ECONOMIC OUTLOOK FOR SOUTHEAST ASIA, CHINA AND INDIA 2020:
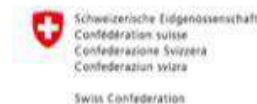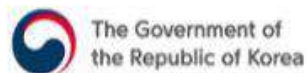
DIGITAL ECONOMY
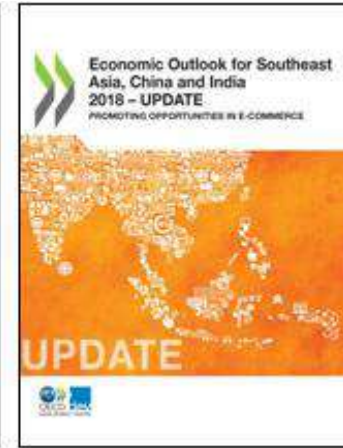
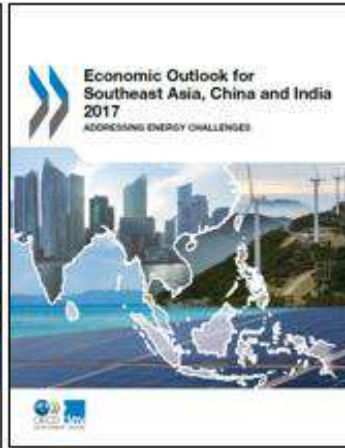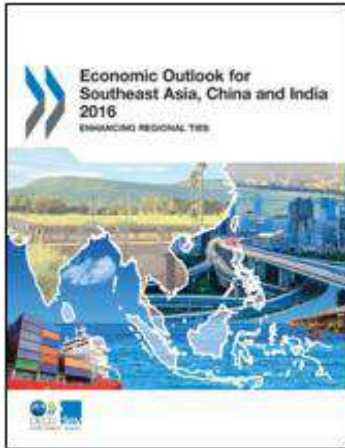**Kensuke Tanaka**
Head, Asia Desk
OECD Development Centre

November 2019
Jakarta, Indonesia

Economic Outlook for Southeast Asia, China and India

- **2020 edition - November 2019, released**

- **2020 Update edition -- June, 2020 (TBD)**

What is the Outlook?

Thematic focus of the _Outlook_

2010: Infrastructure development
2011/12: Green growth
2013: Narrowing development gaps
2014: Beyond the middle-income trap
2015: Strengthening institutional capacity
2016: Enhancing regional ties
2017: Addressing energy challenges
2018: Fostering growth through digitalisation
2018 Update: Promoting opportunities in e-commerce
2019: Towards smart urban transportation
2019 Update: Responding to environmental hazards in cities
2020: Human capital development

1. Macroeconomic Assessments and Economic Outlook and Regional Integration

2. Thematic Focus

3. Structural Policy Country Notes

Outline

- **Macroeconomic outlook and risks**

- **Digital economy:**

  - ➢ **Growth through Digitalisation (2018)**

  - ➢ **Digital education (2020)**

  - ➢ **Smart cities (2019)**
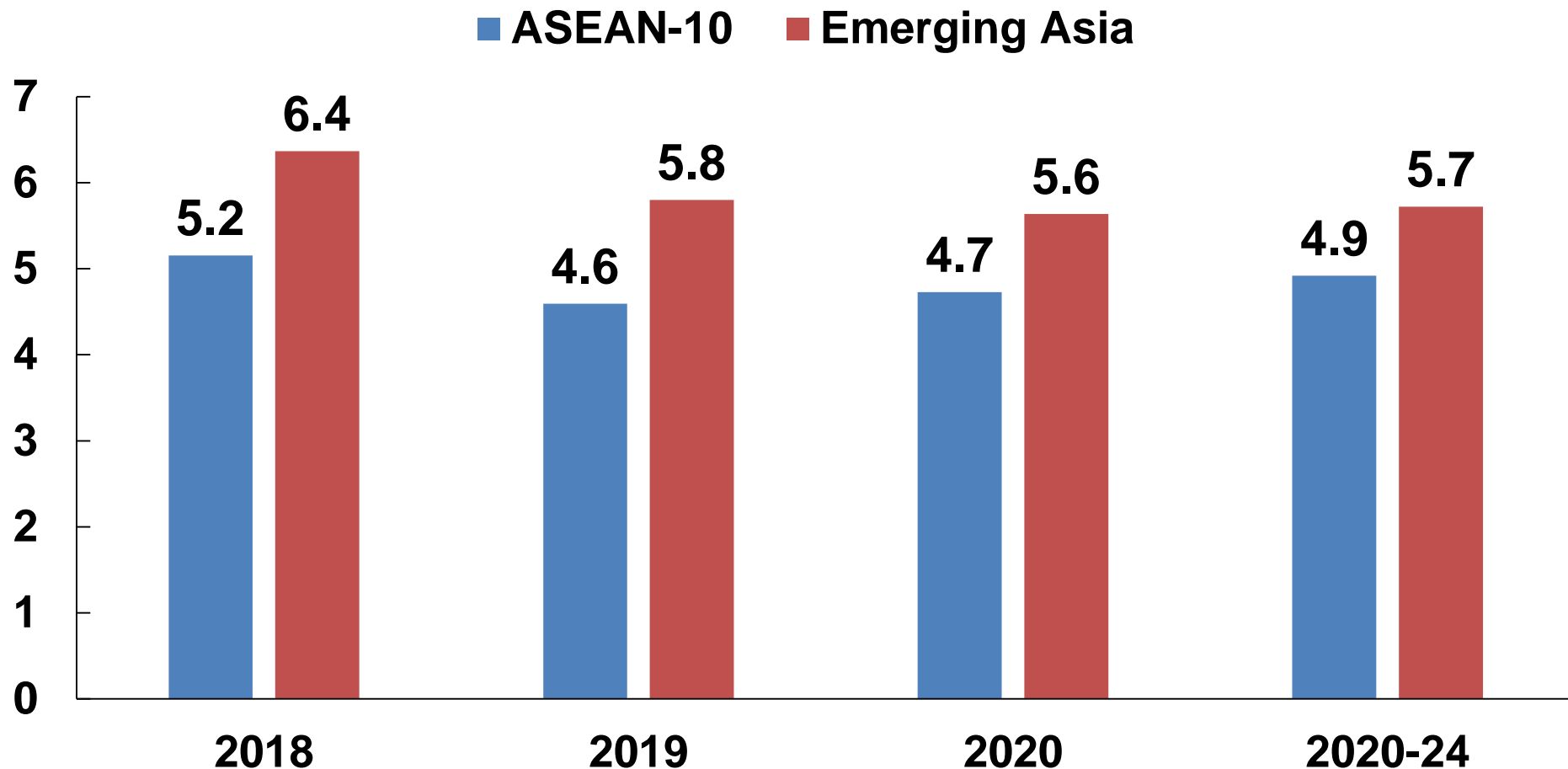
- **Macroeconomic outlook and risks**

Growth in Emerging Asia is moderating

Real GDP growth in ASEAN and Emerging Asia, 2018-24
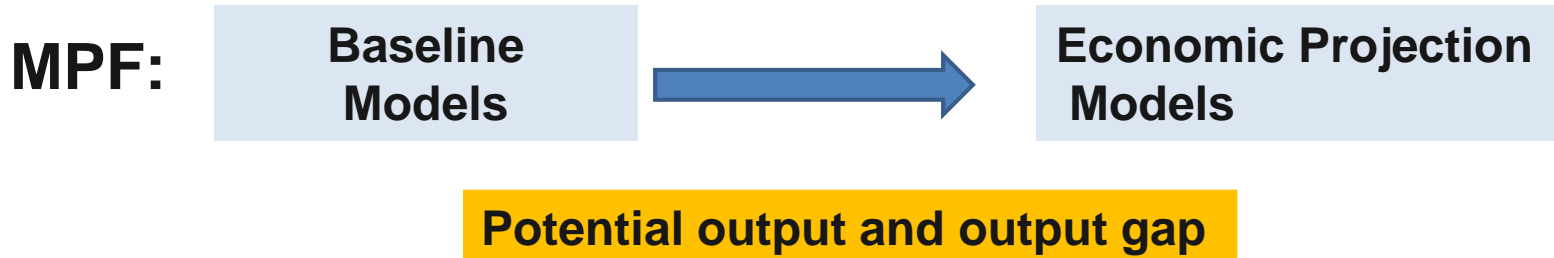Percentage

■ ASEAN-10   ■ Emerging Asia

	2018	2019	2020	2020-24
ASEAN-10	5.2	4.6	4.7	4.9
Emerging Asia	6.4	5.8	5.6	5.7

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.

Real GDP growth in ASEAN, China and India, 2018-24

	2018	2019	2020	Changes from previous forecast (July 2019)		2020-24
				2019	2020	
ASEAN-5 countries						
Indonesia	**5.2**	**5.0**	**5.0**	↓	↓	**5.1**
Malaysia	4.7	4.4	4.4	−	↓	4.4
Philippines	6.2	5.6	6.0	↓	↓	6.2
Thailand	4.1	2.7	3.0	↓	↓	3.2
Viet Nam	7.1	6.8	6.6	↑	−	6.5
Brunei Darussalam and Singapore						
Brunei Darussalam	0.1	2.0	1.7	↑	↓	1.9
Singapore	3.1	0.6	1.2	↓	↓	2.3
CLM countries						
Cambodia	7.5	7.0	6.8	−	−	6.7
Lao PDR	6.3	6.5	6.6	↓	↓	6.8
Myanmar	6.5	6.6	6.7	↓	↓	6.9
China and India						
China	6.6	6.2	5.7	−	↓	5.6
India	6.8	5.8	6.2	↓	↓	6.6
ASEAN-10 average	5.2	4.6	4.7	↓	↓	4.9
Emerging Asia average	6.4	5.8	5.6	↓	↓	5.7

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.

MPF: Medium-term projection framework

MPF:
| Baseline Models | ⟶ | Economic Projection Models |

Potential output and output gap

• One of the key assumptions for the medium-term projections is related to potential output, which is estimated by baseline models.

➢ **Statistical filter approach (the Hodrick-Prescott filter)**
   → **'end-point' problem**
➢ **Production function approach in which potential output is related to labour and capital inputs**
   → **the lack of reliable data**

➢**Dynamic stochastic general equilibrium (DSGE)**

MPF-baseline model

Households :

$$y_t = \frac{1}{1+b} E_t y_{t+1} + \frac{b}{1+b} y_{t-1} - \frac{1-b}{\sigma(1+b)} (r_t^n - E_t \pi_{t+1}) + \frac{1-b}{\sigma(1+b)} (z_t^d - E_t z_{t+1}^d)$$

where b represents external habit persistence in consumption preferences, σ measures the risk aversion. r_t^n is the nominal interest rate, π_t is inflation, and z_t^d is the demand shock.

Following the price-setting of profit-maximising firms, the New Keynesian Phillips curve:

$$\pi_t = \frac{\beta}{1+\omega\beta} E_t \pi_{t+1} + \frac{\omega}{1+\omega\beta} \pi_{t-1} + \frac{(1-\theta)(1-\theta\beta)}{\theta(1+\omega\beta)} \left[\left(\eta + \frac{\sigma}{1-b} \right) y_t - \frac{\sigma b}{1-b} y_{t-1} - (1+\eta) A_t \right]$$

In each period, a fraction 1-θ of firms re-optimise prices, while the remaining fraction keeps prices unchanged or indexes prices to past inflation.

Source: OECD Southeast Asia Economic Outlook 2011/12.

MPF- baseline model

Monetary authorities follow the Taylor rule:

$$r_t^n = \rho_r r_{t-1}^n + (1-\rho_r)\left\{\psi_\pi \frac{1}{4}\sum_{j=0}^{3}\pi_{t-j} + \psi_y\left(y_t - y_t^*\right)\right\} + \varepsilon_t^r$$

where ρ_r determines the degree of policy smoothing, and ψ_π and ψ_y measure the responsiveness of the interest rate to inflation and the output gap respectively. ε_t^r is the monetary policy shock interpreted as an unsystematic component of the monetary policy.

The data used for estimation are real GDP (GDP$_t$), the CPI inflation rate (INFL$_t$), and the short term interest rate (SR$_t$).These data are related to model variables by the following measurement equations:

$$\begin{bmatrix} GDP_t \\ INFL_t \\ SR_t \end{bmatrix} = \begin{bmatrix} 0 \\ \bar{\pi} \\ \bar{\pi} + \bar{r} \end{bmatrix} + \begin{bmatrix} y_t \\ \pi_t \\ r_t^n \end{bmatrix}$$

where π and $\bar{r}$ are the inflation rate and the nominal interest rate that prevail in the long-run respectively. The real GDP series are de-trended by the HP filter prior to estimation.
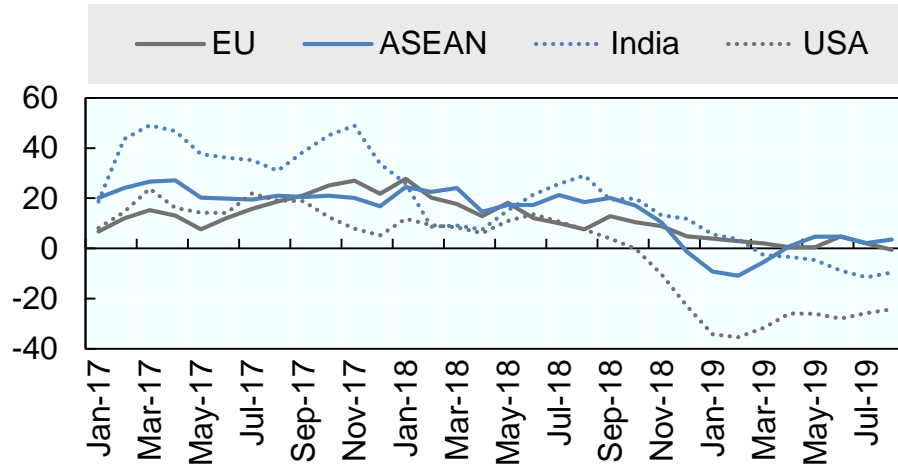
Source: OECD Southeast Asia Economic Outlook 2011/12.
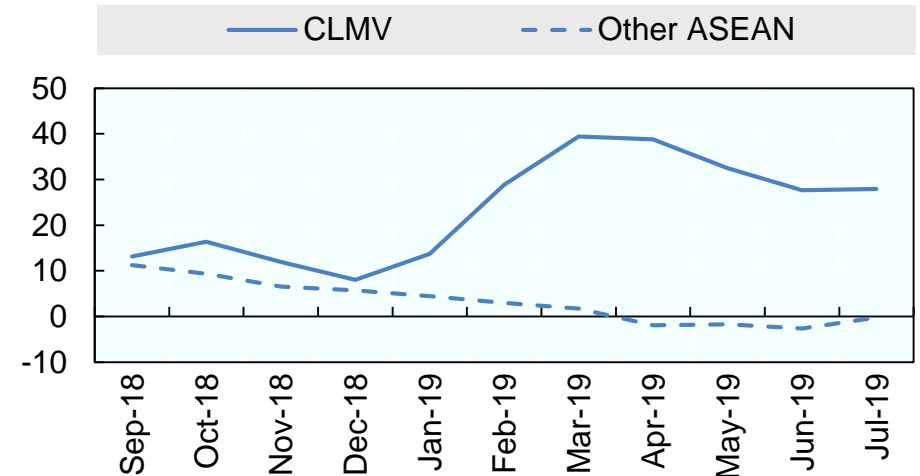
Trade tensions largely underpin the export performance

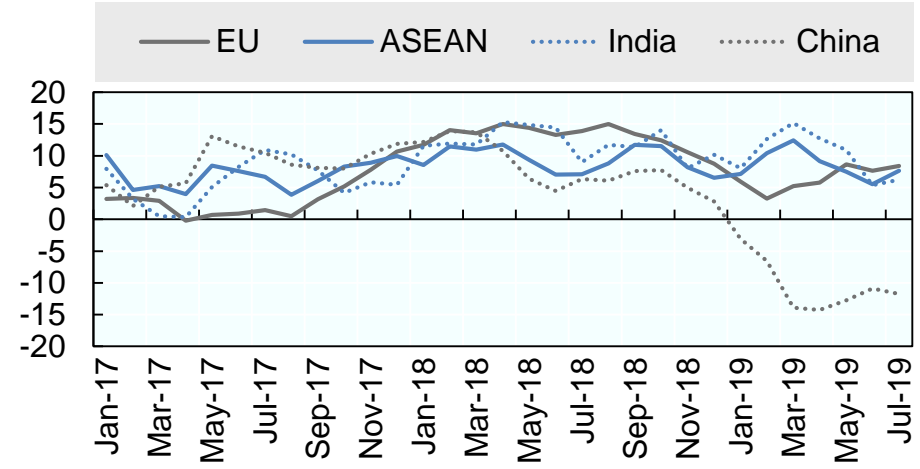## Growth in goods imports of China and the US by partner, 2017-19

Percentage

China

Legend: EU, ASEAN, India, USA
Legend: CLMV, Other ASEAN

United States

Legend: EU, ASEAN, India, China
Legend: CLMV, Other ASEAN

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.
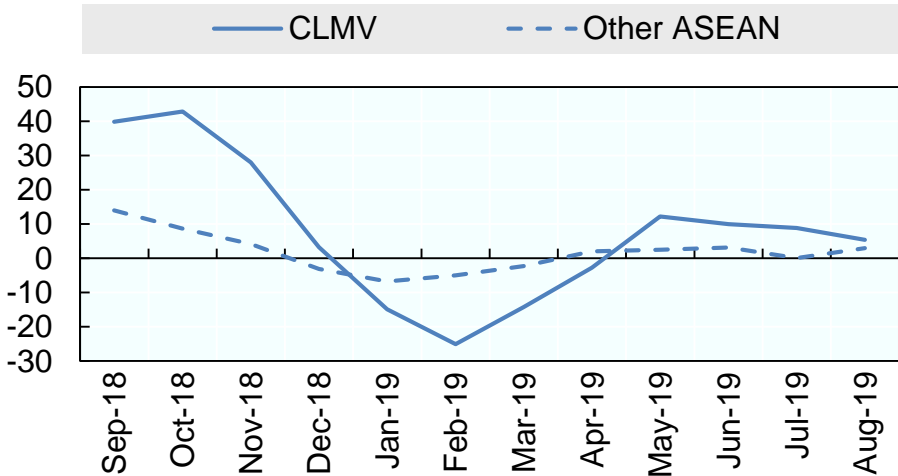
Recent trends of exports

Growth in goods exports of Emerging Asia, 2017-19
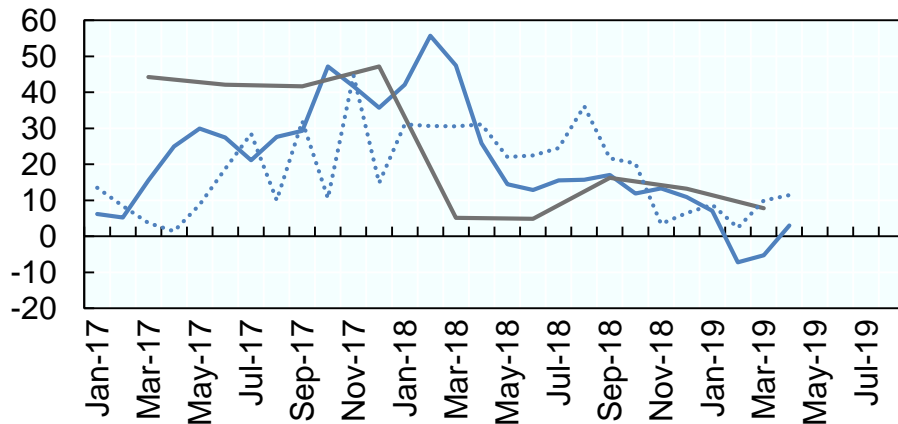
3-month moving average, year-on-year, percentage

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.
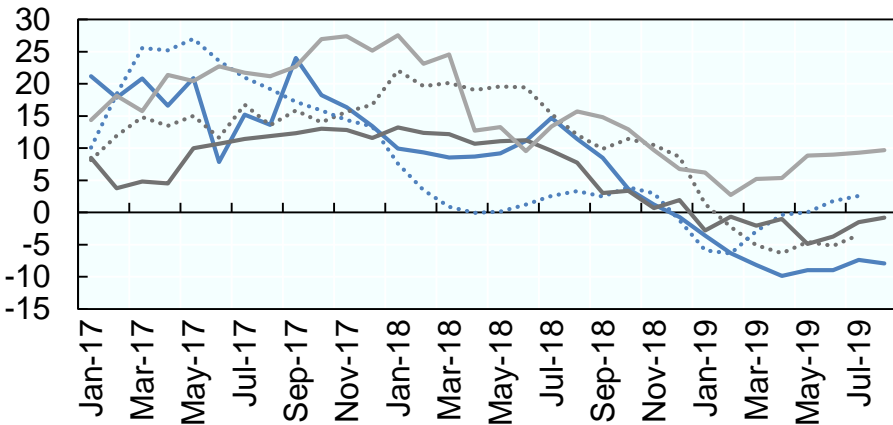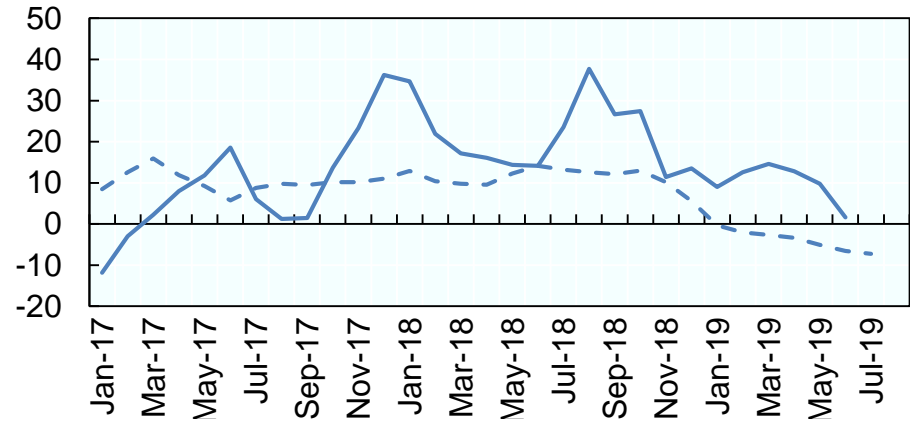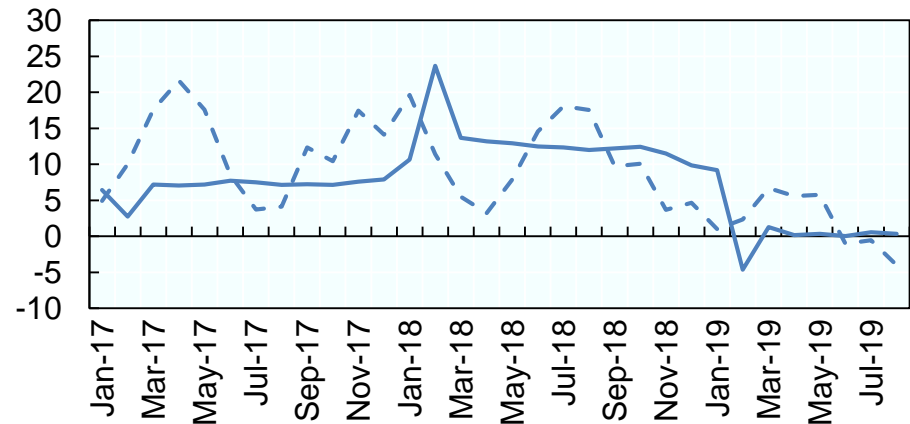
Viet Nam and Malaysia have broader links to China in terms of intermediate goods

Intermediate good exports to China, 2018
Percentage of GDP

Legend:
- ▨ Industrial supplies nes, primary
- ☒ Fuels and lubricants, primary
- ▨ Parts and accessories of transport equipment
- ▨ Food and beverages, processed, mainly for industry
- ☐ Industrial supplies nes, processed
- ▨ Parts and accessories of capital goods (except transport equipment)
- ▨ Food and beverages, primary, mainly for industry
- ■ Fuels and lubricants, processed (other than motor spirit)
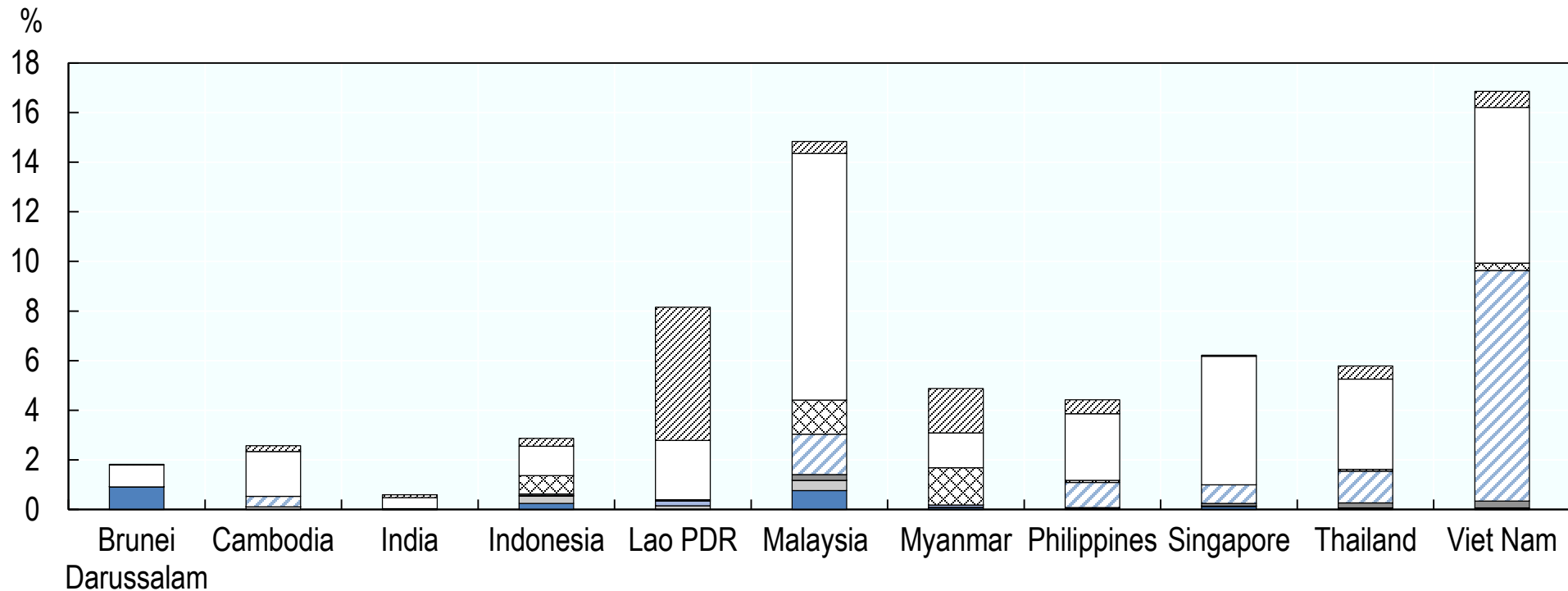
Note: The calculations made use of broad economic categories commodity classification.
Source: OECD Development Centre calculations based on UN Comtrade; OECD Economic Outlook for Southeast Asia, China and India 2019.

India and Southeast Asia are more forwardly integrated with China in the value chain

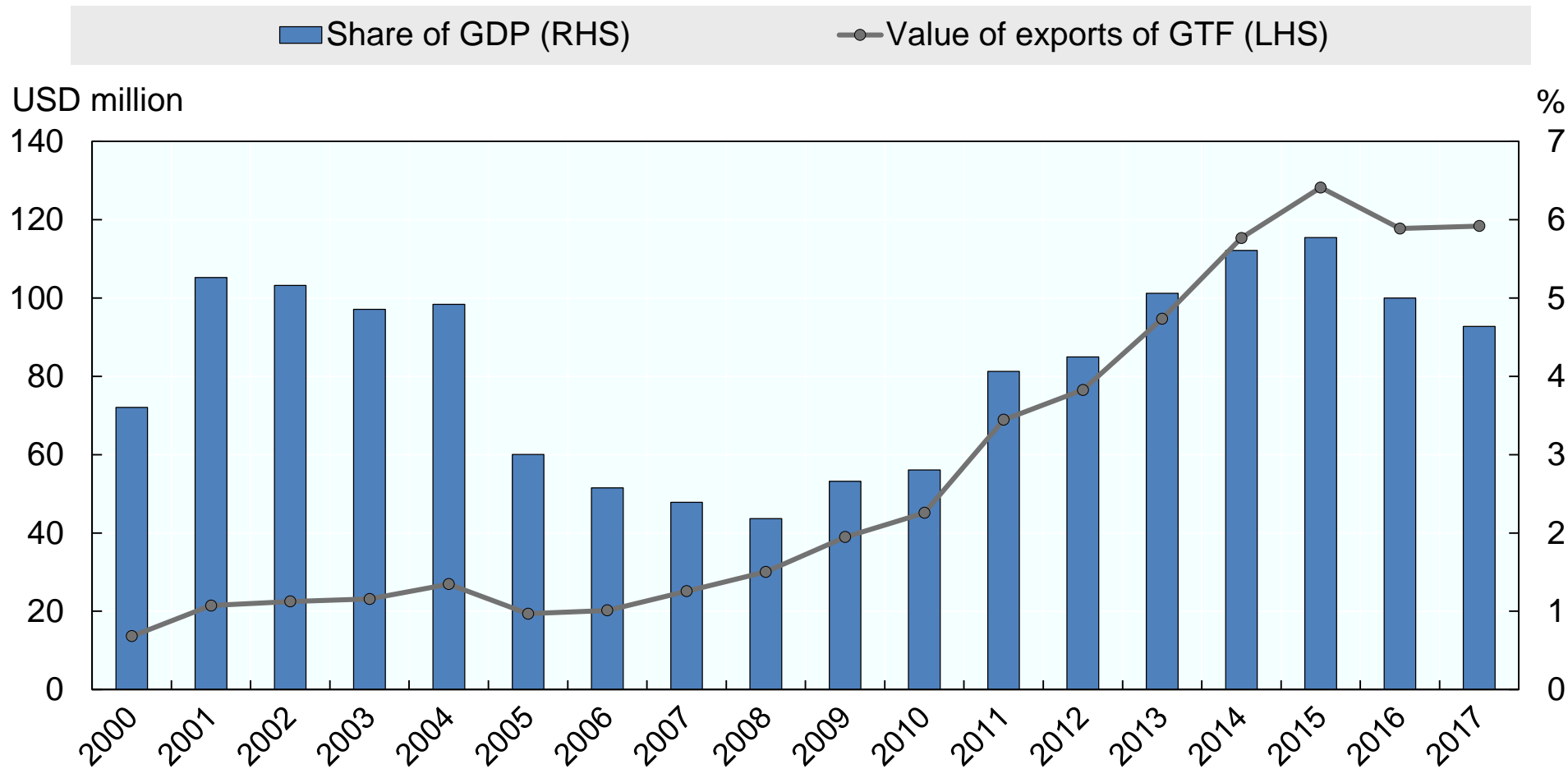## Emerging Asia's forward and backward GVC participation in trade with China, 2011

Participation in percentages

Source: OECD Economic Outlook for Southeast Asia, China and India 2019.
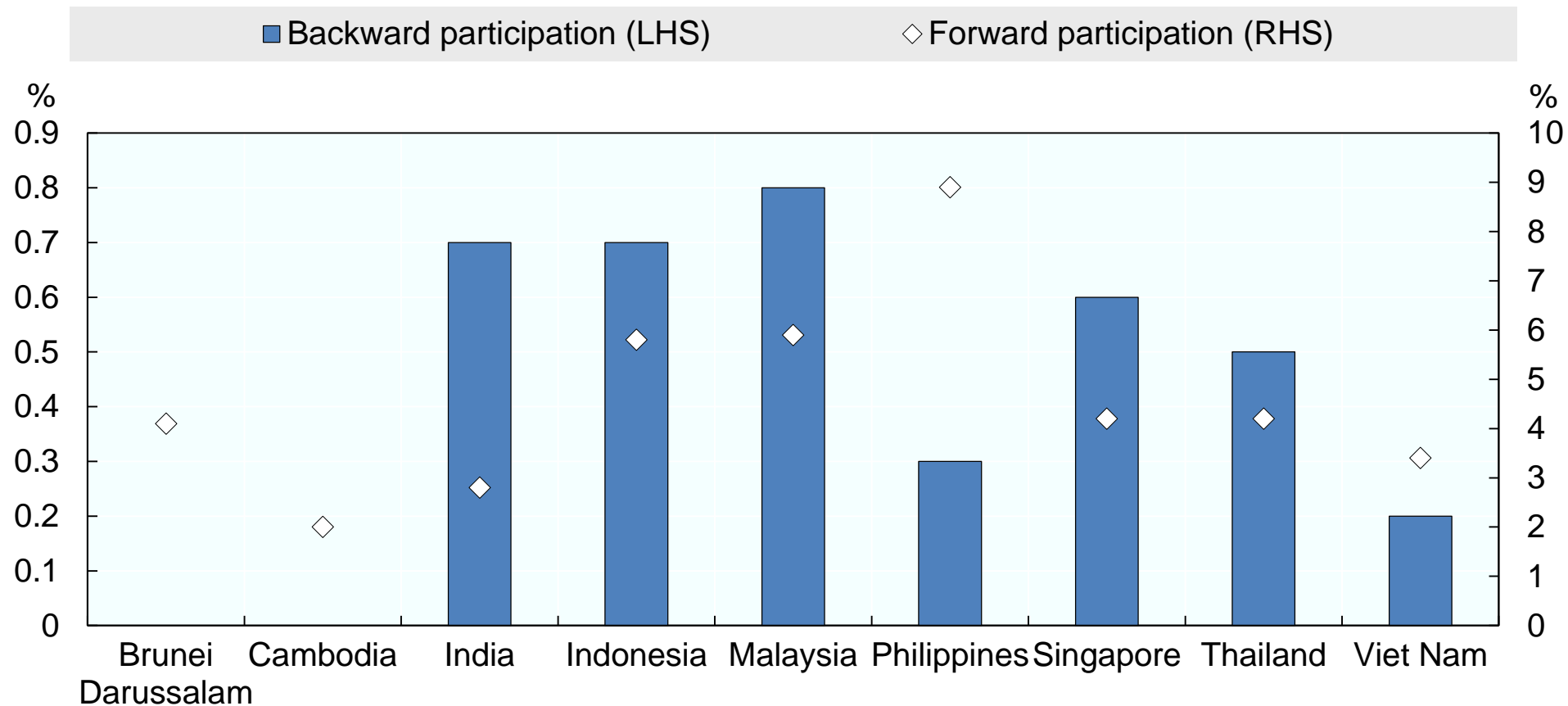
Exports of some Emerging Asian countries are susceptible to Brexit

Cambodia's exports of textile and clothing to the United Kingdom

Legend: ■ Share of GDP (RHS)   ─●─ Value of exports of GTF (LHS)

USD million (LHS, 0 to 140), % (RHS, 0 to 7), years 2000–2017

The speed of export adjustment matters in containing the trade tension effects

Selected goods exports of Thailand and Viet Nam by partner economy, 2018-19

Source: OECD Economic Outlook for Southeast Asia, China and India 2019-Update.
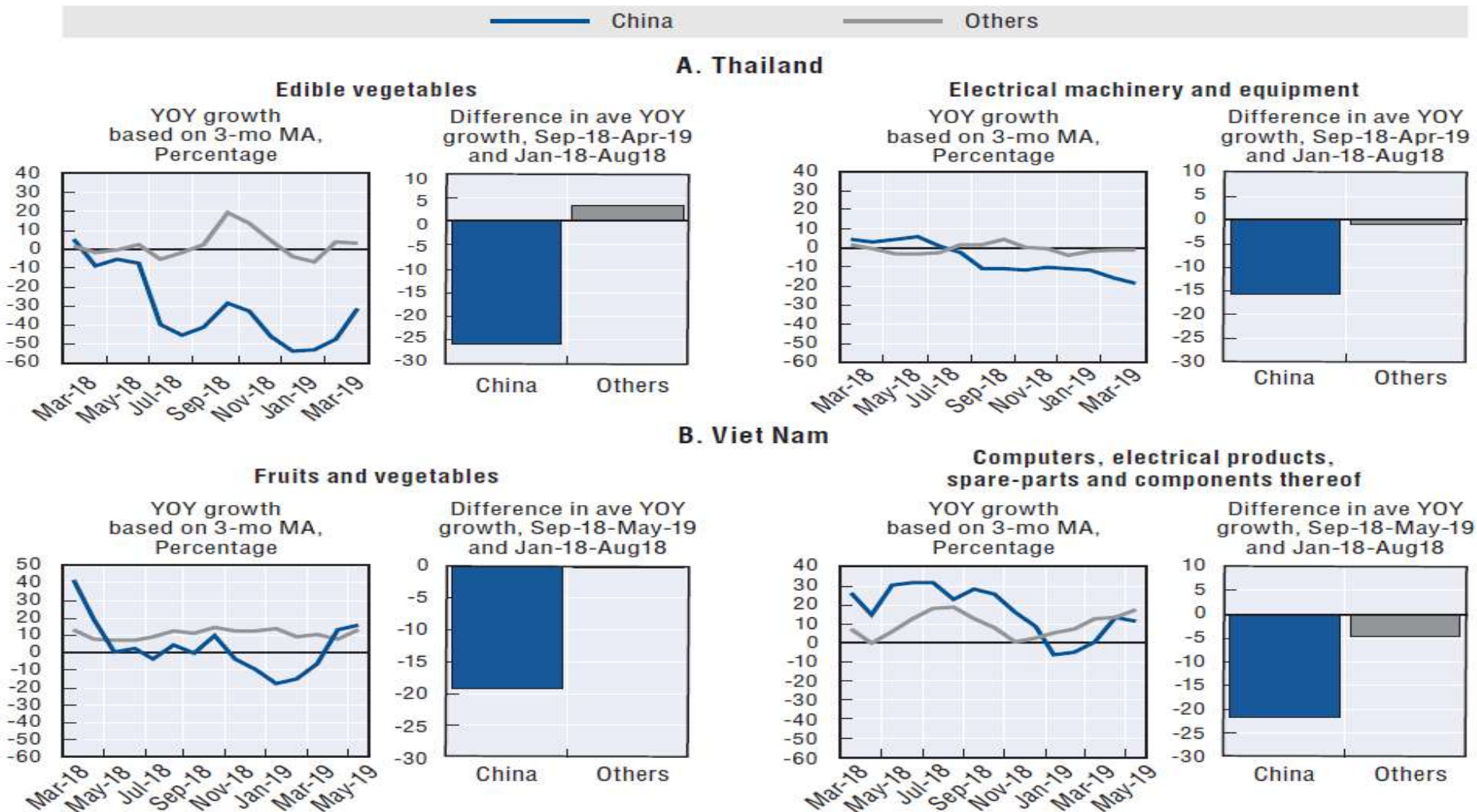
Consumer confidence is holding up

Consumer confidence indices in Indonesia, Malaysia, Philippines and Thailand
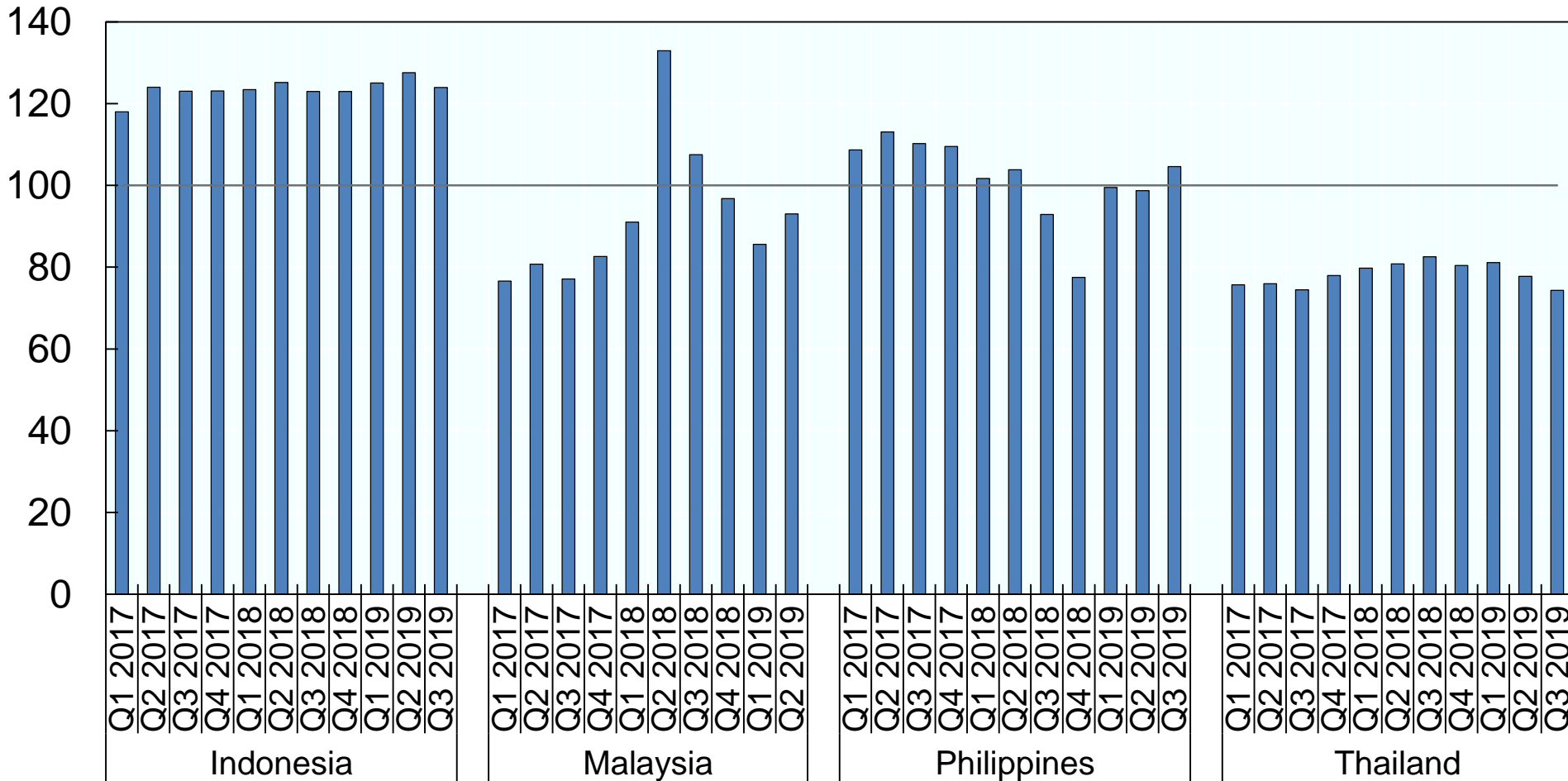
Note: All indices are adjusted to set 100 as neutral confidence point. The latest data for Indonesia and Thailand are as of August 2019.
Source: OECD Economic Outlook for Southeast Asia, China and India 2020.

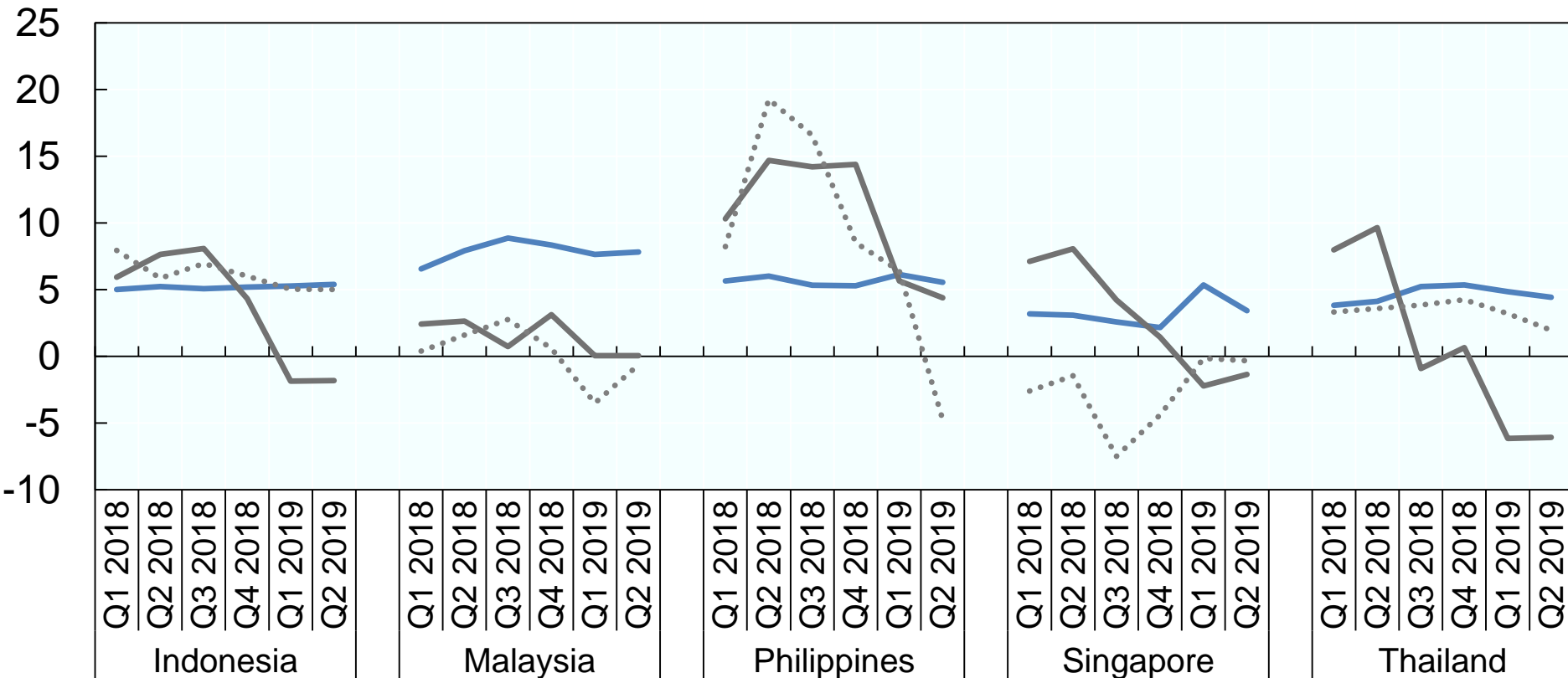# Private consumption growth steadies as export and investment growth ease

Private consumption, exports and fixed investment real growth

Percentage

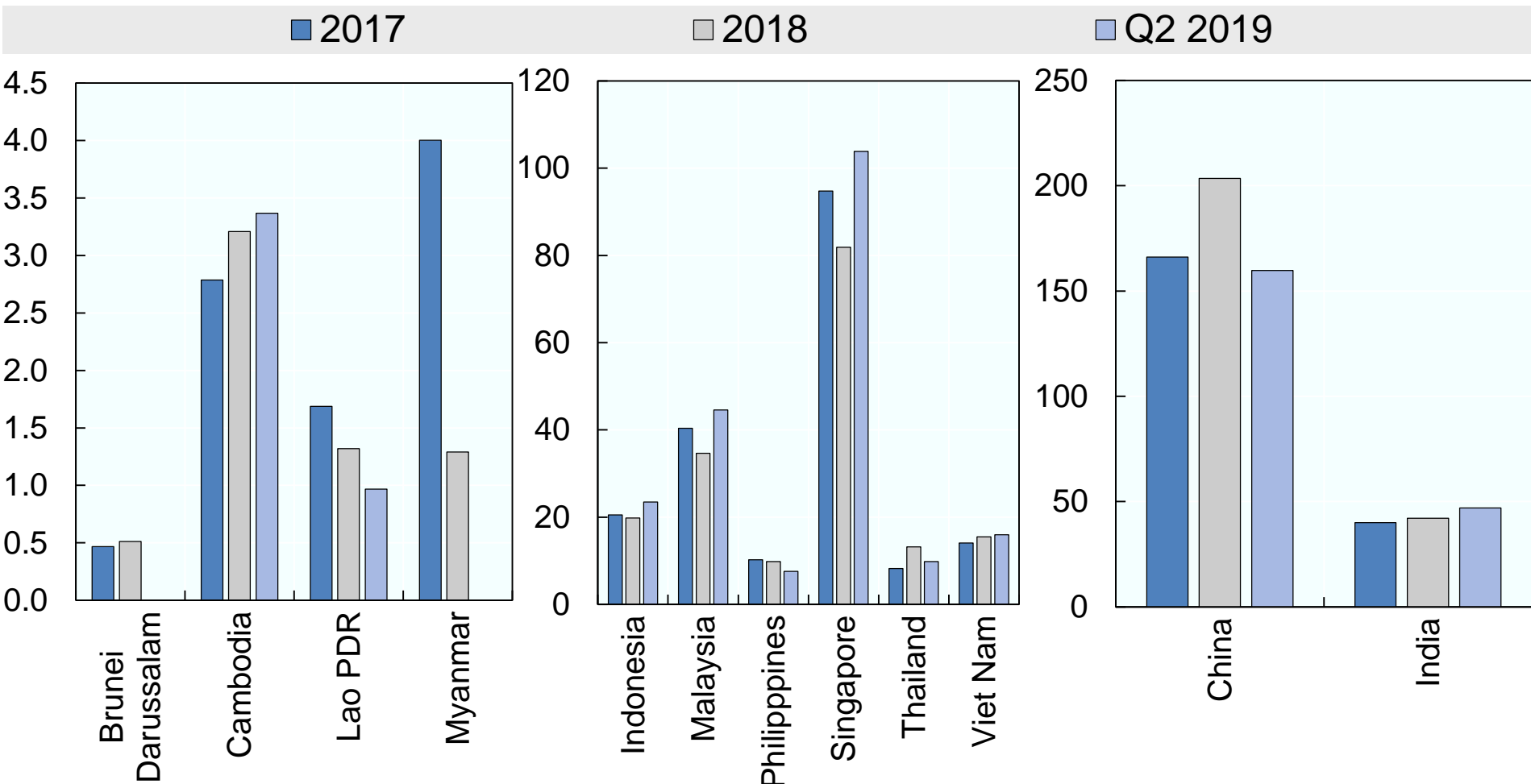— Private Consumption — Exports ····· Fixed investment

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.

FDI inflows are seemingly resilient

Foreign direct investment in Emerging Asia, 2017-19

Annualised, USD billion

■ 2017   □ 2018   □ Q2 2019

Note: All data are in calendar years. Quarterly data are annualised (i.e. 4-quarter sum as of the period indicated. Latest data for Brunei Darussalam and Myanmar are as of Q4 2018.
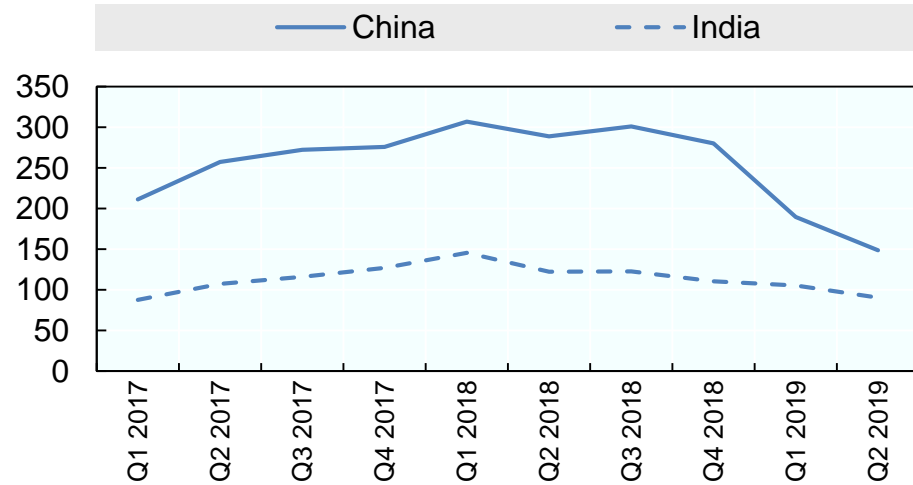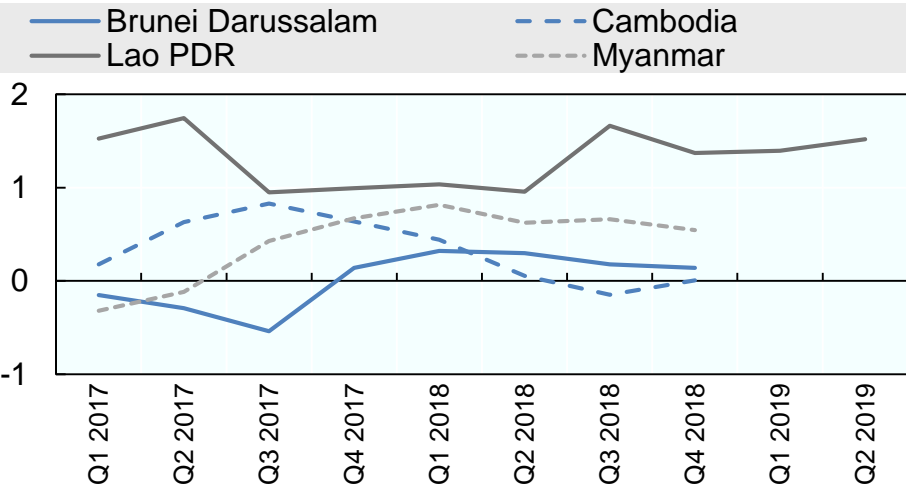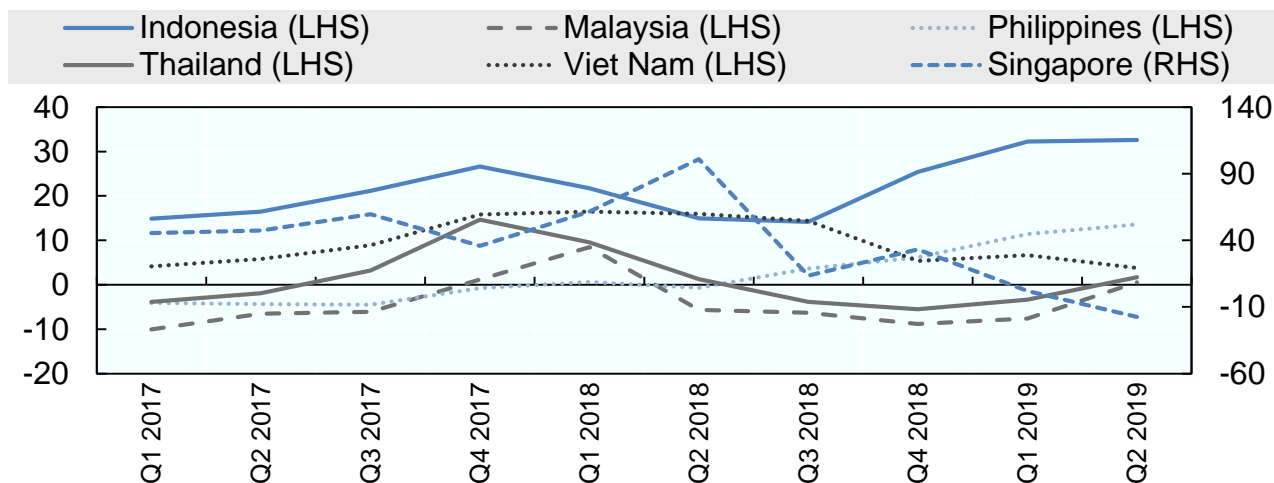Source: OECD Economic Outlook for Southeast Asia, China and India 2020.

Hot money capital inflows have not been disruptive thus far

Portfolio and other investment liability inflows in Emerging Asia 2017-19

USD billion, Annualised

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.

Exchange rate volatility has been fairly contained

Nominal effective exchange rate of selected Emerging Asian economies, 2019, 1 January 2019=100

Legend: China — India — Indonesia — Malaysia (dashed) — Philippines (dashed) — Singapore (dotted) — Thailand (dotted)
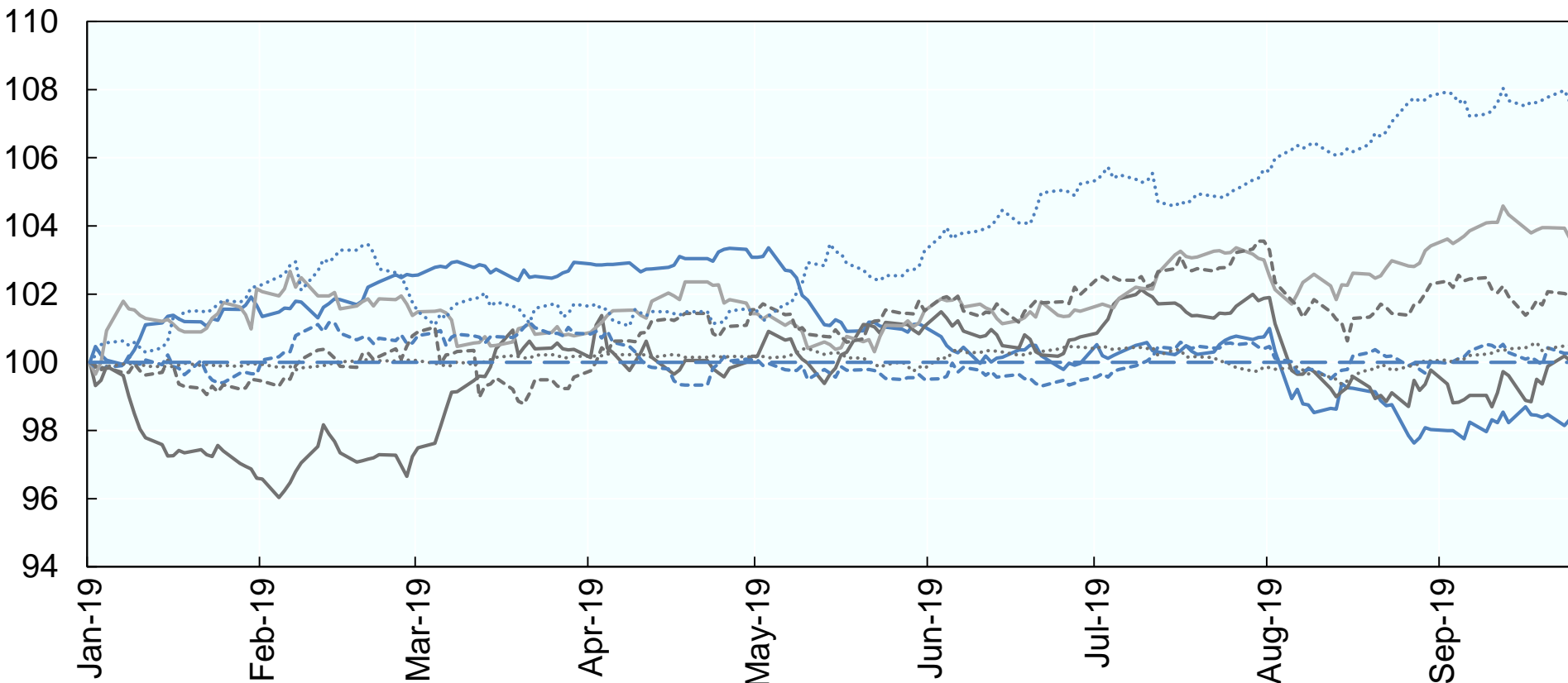
Monetary tools have been employed to support economic growth

Monetary policy actions in selected Emerging Asian economies in 2019

Change in policy rate, basis points
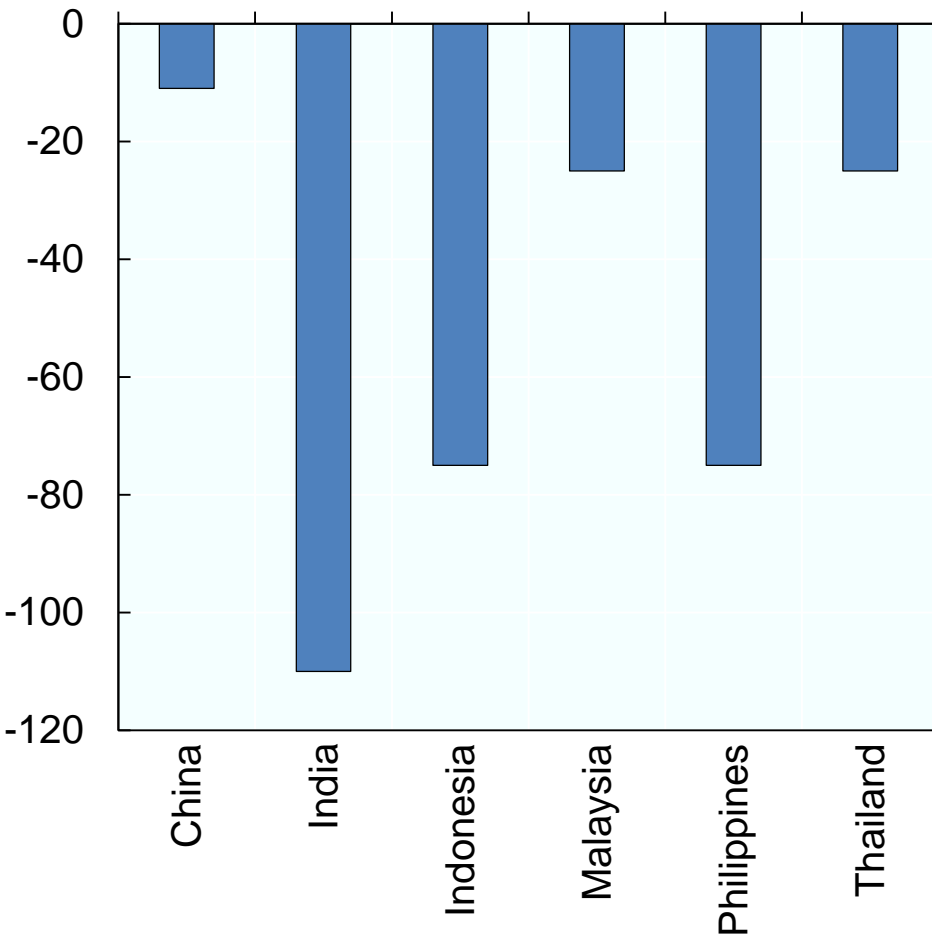
Change in RRR for banks, basis points
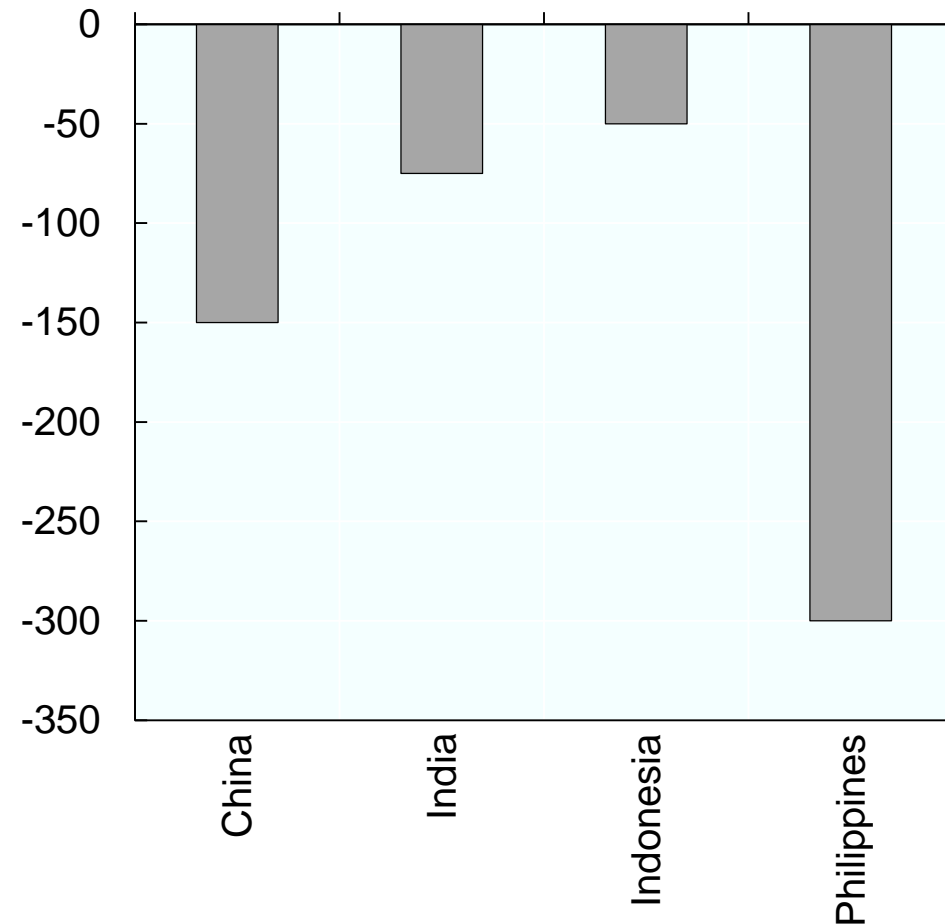
Headline inflation stays subdued but food prices are rising in some countries

Headline, core and food inflation in Emerging Asia, 2017-19
Percentage

—— Headline   —— Food   ·········· Core

Indonesia
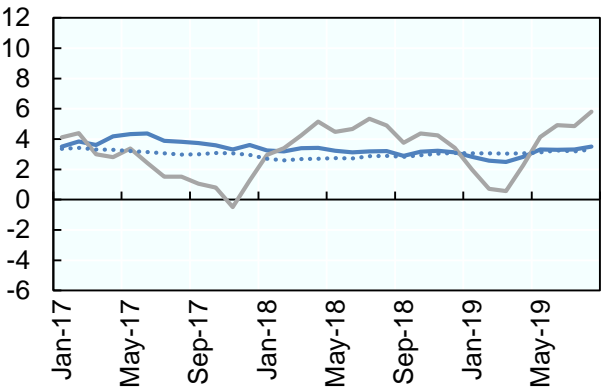
Malaysia
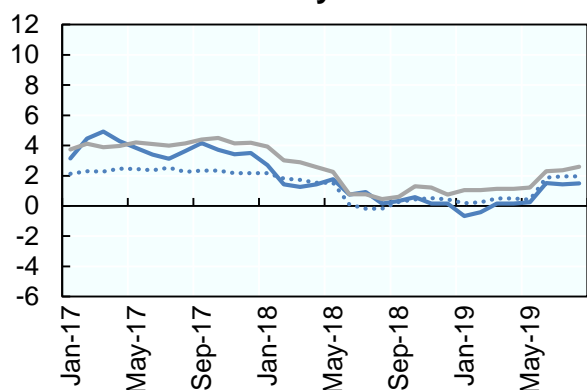
Philippines
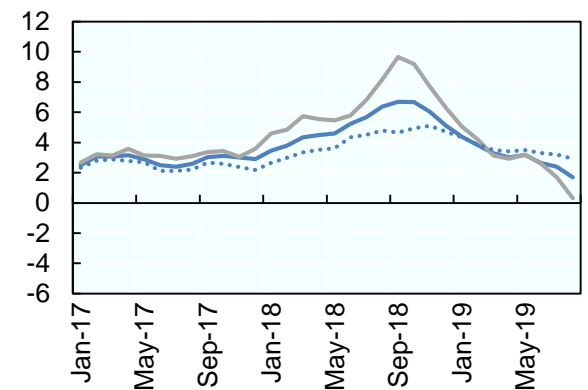
Thailand
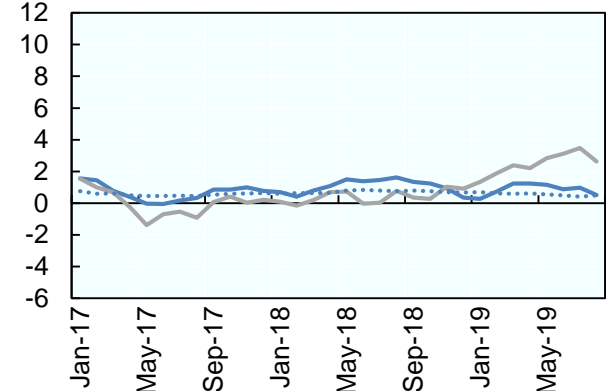
Viet Nam

Brunei Darussalam

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.

Headline, core and food inflation in Emerging Asia, 2017-19
Percentage

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.
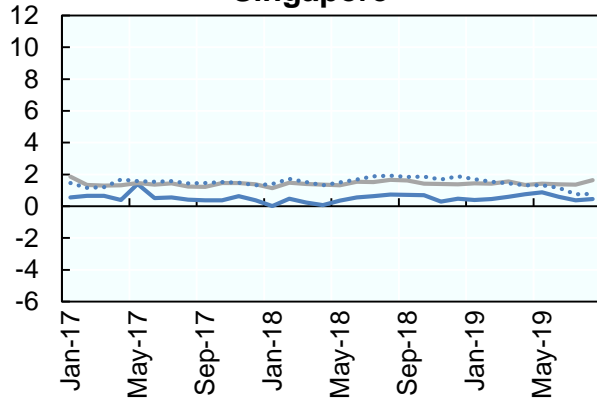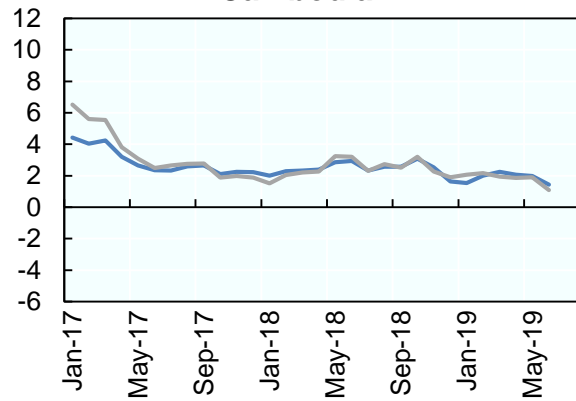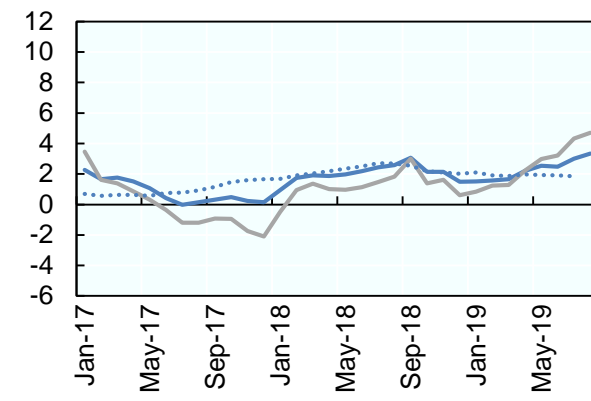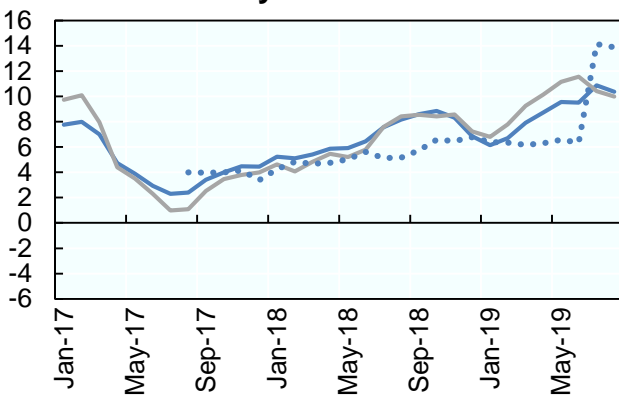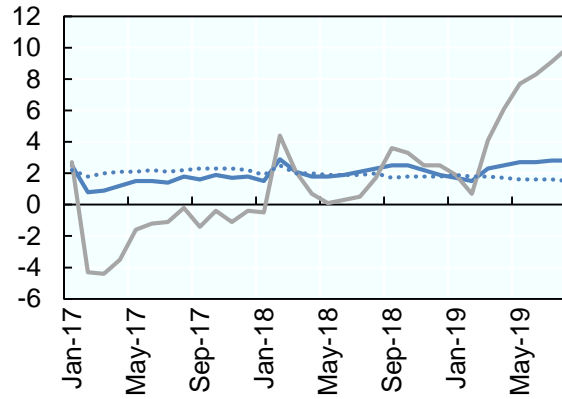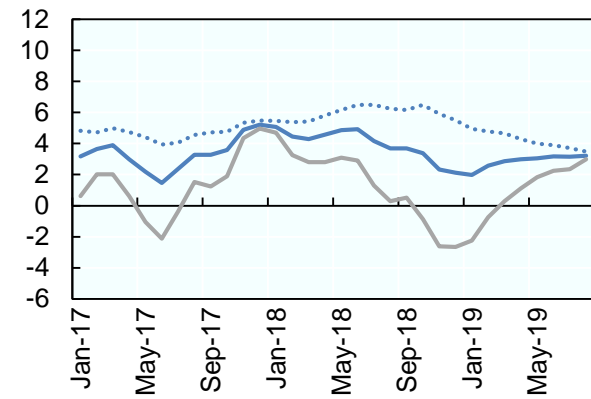
Food has a large share in the CPI of Emerging Asian economies

Consumer price index weights
Percentage

- ■ Food and non-alcoholic beverages(1)
- □ Housing, water, electricity, gas and other fuels(2)
- ■ Transportation(3)
- ■ Others
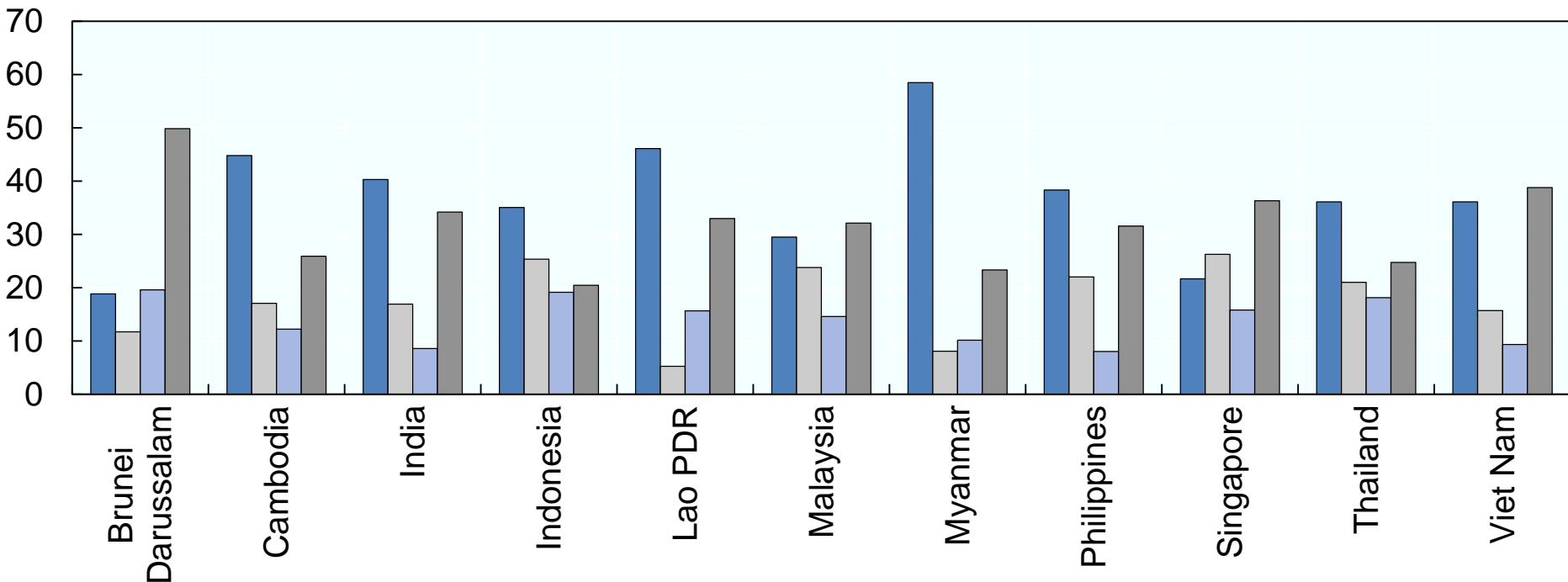
Note: Definitions of the components and the level of breakdown published may not be necessarily the same across countries. China does not publish the weights of the CPI. 1-For Indonesia, data includes food, processed food, beverages and tobacco. For Viet Nam, data refer to foods and foodstuffs. 2-For Thailand, data refer shelter and utilities. For Viet Nam, data refer to housing and construction materials. 3-For India and Lao PDR, data includes communication. For Indonesia, data includes communication and finance. For Thailand, data refer to public transportation, vehicles and vehicle operation.
Source: OECD Economic Outlook for Southeast Asia, China and India 2020.

Global oil prices pass through relative to headline inflation

Global oil prices pass through relative to headline inflation

Legend: ■ 4 Months □ 12 Months

Categories: Brunei Darussalam, Cambodia, China, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Viet Nam, Average

Source: OECD Economic Outlook for Southeast Asia, China and India 2019.
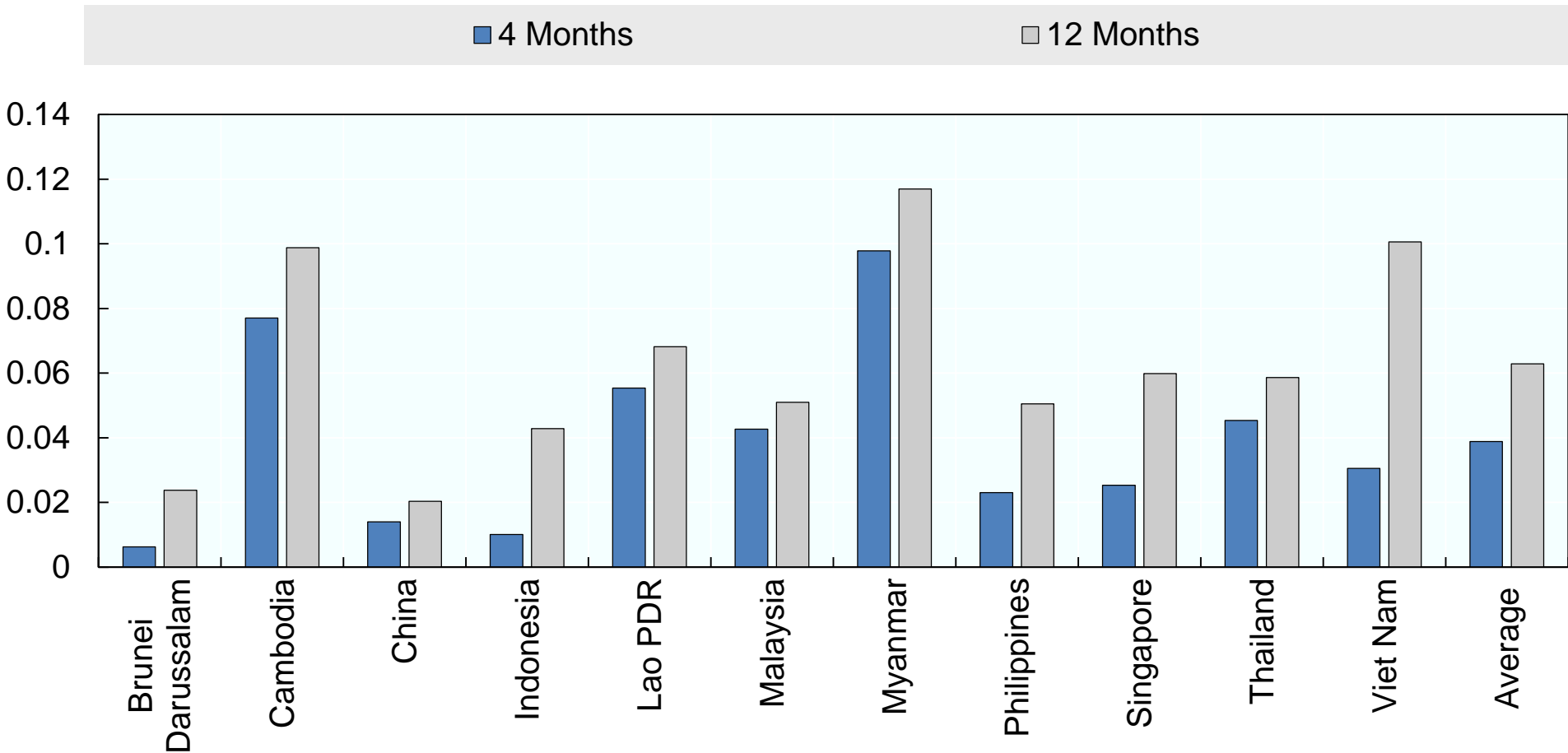
Global oil price to inflation pass through

Local projection method

$$\pi_{t+k} = \alpha_k + \sum_{i=1}^{12} \gamma_{k,t-i}\pi_{t-i} + \beta_k \pi_t^{oil} + \sum_{i=1}^{k} \theta_j \pi_{t+i}^{oil} + \varepsilon_{k,t}.$$

where ϖ_{t+k} stands for headline inflation at period t and horizon k, ϖ_t^{oil} global oil inflation and $_{k,t}$ is the error term. We take $\sum_{k=1k'}^{l}$ for l=4,12 as our measure for global oil price pass through. It is the cumulative effect over 4 and 12 months after the shock.

The flattening of the Phillips curve needs attention to enhance policy efficacy

The Phillips curve for Singapore and Thailand

Singapore

- Q1 2000 - Q4 2008
- Q1 2010 - Q1 2019

Inflation (%, YOY)

Output gap

Thailand

- Q1 2000 - Q4 2008
- Q1 2010 - Q1 2019

Inflation (%, YOY)

Output gap

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.
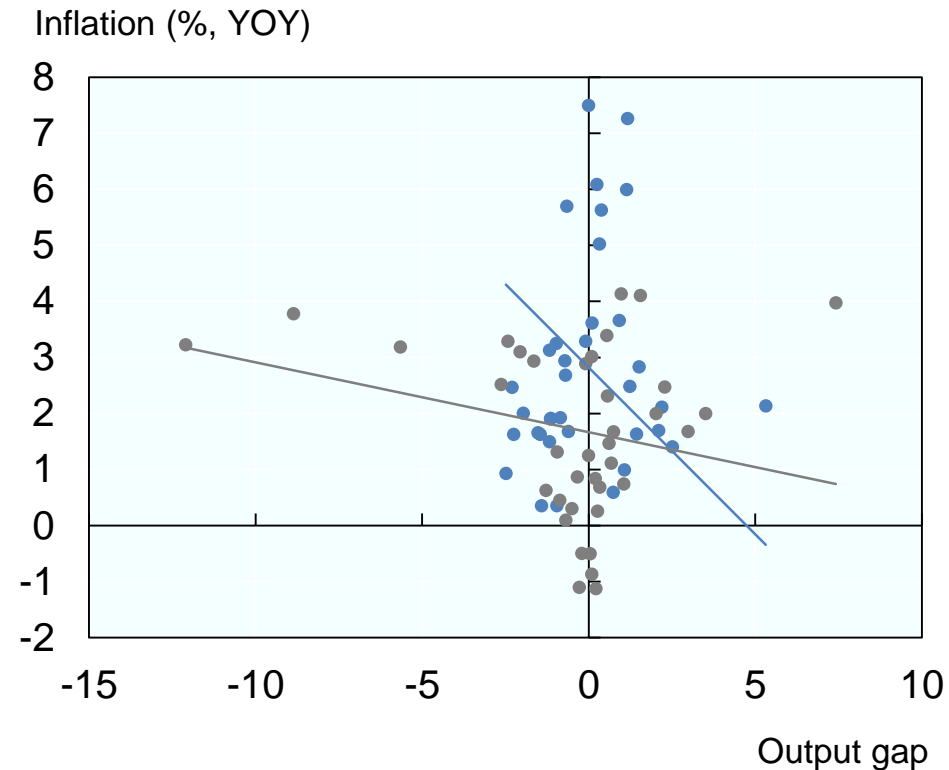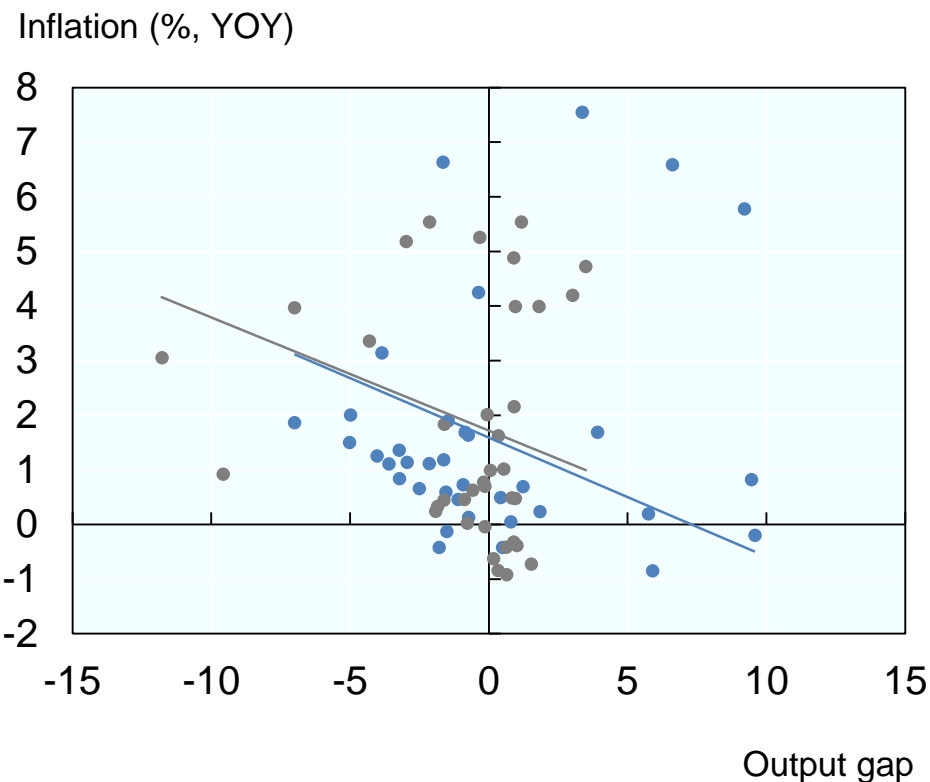
Phillips curve

Phillips curve augmented form

$$\pi_t^{cpi} = c + \beta_1 \pi_t^m + \beta_2 \pi_{t-1}^{mean} + \beta_3 OG_t^c + e_t$$

Note: The relative price of imports is measured as the import price deflator divided by the GDP deflator. In equation (1) π_t^{cpi}, stands for the CPI inflation rate; π_t^m stands for the inflation of the relative price of imports; π_{t-1}^{mean} stands for the average inflation rate of the 4 previous quarters at t-1; and OG_t^c stands for the output gap. The output gap is measured as the difference between the real GDP growth rate and its trend component. The sample was split in two, from Q1 2000 to Q4 2008, and from Q1 2010 to Q1 2019; the estimation thus does not include the global financial crisis (GFC).

Source: OECD Outlook for Southeast Asia Economic China and India 2020.

Inflation targeting has seemingly worked well in anchoring inflation in Emerging Asia

Target inflation band and actual inflation in Thailand and Indonesia

Thailand

- Target band
- Headline 12-month moving average

Indonesia

- Target band
- Headline 12-month moving average

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.
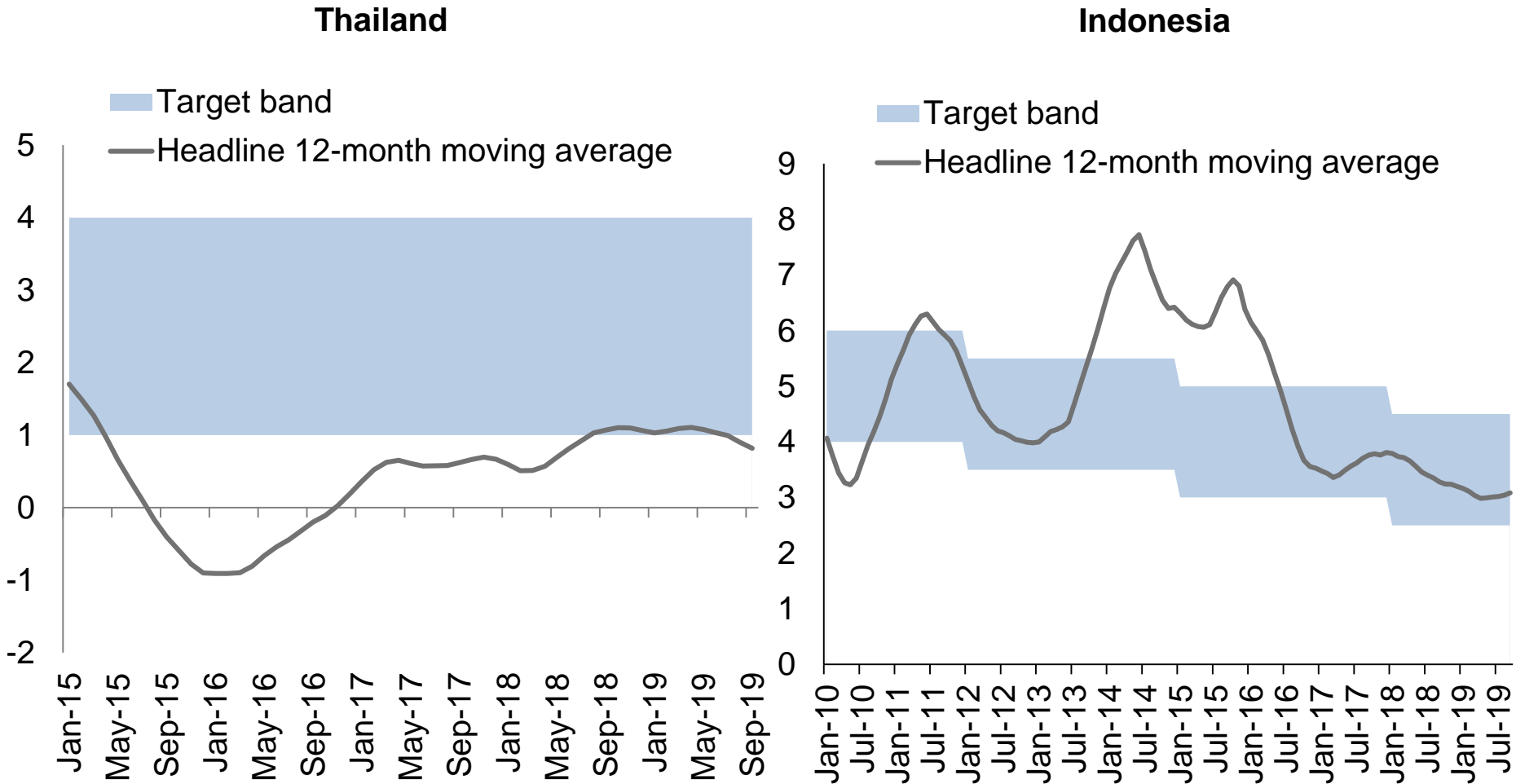
Emerging Asian economies are susceptible to natural disasters

Recorded occurrences of natural disasters in Emerging Asia, 1950-2018

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.
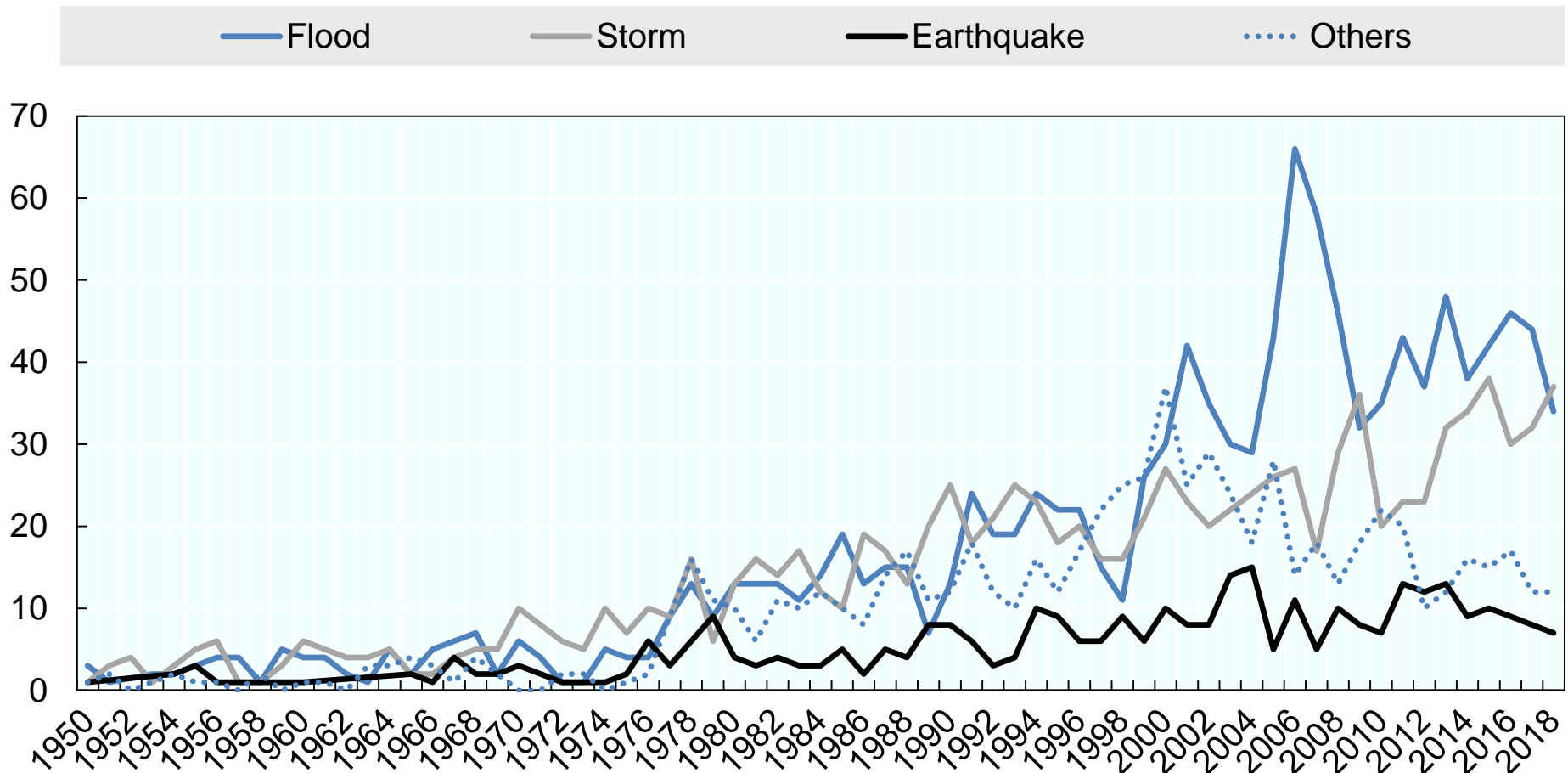
There is scope to mitigate the impact of natural disasters further

■ Earthquake and Volcanic activity, LHS ☐ Flood, LHS ■ Storm, LHS ■ Others, LHS ◆ Total incidents per year, RHS

% of GDP

Incidence
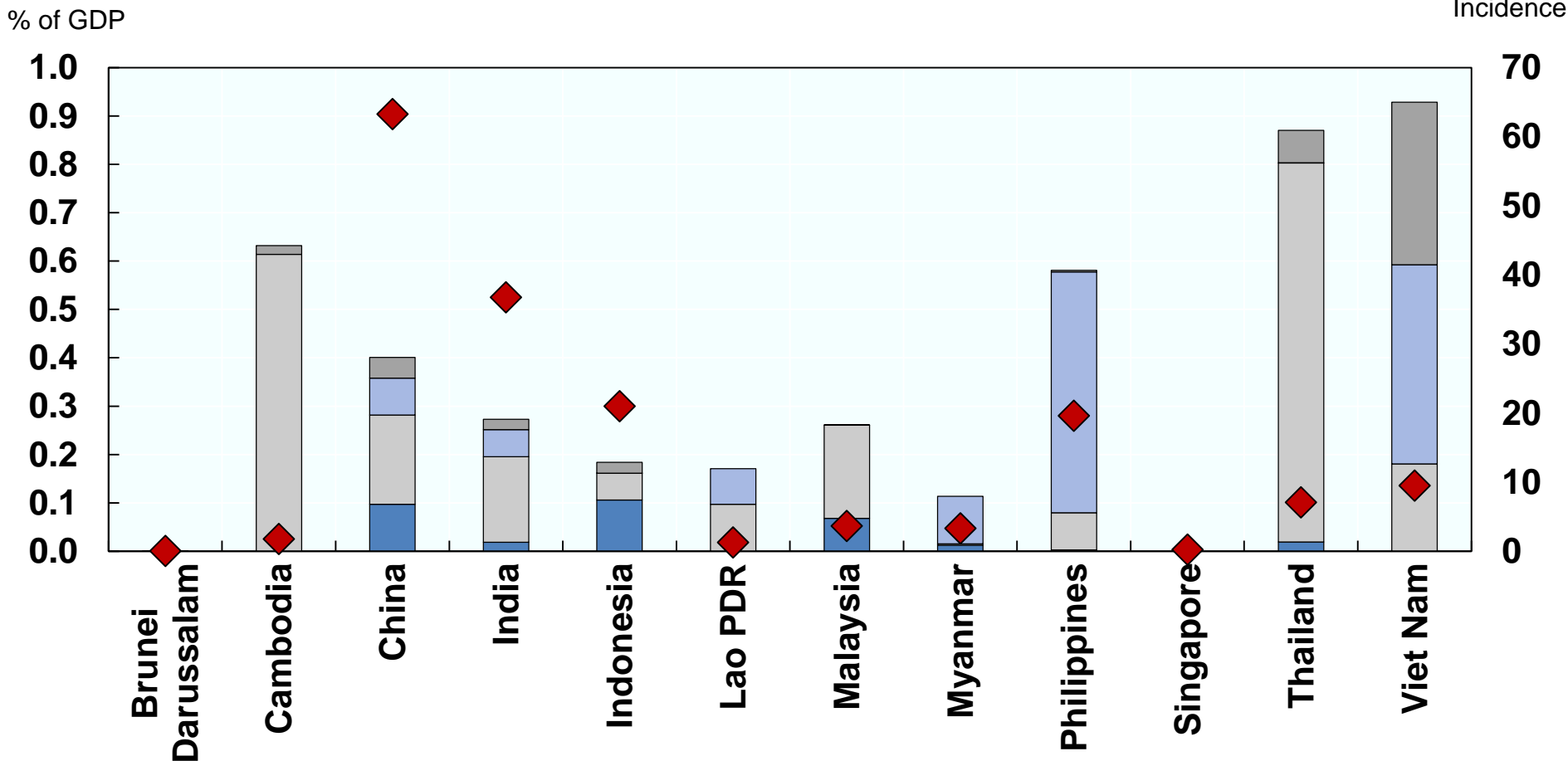
The impact of natural disasters lingers and is hardly captured by economic data

Three-year average growth rates of selected variables after a natural disaster, based on principal component analysis (PCA) approach

Legend: ■ GRDP   □ Factors

X-axis categories: Dujiangyan, China (2008); State of Jammu and Kashmir, India (2014); Lushan, China (2013); Thailand (2011); Wenchuan, China (2008); Yogyakarta, Indonesia (2006); Yushu, China (2010)

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.
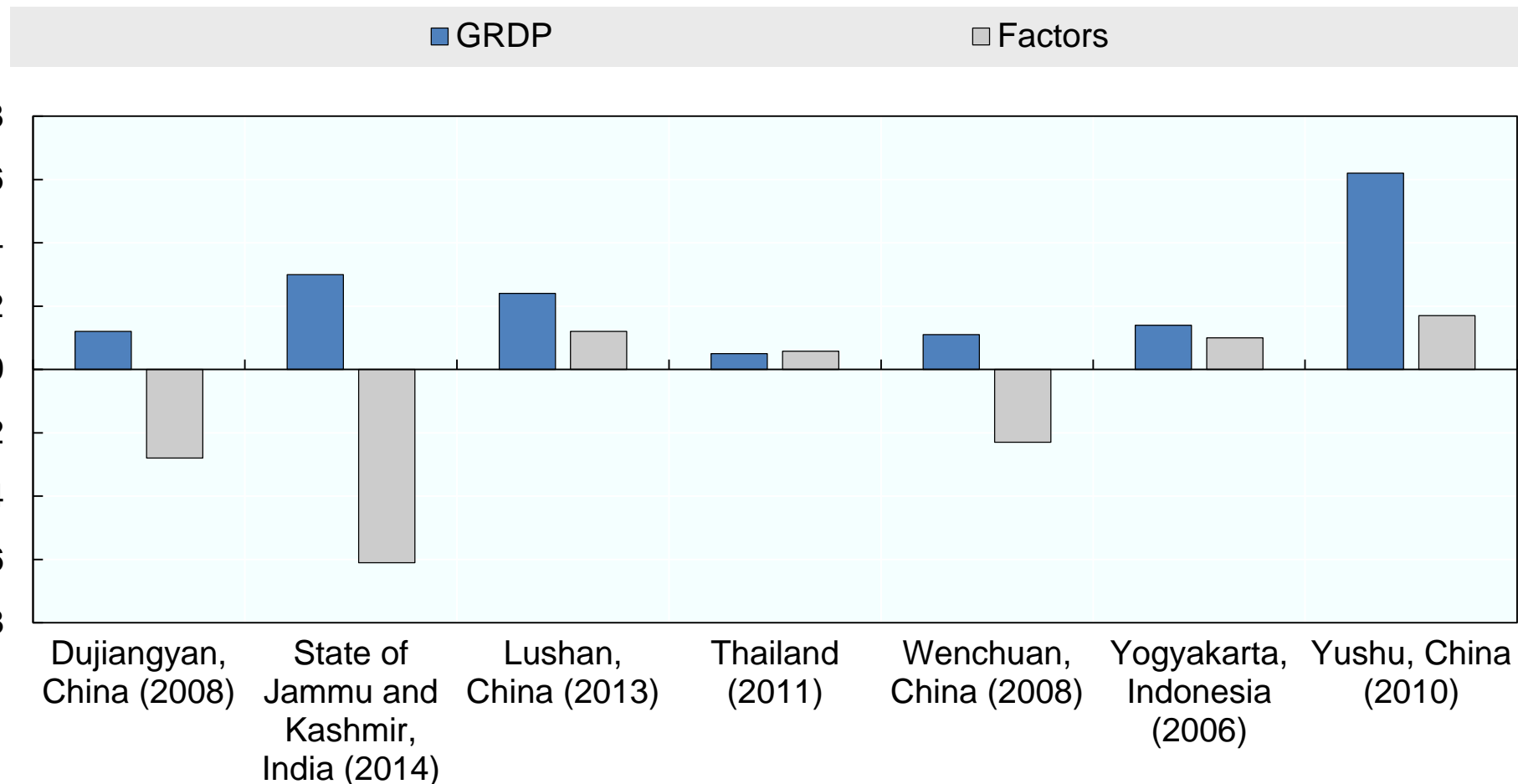
Disaster risk management can benefit from "smart" approaches

Conventional vs. smart approaches to disaster risk management

Aspect	Conventional approaches	Smart approaches
Data availability and use	Manual formats Data usefulness is limited by timeliness and accuracy constraints	Digital formats Live or nearly live and widely shared data Effective and targeted early warning
Infrastructure	Employed as a substitute for ecological and social systems Defensive and not reflecting projected threats due to climate change Single-use design	Employed as a complement to ecological and social systems Adaptive, taking into consideration the effects of climate change Multi-purpose design
Institutions	Silos prevent data sharing Policies and actions are fragmented across sectors and organisations	Data is developed and used collaboratively Integrated and co-ordinated policies across sectors and organisations
Incentives	Short-term orientation	Long-term orientation

Mitigating the risk of Fintech

Country	Regulatory sandbox	Lending and capital raising	Data protection and cyber security
Brunei Darussalam	X	X	X
Cambodia	*1	nci	*1
China	*2	X	X
India	*3	X	X
Indonesia	X	X	X
Lao PDR	nci	nci	X
Malaysia	X	X	X
Myanmar	nci	nci	*4
Philippines	*5	*5	X
Singapore	X	X	X
Thailand	X	X	*6
Viet Nam	*7	*7	X

- **Digital economy:**

  ➢ **Growth through Digitalisation (2018)**

  ➢ **Digital education (2020)**

  ➢ **Smart cities (2019)**

ICT and Internet use have grown rapidly

Internet users in Emerging Asian countries, 2000-16
Percent of population
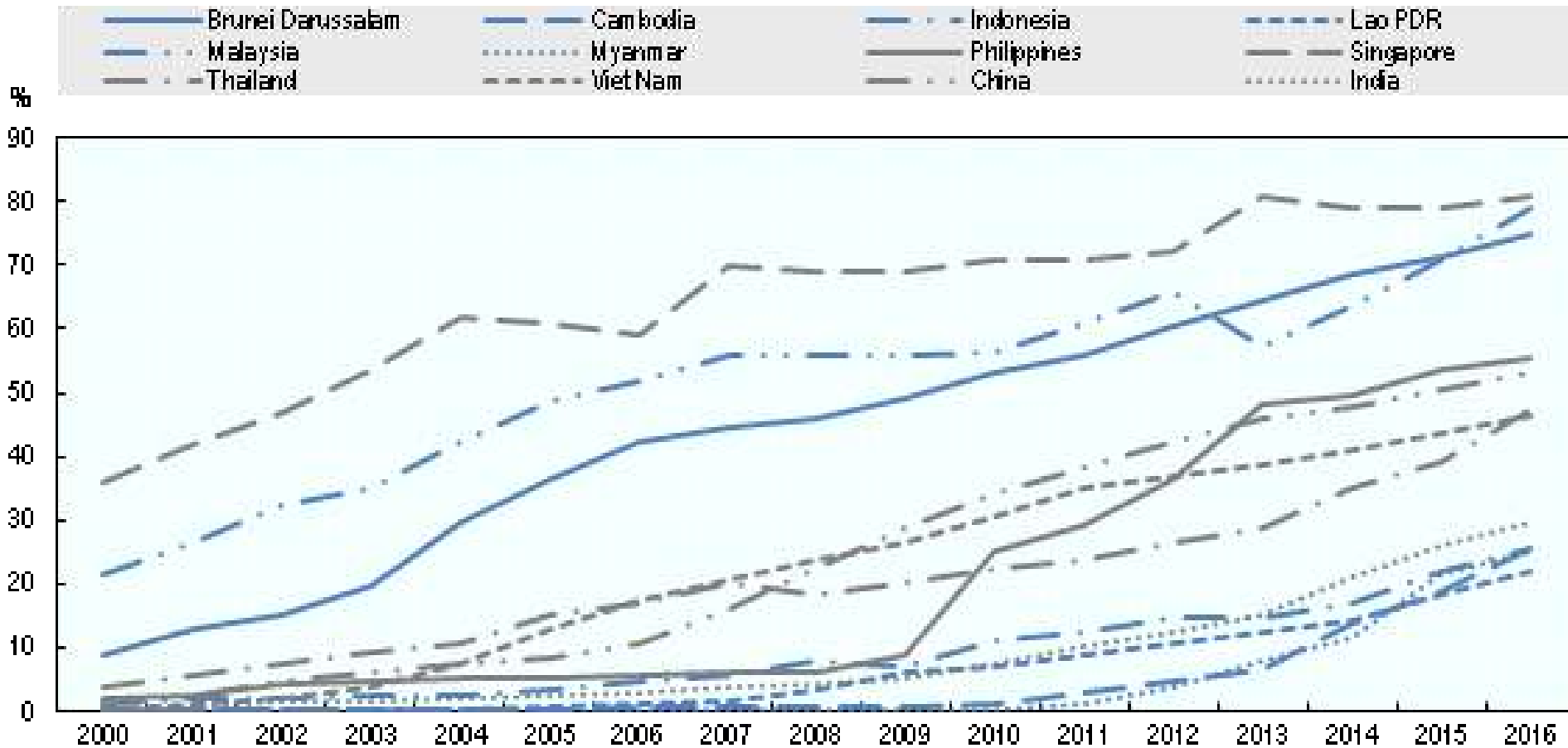
Note: Data on Internet use in Myanmar is not available for the year 2000.
Source: World Bank (2017), *World Development Indicators*, World Bank, Washington, D.C.

Greenfield FDI in ICT and electronics in Emerging Asia

Greenfield FDI in ICT and electronics as a share of manufacturing total, 2012-16 average
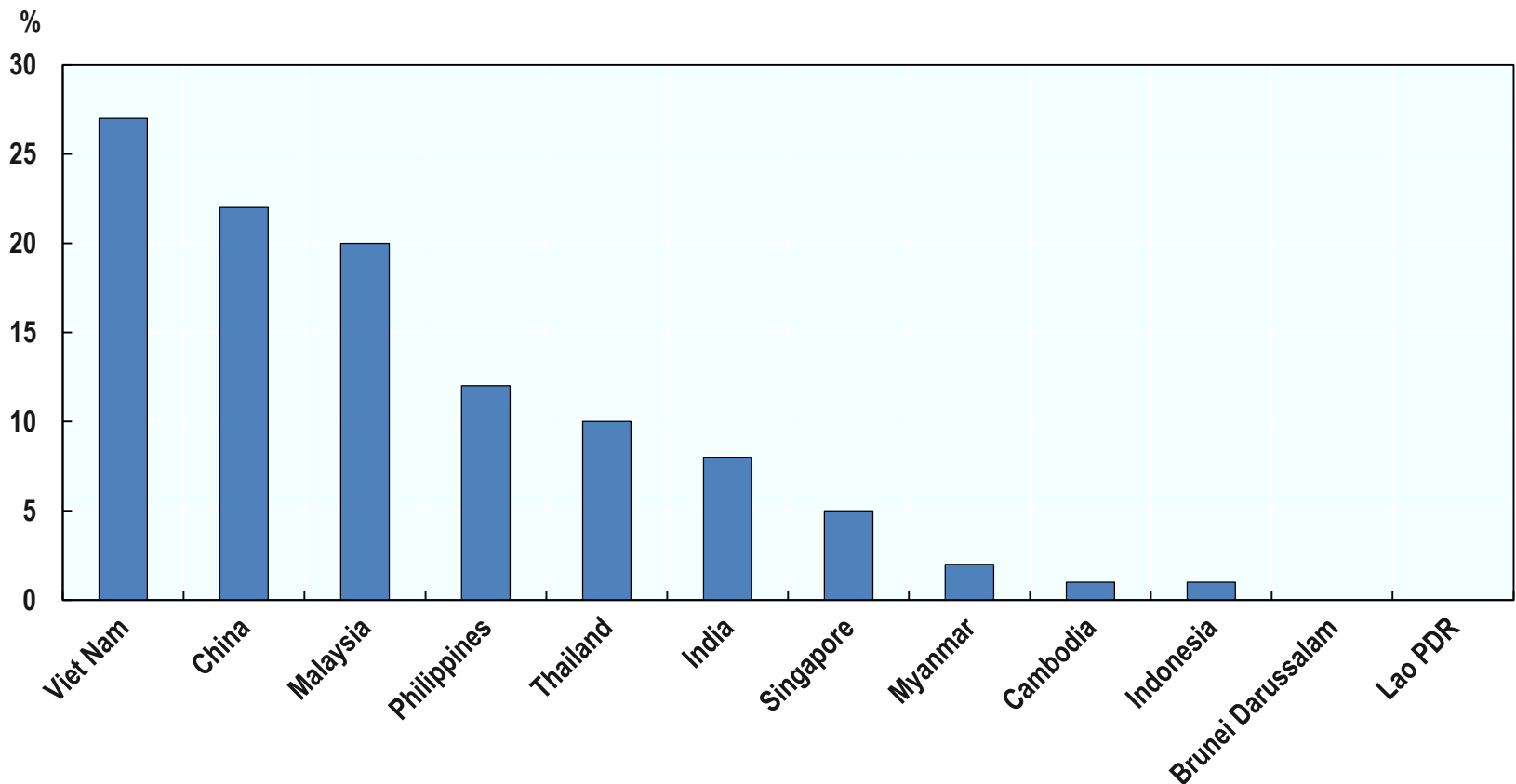
Source: OECD Development Centre calculations, using fDiMarkets (2017), fDiMarkets.

Information technologies change how firms operate…

Shares of firms with websites or using email to communicate with clients or suppliers, by sector
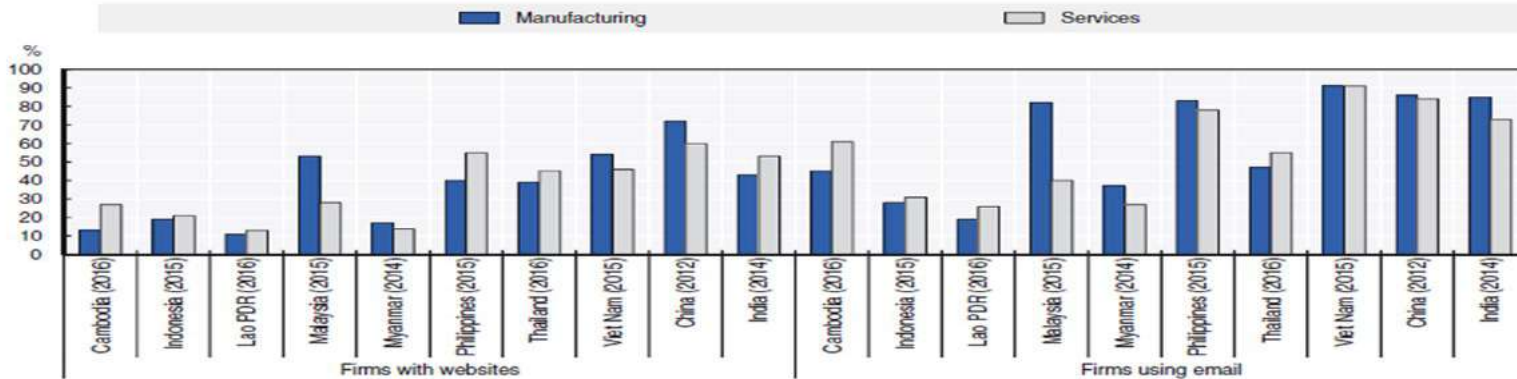
Shares of firms with websites or using email to communicate with clients or suppliers, by exporting activity
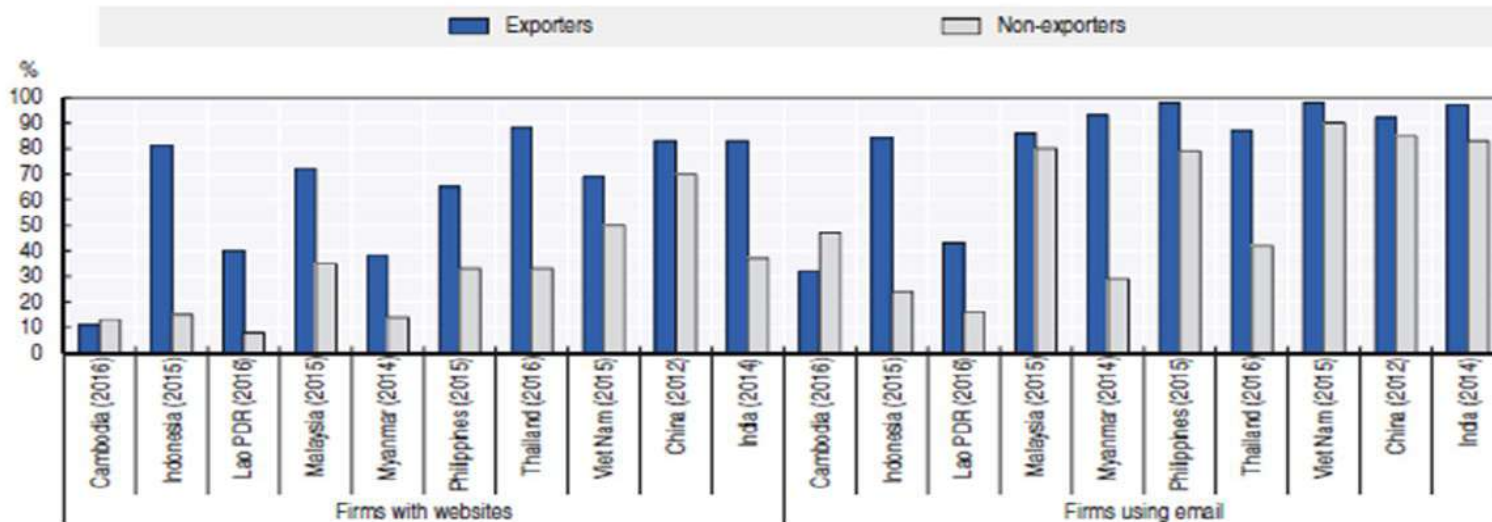
Source: World Bank (2017), Enterprise Surveys.

Use of digital technologies affects aggregate and firm productivity

Average TFP in manufacturing firms with ICT use as a percent of average TFP in firms without ICT use
Percent
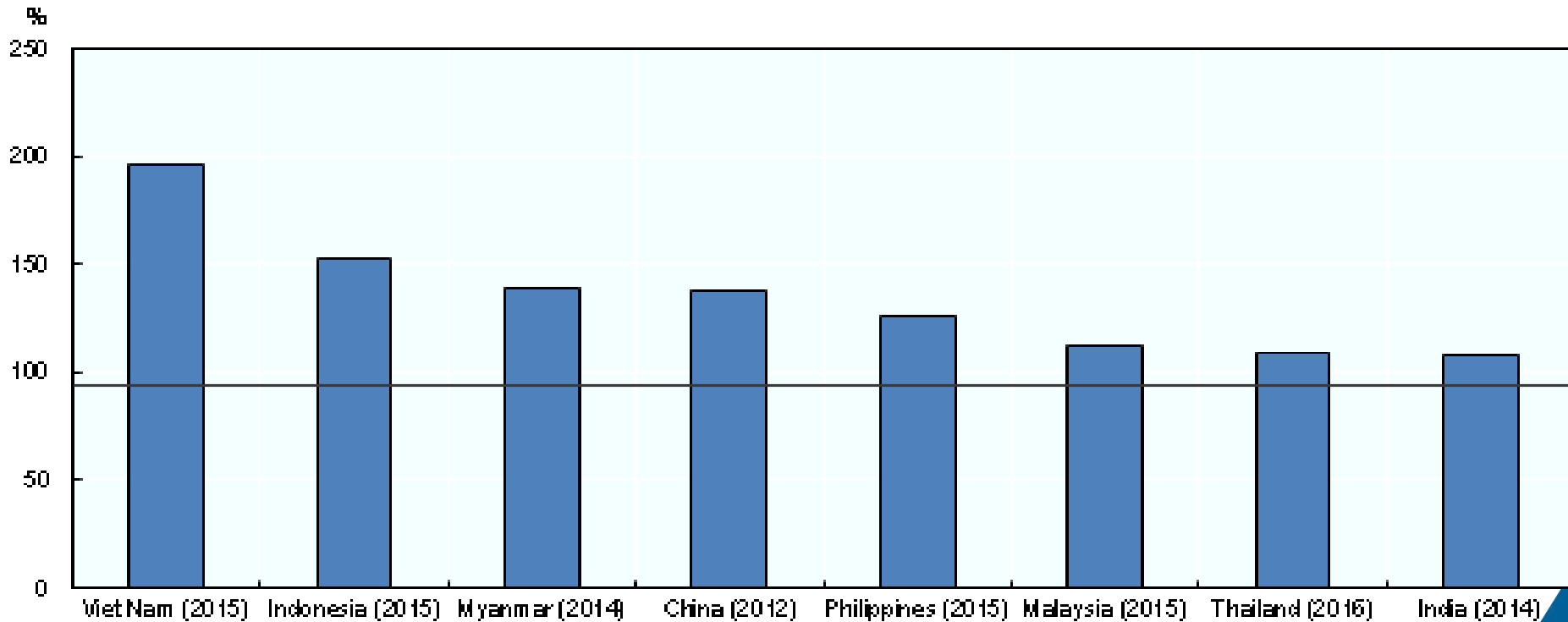
Note: Average TFP in firms with websites and/or using email is presented as a percentage of the average TFP of firms using neither technology, so 100% represents no difference in the average productivity of these two groups. Cambodia and Lao PDR were excluded from this analysis because they contained too few (fewer than 100) observations with sufficient data.
Source: OECD Development Centre's calculations, using World Bank (2017), *Enterprise Surveys*, World Bank, Washington, D.C.

Firms need to make more effective use of ICT tools…

Diffusion of selected ICT tools and activities in enterprises, 2016

As a percentage of enterprises with ten or more employees

Source: OECD (2017), *OECD Digital Economy Outlook* OECD Publishing, Paris.

Trade and investment reforms may be needed to boost digitalisation

Policy restrictiveness in telecommunications and the proportion of telecommunications services embodied in gross exports, 2016
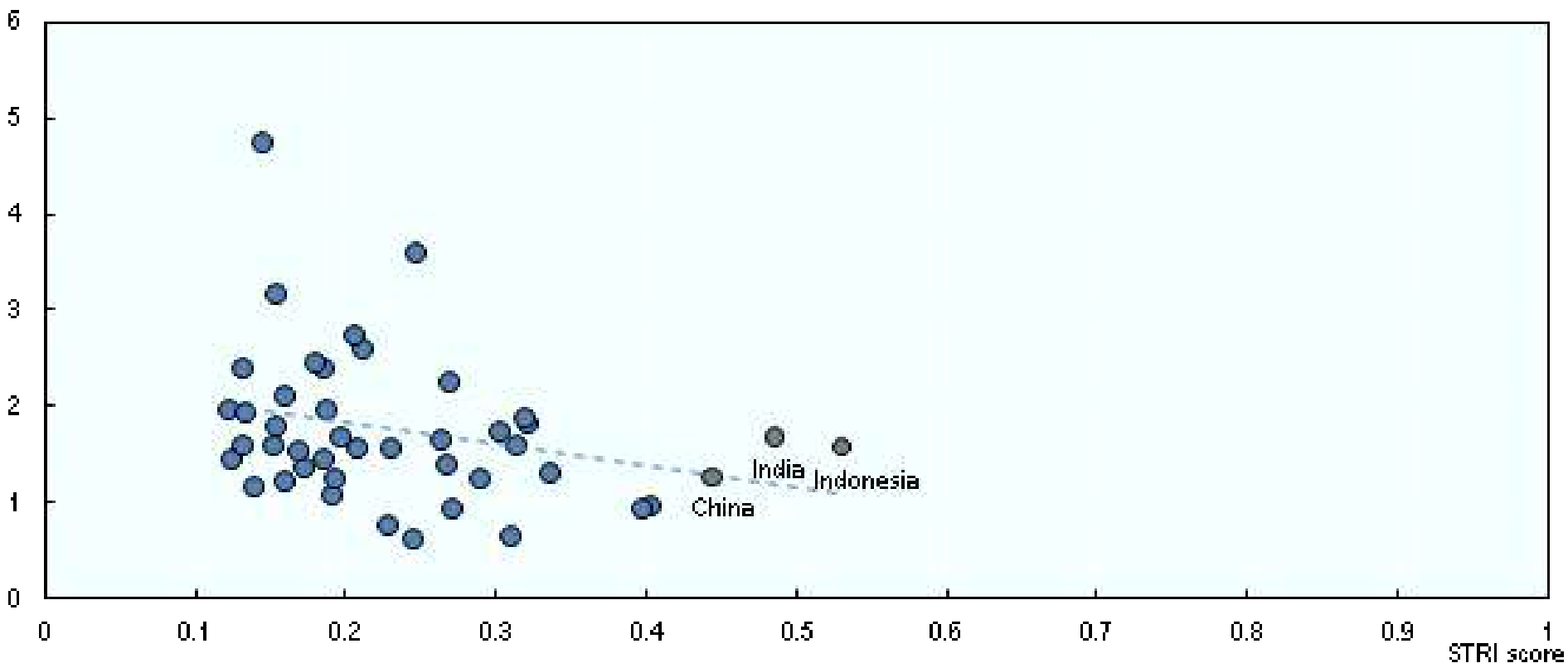
With digitalisation, e-commerce in Asia is seen to grow briskly…

E-commerce market revenue 2015-21

USD billion
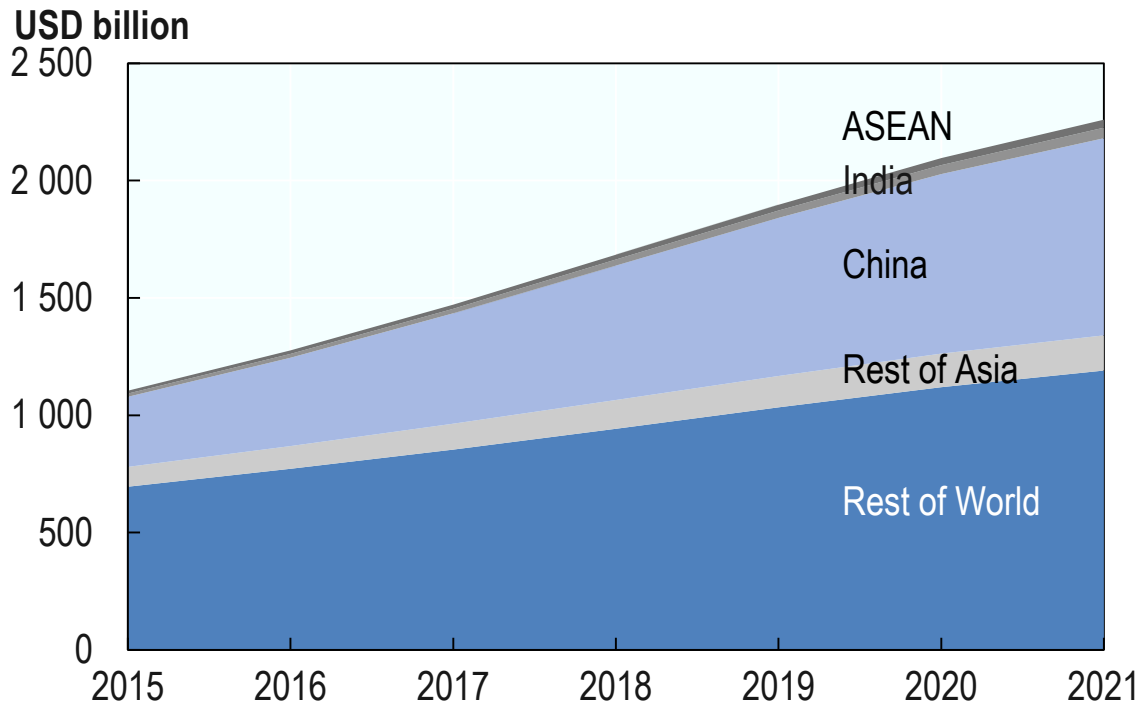
- In 2015, Emerging Asia accounted for an estimated USD 320 billion in e-commerce revenue (29% of the global total)

- By 2021, it is estimated that the region will account for USD 900 billion in e-commerce revenue (41% of the global total)

Source: OECD Development Centre's calculations based on data from Statista.

- **Digital economy:**
  - ➢ **Growth through Digitalisation (2018)**
  - ➢ **Digital education (2020)**
  - ➢ **Smart cities (2019)**

ICT jobs have expanded, but growth can be facilitated further

Employment in the ICT sector in Emerging Asia

■ Actual employment (LHS)   ◇ Share of total employment (RHS)

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.
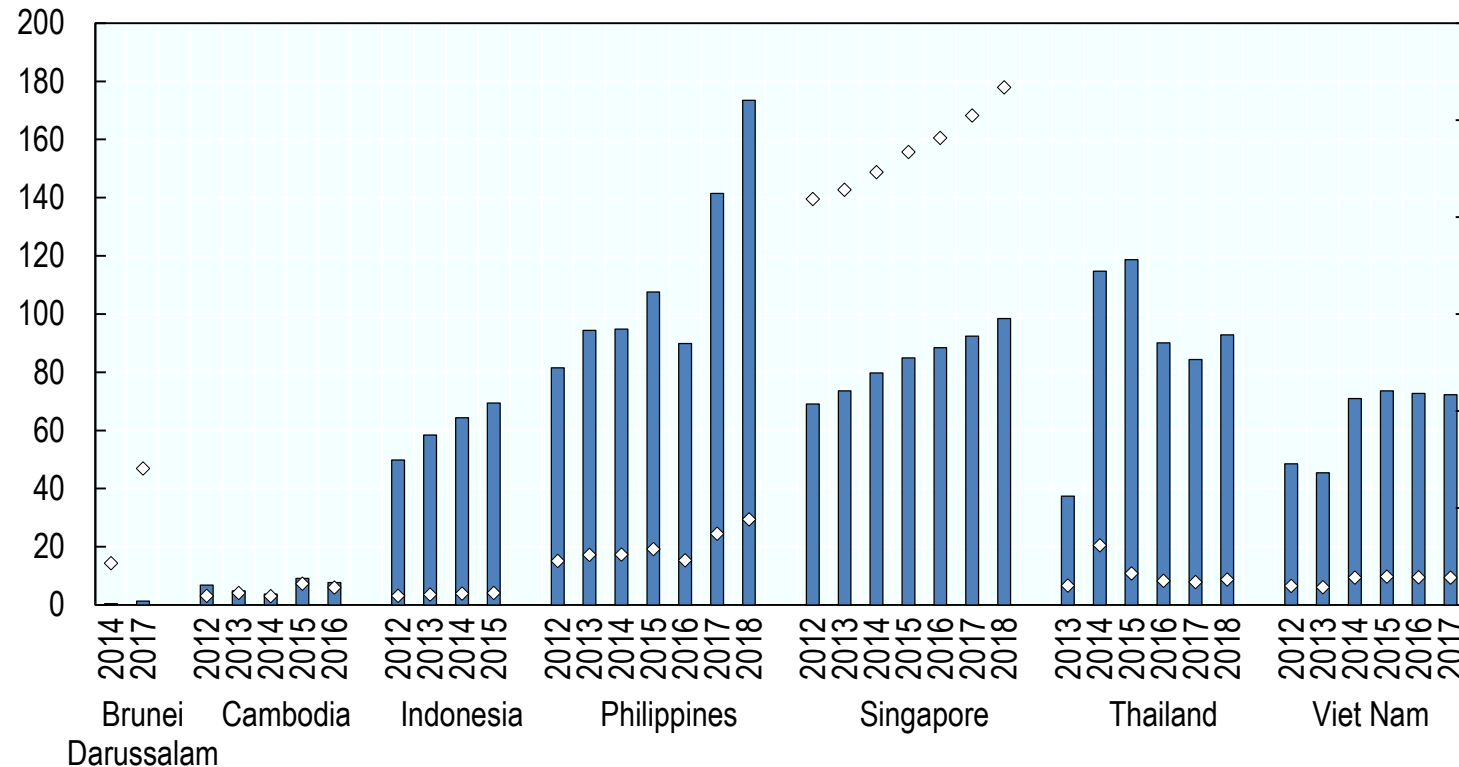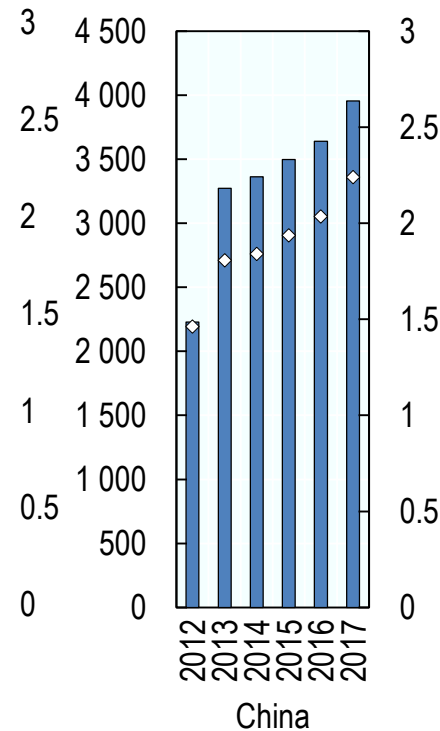
There is a large policy scope to narrow the digital skills gap in Emerging Asia

Current and future skills demand and supply in three Emerging Asian countries – simulation

Cambodia

Demand / Supply

Indonesia

Demand / Supply

Thailand

Demand / Supply
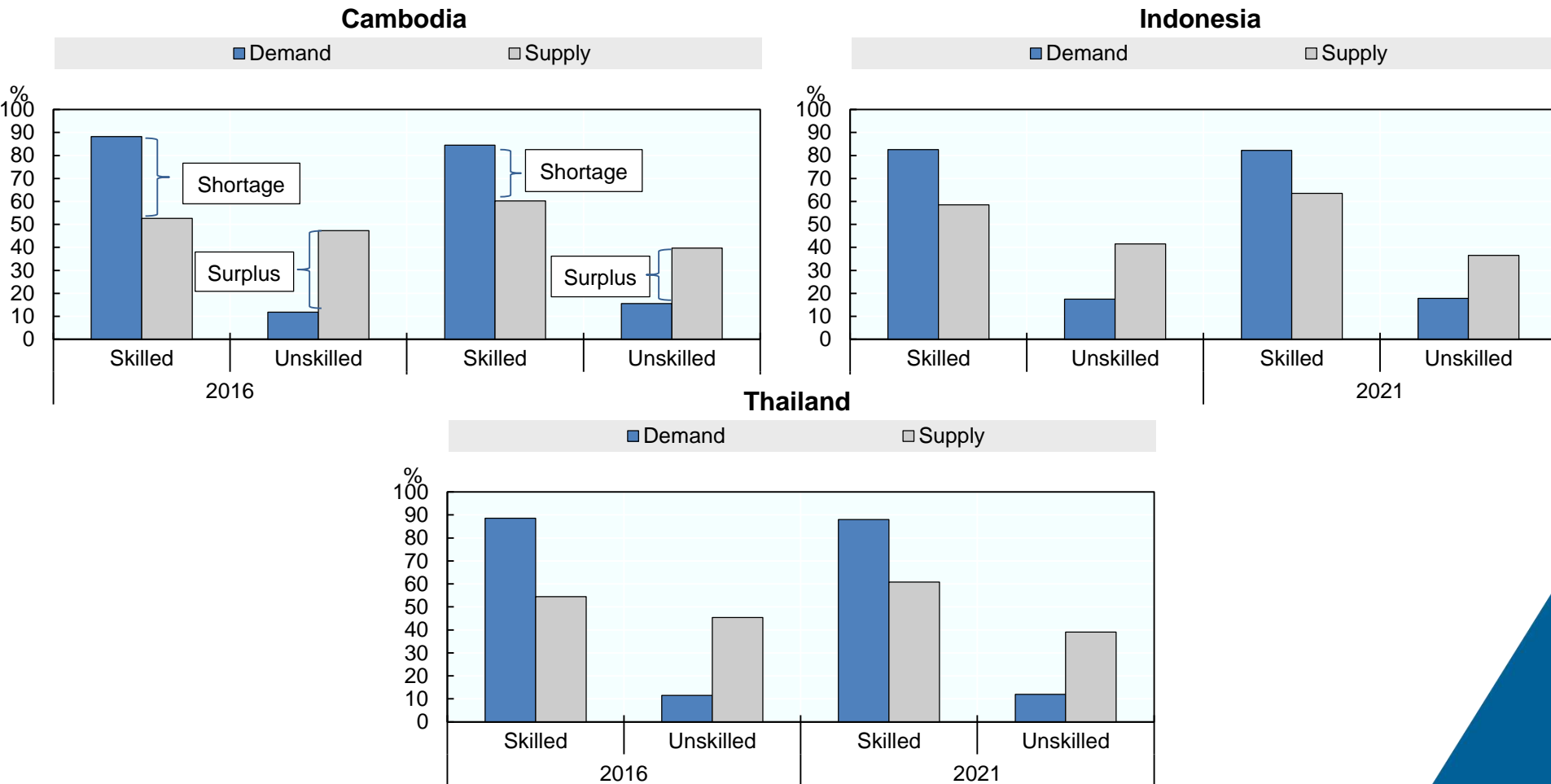
Emerging Asian countries face different, but related challenges in digital education

Country-specific challenges for digital education in Emerging Asia

Countries	Digital education challenges
ASEAN-5 countries	
Indonesia	Ensuring access to technology at schools across the country
Malaysia	Bridging the gap between ICT graduates and industry demands
Philippines	Providing schools with more ICT infrastructure and trained teachers
Thailand	Improving teachers' readiness for digital education
Viet Nam	Strengthening vocational education to meet demand for digital skills
Brunei Darussalam and Singapore	
Brunei Darussalam	Fostering teachers' capacity for ICT use in classrooms
Singapore	Strengthening teachers' belief in ICT use in the classroom
CLM countries	
Cambodia	Improving ICT infrastructure and power supplies for better access
Lao PDR	Increasing access to ICT tools for both teachers and students
Myanmar	Providing quality ICT to all schools
China and India	
China	Bridging the digital talent gap between demand and supply
India	Raising digital literacy through broader access to digital devices

Source: OECD Economic Outlook for Southeast Asia, China and India 2020.

Bridging the socio-economic gap in digital access is a pressing issue

Socio-economic gap in digital access in schools, 2012

%
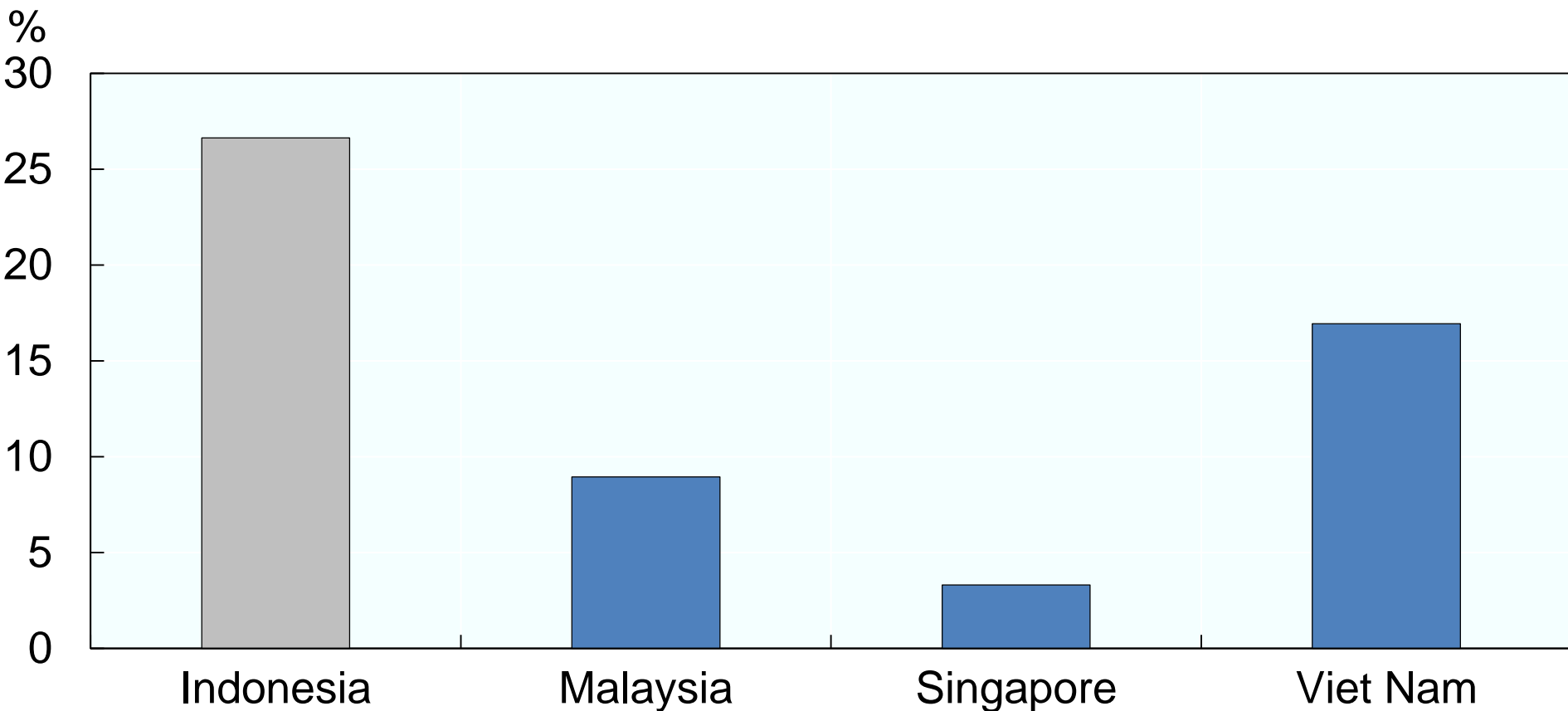
Note: The socio-economic gap in digital access in schools is defined as the difference in internet connection access between schools with students of high socio-economic background and schools with students of low socioeconomic background. The high and low socio-economic background schools are defined based on their students being part of the top quarter or bottom quarter of the PISA index of economic, social and cultural status (ESCS).
Source: OECD (2015b), Students, Computers and Learning: Making the Connection – OECD Economic Outlook for Southeast Asia, China and India 2020.

Appropriate technology use is vital in digital education; More is not always better

PISA 2015 performance and ICT use at school

Legend: ◆ Bottom quartile ▲ Second quartile ○ Third quartile ▮ Top quartile

Students' mean scores in science by quartile of the index of ICT use at school
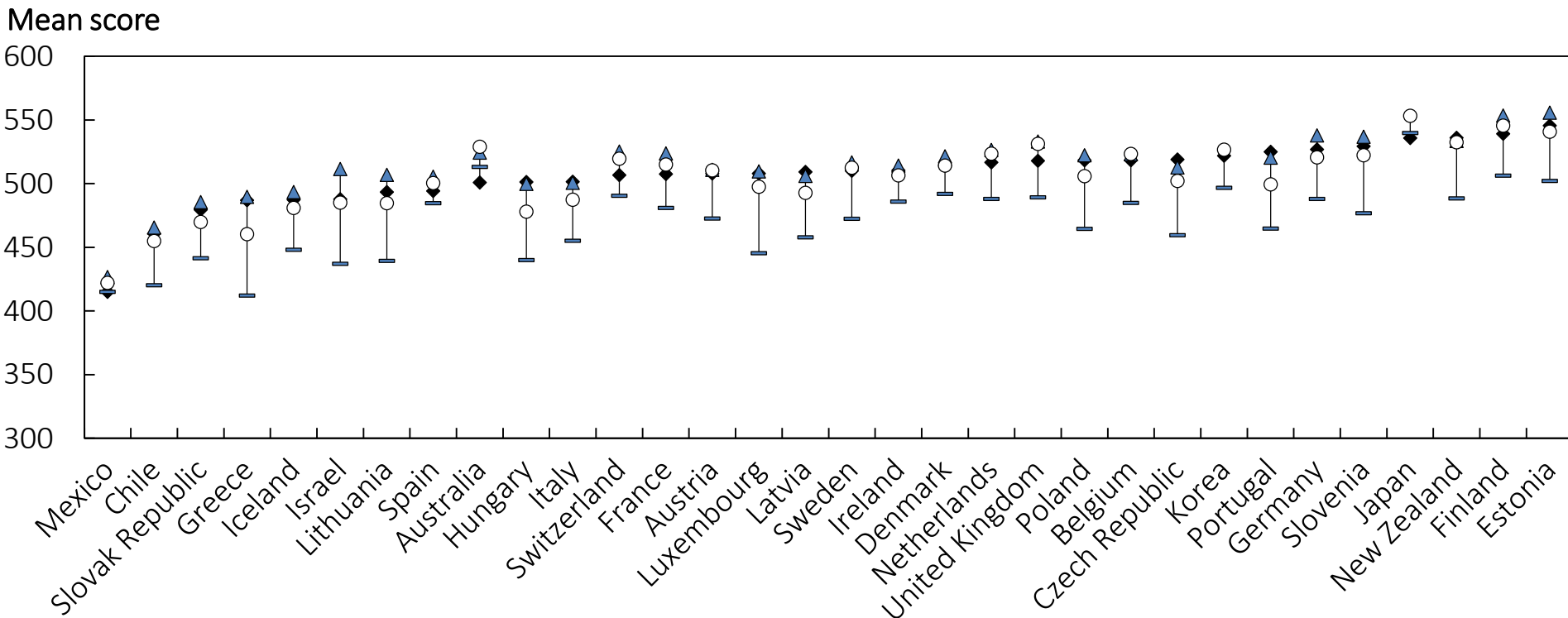
Appropriate technology use is vital in digital education; More is not always better

PISA 2015 performance and ICT use at school

Legend: ◆ Bottom quartile   ▲ Second quartile   ○ Third quartile   ■ Top quartile

Students' mean scores in mathematics by quartile of the index of ICT use at school
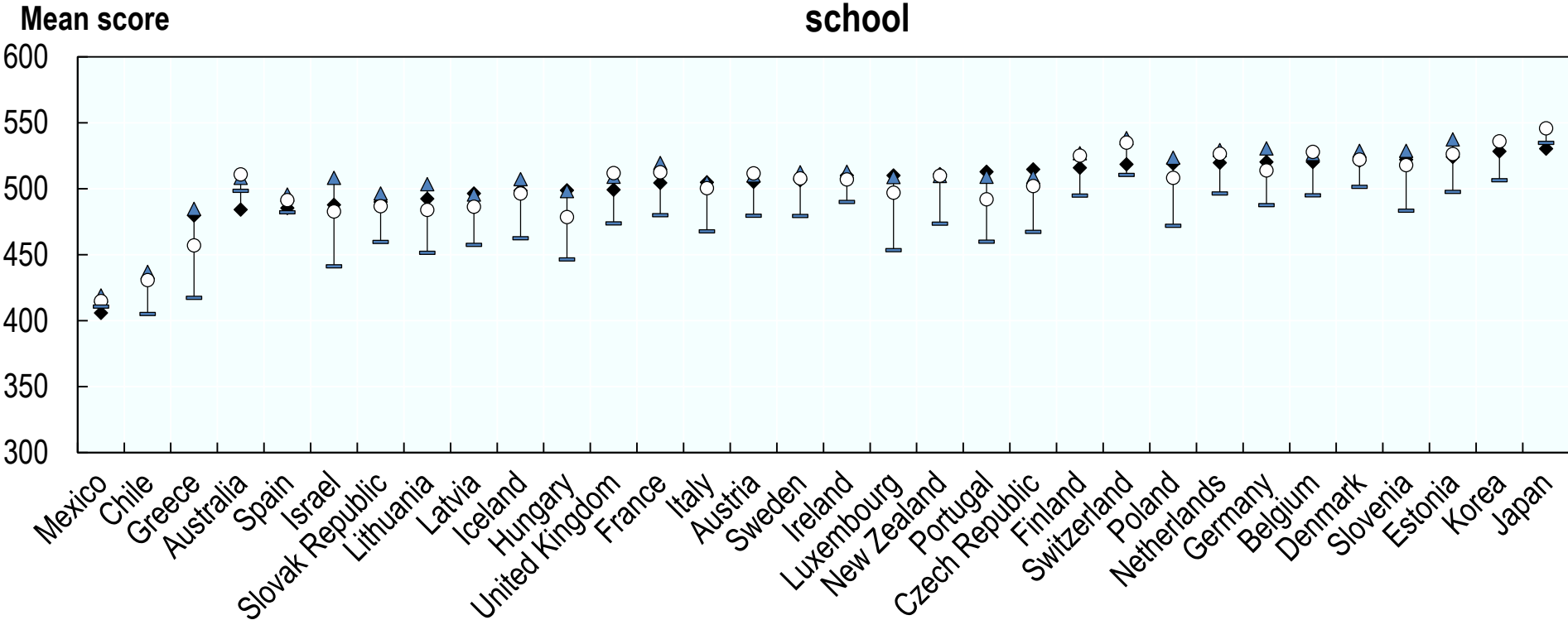
Appropriate technology use is vital in digital education; More is not always better

PISA 2015 performance and ICT use at school

Students' mean scores in reading by quartile of the index of ICT use at school

Mean score

Source: OECD calculations based on OECD (2015c), PISA database 2015, http://www.oecd.org/pisa/data/2015database/; OECD Economic Outlook for
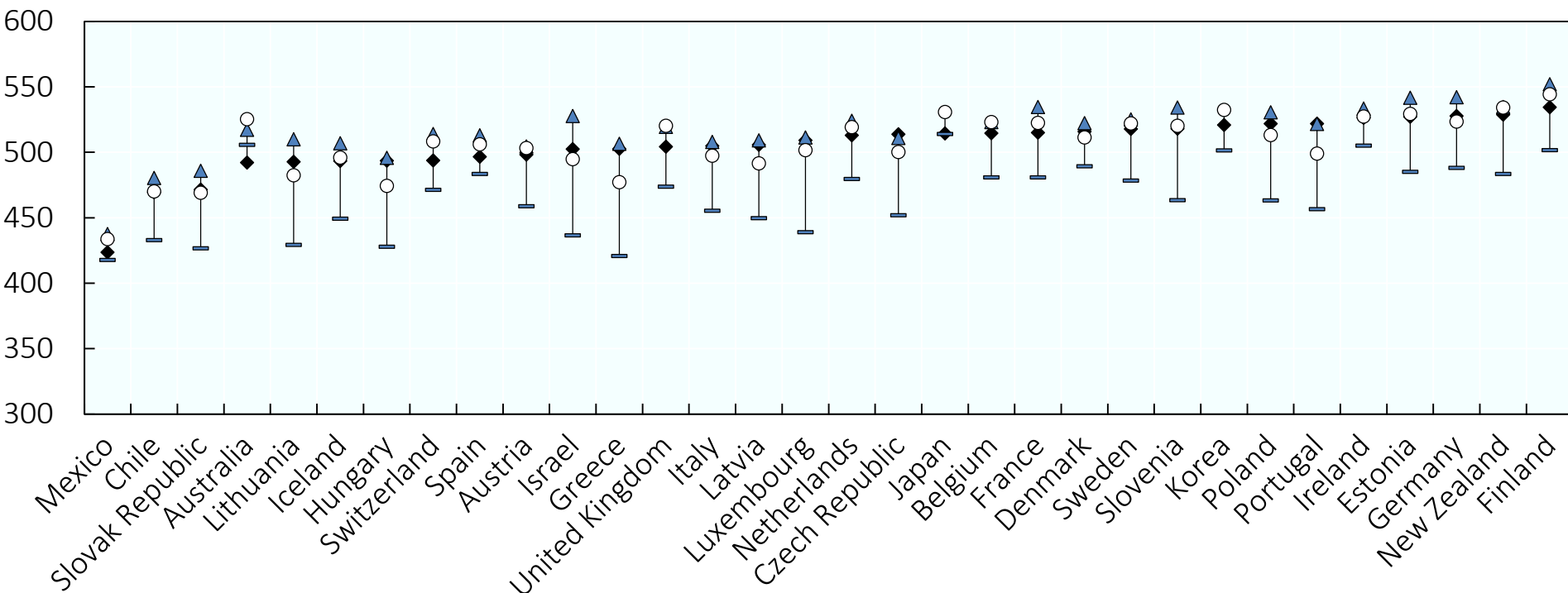
Teacher quality across education levels necessitates support

Vocational teachers with satisfactory computer skills in Viet Nam, 2017
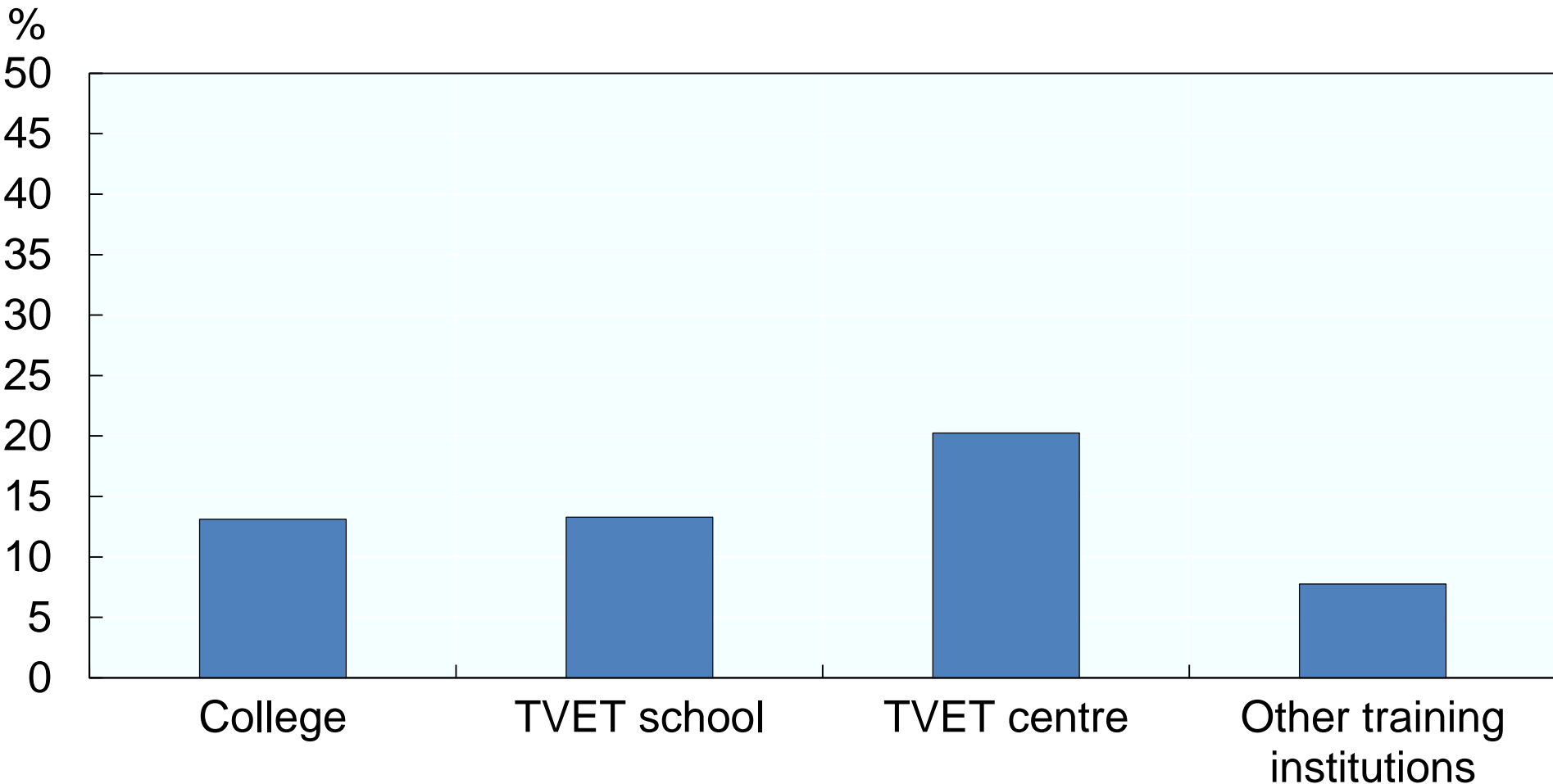
There is scope to deepen the use of ICT in TVET programmes

Examples of initiatives on ICT use in TVET

Countries	Initiatives
Brunei Darussalam	• Project 4C-Minecraft
Indonesia	• Digital Simulation (mainly for all fields of studies in vocational secondary school) • Course Development Plans for e-commerce and Industry 4.0 in vocational higher institution level
Malaysia	• Internet of Things Expertise in Agriculture • Diploma in Database Management System and Application • Industrial Centre of Excellence for Integrated Welding Program
Philippines	• National Technical Education Skills Development Plan 2018-22
Singapore	• Interactive Scenario-Based Learning Experience • Project-Based Learning with Webinar • Learning Through Filming

Monitoring and supervision of lifelong learning initiatives can be improved

Change in adult learning participation rates in Emerging Asia since 2009

■ **Increased**   □ **Decreased**   ■ **No change**   ■ **Do not know/No answer**

Source: OECD Southeast Asia Economic Outlook 2020.
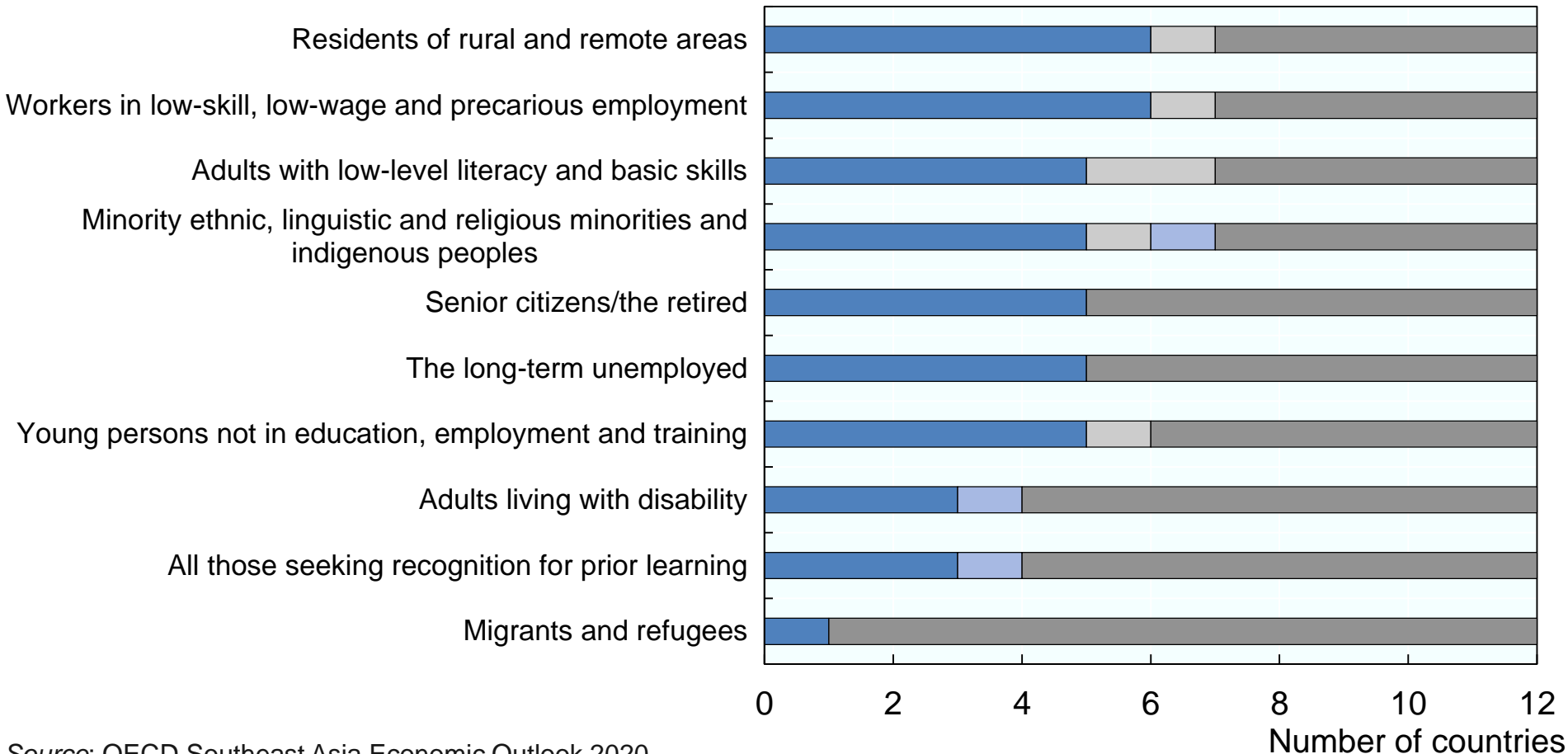
Quality of education is important

OECD PISA score in Southeast Asia and OECD countries, 2015
Average for all students
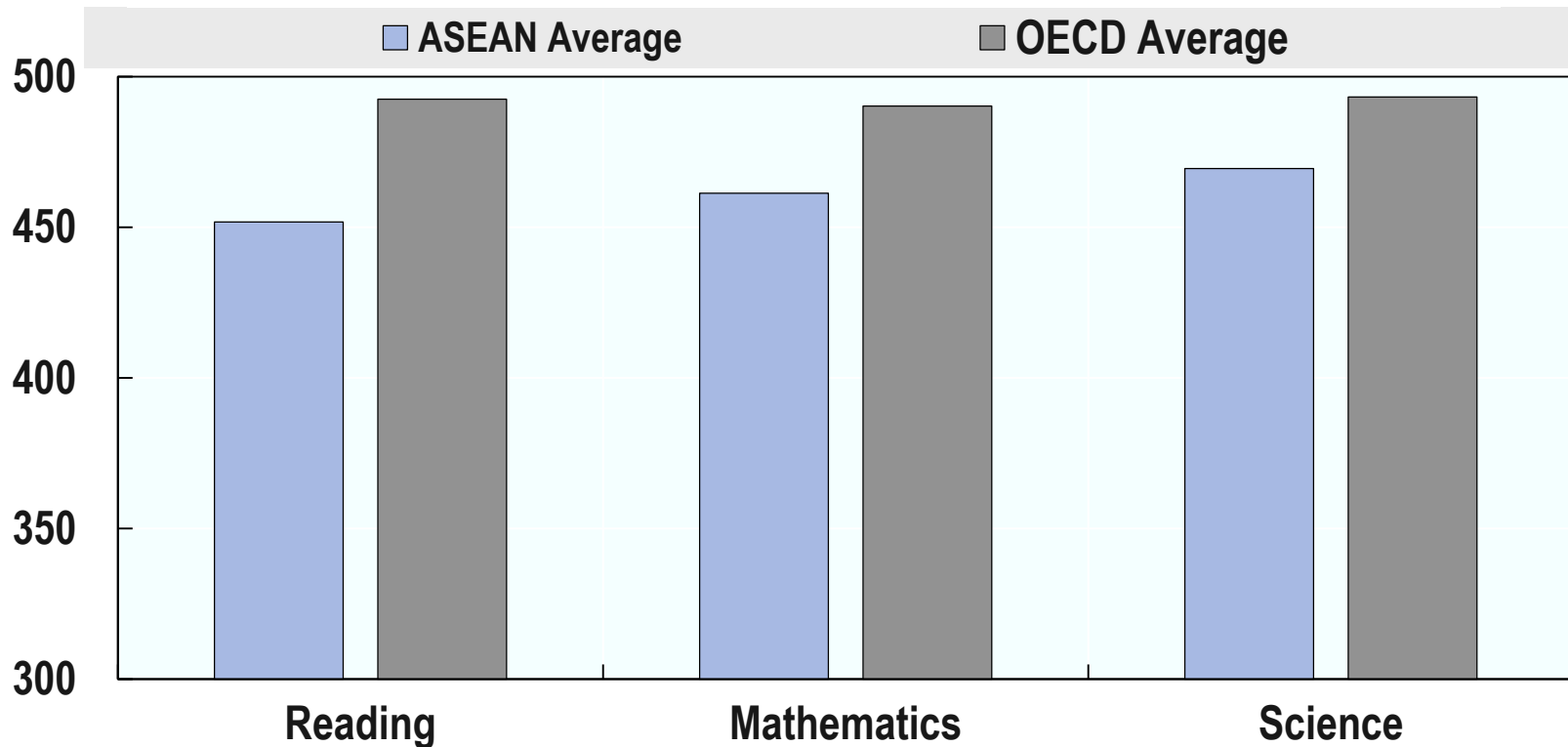
Note: ASEAN Average is the average PISA score of Indonesia, Malaysia, Singapore, Thailand and Viet Nam.
Source: OECD, PISA 2015 database.

- **Digital economy:**

  ➢ **Growth through Digitalisation (2018)**

  ➢ **Digital education (2020)**

  ➢ **Smart cities (2019)**

ASEAN Smart Cities Network pilot cities

countries	Cities
Brunei Darussalam	Bandar Seri Begawan
Cambodia	Battambang, Phnom Penh, Siem Reap
Indonesia	Banyuwangi, DKI Jakarta, Makassar
Lao PDR	Luang Prabang, Vientiane
Malaysia	Johor Bahru, Kota Kinabalu, Kuala Lumpur, Kuching
Myanmar	Mandalay, Nay Pyi Taw, Yangon
Philippines	Cebu City, Davao City, Manila
Singapore	Singapore
Thailand	Bangkok, Chonburi, Phuket
Viet Nam	Da Nang, Ha Noi, Ho Chi Minh City

Source: ASEAN Secretariat.

National strategies are in place

National-level smart city strategies in Emerging Asia

Country	Name of strategy
Brunei Darussalam	Wawasan Brunei 2035/Brunei Vision 2035
	Strategic Plan 2018-2023
Cambodia	National Strategic Development Plan 2014 – 2018
Indonesia	Movement to 100 Smart City
Lao PDR	8th Five-Year National Socio-Economic Development Plan 2016 – 2020

Country	Name of strategy
Malaysia	11th Malaysian Plan 2016 – 2020
	Communications and Multimedia Blueprint 2018-2025*
Myanmar	Myanmar Sustainable Development Plan 2018 – 2030
Philippines	Philippine Development Plan 2017 – 2022
Singapore	Smart Nation Initiative

Country	Name of strategy
Thailand	Thailand 4.0 National Development Plan
	Plan for the Promotion of the Digital Economy 2018-2021
Viet Nam	Sustainable Smart City Development Plan
China	13th 5-Year Plan (2016-2020)
	Guidance on Promoting Healthy Smart City Development
	New-Type Urbanisation Plan

Country	Name of strategy
China (cont.)	Opinions of the State Council on Improving Urban Planning and Development Control
India	Smart Cities Mission

Key features of smart city initiatives

Key features of the smart city strategies assessed

Country	Key Features of Smart City Initiatives
China	Significant scope of 500 cities as of 2017 – with pilots including large, medium and small cities as well as smart city clusters – that have been equipped with a range of technologies (e.g. smart transport, CCTV). Strong national-level engagement with corresponding financial support, but a lack of private sector financial contribution places a burden on public expenditure. While there is evidence of horizontal co-ordination across national ministries, a lack of vertical co-ordination limits subnational authority and financial autonomy.
India	Broad scope (targeting the development of 100 smart cities) with the establishment of urban-led special purpose vehicles intended to promote transparency in decision making. Strong national-level engagement with corresponding financial support as well as flexibility regarding how local government can secure financing: the local government must match the sum provided by the national government but may do so via PPPs, multi-lateral funding, user charges, or other taxes. The bottom-up approach requiring each city to establish its own smart city vision empowers local government with competences and autonomy; however, the lack of a national-level master plan may hamper co-ordination and lead to silo approaches to common issues.
Indonesia	Broad scope targeting the development of 100 smart cities. The bottom-up approach allows cities to propose strategies adapted to local context that are subsequently subject to assessment. The lack of clear national-level smart city criteria and objectives may hinder co-ordination and lead to the development of silo approaches to common issues.

Key features of smart city initiatives

## Key features of the smart city strategies assessed (cont.)

| Country	Key Features of Smart City Initiatives
Malaysia	The lack of a national-level master smart city plan stands as an obstacle to the development of smart cities. A national-level smart services strategy identifies multi-stakeholder working groups that seek to promote multi-level co-ordination for the development and deployment of smart services but the participants and responsibilities of these working groups remain unclear. There appears to be a lack of vertical co-ordination concerning the involvement of local government in designing and implementing the smart services strategy.
Singapore	Comprehensive and advanced smart city initiative promoting a multi-stakeholder approach that accounts for key digital and socio-economic opportunities as well as challenges, including measures to boost cybersecurity, ensure data privacy and (re)train different segments of the population (e.g., displaced workers, low-income residents, students, the elderly). Co-ordination between ministries and agencies is promoted through the appointment of Chief Digital Strategy Officers and Chief Information Officers in order to share data and optimise co-ordinated decision making. Key performance indicators for digital government will assess a range of objectives such as stakeholder satisfaction, AI and data analytics.
Thailand	The lack of a national-level master smart city plan could slow development of smart cities. The current national development plan, Thailand 4.0, acknowledges the development of smart cities but has no explicit strategy per se, while Thailand's "Plan for the Promotion of the Digital Economy 2018-2021" details six smart city domains (economy, living, people governance, mobility and energy and environment) to be pursued. The range of themes covered in the six smart city domains reflects efforts to promote co-ordination and to limit silo approaches to common issues. The extent of multi-level co-ordination is unclear.

Source: OECD Economic Outlook for Southeast Asia, China and India 2019-Update.

Traffic congestion is a pressing issue
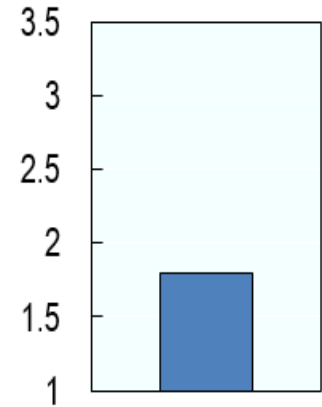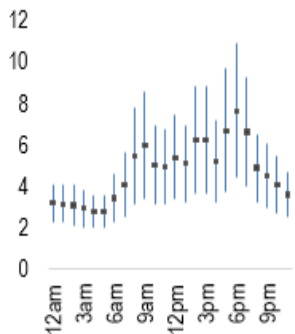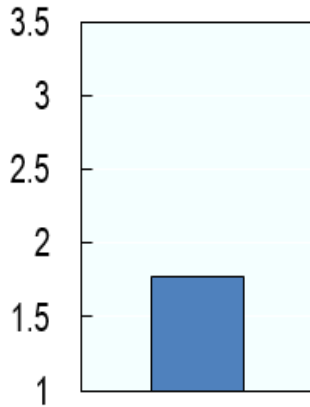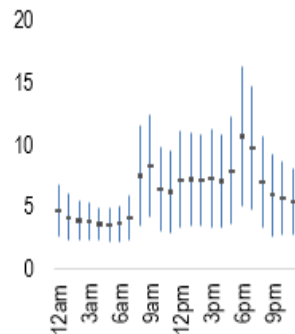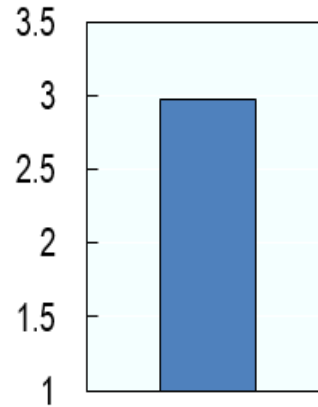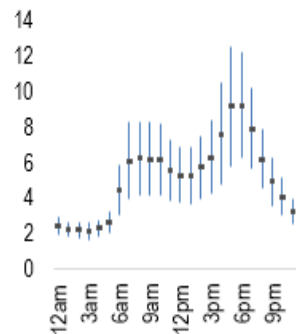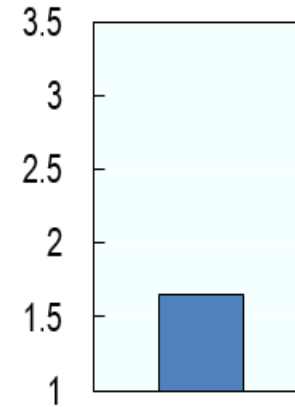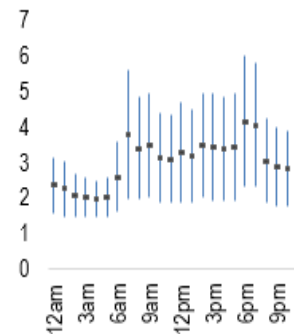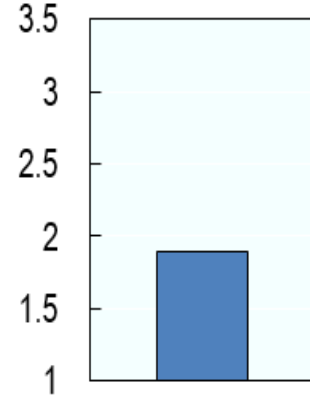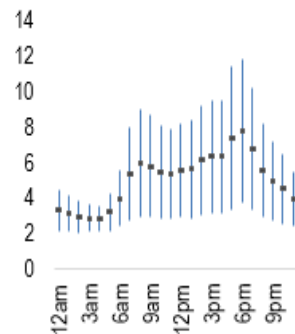
Note: Travel Time Index is defined as peak hour travel time divided by free-flow hour travel time, where 1=no congestion and higher values indicate worse traffic. In travel time figures, markers refer to average travel time at a specific hour in the day while the vertical bars represent the ranges of travel time. Traffic congestion data are based either on the entire specified road if possible or a selected representative segment of a specified road. Data are not necessarily comparable across the five areas shown above.
Source: OECD Development Centre calculations based on data from Google Maps (accessed on 24th September/2018).

Inefficiencies in urban transportation impose significant economic costs

Estimated annual hours spent in traffic congestion in selected cities, per person using motorised transportation

	Hours lost per worker per year
Jakarta, Indonesia	124.8
Kuala Lumpur, Malaysia	99.2
Manila, Philippines	233.6
Singapore, Singapore	89.6
Bangkok, Thailand	208.0
Ho Chi Minh City, Viet Nam	100.0
Beijing, China	208.0
Shanghai, China	264.0
Delhi, India	76.8
Mumbai, India	68.8

Notes: Congestion costs were estimated using the average speed of motorised transportation and average trip length in selected cities to calculate average trip duration. This was compared with a counterfactual average trip duration if average motorised transport speeds were 30 km/h and average trips were of the same length. The difference between the actual average trip duration and the counterfactual was assumed to be the result of traffic congestion. Time spent in congestion per person per year was calculated assuming two trips per day and twenty trips per month.
Source: OECD Economic Outlook for Southeast Asia, China and India 2019-Update.

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Mass transport systems are catching up

Publicly accessible transportation modes in selected Emerging Asian cities

City	Bus	Bus Rapid Transit	Metro and light rail
Bandar Seri Begawan, Brunei Darussalam	✓		
Phnom Penh, Cambodia	✓		
Jakarta, Indonesia*	✓	✓	☺
Vientiane, Lao PDR	✓		
Kuala Lumpur, Malaysia	✓		✓
Yangon, Myanmar	✓		
Manila, the Philippines	✓		✓
Singapore, Singapore	✓		✓
Bangkok, Thailand	✓	✓	✓
Hanoi, Viet Nam*	✓	✓	
Ho Chi Minh City, Viet Nam*	✓		
Beijing, China	✓	✓	✓
Shanghai, China	✓		✓
Delhi, India	✓		✓
Mumbai, India	✓		✓

Note: (*) Metro or light rail system currently under construction.
Source: OECD Development Centre compilation, using national sources.

Traffic congestion policy options

- **Infrastructure and mass transportation expansion and upgrade**

- **Price-based and non-price-based vehicle ownership and use policies (e.g. vehicle purchase tax, license quota, fuel tax, road rationing, road use charge and parking fee)**

- **Effective use of ICT and big data**

- **Flexible work arrangements**

- **Improving urban planning**

Price-based and non-price-based policies need to be effectively used

	Price-based	Non-price-based
Vehicle ownership	• **Vehicle purchase taxes** • **Recurring taxes and charges**	• **License quotas**
Vehicle use	• **Fuel taxes and subsidies** • **Road use pricing and parking fees**	• **Road rationing**

Source: OECD Development Centre.

Public transportation fares in selected Emerging Asian cities

	All public transportation		Mass transit	
	Average 10-km fare (2007 USD PPP)	Cost as percentage of city GDP per capita	Average 10-km fare (2007 USD PPP)	Cost as percentage of city GDP per capita
Kuala Lumpur, Malaysia	0.16	-	0.11	-
Singapore, Singapore	0.39	0.8%	0.36	0.9%
Bangkok, Thailand	0.65	2.7%	0.76	2.7%
Hanoi, Viet Nam	0.05	12.0%	-	-
Ho Chi Minh City, Viet Nam	0.05	2.4%	-	-
Beijing, China	0.16	0.7%	0.15	0.8%
Shanghai, China	0.28	1.1%	0.24	1.2%
Delhi, India	0.17	3.7%	0.12	4.6%
Mumbai, India	0.03	-	0.03	-

Notes: Mass transit includes all public transit modes except for non-BRT buses. Costs are calculated as the average cost of 40 00 km trips per month.
Source: World Bank (2014), Urban Transport Data Analysis Tool.

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Motor vehicles and transport tax revenue, 2013

Percent of GDP
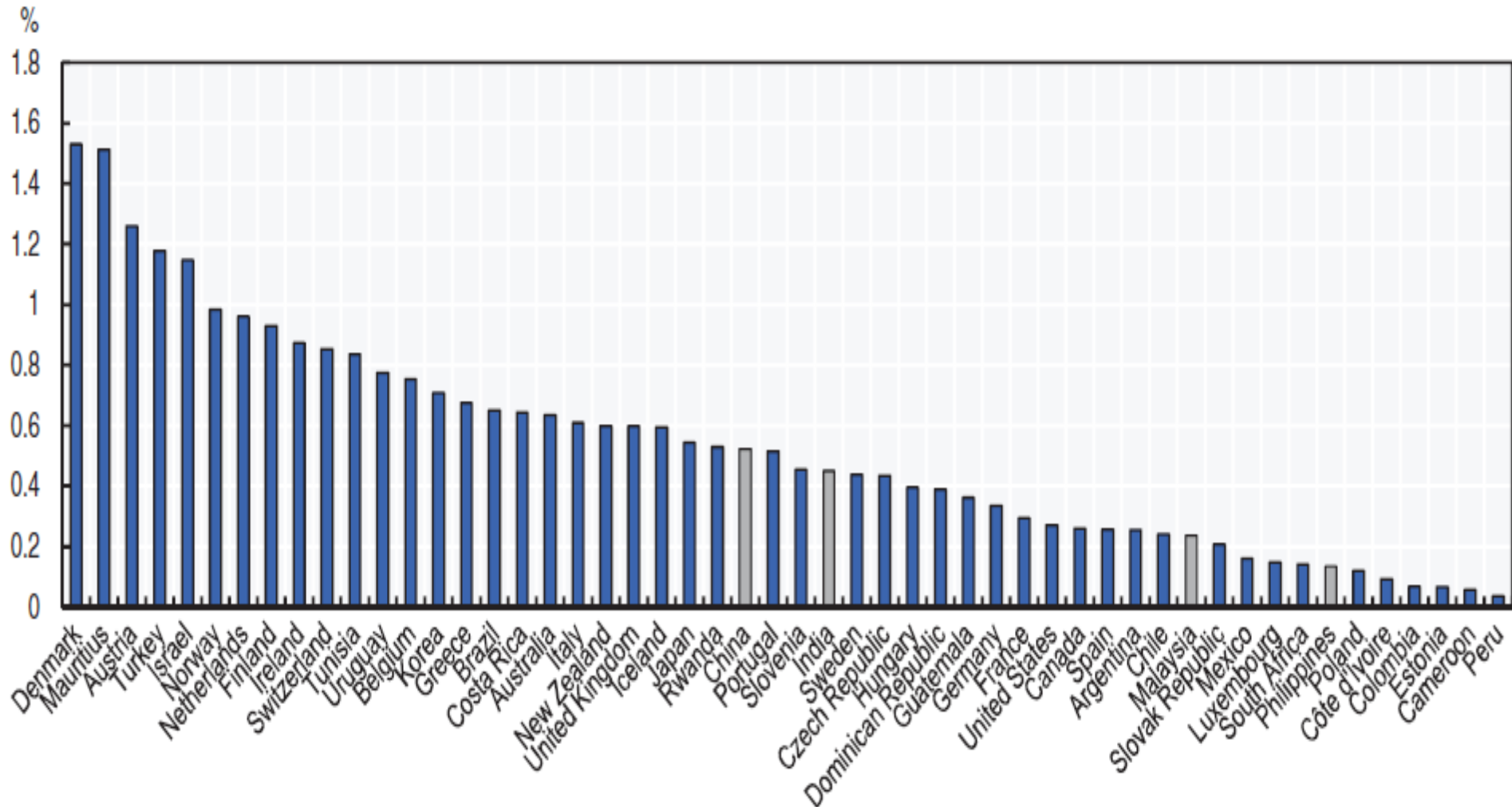
Managing transportation demand through flexible working arrangements

Employees' working hours flexibility in European countries, 2015

Legend:
- They are set by the company/organisation with no possibility for changes
- You can adapt your working hours within certain limits (e.g. flextime)
- You can choose between several fixed working schedules determined by the company/organisation
- Your working hours are entirely determined by yourself
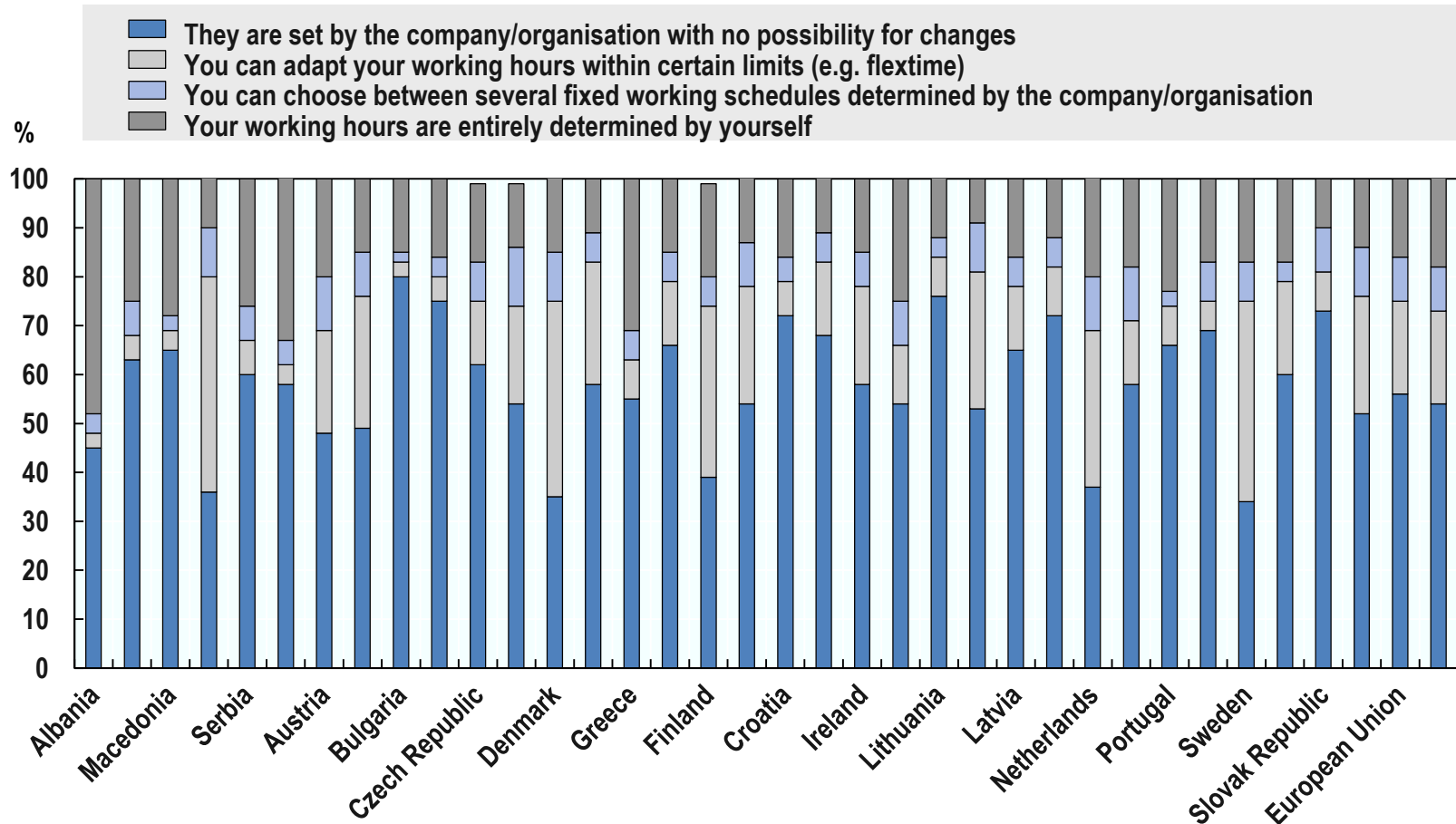
Source: Eurofund (2018), European Working Conditions Survey (database).

Technological innovations in urban transportation systems

City	Technology
London, United Kingdom	**The Smart Ride system has been introduced in 2018. The concept is a hybrid bus and taxi: the buses are on-demand, are small enough to navigate the smaller streets of the inner city and have bookable seats. It also has the option to change routes dynamically, based on data from users' GPS-enabled smartphones (OECD/ITF, 2018).**
Calgary, Canada	**Citizens can make use of an app that shows real-time traffic information such as travel times and road closures, as well as giving access to traffic camera footage (City of Calgary, 2018).**
Gothenburg, Sweden	**An integrated public transport service called UbiGo allows users to use all forms of public transport, car-sharing, rental care service, taxi and bicycle sharing with a single platform. A smartphone app is developed for the mobility service and users receive a single invoice (OECD/ITF, 2015).**
Auckland, New Zealand	**Nearly all traffic signals at intersections have vehicle-actuated control using vehicle detectors. Based on real-time traffic, the phase length is adjusted continuously (Auckland Transport, 2015).**
Seoul, Korea	**All expressways use Dedicated Short-Range Communication to automate settlement of tolls wirelessly (Chung, Choi and Yoon, 2018).**

Source: OECD Development Centre's compilation.

Welfare cost of pollution is substantial

Estimated additional urban mortality and welfare costs associated with elevated pollution levels

Country	Additional deaths (thousands)	Welfare loss of pollution-related mortality (2015 USD millions)
Cambodia	1.3	237.6
Indonesia	28.9	17 094.3
Lao PDR	0.3	88.0
Malaysia	2.5	4 477.4
Myanmar	7.4	1 477.4
Philippines	15.7	9 585.5
Singapore	1.2	10 404.6
Thailand	11.3	11 129.4
Viet Nam	17.4	5 937.8
China	767.8	1 047 240.8
India	614.5	168 993.5
Emerging Asia	1 468.1	1 276 666.5

Notes: Areas with a population density of at least 1 500 people per square kilometre are defined as urban, following OECD (2013). This definition excludes data on Brunei Darussalam, where levels of fine particulate air pollution are relatively low. See Annex 3.A1 for data and methodology used in the estimations.
Source: OECD Economic Outlook for Southeast Asia, China and India 2019-Update.

A number of Emerging Asian countries have national air quality standards

Emerging Asian countries with national air quality standards, by pollutant

	Fine particulate matter ($PM_{2.5}$)	Coarse particulate matter (PM_{10})	Ozone (O_3)	Nitrogen dioxide (NO_2)	Sulphur dioxide (SO_2)
Brunei Darussalam					
Cambodia			✓	✓	✓
Indonesia		✓	✓	✓	✓
Lao PDR					
Malaysia	✓	✓	✓	✓	✓
Myanmar					
Philippines		✓	✓	✓	✓
Singapore	✓	✓	✓	✓	✓
Thailand		✓	✓	✓	✓
Viet Nam	✓	✓			✓
China	✓	✓	✓	✓	✓
India	✓	✓	✓	✓	✓

Source: OECD Economic Outlook for Southeast Asia, China and India 2019-Update.

More developed Emerging Asian economies have enough air quality monitoring sites

Actual and prescribed number of air quality monitoring sites in selected Emerging Asian cities, 2014

Country	Number of cities studied	Number of cities with at least the recommended number of sites	Total number of sites	Total recommended number of sites
Brunei Darussalam	1	0	1	2
Cambodia	1	0	1	7
Indonesia	3	1	39	33
Lao PDR	1	0	0	4
Philippines	3	1	28	26
Singapore	1	1	15	13
Thailand	5	3	24	19
Viet Nam	2	0	10	25
China	9	9	199	124
India	10	2	64	116

Source: ADB (2014), *Improving Air Quality Monitoring in Asia: A Good Practice Guide.*

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Cleaner alternatives to private vehicle use are needed

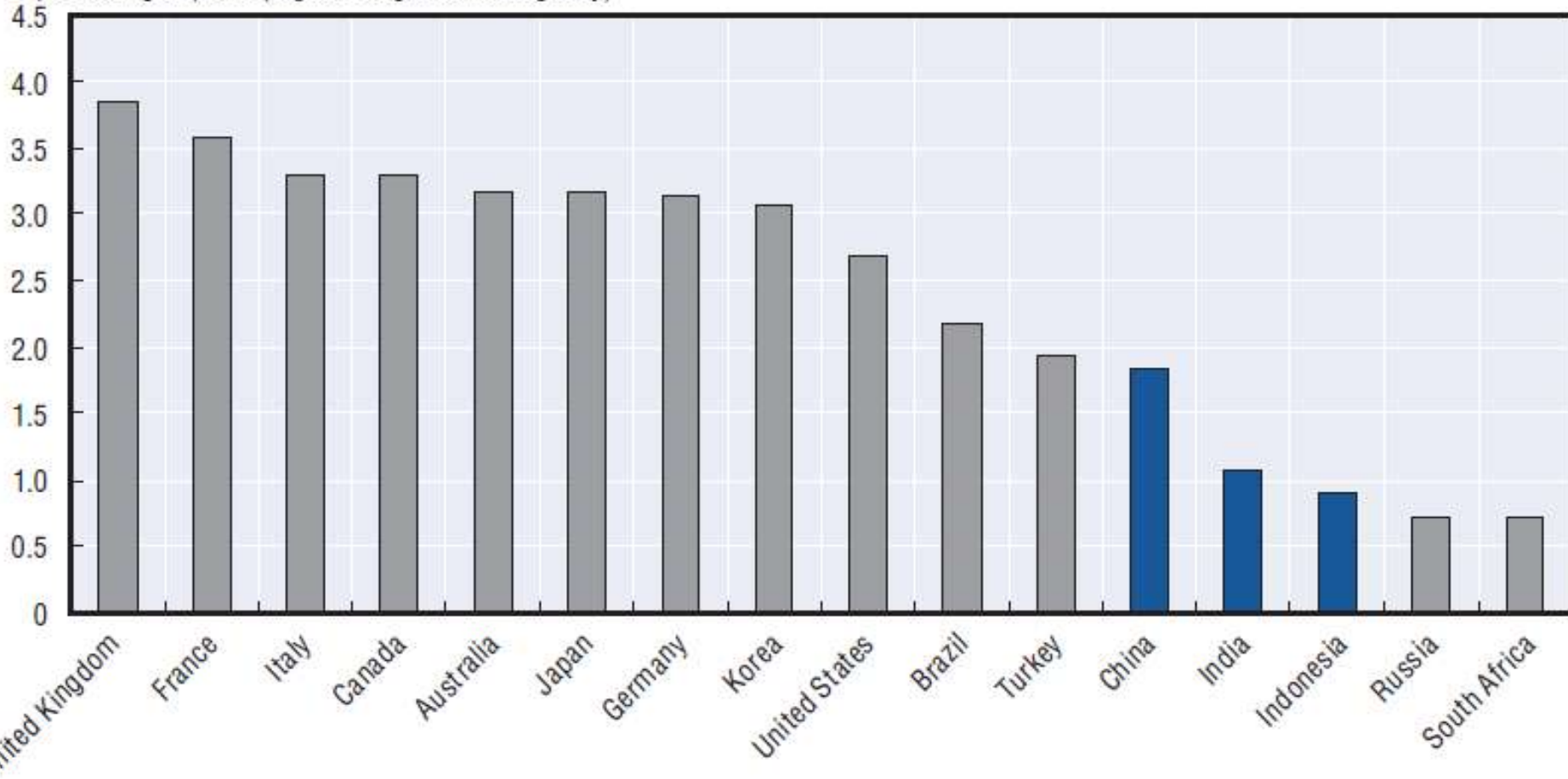**Transportation energy use in selected Emerging Asian cities**
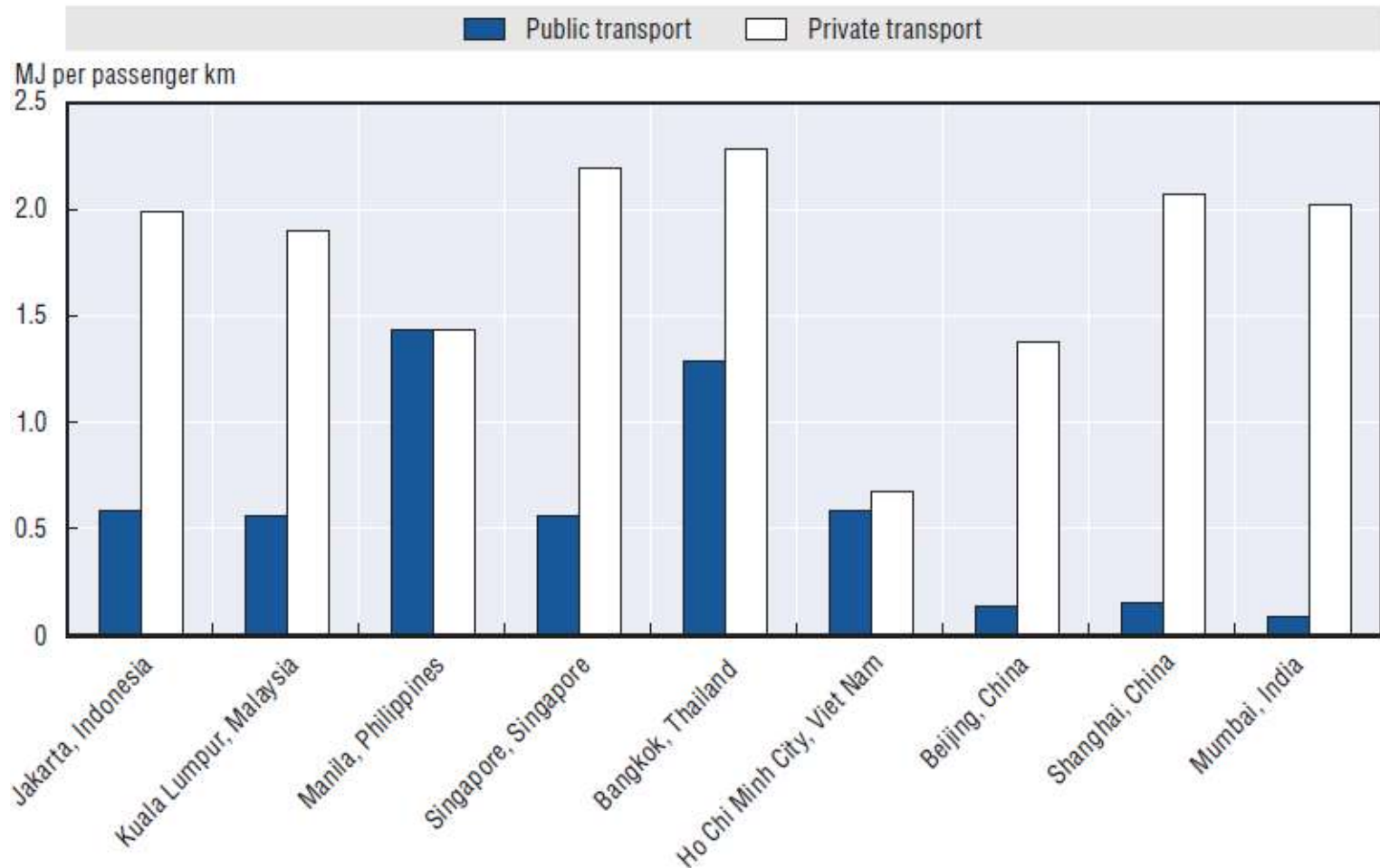
Source: World Bank (2014), Urban Transport Data Analysis Tool.

Emerging Asian countries have relatively less stringent environmental policies

OECD Environmental Policy Stringency Index, 2015

Source: OECD (2018a), OECD Environmental Policy Stringency Index.

THANK YOU FOR YOUR ATTENTION

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