higher than AAL, ranging from about 2.9 times AAL in Nepal to 1.1 times AAL in the Islamic Republic of Iran, this may not indicate sufficient fiscal space as a large part or the entire tax revenue is often needed to fund recurrent public spending, such as civil service salaries and interest payments. Overall, as the tax-to-AAL ratio in nearly all more exposed economies falls below the regional average, this highlights the need for significant improvements in domestic fiscal resource mobilization.

### *Climate finance mobilization*

**Securing climate financing from various sources, including the international development community, the private sector and national initiatives, is vital for enabling countries to effectively address the dual challenges of climate change and sustainable development.** According to the United Nations Framework Convention on Climate Change (UNFCCC, 2020), climate finance encompasses local, national and transnational financial resources – derived from public, private and alternative sources – that support mitigation and adaptation actions to combat climate change. The significance of such financing extends beyond economic considerations, serving as a key enabler for technological innovation, capacity-building and the transition to low-carbon and climate-resilient economies. It also plays a vital role in safeguarding environmental sustainability and social welfare for future generations (IPCC, 2018; UNFCCC, 2020). However, as noted by the UNFCCC Standing Committee on

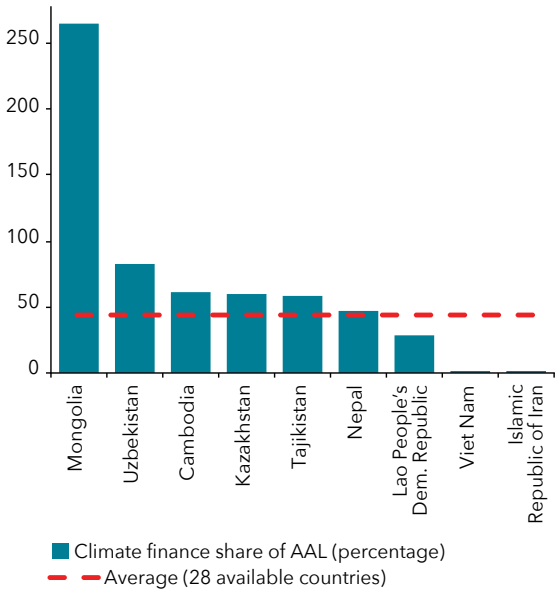
**Figure 5.12 Tax revenues as share of annual average loss, sorted from highest to lowest**




*Source*: ESCAP analysis, based on ESCAP Asia-Pacific Risk and Resilience Portal and World Bank, World Development Indicators database.

Finance, there are differing interpretations of what constitutes climate finance, including which sectors and activities are eligible, the financial instruments involved and the methods for tracking and reporting flows. These definitional ambiguities add complexity to evaluating and comparing climate finance mobilization across countries.

**Figure 5.13 Climate finance mobilization, share of average annual losses**




*Source*: Asian Development Bank (2023b).

*Note*: Among the 30 sample countries, data for Afghanistan and Myanmar are not available.

**To examine a country's access to climate finance, this section uses a country's climate finance mobilization as a proxy.** Specifically, the analysis uses climate finance flows as a share of AAL rather than comparing flows with estimated climate finance needs (ESCAP, 2023f). This approach is necessitated by the limited availability of comprehensive and consistent data on climate finance needs across countries. While a comparison with climate finance needs would have been more precise, the AAL indicator serves as a practical alternative, providing insights into the extent of financial support relative to disaster-related economic risks.

**Mongolia stands out as a country that has mobilized sizeable climate finance relative to its annual average losses.** Its climate finance stood at about 2.65 times its AAL (figure 5.13), which is much higher than the regional average of about 0.5 times. However, the country's high exposure to climate risks, such as extreme weather events (e.g. dzud and droughts), combined with its structural reliance on high-emission industries, underscores the need for continued and enhanced access to climate finance. In all other exposed economies, climate finance is smaller than AAL, ranging from 0.84 times in Uzbekistan to 0.29 times in the Lao People's Democratic Republic. Notably, the Islamic Republic of Iran and Viet Nam display close to zero climate finance. Overall, this analysis highlights countries' limited access to climate finance domestically and internationally to address critical areas, such as disaster recovery, climate resilience-building and mitigation measures.

### *Sovereign debt ratings*

The ability of a country to access financial markets, particularly through sovereign debt, plays an important role in its capacity to mobilize resources for climate adaptation, mitigation and recovery efforts. The Sovrate, developed by the World Bank, serves as a key indicator of a Government's access to financial markets and its ability to secure long-term financing. This measure is based on foreign currency long-term sovereign debt ratings, which reflect the Government's creditworthiness and its ability to access international capital.

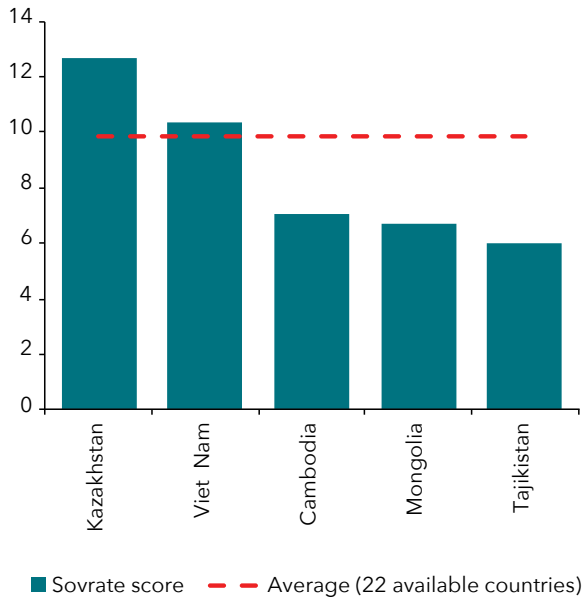
A higher score value indicates better access to financial markets, greater investor confidence and a stronger capacity to mobilize fiscal resources to address economic shocks, including those induced by climate change.

As shown in the figure 5.14, among the countries more exposed to macroeconomic risks from climate change, Kazakhstan and Viet Nam stand out with Sovrate scores above the regional average, signalling relatively stronger access to financial markets compared with their peers. These countries are better positioned to secure the fiscal resources needed to respond to climate-related economic disruptions, such as funding climate adaptation projects, recovering from climate-induced losses and stabilizing their economies during crises. In contrast, such countries as Cambodia, Mongolia and Tajikistan have Sovrate scores below the regional average, indicating weaker access to financial markets and greater vulnerability in mobilizing resources to address climate-related risks. This limited access could hinder their ability to implement climate resilience measures and recover from climate shocks. Furthermore, among the more exposed countries, data are not available for Afghanistan, the Islamic Republic of Iran, the Lao People's Democratic Republic, Myanmar, Nepal and Uzbekistan. As a result, these countries are not shown in the figure, highlighting gaps in assessing their financial market access and underscoring the challenges of inconsistent data coverage in evaluating fiscal preparedness across the region.

### *4.1.2 Monetary and financial preparedness*

This section examines the monetary and financial coping ability of Asia-Pacific countries to address the macroeconomic challenges posed by climate change. This analysis is conducted through the lens of three key indicators, each highlighting a distinct aspect of monetary and financial preparedness. First, the resilience of the banking system, measured through Z-scores, assesses the capacity of financial institutions to withstand economic shocks, including climate-related shocks. Second, the bindingness of financial authorities' green financial policymaking reflects the degree to which countries integrate climate considerations into their financial systems. Finally, the ability of central banks to meet inflation targets underlines the importance of managing inflationary pressures exacerbated by climate change. Together, these indicators offer a comprehensive analysis of the monetary and financial dimensions of readiness in coping with climate-related risks.

Figure 5.14 Sovrate (foreign currency long-term sovereign debt ratings), 2023




*Source*: World Bank (2024d).

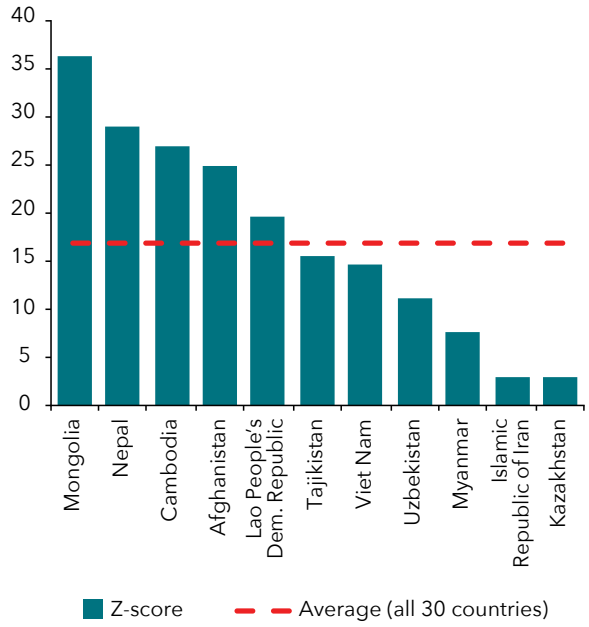
*Note*: Among the 30 sample countries, data for Afghanistan, Bhutan, the Islamic Republic of Iran, the Lao People's Democratic Republic, Myanmar, Nepal, Turkmenistan and Uzbekistan are not available.

#### *Strength of banking sector*

This indicator captures the probability of default of a country's commercial banking system. The Z-score (World Bank, 2024d) compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns. This metric captures the probability of default of a country's banking system. As such, it provides a composite measure of a bank's profitability, leverage and risk, making it a valuable tool for evaluating the banking system's coping capacity in the face of climate change. A higher Z-score is generally considered better, suggesting that the banking system is more stable and has a lower probability of insolvency.

**Relatively stronger banking systems in Afghanistan, Cambodia, the Lao People's Democratic Republic, Mongolia and Nepal suggest a greater ability to withstand economic shocks, including those induced by climate change (figure 5.15).** These relatively more resilient banking systems, with higher Z-scores, reflect more robust financial health, which is important for maintaining economic stability in the face of climate-related risks. Strong equity buffers and stable returns on assets of commercial banks reduce fiscal contingency risks in case of bank bailouts, thus freeing up fiscal resources for various purposes, including climate action. In Nepal, for example, the capital-to-asset ratio exceeds 10 per cent with stable returns on assets.

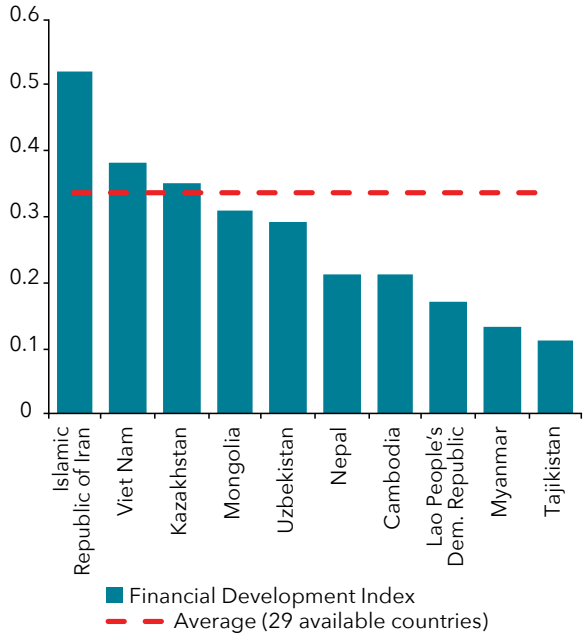
Figure 5.15 Bank Z-scores




*Source*: World Bank (2024d).

In contrast, the Islamic Republic of Iran, Kazakhstan, Myanmar, Tajikistan, Uzbekistan and Viet Nam, with Z-scores below the regional average, signal financial system fragility driven by thin equity buffers and significant return volatility. These findings underscore the importance of targeted reforms, including strengthening bank capitalization, enhancing regulatory oversight and stabilizing financial returns, to reduce insolvency risks and improve fiscal capacity in vulnerable economies.

Figure 5.16 Financial Development Index, 2021




*Source*: World Bank (2024d). Financial Development Index.

*Note*: Among the 30 sample countries, data for Afghanistan are not available.

### *Financial Development Index*

The Financial Development Index, developed by IMF, offers a comprehensive evaluation of a country's financial system by integrating both financial institutions and markets. Rather than focusing solely on managing climate-related shocks, the index reflects a broader foundation for economic resilience, enabling countries to support growth, mobilize resources and withstand diverse macroeconomic challenges. Countries with higher index scores exhibit key strengths that bolster economic stability. Greater financial liquidity enables firms to access funds through such channels as stock markets, enhancing their flexibility and resilience. A prominent role for institutional investors – such as pension funds, mutual funds and insurance companies – enables longer-term, conservative investment strategies, supporting sustained business and sovereign financing. Improved access to finance for firms and individuals builds resilience during stable periods, while higher profitability of financial institutions strengthens their lending capacity, reinforcing the financial ecosystem.

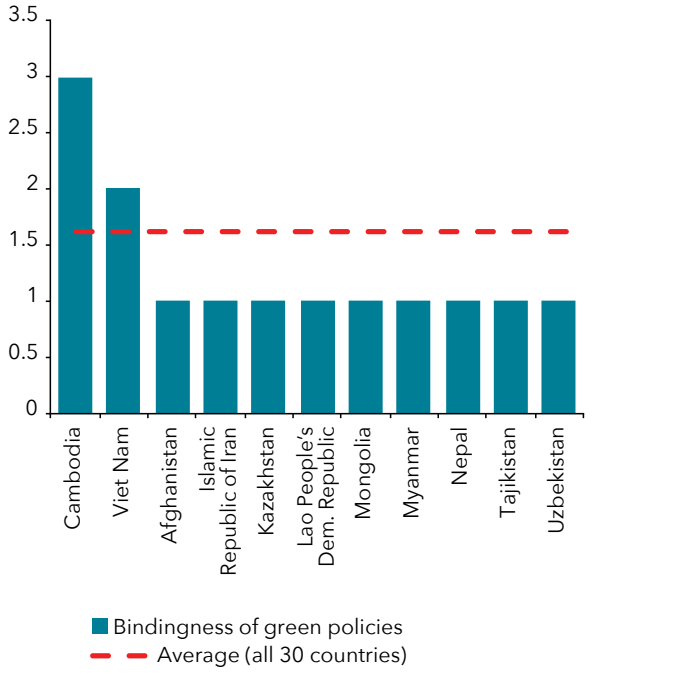
As shown in figure 5.16, among the countries more exposed to macroeconomic risks from climate change, the Islamic Republic of Iran, Kazakhstan and Viet Nam stand out with index scores above the regional average, indicating relatively stronger financial systems compared with their peers. These countries may benefit from deeper, more liquid markets, broader financial access and efficient, profitable institutions, equipping them to mobilize resources effectively for both climate risks and broader economic pressures. Mongolia and Uzbekistan also have index scores close to the average, indicating moderate financial development that supports reasonable stability. In contrast, other more exposed countries, such as Cambodia, the Lao People's Democratic Republic, Myanmar, Nepal and Tajikistan, have index scores much lower than the average, signalling significant financial vulnerabilities. These findings underscore the uneven financial development that exists across the Asia-Pacific region, where weaker financial systems may struggle to foster resilience, adapt to climate pressures and sustain recovery

efforts. The index resilts thus highlight the critical role of a strong financial framework in ensuring economic durability across diverse challenges.

***Bindingness of financial authorities' green financial policymaking***

**Another area of a country's macroeconomic coping capacity revolves around the preparedness of financial authorities in maintaining financial stability and accounting for climate change in their monetary policy frameworks.** Climate change poses a direct threat to financial stability. These physical risks can erode the value of collateral assets held by financial institutions and exacerbate insurance liabilities when such events materialize. Additionally, transition risks due to shifts in climate policies or changes in public sentiment and consumer preferences, can further destabilize financial markets. As such, there is a growing consensus that central banks and financial regulators need to play a proactive role in developing regulatory frameworks to mitigate climate-related financial risks and promote the expansion of green finance. While their efforts cannot replace comprehensive climate policy, the actions of central banks and financial regulators are indispensable in addressing both immediate and long-term climate threats to financial stability. We use the degree of "bindingness" of green financial policies implemented by central banks, financial sector regulators and non-financial institutions (such as government ministries and banking associations), as estimated by D'Orazio (2023). Five policy areas are covered, namely green prudential regulations, green credit allocation policies, green financial guidelines, other green disclosure requirements and green bonds taxonomy and issuing. Policy "bindingness" is defined as a value of 1 when there is no information on the bindingness or the policy is not binding in a country; 2 when the policy's adoption is voluntary; and 3 when it is mandatory. A higher score in this context implies higher levels of bindingness of green financial regulation as stipulated by central banks, financial regulators and non-financial institutions. The data suggest that Cambodia and Viet Nam have the highest levels of green financial policy bindingness.

Figure 5.17 Bindingness of central banks, financial regulators and non-financial institutions' green financial policymaking, 2000–2020 average




*Source*: D'Orazio (2023).

*Note*: Y-axis refers bindingness of green policies. 1: no information on the bindingness (or the policy is not binding); 2: voluntary adoption; and 3: mandatory adoption.

**In the more exposed economies, the alignment of financial frameworks with climate adaptation and mitigation goals appears limited (figure 5.17).** Cambodia and Viet Nam stand out with levels of green financial policymaking bindingness above the regional average, reflecting early steps towards integrating climate considerations into their financial regulations and practices. In contrast, other economies disclose no information on the bindingness of their policies, or their policies are not binding at all. The Islamic Republic of Iran, Mongolia and Uzbekistan, which depend heavily on carbon-intensive industries, exhibit low bindingness levels, a situation that exposes them to significant transition risks. Similarly, Kazakhstan, despite having made some initial efforts in green finance, still shows a level of bindingness below the regional average. The economy's reliance on fossil fuels and heavy industries limits the effectiveness of green financial policies, making the country susceptible to transition risks associated with global shifts towards lower-carbon economies. The Lao People's Democratic Republic, Nepal and Tajikistan also show limited progress in developing green financial policies, with challenges linked to broader institutional and policy gaps that inhibit the effective integration of climate objectives into financial systems. Afghanistan and Myanmar, with compounded challenges of limited institutional capacity and underdeveloped financial sectors, are particularly vulnerable to both climate and economic risks. These findings highlight systemic gaps in aligning financial systems with climate goals and call for targeted efforts to strengthen green financial policymaking, particularly in countries with structural financial constraints or significant transition risks.

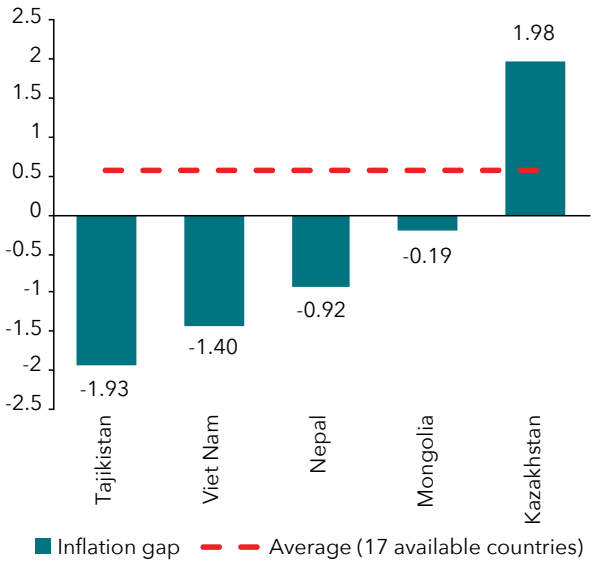
***Ability to meet inflation targets***

**The gap between actual and official inflation rates in recent years provides insight into central banks' ability to manage inflation pressures, which is crucial as climate change is expected to exacerbate inflationary pressures.** The indicator measures the gap observed over the past 10 years. A positive gap indicates that actual inflation has exceeded the target, while a negative gap suggests that inflation has been below the target. This provides a proxy for how effectively a country could manage inflationary pressures for future challenges, including climate-induced "greenflation".

**For the more exposed economies that have official inflation targets, actual inflation has generally exceeded the targets in the past decade.** Better adherence to inflation targets reflects greater ability to absorb inflationary shocks. Tajikistan, with a negative inflation gap of –1.9 percentage points (figure 5.18), demonstrates stronger inflation management and offers policy leeway for future challenges. In contrast, Kazakhstan's substantial positive gap of +2 percentage points reflects macroeconomic vulnerabilities that would undermine its capacity to address such compounded pressures as greenflation. It is important to note that only those more exposed countries with official inflation targets are shown in figure 5.18. Furthermore, the regional average for this indicator in figure 5.18 is calculated only for the subset of the total of 30 sample countries that have official inflation targets.

**However, when considering exposed economies without official inflation targets, past inflation trends reveal additional challenges.** From 2014 to 2023, the global average inflation rate was approximately 3.13 per cent, yet several more exposed economies experienced consistently higher inflation. The Lao People's Democratic Republic, Myanmar and Nepal, for instance, recorded average inflation rates exceeding 6 per cent during this period, indicating structural inflationary pressures that could hinder their ability to manage future shocks, such as greenflation. For economies with persistently high inflation, the lack of formal targets and structural challenges could exacerbate their vulnerability to external pressures, making it more difficult to implement effective monetary policies in response to future economic transitions. These results emphasize the importance of robust monetary policy frameworks as a foundation for managing transition risks and ensuring economic resilience.

Figure 5.18 Gap between actual and central bank target inflation rates, 10-year averages




*Source*: ESCAP analysis, based on World Bank Dataset (actual inflation rate) and CEIC data set (target inflation rate).

*Note*: The inflation gap is calculated as the difference between the average actual inflation rate (2014-2023) and the central bank's specified target, where lower gaps (closer to or below zero) indicate better alignment with monetary policy objectives. Among the 30 sample countries, data for Afghanistan, Azerbaijan, Bhutan, Cambodia, Fiji, the Islamic Republic of Iran, the Lao People's Democratic Republic, Malaysia, Myanmar, Papua New Guinea, Sri Lanka, Turkmenistan and Uzbekistan are not available.

### *4.1.3 Institutional quality of fiscal authorities*

This section examines the institutional coping ability of Asia-Pacific countries to address the macroeconomic challenges posed by climate change. The analysis focuses on two key indicators that highlight distinct aspects of institutional quality and effectiveness in fiscal management. First, the World Bank's "Government Effectiveness" measures perceptions of public service quality, civil service independence from political pressures, policy formulation and implementation and the credibility of government commitments. High scores indicate strong institutions capable of implementing sound fiscal policies to effectively respond to climate-related risks. Second, the World Bank "Public Expenditure and Financial Accountability" (PEFA) score, using the PEFA 2016 framework, evaluates the transparency, accountability and efficiency of public financial management systems. Together, these indicators offer a detailed view of the institutional quality of fiscal authorities, underscoring their capacity to manage and allocate resources in response to climate-induced economic pressures. Strong institutions with high levels of effectiveness and accountability are essential for building resilience against climate-related shocks and fostering sustainable development.

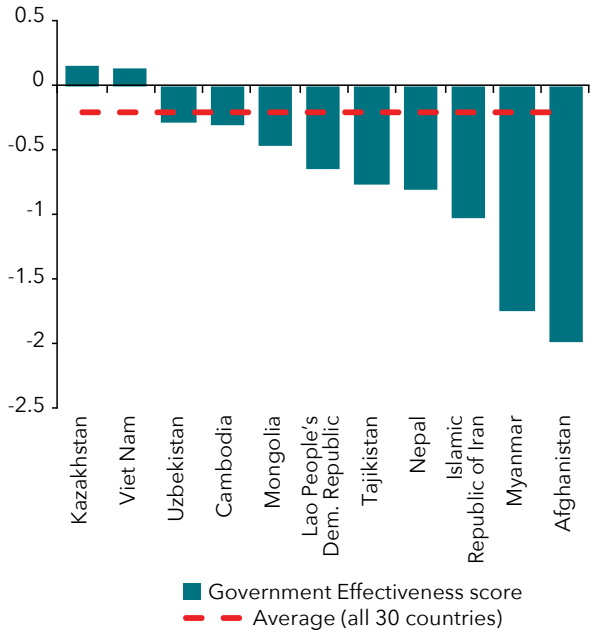
### *Government effectiveness*

This indicator is scored on a scale from –2.5 to 2.5 (World Bank, 2024d). High scores reflect strong institutions capable of effectively formulating and implementing fiscal policies. Within the context of institutional quality of fiscal authorities, the "Government Effectiveness" pillar is critical for assessing the ability to mobilize resources, implement climate adaptation measures and manage economic shocks related to climate change. Strong effectiveness enhances the credibility of fiscal policies, supports efficient allocation of climate finance and ensures that public expenditure targets impactful projects. Thus, it plays a vital role in evaluating the readiness and resilience of fiscal authorities in addressing climate-related macroeconomic challenges.

Among the 11 more exposed countries, Kazakhstan and Viet Nam have governance effectiveness scores slightly above zero, although only marginally higher than the regional average of -0.21 (figure 5.19). This suggests modestly stronger institutions but still indicates room for improvement. In contrast, the remaining nine countries score below the regional average. Cambodia, the Islamic Republic of Iran, the Lao People's Democratic Republic, Mongolia, Nepal, Tajikistan and Uzbekistan have scores between 0 and -1, reflecting challenges in governance and policy implementation. Notably, Afghanistan and Myanmar have the lowest scores, nearing -2, indicating significant institutional weaknesses exacerbated by ongoing conflicts and economic instability.

These results highlight varying levels of institutional quality among more exposed countries. Lower-scoring countries face substantial challenges in mobilizing resources and implementing effective policies to address climate-related macroeconomic risks, underscoring the need for comprehensive reforms and support.

**Figure 5.19 Government Effectiveness**




*Source*: World Bank (2024d).

### *Transparency of public finances*

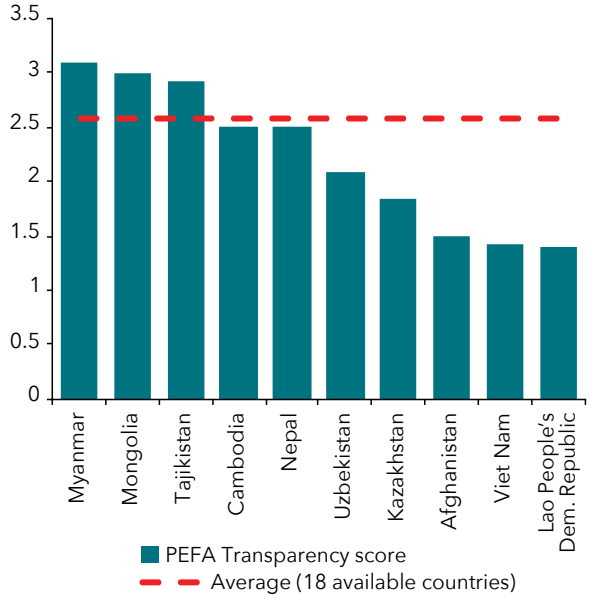
To further assess the institutional quality of fiscal authorities, we use another indicator derived from the World Bank PEFA framework. Rather than covering all 31 sub-indices across 7 pillars, we focus on "Transparency of Public Finances", a key area directly relevant to this analysis. This pillar evaluates how comprehensive, consistent and accessible information on public financial management is, covering such aspects as budget classification, documentation, reporting of government operations, transfers to subnational governments, performance information for service delivery and public access to fiscal information. For this indicator, we converted the respective indices into numerical values following the PEFA official conversion guidelines and calculated an average score, yielding the PEFA score for transparency of public finances. This score provides a concise measure of a country's ability to manage public finances transparently, which is critical for effective climate-related fiscal planning and resilience-building.

Among the more exposed countries, Mongolia, Myanmar and Tajikistan outperform the regional average in "Transparency of Public Finances" (figure 5.20), indicating relatively strong institutional frameworks for accessible and comprehensive financial management. In contrast, Afghanistan, Cambodia, the Lao People's Democratic Republic, Nepal, Uzbekistan and Viet Nam score below the regional average, highlighting significant challenges in establishing transparent financial management systems and signalling a need for substantial reforms to enhance fiscal governance. These results reflect varying levels of institutional strength, with some countries demonstrating progress while others require comprehensive improvements, particularly in the context of climate-related risks.

### *Policy-based fiscal strategy and budgeting*

In addition to transparency, we assess institutional quality using another indicator from the PEFA framework: "Policy-based Fiscal Strategy and Budgeting". This pillar examines the alignment of fiscal strategy and budget preparation with government policies,

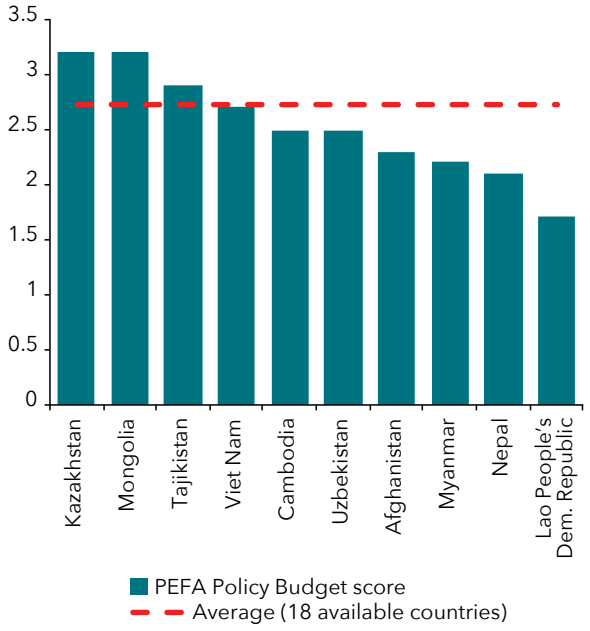
Figure 5.20 PEFA Score: Transparency of Public Finances




*Source*: World Bank Public Expenditure and Financial Accountability (PEFA) framework. Available at https://datacatalog.worldbank.org/search/dataset/0039613/public_expenditure_and_financial_accountability_pefa.

*Note*: Among the 30 sample countries, data for Azerbaijan, China, India, the Islamic Republic of Iran, Malaysia, Nepal, Pakistan, Papua New Guinea, the Republic of Korea, Sri Lanka, Thailand, Türkiye and Turkmenistan are not available.

Figure 5.21 PEFA Score: Policy-based Fiscal Strategy and Budgeting




*Source*: World Bank Public Expenditure and Financial Accountability (PEFA) framework. Available at https://datacatalog.worldbank.org/search/dataset/0039613/public_expenditure_and_financial_accountability_pefa.

*Note*: Among the 30 sample countries, data for Azerbaijan, China, India, the Islamic Republic of Iran, Malaysia, Nepal, Pakistan, Papua New Guinea, the Republic of Korea, Sri Lanka, Thailand, Türkiye and Turkmenistan are not available.

strategic plans and macroeconomic projections, focusing on robust forecasting, fiscal strategy development, medium-term expenditure planning, stakeholder participation in budget preparation and legislative scrutiny of budgets. Following the PEFA official conversion guidelines, we transformed the relevant indices into numerical values and computed an average, resulting in the PEFA score for Policy-based Fiscal Strategy and Budgeting. This score offers a robust evaluation of a country's capacity to strategically manage public finances, a cornerstone of fiscal resilience and effective climate-related planning.

Among the more exposed countries, Kazakhstan, Mongolia and Tajikistan outperform the regional average in Policy-based Fiscal Strategy and Budgeting (figure 5.21), showcasing strong alignment of fiscal policies with strategic objectives. In contrast, Afghanistan, Cambodia, the Lao People's Democratic Republic, Nepal, Uzbekistan and Viet Nam score below the regional average, highlighting weaker capacity in formulating effective fiscal strategies and indicating a pressing need to bolster institutional quality. These findings illustrate the diverse levels of fiscal strategy capability across the region, with some countries well positioned to implement sound policies while others face challenges that could hinder their response to climate-related and broader economic pressures.

## 4.2 Assessing coping capacity for climate change

The interplay between exposure to climate change and coping capacity reveals critical disparities in the readiness of Asia-Pacific countries to address the macroeconomic implications of climate change. By analysing the 30 countries in the region, we identified 11 countries as "more exposed" to climate risks: Afghanistan, Cambodia, the Islamic Republic of Iran, Kazakhstan, the Lao People's Democratic Republic, Mongolia, Myanmar, Nepal, Tajikistan, Uzbekistan and Viet Nam, as figure 5.11 shows. These countries face heightened vulnerabilities due to their geographical, structural and economic factors, which amplify their susceptibility to extreme weather events, sea level rise and other climate-related disruptions.

## Figure 5.22 Coping capacity analysis

| Country | Fiscal resources | | | Monetary and financial preparedness | | | | Institutional quality | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tax to AAL | Climate finance mobilization | Sovereign debt ratings | Strength of banking sector | Financial Development Index | Use of green financial policymaking | Ability to meet inflation targets | Government effectiveness | Public finance transparency | Policy-based fiscal strategies |
| Afghanistan | | | | | | | | | | |
| Armenia | | | | | | | | | | |
| Azerbaijan | | | | | | | | | | |
| Bangladesh | | | | | | | | | | |
| Bhutan | | | | | | | | | | |
| Cambodia | | | | | | | | | | |
| China | | | | | | | | | | |
| Fiji | | | | | | | | | | |
| Georgia | | | | | | | | | | |
| India | | | | | | | | | | |
| Indonesia | | | | | | | | | | |
| Islamic Republic of Iran | | | | | | | | | | |
| Kazakhstan | | | | | | | | | | |
| Kyrgyzstan | | | | | | | | | | |
| Lao People's Democratic Republic | | | | | | | | | | |
| Malaysia | | | | | | | | | | |
| Mongolia | | | | | | | | | | |
| Myanmar | | | | | | | | | | |
| Nepal | | | | | | | | | | |
| Pakistan | | | | | | | | | | |
| Papua New Guinea | | | | | | | | | | |
| Philippines | | | | | | | | | | |
| Republic of Korea | | | | | | | | | | |
| Sri Lanka | | | | | | | | | | |
| Tajikistan | | | | | | | | | | |
| Thailand | | | | | | | | | | |
| Türkiye | | | | | | | | | | |
| Turkmenistan | | | | | | | | | | |
| Uzbekistan | | | | | | | | | | |
| Viet Nam | | | | | | | | | | |

**Legend:**

- Red (worse than average)
- Green (better than average)
- White (data not available)
- Country name — Green (at least half the available indicators are 'green')

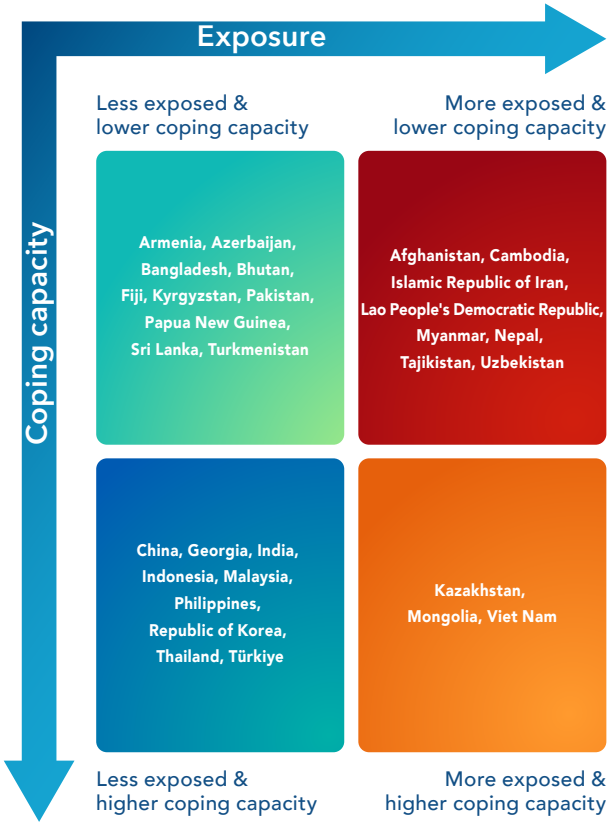
*Note*: The coping capacity of 30 Asia-Pacific countries is based on 10 key indicators. The classification of countries into "high coping capacity" is determined by their performance relative to the regional average across these indicators.

Simultaneously, our assessment of coping capacity, based on 10 key indicators, highlights significant variations in the ability of these more exposed countries to manage and mitigate climate risks. Figure 5.22 illustrates the performance of our entire sample of 30 countries across these indicators. We use white to denote data not available, green to indicate performance better than the regional average and red to signify performance worse than the regional average. It is important to note that due to data unavailability for some countries across certain indicators, the regional average is not always calculated based on all 30 countries and instead depends on the number of countries with available data for each specific indicator. A country is classified as having "high coping capacity" if at least half of its available indicators are rated green (better than average).[5] China, Georgia, India, Indonesia, Kazakhstan, Malaysia, Mongolia, the Philippines, the Republic of Korea, Thailand, Türkiye and Viet Nam meet the "high coping capacity" threshold. These countries benefit from stronger governance, more robust infrastructure and greater financial resilience, which together enhance their ability to respond to climate challenges.

However, the intersection of exposure and coping capacity paints a more nuanced picture. By simultaneously analysing exposure and coping capacity, we categorize the 30 countries into 4 distinct groups, as illustrated in figure 5.23. The horizontal axis represents coping capacity, with lower capacity on the left and higher capacity on the right, while the vertical axis represents exposure, with higher exposure at the top and lower exposure at the bottom.

1. **High exposure, lower coping capacity:** Countries in this quadrant are highly vulnerable to climate change due to their significant exposure and limited ability to cope. This group includes Afghanistan, Cambodia, Myanmar, Nepal, Tajikistan and Uzbekistan, among others. For instance, Cambodia's fiscal coping ability is weak, with tax revenue covering only 1.5 times its average annual loss from climate-related disasters, far below the threshold needed for effective resilience-building (ESCAP, 2023f). These countries require urgent support to build resilience and enhance their adaptive capacities.
2. **High exposure, higher coping capacity:** Countries in this quadrant, such as Kazakhstan, Mongolia and Viet Nam, face high exposure to climate risks but possess relatively strong coping mechanisms. While they are better equipped to manage climate-related challenges, they still

Figure 5.23 Comparison of exposure and coping capacity, available Asia-Pacific developing economies




5 Specifically, for countries with 9–10 available indicators, 5 or more green indicators are required. For countries with 7–8 available indicators, 4 or more green indicators are required. For countries with only 6 available indicators (the minimum number in our sample countries), 3 or more green indicators are required.

need targeted interventions to address their vulnerabilities. For example, Mongolia benefits from strong governance and financial resilience, which enables it to implement adaptation measures more effectively. However, its geographic location makes it highly susceptible to extreme weather events, necessitating continuous investment in resilience-building efforts.

3. **Low exposure, lower coping capacity:** This group includes countries with lower exposure to climate change but limited coping capacity, such as Pakistan and Papua New Guinea. Although they are less exposed, their weak coping mechanisms could exacerbate the impacts of even moderate climate risks. Pakistan's limited financial and infrastructural capabilities mean that even minor climate events can have disproportionately large economic impacts. Enhancing coping capacity through improved governance, financial management and infrastructure development is crucial for these countries.

4. **Low exposure, higher coping capacity:** Countries in this quadrant, such as China, Georgia, India, Indonesia, the Philippines and the Republic of Korea, have both low exposure and high coping capacity. These countries are relatively well positioned to handle the macroeconomic implications of climate change, although they must remain vigilant to emerging risks. For instance, China's robust infrastructure and financial systems provide a solid foundation for managing climate risks, but ongoing investments in green technologies and sustainable practices are essential to maintain this advantage.

These insights highlight the importance of addressing both exposure and coping capacity in tandem. While some countries have made strides in enhancing their fiscal and financial resilience, significant gaps remain, particularly in countries with limited resources and structural dependencies on climate-sensitive sectors. In moving forward, regional cooperation, targeted policy interventions and increased investment in climate adaptation will be essential to bridge these gaps and ensure a more resilient Asia-Pacific region. Understanding the specific characteristics and needs of each country group can inform more effective and tailored strategies to enhance climate resilience across the region.

## 5. Country case studies

This section presents case studies of five countries in Asia and the Pacific. To provide a diverse representation of the region, each country represents a different subregion and an income level or a classification of countries in special situations: the Republic of Korea (East and North-East Asia, high-income country), Kazakhstan (North and Central Asia, landlocked and upper-middle-income country), Vanuatu (Pacific, small island developing State), the Lao People's Democratic Republic (South-East Asia, landlocked developing country and least developed country), and Bangladesh (South and South-West Asia, least developed country). The analysis focuses on their macroeconomic exposure to climate change and their coping policies, highlighting the unique challenges and approaches in each country.

### 5.1 Republic of Korea: balancing industrial growth and climate goals

#### *Macroeconomic exposure*

The Republic of Korea faces significant macroeconomic exposure to climate change, particularly due to its carbon-intensive economy. The country's carbon intensity is relatively high at 0.28 kg of carbon dioxide per dollar of GDP, suggesting substantial exposure to transition risks as global decarbonization efforts intensify (Friedlingstein and others, 2024; Bolt and van Zanden, 2023). This high-carbon intensity stems from the country's robust manufacturing sector and heavy reliance on fossil fuels, with coal having accounted for 31.44 per cent of power generation in 2023.

#### *Coping policies*

The Carbon Neutral Green Growth Framework Act, enacted in 2021, commits to achieving net-zero emissions by 2050 and sets a 40 per cent reduction target by 2030 relative to 2018 levels (Republic of Korea, Ministry of Environment, 2021). This ambitious legislation directly addresses the country's dependence on carbon-intensive industries and provides a clear road map for transitioning to a low-carbon economy. This will not only have impacts on the revenues of related industries but will also require the government to consider green investments more extensively in public budgeting.

The Green New Deal, launched in 2020, allocates 73.4 trillion won (roughly equivalent to $66.5 billion) to renewable energy development, green infrastructure and energy efficiency improvements (Republic of Korea, Ministry of Economy and Finance, 2020). This policy is aimed at creating 659,000 jobs and transitioning the country to a greener economy, while including fiscal incentives to encourage private sector participation in green innovation, thereby enhancing climate finance mobilization.

The Republic of Korea has also implemented an emissions trading system covering about three quarters of domestic emissions (ICAP, 2024). This market-based approach provides

economic incentives for emissions reduction, addressing both the high carbon intensity and the potential inflationary impacts of climate change. Moreover, the knowledge gained from this initiative can be leveraged to boost the strength of the financial sector, as banks and investors can assess risks associated with climate change more effectively, thus supporting sustainable financing solutions.

Furthermore, the government has developed a national adaptation plan to enhance climate resilience, focusing on improving climate resilience, strengthening monitoring, forecasting and assessment, and mainstreaming adaptation in all corners of society (UNFCCC, 2021). This comprehensive approach not only bolsters the country's capability to manage climate risks but also ensures that financial resources are mobilized efficiently to support adaptation efforts.

Finally, the central bank and financial supervisory authorities in the Republic of Korea also play an important role in fostering green development. For example, the Korea Development Bank has been investing in green industries since 2009, while the Export-Import Bank of Korea is the first Asian financial institution to issue green bonds.

## 5.2 Kazakhstan: fossil fuel-dependent economy with structural climate risks

### *Macroeconomic exposure*

Kazakhstan faces high macroeconomic exposure due to its heavy reliance on carbon-intensive industries and its vulnerability to increased drought risk. In one respect, the energy sector plays a dominant role in Kazakhstan, accounting for 80 per cent of the country's total greenhouse gas emissions, with 90 per cent of these emissions coming from fossil fuel combustion (IMF, 2024). This results in the country's carbon intensity being notably high at 0.6 kg of carbon dioxide per 2017 PPP dollar of GDP (Global Carbon Budget, 2024; Bolt and van Zanden, 2023). This high carbon intensity makes Kazakhstan particularly vulnerable to transition risks as global decarbonization efforts intensify. Furthermore, climate change could significantly damage agricultural productivity, which still provided 13 per cent of employment in 2022. In the absence of adaptation, spring wheat yields in Kazakhstan are projected to decline by as much as 50 per cent by the 2050s due to higher temperatures and reduced soil moisture (World Bank and ADB, 2021b). Such grain yield losses are expected to have notable implications for global food security, as Kazakhstan is one of the largest exporters of grain in the world.

### *Coping policies*

The "Green Economy Concept", adopted in 2013, sets ambitious targets to reduce energy intensity by 30 per cent by 2030, transition to 50 per cent renewable energy and eliminate national water shortages by 2050 (Kazakhstan, Ministry of Environmental Protection, 2013). This policy is crucial for diversifying the economy and reducing reliance on fossil fuel exports, thereby mitigating transition risks associated with global decarbonization efforts. The highlighted sustainable water management and the modernization of agricultural practices also help to reduce the impacts of drought. As of 2017, Kazakhstan had already reduced its energy intensity by 18 per cent compared with 2008, indicating progress towards the 2030 target. The renewable energy sector has also seen growth, with total installed capacity reaching 531 MW by the end of 2018, up from 177 MW in 2014. However, the share of renewable energy in total electricity generation remains low at about 0.4 per cent, highlighting the need for further efforts to achieve the 50 per cent target by 2050 (PAGE, 2020).

The "Environmental Code", updated in 2021, is aimed at aligning Kazakhstan's environmental legislation with OECD standards and introducing the "polluter pays" principle (Kazakhstan, Ministry of Justice, 2021). This policy addresses both the high carbon intensity and the potential economic losses from climate-related disasters by promoting more sustainable environmental management and incentivizing cleaner production methods.

Kazakhstan has pledged to reduce greenhouse gas emissions by 15-25 per cent between 1990 and 2030 and reach carbon neutrality by 2060 (Kazakhstan, Ministry of Ecology and Natural Resources, 2023). These commitments demonstrate the country's recognition of the need to transition away from its current carbon-intensive economic model. Despite these commitments, Kazakhstan's GHG emissions continue to grow; the country is projected to miss its 2030 target by approximately 45 million tons of carbon dioxide equivalent. Therefore, significant challenges remain, particularly in the energy sector, which accounts for 85 per cent of the country's GHG emissions (PAGE, 2020).

In 2019, Kazakhstan started its "National Adaptation Plan" (NAP) process, which involved extensive consultations at national and subnational levels (The Astana Times, 2024). As part of the UNDP "Community-Based Adaptation" (CBA) programme, Kazakhstan works with communities to integrate climate change concerns into sustainable rangeland and agricultural management practices, and work with local water managers to integrate climate change concerns into irrigation regimes for climate-resilient and sustainable agriculture. These approaches recognize that much of the adaptation action would be implemented

at the subnational level, ensuring that local vulnerabilities are addressed effectively. By enhancing climate resilience, the NAP and CBA are aimed at protecting agricultural productivity, which is vital for both national employment and global food security.

## 5.3 Vanuatu: small island economy facing severe climate impacts

### *Macroeconomic exposure*

Vanuatu faces severe macroeconomic exposure to climate change, particularly in terms of climate damage and impact on GDP. As a small island developing State, Vanuatu is highly vulnerable to the physical impacts of climate change, including sea level rise, ocean acidification and increased frequency and intensity of tropical cyclones. Moreover, its economy remains strongly oriented towards agriculture, particularly in rural areas, with agriculture, forestry and fishing having contributed 21.22 per cent to GDP in 2018 (World Bank, 2018). Food products constituted about 63 per cent of exports in 2023 (UNCTAD, 2024). Simultaneously, Vanuatu is highly dependent on imports for food and energy, resulting in high vulnerability to price shocks and disaster events. The country's AAL as a share of GDP is very high at 18.9 per cent, indicating substantial economic vulnerability to climate-related disasters (ESCAP Asia-Pacific Risk and Resilience Portal). The country's exposure to natural hazards, extensive low-lying coastal zone, development context and precarious natural resource base mean it is among the most vulnerable countries in the world to climate change.

### *Coping policies*

The Vanuatu Infrastructure Strategic Investment Plan 2015-2024, essential for bolstering infrastructure resilience and implementing disaster risk reduction strategies, outlines priority projects that promote economic growth and enhance the climate resilience of rural agricultural communities. These measures are vital given the country's significant dependence on agriculture for employment and export revenues, which are susceptible to extreme weather events.

The National Climate Change and Disaster Risk Reduction Policy 2016-2030 provides a comprehensive framework for addressing climate change impacts and promoting resilience (Vanuatu, Prime Minister's Office and others, 2016). This policy is aimed at improving coordination across ministries, departments and stakeholders in responding to climate-related challenges.

Vanuatu has made an ambitious commitment in its nationally determined contributions to transition to nearly 100 per cent renewable energy in the electricity sector by 2030 (Government of Vanuatu, 2020). This commitment is essential not only for mitigating potential economic losses from climate change but also for transitioning to a low-carbon economy that enhances energy security and reduces dependence on imported fossil fuels, thereby addressing the country's trade deficit and associated vulnerabilities. In 2022, renewable sources accounted for 23 per cent of electricity generation in Vanuatu (IRENA, 2024).

In 2022, Vanuatu launched its National Policy on Climate Change and Disaster-induced Displacement (IOM, 2022). This policy provides a national road map for mitigating challenges related to climate-induced displacement, ensuring that vulnerable populations receive the support they need as climate impacts escalate. By providing effective mechanisms for managing displacement, Vanuatu intends to safeguard livelihoods, particularly in rural areas that rely heavily on agriculture, which constitute a significant part of the national economy.

## 5.4 Lao People's Democratic Republic: agriculture-dependent economy facing climate shocks

### *Macroeconomic exposure*

The Lao People's Democratic Republic faces significant macroeconomic exposure to climate change, as analysed above, particularly in its reliance on climate-sensitive sectors. The country's agricultural sector is highly exposed, with 47 per cent of its agricultural production value at risk due to climate hazards (ESCAP Asia-Pacific Risk and Resilience Portal). This high exposure stems from the country's dependence on agriculture, which employs about 73 per cent of the labour force. Another concern is the increased incidence of extreme heat. The Lao People's Democratic Republic faces projected warming of 3.6°C by the 2090s; such extreme heat represents a major threat to human health, especially for outdoor labourers (World Bank and ADB, 2021b). The hazards are exacerbated by poverty, malnourishment and high exposure of poor and marginalized communities in the rural and remote areas, as 20 per cent of the total population in the country still live below the national poverty line, more than 15 per cent of the population have no access to clean water, more than 30 per cent have no access to sanitary latrines and about 40 per cent suffer from malnutrition (the 8th Five-Year National Socio-Economic Development Plan (2015-2020)).

The annual cost of environmental degradation (reduced natural capital from depletion and reduced human capital from pollution) was estimated at 19.3 per cent of GDP (UNICEF, 2024). This highlights the significant economic impact of climate and environmental threats on the country.

***Coping policies***

The National Strategy on Climate Change (2010, updated 2015) serves as the foundational policy for climate adaptation and mitigation. This strategy specifically targets sustainable land management, forest conservation and renewable energy development to reduce climate risks. Recognizing the agricultural sector's extreme vulnerability, the strategy includes targeted interventions to enhance agricultural resilience against climate hazards.

In 2019, the Lao People's Democratic Republic established a national green growth strategy, which represents a transformative approach to sustainable development. By integrating climate considerations across seven key sectors (i.e. natural resources and environment; agriculture and forestry; industry and commerce; energy and mining; public works and transport; information, culture and tourism; and science and technology) and five supporting sectors (finance; banking; education and sports; labour and employment; and social welfare), the strategy provides a holistic framework for economic development that simultaneously addresses climate challenges. Moreover, one of its cross-cutting areas focuses on ensuring rural development and poverty reduction to raise the living standards of rural people and decrease the disparity between urban and rural areas, enabling poor communities to receive the benefits from economic growth in an inclusive and fair manner.

The State's nationally determined contribution was revised in 2021; it further demonstrates the country's commitment, with an ambitious unconditional emission-reduction target of 60 per cent by 2030 (UNDP Climate Promise, 2023). This revised nationally determined contribution not only strengthens mitigation measures in the forestry and energy sectors but also incorporates gender equality perspectives, ensuring a more inclusive and comprehensive climate response.

## 5.5 Bangladesh: coastal economy with high climate risk

***Macroeconomic exposure***

Bangladesh faces substantial macroeconomic exposure to climate change, particularly in terms of climate damage and impact on GDP, and reliance on climate-sensitive sectors. The country's AAL as a share of GDP is 9 per cent, indicating substantial economic vulnerability to climate-related disasters (ESCAP Asia-Pacific Risk and Resilience Portal).

Bangladesh has some of the highest risk levels in the world in terms of climate-related hazards, such as cyclones and floods (flash, riverine and coastal flooding) (European Commission, 2023). More than 90 million Bangladeshis (56 per cent of the population) are estimated to live in "high climate exposure areas" affected by multiple hazards (World Bank, 2024d). The agricultural sector is particularly exposed, with 33 per cent of agricultural production value at risk due to climate hazards. Moreover, as one of the most densely populated countries in the world, the economic impacts of climate-related disasters are magnified, leading to severe humanitarian crises and economic losses.

***Coping policies***

The Bangladesh Climate Change Strategy and Action Plan provides a comprehensive framework for addressing climate change impacts and promoting resilience across various sectors (Bangladesh, Ministry of Environment and Forests, 2009). This plan comprises six thematic areas (i.e. food security, social protection and health; comprehensive disaster management; infrastructure; research and knowledge management; mitigation and low-carbon development; and capacity-building and institutional strengthening), with five of them focused on adaptation, demonstrating Bangladesh's commitment to integrating climate resilience into its economic development strategy.

The Bangladesh Climate Change Trust Act, enacted in 2010, established a legal framework for climate change management and financing (Bangladesh, Ministry of Law, Justice and Parliamentary Affairs, 2010). This policy directly addresses the need for dedicated financial resources to cope with the high economic costs of climate change. Over the past few years, Bangladesh Bank has introduced a variety of refinancing schemes aimed at supporting environmentally friendly projects. One notable example is the revolving relending facility established in 2014, which promotes the use of environmentally friendly brick kilns. Additionally, the Green Transformation Fund, introduced in 2016, represents a significant long-term refinancing scheme that initially focused on enhancing the sustainability of export-oriented sectors, such as textiles, leather and jute.

Continuous research and development efforts have also been undertaken. The Bangladesh Delta Plan 2100 is a comprehensive, long-term strategy adopted by the Government in 2018 to address the multifaceted challenges posed by climate change, natural disasters and environmental sustainability within the country's largest deltaic region. This plan is designed to ensure water and food security, economic growth and environmental sustainability while reducing vulnerability to natural disasters and building resilience against climate

change and other deltaic challenges (Bangladesh, Ministry of Planning, 2018).

In 2023, Bangladesh formulated its National Adaptation Plan, which encompasses 8 distinct sectors and considers 11 climatic stress areas (Bangladesh, Ministry of Environment, Forest and Climate Change, 2022). The plan provides a framework for implementing 113 interventions aimed at enhancing the country's climate resilience across various sectors.

In conclusion, these case studies highlight the diverse nature of climate change exposure and coping strategies across individual Asia-Pacific countries. While all countries face significant challenges, the nature and severity of these challenges vary. Kazakhstan and the Republic of Korea primarily face transition risks due to their carbon-intensive economies, while Bangladesh, the Lao People's Democratic Republic and Vanuatu are more exposed to physical risks, particularly in their agricultural sectors. Despite these differences, there are similarities in the policy approaches, with all countries implementing comprehensive strategies that address both mitigation and adaptation. The case studies underscore the importance of tailored policies that consider each country's unique economic structure and climate vulnerabilities.

## 6. Policy implications and recommendations

The readiness analysis in this chapter highlights the significant macroeconomic exposure of Asia-Pacific countries to climate change and their varying levels of coping capacity across the region. To address these challenges and enhance resilience, policymakers need to implement comprehensive strategies that encompass fiscal, monetary and financial policies. This section briefly outlines key policy recommendations to strengthen the macroeconomic coping capacity of countries in the face of climate change.

### *Fiscal policy recommendations*

**Fiscal policies are essential for building resilience against climate challenges.** Expanding fiscal space to better respond to climate-related physical risks and finance adaptation and mitigation measures is crucial. This can be achieved through improving tax administration, broadening the tax base, implementing progressive taxation systems and phasing out inefficient fossil fuel subsidies. For instance, Indonesia has made progress in this area by gradually reducing fuel subsidies, which decreased from $45.04 billion in 2014 to $13.66 billion in 2020 (Fossil Fuel Subsidy Tracker) and redirecting funds towards clean energy investments and social protection programmes (ESCAP, 2023e).

**Effective financial management ensures the efficient use of climate resources.** Strengthening public financial management systems is essential for effective climate finance allocation and utilization. This involves integrating climate considerations into budgeting processes, developing medium-term expenditure frameworks that incorporate climate risks, and enhancing transparency and accountability in climate-related public spending. The Philippines, for example, has implemented climate budget tagging to track and monitor climate-related expenditures across government agencies (ESCAP, 2022).

**Investments in resilient infrastructure can safeguard economies from climate risks.** Prioritizing investments in climate-resilient infrastructure can significantly reduce long-term economic losses and enhance adaptive capacity. This includes developing and implementing national adaptation plans, leveraging public-private partnerships and incorporating climate risk assessments into infrastructure planning and design processes. Viet Nam, for instance, has developed a national adaptation plan that prioritizes critical infrastructure sectors vulnerable to climate risks (ESCAP, 2023d).

**Social protection systems protect vulnerable populations from climate impacts.** Robust social protection systems are crucial for mitigating the socioeconomic impacts of climate change, particularly on vulnerable populations. Expanding the coverage of social protection programmes, developing adaptive social protection mechanisms and integrating climate vulnerability assessments into social protection targeting and delivery systems are critical steps. Bangladesh has made significant progress in this area by implementing adaptive social protection programmes that can quickly scale up in response to climate-related disasters (UNDP, 2023).

**Green fiscal stimulus supports economic recovery and climate goals.** In the context of economic recovery from economic downturns, countries should prioritize green fiscal stimulus measures that support both economic growth and climate objectives. This can include investing in renewable energy infrastructure, supporting green innovation and research and development, and implementing carbon pricing mechanisms to address transition risks. For example, India's renewable energy initiatives under its fiscal stimulus programmes highlight how green growth can be balanced with economic recovery (UNDP, 2023). Following the COVID-19 pandemic, this approach advocates for investments that create a more equitable and environmentally sustainable economy. Green fiscal measures, therefore, should target sectors and projects that advance

social inclusion, environmental protection and long-term economic resilience, aligning with the principles of "Build Forward Fairer" (ESCAP, 2022).

**Regional cooperation enhances financial resilience to climate risks.** Given the global nature of climate change, strengthening international and regional cooperation is essential for addressing fiscal challenges, such as increased costs for disaster response and recovery, infrastructure damage and the need for significant investments in adaptation and mitigation measures. Advocating for increased climate finance commitments from developed countries, participating in regional and global initiatives for knowledge-sharing and capacity-building, and exploring innovative financing mechanisms, such as debt-for-climate swaps and green bonds, can strengthen resilience. The Pacific subregion's disaster risk financing mechanisms, such as the Pacific Catastrophe Risk Insurance Facility (World Bank, 2016), provide an example for other regions of Asia and the Pacific.

***Monetary and financial policy recommendations***

**Embedding climate risks in financial frameworks strengthens economic stability.** Monetary and financial policies are critical for managing macroeconomic risks associated with climate change while supporting green sustainable transitions. Taking a proactive approach to address climate-related financial risks is vital for central banks and financial regulators in the Asia-Pacific region. This includes developing comprehensive frameworks for climate risk assessment and management in the financial sector, covering both physical and transition risks associated with climate change.

**Green macroprudential frameworks align financial systems with sustainability goals.** Central banks and financial supervisors should integrate climate and environmental risks into existing regulatory and supervisory practices. This involves conducting climate stress tests, implementing green Basel III requirements,[6] and incorporating sustainability factors into monetary policy operations. For example, the People's Bank of China has announced plans to conduct climate scenario analysis for major financial institutions (ESCAP, 2023e).

**Harmonizing sustainable finance taxonomies builds investor confidence.** Financial regulatory authorities should establish clear and harmonized sustainable finance taxonomies to provide a common language for defining green and sustainable economic activities. This will help reduce greenwashing and facilitate the growth of sustainable finance markets across the region. The International Capital Market Association emphasizes the importance of harmonizing transparency expectations and ensuring investor confidence through voluntary market standards (ESCAP, 2023e).

**Transparent climate disclosures empower investors and regulators.** Transparency in financial markets should be improved through mandatory and standardized climate-related financial disclosures for financial institutions and corporations. These disclosures should align with international frameworks, such as the Task Force on Climate-related Financial Disclosures recommendations. Key recommendations include governance structures for climate-related risks, scenario analyses for physical and transition risks and metrics for financial impacts. Bangladesh's adoption of climate-related financial disclosure practices has helped strengthen investor confidence (ESCAP, 2023e).

**Monetary tools could seek to support climate mitigation efforts.** Central banks should explore ways to align their monetary policy instruments with climate goals. This may involve incorporating sustainability considerations into asset purchase programmes and collateral frameworks used in central bank operations. Asia-Pacific countries could also consider climate-oriented monetary tools, such as green refinancing programmes or differentiated reserve requirements, to direct credit towards sustainable investments.

**Green bonds unlock domestic financing for climate action.** Mobilizing domestic savings is crucial for climate action. Authorities should establish clear guidelines, provide tax incentives and create enabling regulatory frameworks to mobilize domestic savings for climate-friendly investments and reduce reliance on foreign currency borrowing. For example, tax incentives for green savings accounts and investment in green mutual funds can encourage domestic investors to contribute to sustainable projects. Indonesia has made strides in this area by implementing policies that support domestic savings mobilization for green investments. Additionally, Indonesia successfully mobilized $734 million from sovereign thematic bond issuance, including a first-of-its-kind "Blue Bond" raising $150 million for marine ecosystem conservation (UNDP, 2024b).

**To achieve sustainable economic growth while addressing climate change, innovative financial tools are essential.** Financial regulators should implement targeted refinancing schemes and differentiated reserve requirements to incentivize banks to increase lending for green projects and climate-resilient investments. This can help channel credit towards sustainable economic activities and address transition risks. For example, targeted refinancing schemes can be used to lower borrowing costs for renewable energy projects, while

6 A set of banking reforms that increase capital requirements and strengthen liquidity and solvency in the banking sector.

differentiated reserve requirements can encourage banks to allocate more credit to climate-smart agriculture initiatives, directly supporting the green transition.

**Regional networks foster knowledge-sharing and capacity-building.** Central banks and financial supervisors should actively participate in regional and international networks, such as the Network for Greening the Financial System, to share best practices and build capacity for addressing climate-related financial risks. Regional financial cooperation supports capacity-building and sharing best practices to scale up effective policy measures.

By implementing these comprehensive fiscal, monetary and financial policy recommendations, Asia-Pacific countries can enhance their macroeconomic coping capacity to address climate-related risks while promoting sustainable economic development. These policies complement each other, providing a holistic approach to strengthening resilience in the face of climate change.

## 7. Conclusions

This chapter assesses the readiness of Asia-Pacific countries to manage the macroeconomic implications of climate change. Countries are considered more exposed if they face larger estimated economic losses from climate shocks, have larger climate-prone agricultural sectors, rely on carbon-intensive sectors as a source of economic growth and are expected to face much higher inflation due to climate factors. Among 30 Asia-Pacific countries analysed, 11 are identified as particularly exposed to climate risks: Afghanistan, Cambodia, the Islamic Republic of Iran, Kazakhstan, the Lao People's Democratic Republic, Mongolia, Myanmar, Nepal, Tajikistan, Uzbekistan and Viet Nam. While this assessment is based only on regional countries for which sufficient data are available, it provides valuable insights into the factors that make countries more or less exposed to climate risks and shape their coping capacities.

The findings reveal significant disparities in climate risk exposure across these countries, driven by structural and policy-related factors, such as agricultural dependence, carbon intensity and inflationary pressures. Coping ability is assessed based on such factors as the availability of fiscal resources, the financial sector's ability to withstand physical and transition risks related to climate change due to the presence of green financial policies and effective inflation management, and the institutional quality of fiscal authorities. Mongolia and Uzbekistan, for example, exhibit relatively strong fiscal coping capacities, benefiting from higher tax-to-average annual loss ratios and better mobilization of climate finance or stronger sovereign credit rating. In contrast, Cambodia and Tajikistan fare less well on fiscal readiness. From the financial perspective, Cambodia and Mongolia appear to have better coping ability due to relatively robust banking sectors or a commitment to green financial policymaking. Uzbekistan performs less well on these fronts, as well as facing challenges in meeting official inflation goals at a time when climate change could push up inflation further. These variations highlight the diverse challenges faced by countries in the region and the importance of targeted interventions by national Governments, international organizations and regional cooperation initiatives to address specific vulnerabilities.

The chapter also identifies key policy areas that are critical for enhancing macroeconomic resilience in the wake of climate change. Expanding fiscal space through improved tax administration and mobilizing climate finance are essential for addressing climate risks effectively. Strengthening monetary and financial systems, particularly in managing inflationary impacts and integrating green financial policies, is also important. Institutional capacity, including governance reforms, climate adaptation planning and robust social protection systems, plays a pivotal role in building resilience. Investments in climate-resilient infrastructure and fostering regional cooperation, such as through innovative financing mechanisms (e.g. green bonds and debt-for-climate swaps), can further support these efforts, especially for countries with lower coping capacities.

The case studies of Bangladesh, Kazakhstan, the Lao People's Democratic Republic, the Republic of Korea and Vanuatu provide practical examples of how macroeconomic exposure and coping capacity manifest in diverse contexts. For instance, Vanuatu faces severe physical risks with a high AAL-to-GDP ratio, while the Republic of Korea addresses significant transition risks related to its carbon-intensive industries. These examples illustrate the importance of aligning fiscal, monetary and institutional policies with climate adaptation and mitigation objectives while tailoring approaches to each country's unique circumstances.

In conclusion, this chapter highlights the significant disparities in climate readiness across the region and emphasizes the need for tailored, data-driven strategies to address these challenges. While the analysis is not exhaustive, it offers critical insights into the factors influencing exposure and coping capacity, providing a foundation for strengthening macroeconomic resilience and supporting sustainable development in the face of accelerating climate risks.

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Average economic growth in Asia and the Pacific continued to outpace other developing regions of the world in 2024. Nevertheless, the region is also facing several near-term economic risks and long-term development challenges. Ensuring that no one is left behind as economies develop and strengthening inclusive regional economic cooperation to deal with high global economic uncertainty are examples of critical tasks for policymakers.

To sustain long-term economic development, the region needs to revive labour productivity growth. Proactive government support, including through industrial policies, may be necessary to upgrade economic sectors amid rising trade tensions and intense technological competition worldwide.

Another emerging challenge is how fiscal and monetary authorities can better manage climate-induced economic risks and foster climate action. Understanding the complex nexus between climate change, climate policies and macroeconomic outcomes is a prerequisite. However, such interlinkages are not well understood by policymakers in Asia and the Pacific.

The *Survey* for 2025 shows that many Asia-Pacific countries are less ready to cope with the macroeconomic implications of climate change and transition to low-carbon development. Available fiscal resources are not sufficient to support people affected by climate disasters, while financial stability can be at risk as energy transition moves forward. Beyond reducing the reliance on fossil-fuel industries and having climate-resilient agriculture and infrastructure, embedding climate aspects into macroeconomic policies is indispensable.

"This *Survey* reminds us that the health of our climate and the health of our economies go hand in hand. It calls on Governments, businesses and policymakers across Asia and the Pacific to join forces to develop proactive policies that integrate climate risks into fiscal and monetary policies".

**António Guterres**
Secretary-General of the United Nations

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