

# Global Chinese Economic & Technology Summit

## Session 1: Geostrategic and Geoeconomic Challenges Facing a New Multipolar World

Tan Sri Andrew Sheng

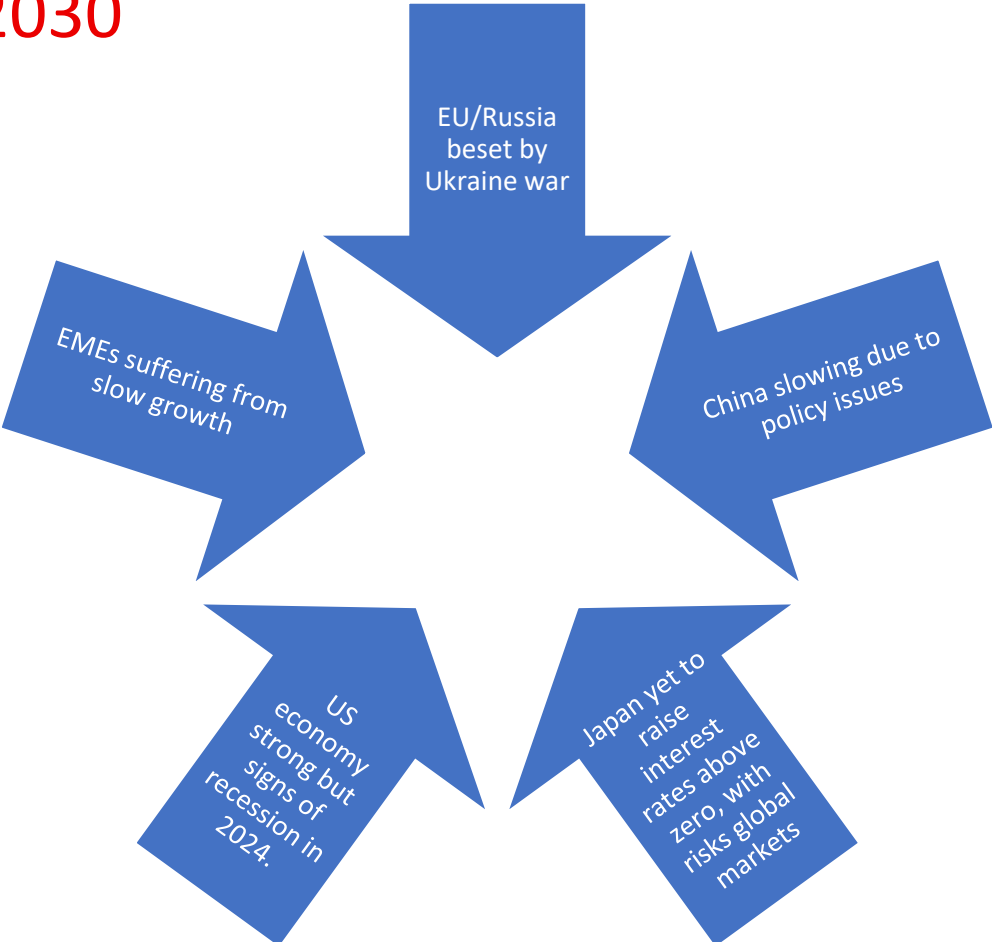
Chairman, George Town Institute of Open Advanced Studies,  
Wawasan Open University, Penang

7<sup>TH</sup> November 2023

## Section 1 **Geo-economic Trends**

*Techno Competition and Geopolitics means  
higher Uncertainty*

IMF – Global Growth slowing:  
 2022 3.5% to 3% 2023; 2.9% 2024  
 with fragile recovery – World Bank  
 forecast half pre-2008 growth by  
 2030



	2022	2023	2024
<b>World Output</b>	3.5	3.0	2.9
<b>Advanced Economies</b>	2.6	1.5	1.4
United States	2.1	2.1	1.5
Euro Area	3.3	0.7	1.2
<b>Emerging Market and Developing Economies</b>	4.1	4.0	4.0
Emerging and Developing Asia	4.5	5.2	4.8
China	3.0	5.0	4.2
India	7.2	6.3	6.3
Emerging and Developing Europe	0.8	2.4	2.2
Russia	-2.1	2.2	1.1
Emerging Market and Middle-Income Economies	4.0	4.0	3.9
Low-Income Developing Countries	5.2	4.0	5.1

Overall, China and ASEAN growing at 4+% and will remain engine of global growth

Source: IMF WEO Jul 2023.

# Geopolitical Rivalry: US\$105 trn Global GDP

China as USA peer competitor,  
72.1% of US GDP

EU (\$17.1)+ Japan (\$4.4) next  
tier as net surplus areas.

Rise of \$Trillion class powers:

India - \$3.7 trn

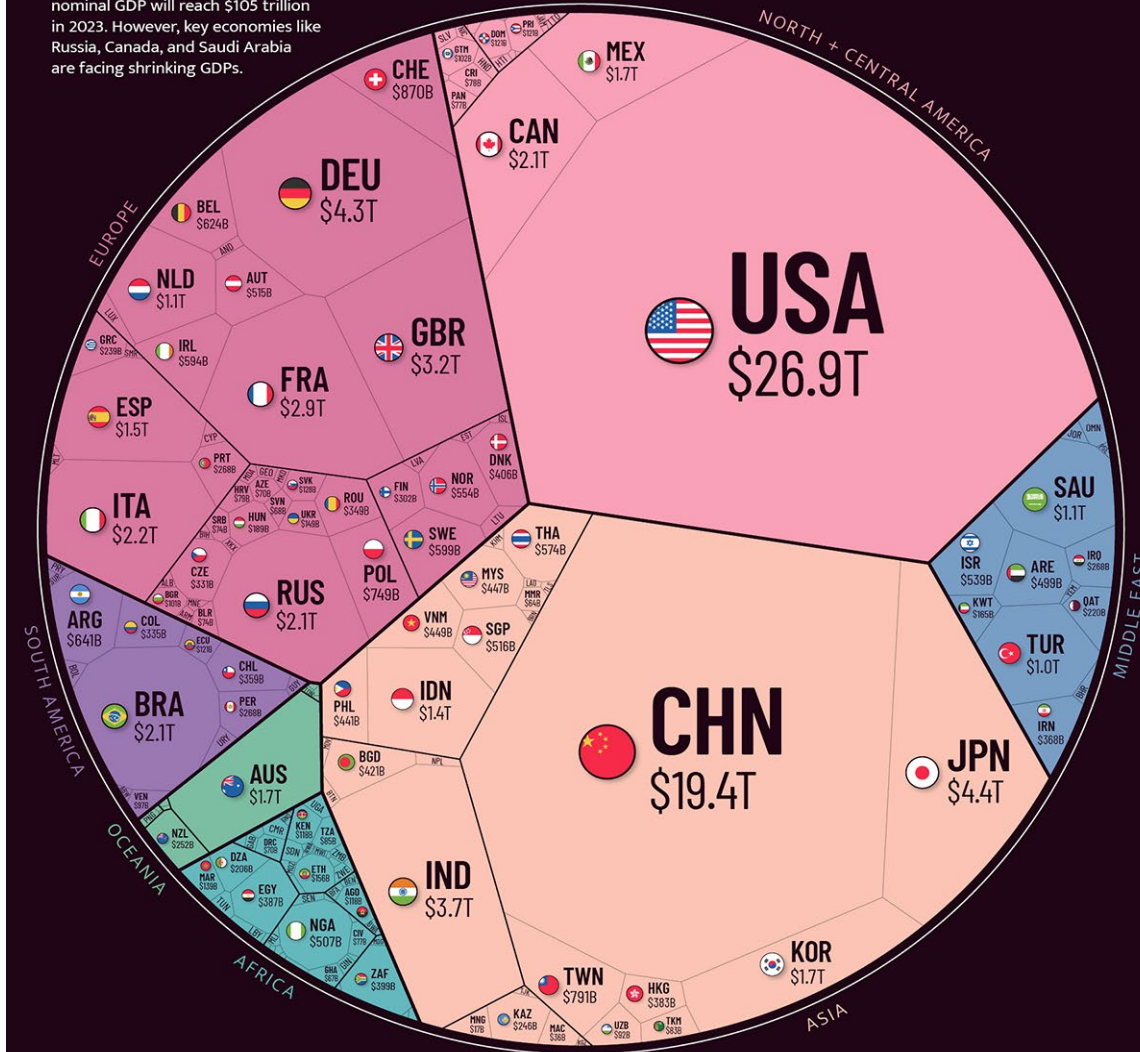
Brazil & Russia - \$2.1 trn each

Korea, Australia, Mexico -  
\$1.7 each

# THE \$105 TRILLION WORLD ECONOMY

2023 GLOBAL GDP

According to IMF projections, global nominal GDP will reach \$105 trillion in 2023. However, key economies like Russia, Canada, and Saudi Arabia are facing shrinking GDPs.



The IMF sees the world economy growing 5.3%, or when adjusted for inflation, 2.8%.

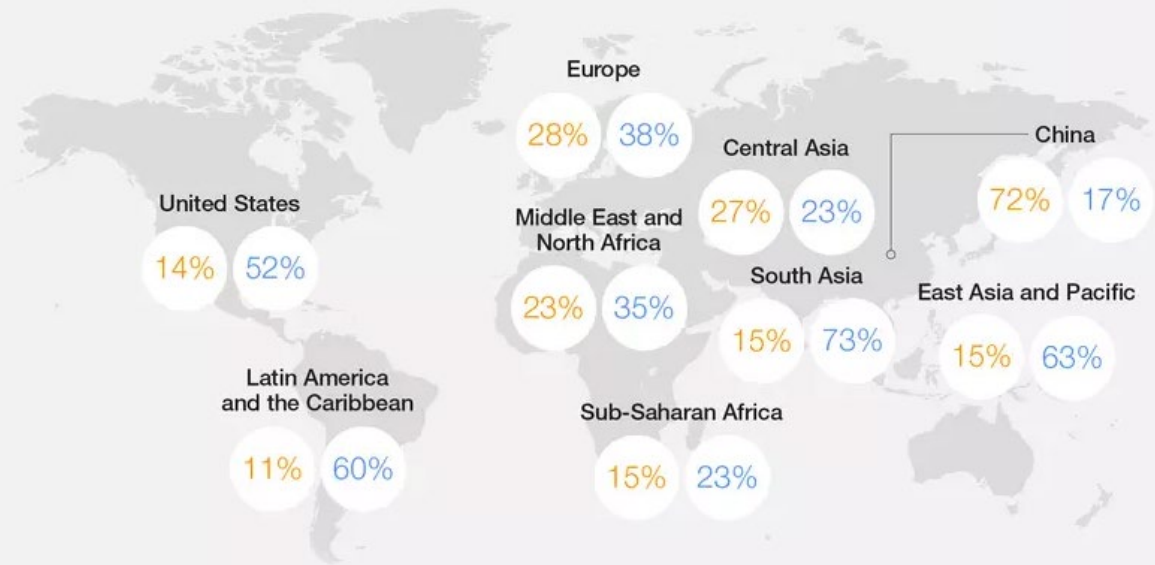
Russia's projected \$150B GDP drop is more than Ukraine's total \$149B GDP.

India dethrones the UK as the 5th largest economy in the world.

China's GDP is expected to grow 7.1% in 2023, ahead of U.S. growth of 5.5%.

# Industrial Policy Means More Protectionism, Intervention, Less Free Market Competition

## Economic impact of supply chains' changes



Chief economists expecting

⊖ Negative effect    ⊕ Positive effect

## New era of industrial policy



Over the next three years, chief economists expect the recent trend of stronger industrial policy to:



## Changing face of globalization



**100%** expect changes in the structure of global supply chains over the next three years

Corporate strategies expected to shape global supply chains over the next three years:

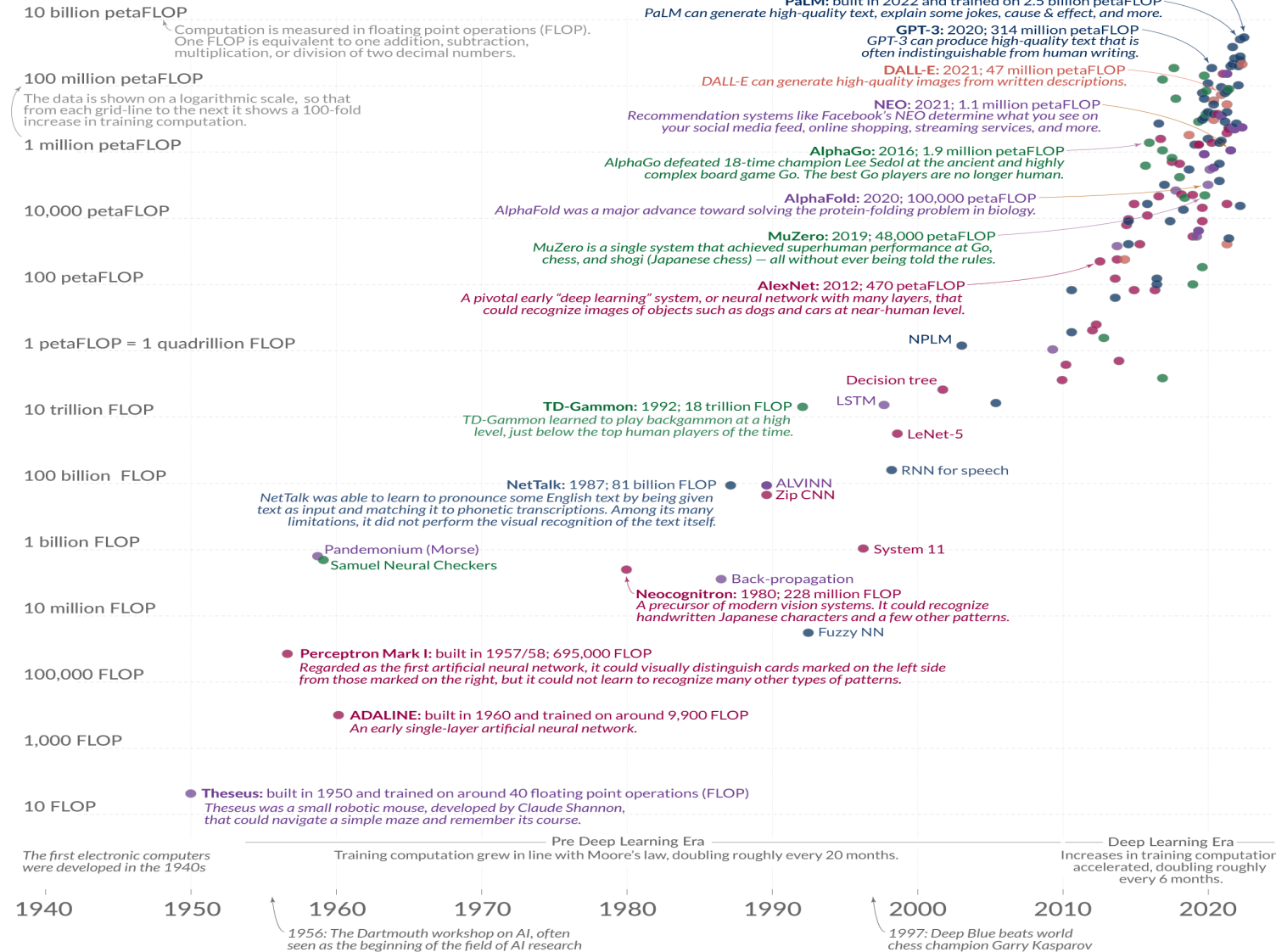




# The rise of artificial intelligence over the last 8 decades: As training computation has increased, AI systems have become more powerful

The color indicates the domain of the AI system: ● Vision ● Games ● Drawing ● Language ● Other

Shown on the vertical axis is the training computation that was used to train the AI systems.



Tech: AI + Big Data + Robotics are Game Changers – those who use well will have tech, trade and military advantage over others

Thus: using AI to speed up re-skilling of workers key in competition.

The data on training computation is taken from Sevilla et al. (2022) – Parameter, Compute, and Data Trends in Machine Learning. It is estimated by the authors and comes with some uncertainty. The authors expect the estimates to be correct within a factor of two. OurWorldinData.org – Research and data to make progress against the world's largest problems.

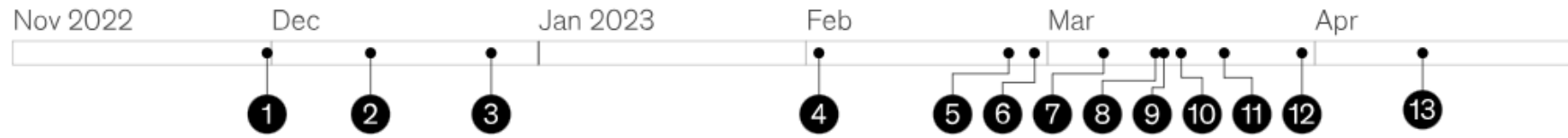
Licensed under CC-BY by the authors Charlie Giattino, Edouard Mathieu, and Max Roser

# Generative AI May Add Up to \$4.4 Trn to Global Economy Annually

- AI/Big Data will boost global economy – but not all countries benefit.
- Virtuous cycle of innovation/tech bubble, wealth creation/more startups means that those who cannot innovate will be marginalized.

## Generative AI has been evolving at a rapid pace.

### Timeline of major large language model (LLM) developments following ChatGPT's launch



- 1 Nov 30, 2022:** OpenAI's ChatGPT, powered by GPT-3.5 (an improved version of its 2020 GPT-3 release), becomes the first widely used text-generating product, gaining a record 100 million users in 2 months
- 2 Dec 12:** Cohere releases the first LLM that supports more than 100 languages, making it available on its enterprise AI platform
- 3 Dec 26:** LLMs such as Google's Med-PaLM are trained for specific use cases and domains, such as clinical knowledge
- 4 Feb 2, 2023:** Amazon's multimodal-CoT model incorporates "chain-of-thought prompting," in which the model explains its reasoning, and outperforms GPT-3.5 on several benchmarks
- 5 Feb 24:** As a smaller model, Meta's LLaMA is more efficient to use than some other models but continues to perform well on some tasks compared with other models
- 6 Feb 27:** Microsoft introduces Kosmos-1, a multimodal LLM that can respond to image and audio prompts in addition to natural language
- 7 Mar 7:** Salesforce announces Einstein GPT (leveraging OpenAI's models), the first generative AI technology for customer relationship management
- 8 Mar 13:** OpenAI releases GPT-4, which offers significant improvements in accuracy and hallucinations mitigation, claiming 40% improvement vs GPT-3.5
- 9 Mar 14:** Anthropic introduces Claude, an AI assistant trained using a method called "constitutional AI," which aims to reduce the likelihood of harmful outputs
- 10 Mar 16:** Microsoft announces the integration of GPT-4 into its Office 365 suite, potentially enabling broad productivity increases
- 11 Mar 21:** Google releases Bard, an AI chatbot based on the LaMDA family of LLMs
- 12 Mar 30:** Bloomberg announces a LLM trained on financial data to support natural-language tasks in the financial industry
- 13 Apr 13:** Amazon announces Bedrock, the first fully managed service that makes models available via API from multiple providers in addition to Amazon's own Titan LLMs

# Competition between Great Powers will depend on Evolution of Digital Infrastructure and Technology: i.e. R&D

FIGURE 4.1  
Key Events in the Evolution of Terrestrial, Wireless, and Submarine Networks

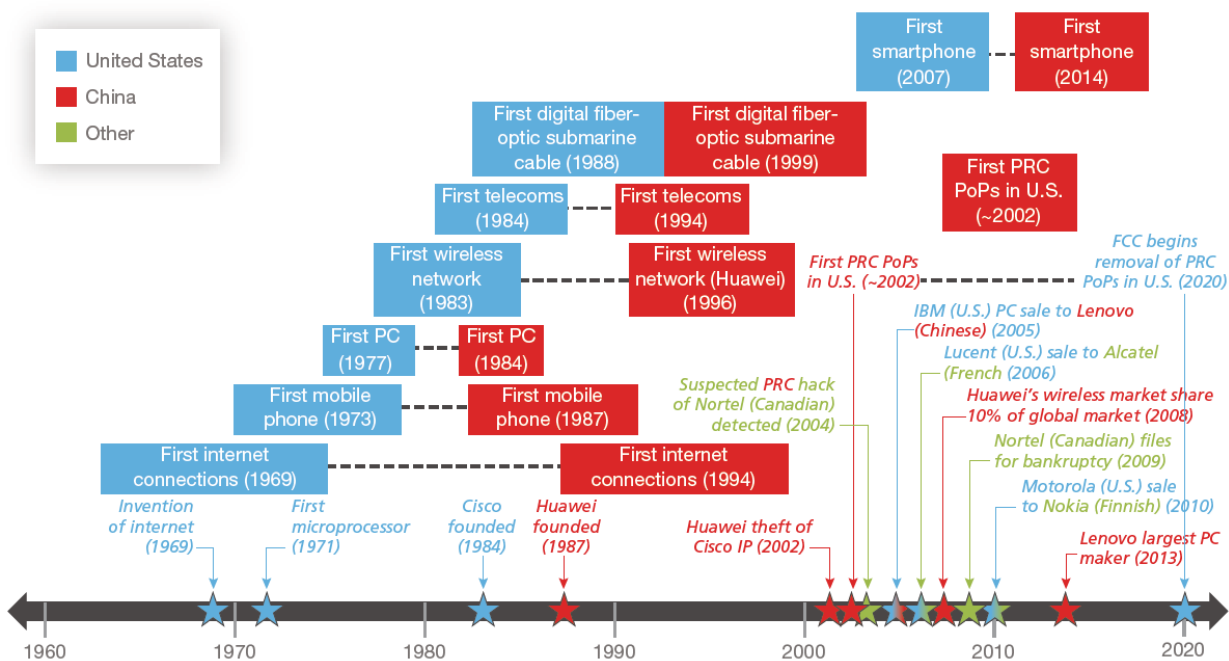
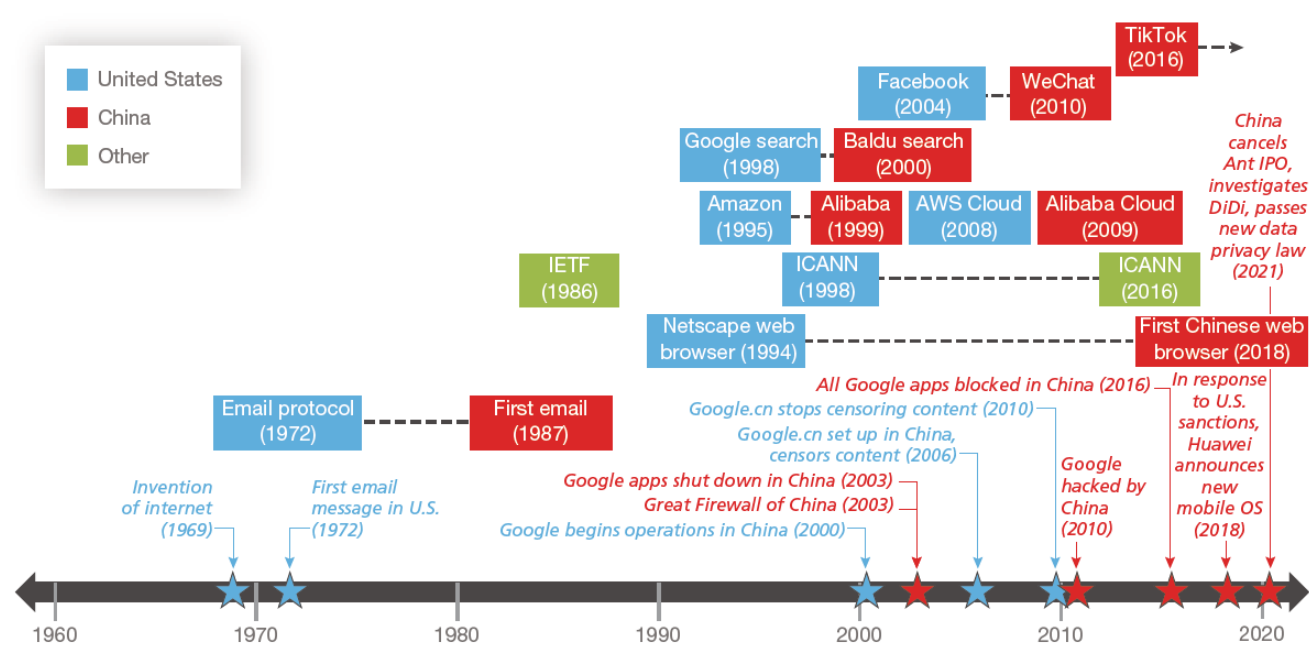


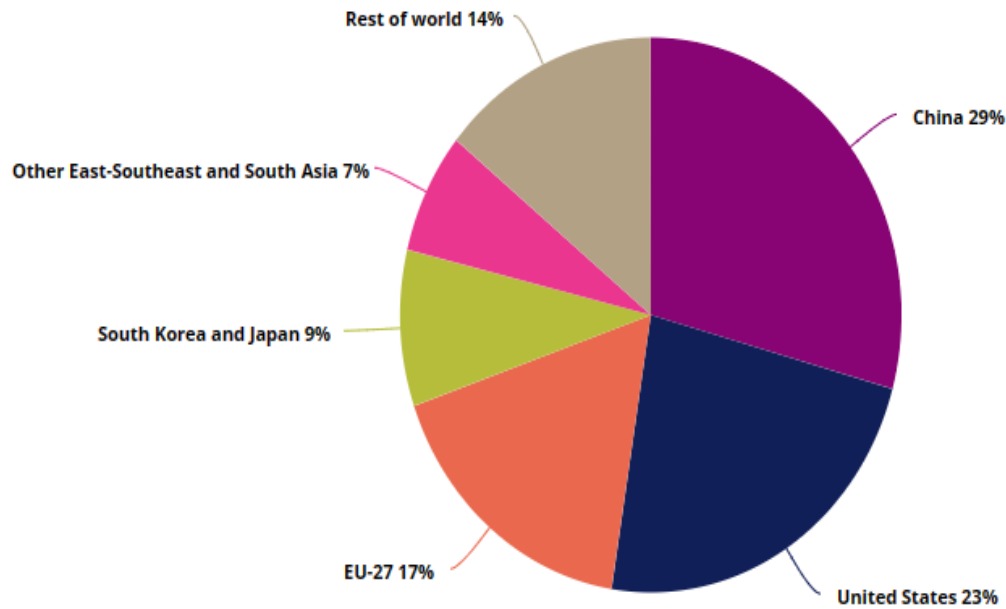
FIGURE 4.2  
Key Events in the Evolution of Application Layer



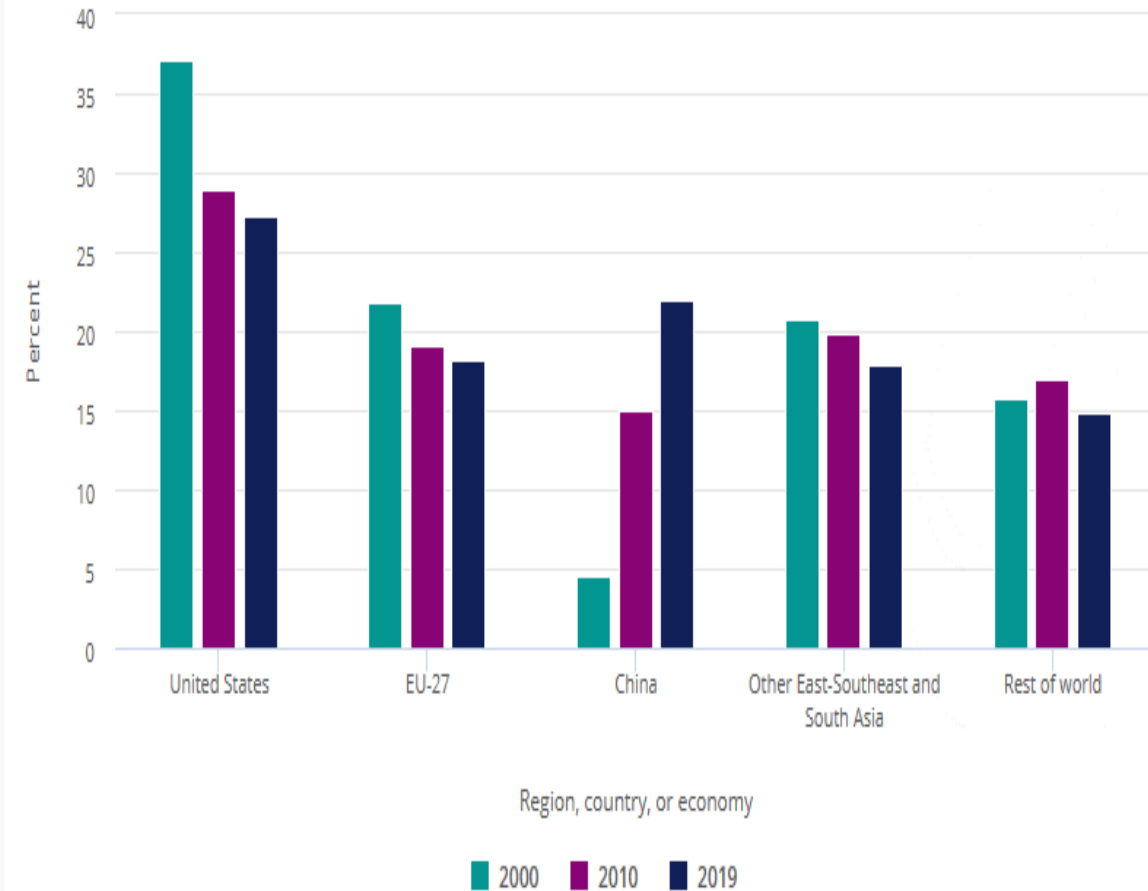


# China as challenger: R&D mkt share from 4.5% to 22% in 20 years

Contributions to growth of worldwide R&D expenditures, by selected region, country, or economy: 2000–19

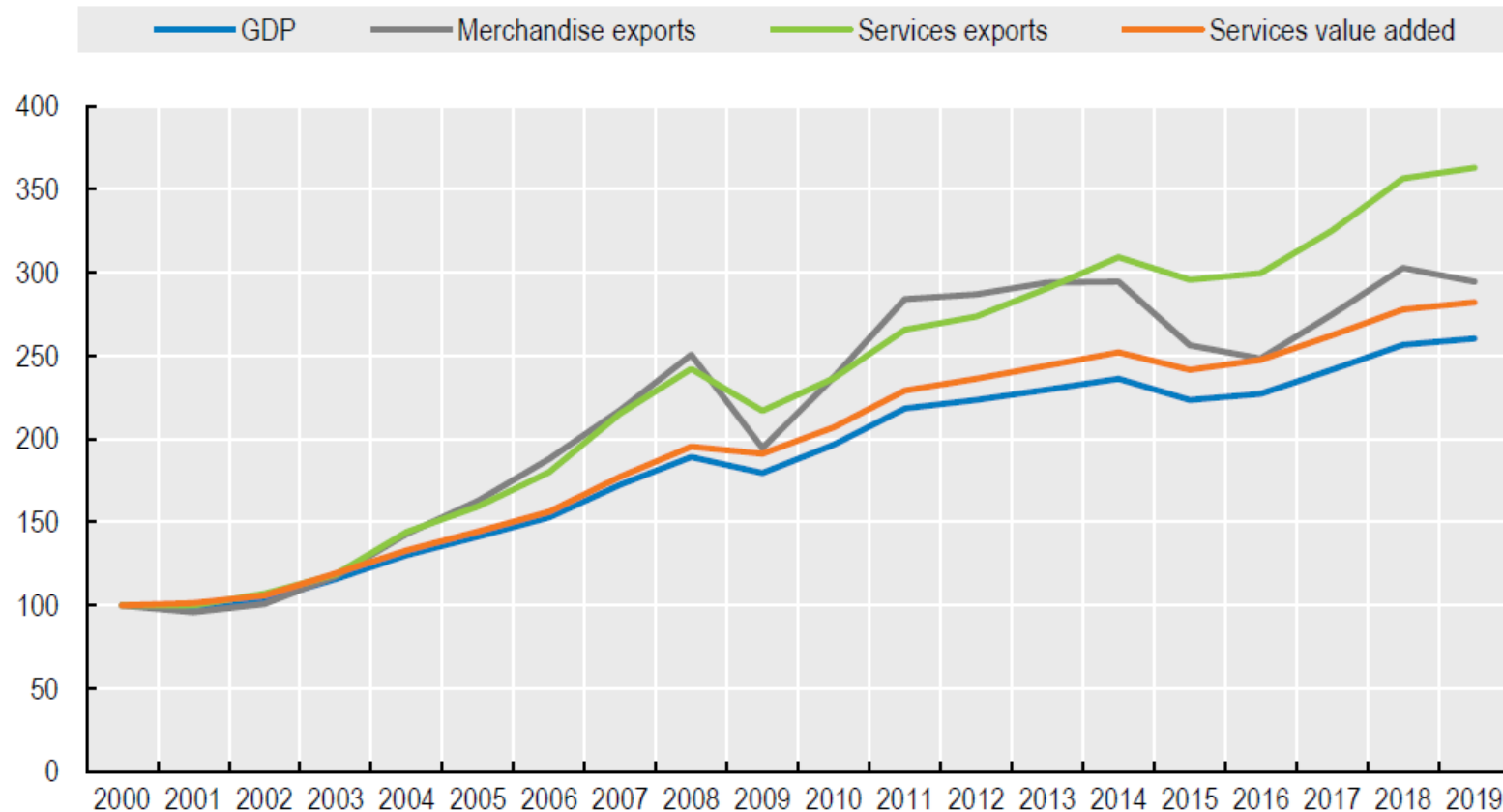


Shares of worldwide R&D expenditures, by selected region, country, or economy: 2000, 2010, and 2019



# Asia shifting from Global Factory to Global Services Provider – as digital cross-border services grow faster than merchandise trade (Richard Baldwin)

Figure 1. Global services output and services exports



## Section 2

# Why is Southeast Asia so important to Global tech Trends?

*who will finance coping with higher risks going forward?*

By 2030, ASEAN fourth largest PPP \$14.7 trn, after CN (\$47.4), US (\$24.3), India (\$19.4) and Japan (\$5.9 trn)



ASEAN population in 2030

334 million

Consumer class

500 million

Working age

700 million

Total population



# East and SE Asia region is biggest link in global electronic components trade

Global trade in electronic components (Q2 2021)



Source: IHS Markit *Global Trade Atlas*(GTA). Flows above USD 25 million in Q2 2021.

Global trade in electronic components (Q2 2021) Zoom into East & Southeast Asia

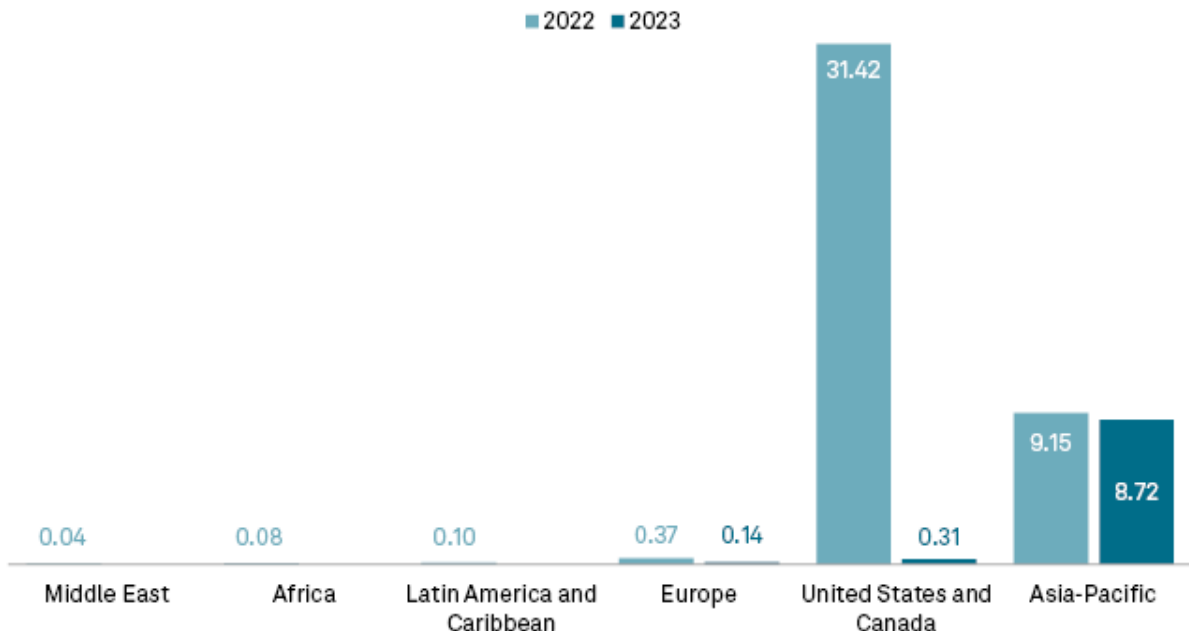


Source: IHS Markit *Global Trade Atlas*(GTA). Flows above USD 25 million in Q3 2021.



# Largest PE investment in Asia semiconductor: 80% to China

Private equity/venture capital-backed investments in semiconductors, 2022-2023\* (\$B)



Data compiled April 4, 2023.

\* Year to date through April 3, 2023.

Analysis includes global whole-company acquisitions, minority stake acquisitions, asset acquisitions, and rounds of funding announced between Jan. 1, 2022, and April 3, 2023, where the target is a company or asset classified in the semiconductor industry and the buyer/investor is or includes a private equity or venture capital firm.

Excludes terminated deals.

Source: S&P Global Market Intelligence.

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Target	Buyer/Investor	Announcement date	Value (\$B)
Yangtze Memory Technologies Co. Ltd.	Hubel Province Changjiang Industry Investment Group Co. Ltd., Huaxin Investment Management Co. Ltd., China Integrated Circuit Industry Investment Fund Co. Ltd. and Hubei Changsheng Technology Development Co. Ltd.	03/02/23	7.09
Chengdu Silan Semiconductor Manufacturing Co. Ltd.	Hangzhou Silan Microelectronics Co. Ltd., Huaxin Investment Management Co. Ltd. and National Integrated Circuit Industry Investment Fund Phase II Co. Ltd.	03/31/23	0.31
Anhui Huasun Energy Co. Ltd.	Hefei Industrial Investment Holding Co. Ltd., Zhejiang Puhua Tianqin Equity Investment Management Co. Ltd., Anhui Kungang Equity Investment Management Co. Ltd, Wuxi Capital Group Co. Ltd., Hidden Hill Capital, Dayone Capital, CNBM New Materials Fund Management Co. Ltd. and Nuoyan Capital	01/19/23	0.30
Yuze Semiconductor (Yunnan) Co. Ltd.	Ningbo Development & Investment Group Co. Ltd., SDIC Unity Capital Co. Ltd., National Green Development Fund Co. Ltd. and Zhejiang Seaport Group Finance Co. Ltd.	01/10/23	0.18
Dongguan Tianyu Semiconductor Technology Co. Ltd.	China Development Bank Capital Corp. Ltd., Haitong-Fortis Private Equity Fund Management Co. Ltd., Guangdong Yueke Asset Management Co. Ltd., China-Belgium Direct Equity Investment Fund LP, Nanchang Industrial Investment Group Co. Ltd. and Qianchuang Capital	02/07/23	0.18
Polar Semiconductor LLC	OEP Capital Advisors LP	01/27/23	0.15
Silfab Solar Inc.	Manulife Financial Corp., CF Private Equity Inc., ARC Financial Corp., ARC Energy Fund 9, BDC Capital Cleantech Practice and Ontario Power Generation Inc. Pension Plan	03/08/23	0.09
Suzhou Keyang Semiconductor Co. Ltd.	Zhenjiang State-Owned Investment Holding Group Co. Ltd., Jiangnan Yifan Motor Co. Ltd., Zhejiang Caltong Innovation Investment Co. Ltd., Jiaxing Linyang Equity Investment Partnership LLP, Yangzhou Economic Technology Development Zone Linxin Industry Investment Fund Partnership, Suzhou Kangli Junzhuo Digital Economic Industry Investment Fund Partnership Enterprise LP, Hangzhou Dinghui Hongyuan Equity Investment Partnership Enterprise LP, Gongqingcheng Longxin Chuangwu Venture Capital Partnership Enterprise LP, Suzhou Yuelin Venture Capital Partnership Enterprise LP, Suzhou Zhidao Xiangze Equity Investment Partnership Enterprise LP, Suzhou Zhongxin Hengxin Venture Capital Partnership Enterprise LP, Suzhou Gusu Talent Phase 2 Venture Capital Enterprise LP, Suzhou Longju Zhifeng Venture Capital Partnership Enterprise LP, Suzhou Huachuang Industrial Investment Development Co. Ltd., Jiangsu Bellai Investment Management Co. Ltd., Zhenjiang Bolang Electric Power Technology Co. Ltd., Suzhou Dongwu High-Speed Railway Private Equity Fund Partnership Enterprise LP, Suzhou Huanxiuhu No. 1 Investment Co. Ltd., Suzhou Juyuan Zhenxin Equity Investment Partnership Enterprise LP and Suzhou Yuanlixing Audit Consulting Services Co. Ltd.	03/09/23	0.08
Anhui Huasun New Energy Technology Co. Ltd.	Hongtal Capital Holdings	03/17/23	0.06
SemiFive	Doosan Corp., Korea Development Bank, SV Investment Corp., Korea Investment Partners Co. Ltd., Zephyrus Lab and Shinhan Investment & Securities Co. Ltd.	04/03/23	0.05

Target's country: ● China ● US ● Canada ● South Korea

Data compiled April 4, 2023.

Year to date through April 3, 2023.

Analysis includes largest global whole-company acquisitions, minority stake acquisitions, asset acquisitions, and rounds of funding announced between Jan. 1, 2023, and April 3, 2023, where the target is a company or asset classified in the semiconductor industry and the buyer/investor is or includes a private equity or venture capital firm.

Limited to largest 10 deals.

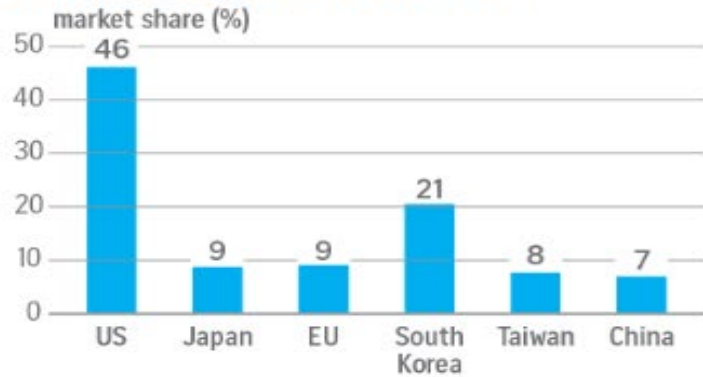
Excludes terminated deals.

Source: S&P Global Market Intelligence.

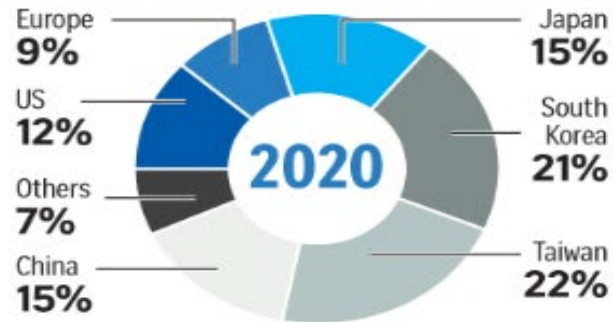
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# 73% chips made in Asia: 22.5% value contribution from ASEAN (SIA/McKinsey)

## GLOBAL INDUSTRY OVERVIEW



## GLOBAL MANUFACTURING CAPACITY

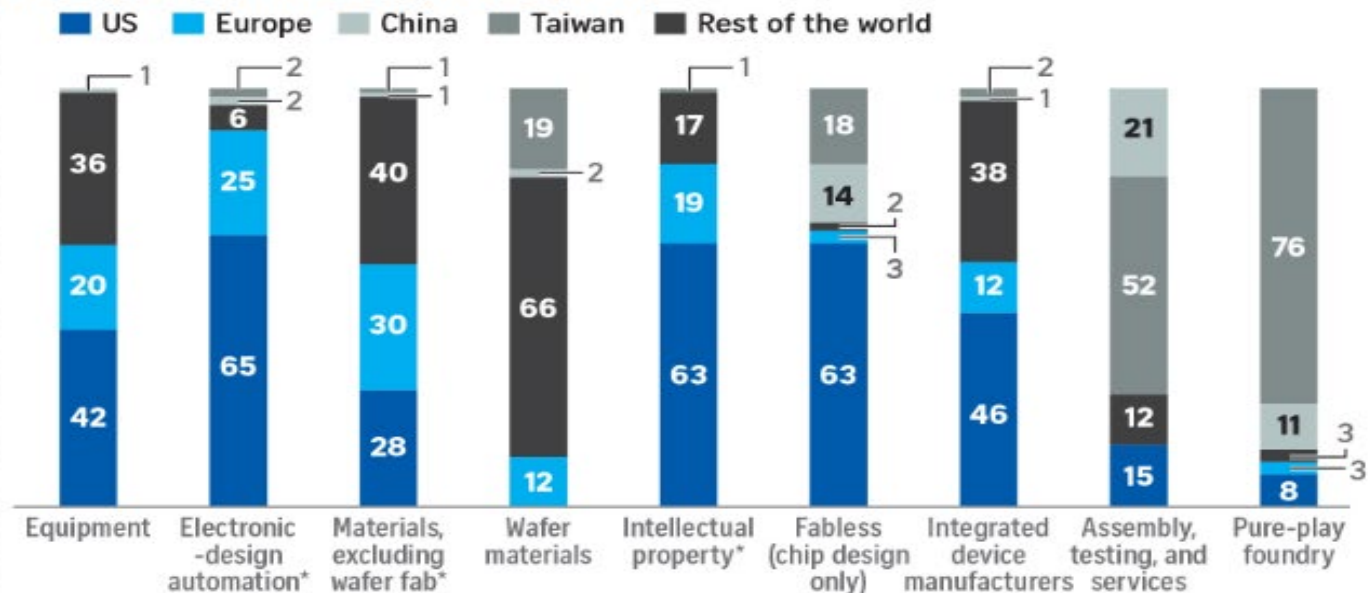


## ASEAN'S INVOLVEMENT IN THE GLOBAL VALUE CHAINS

• Second-largest semiconductor exporter globally, with a **22.5%** share of global semiconductor exports

• **Five** Asean states are among the world's top 15 semiconductor exporters

## 2020 SALES ALONG THE VALUE CHAIN



NOTE: \*Based on 2018 sales

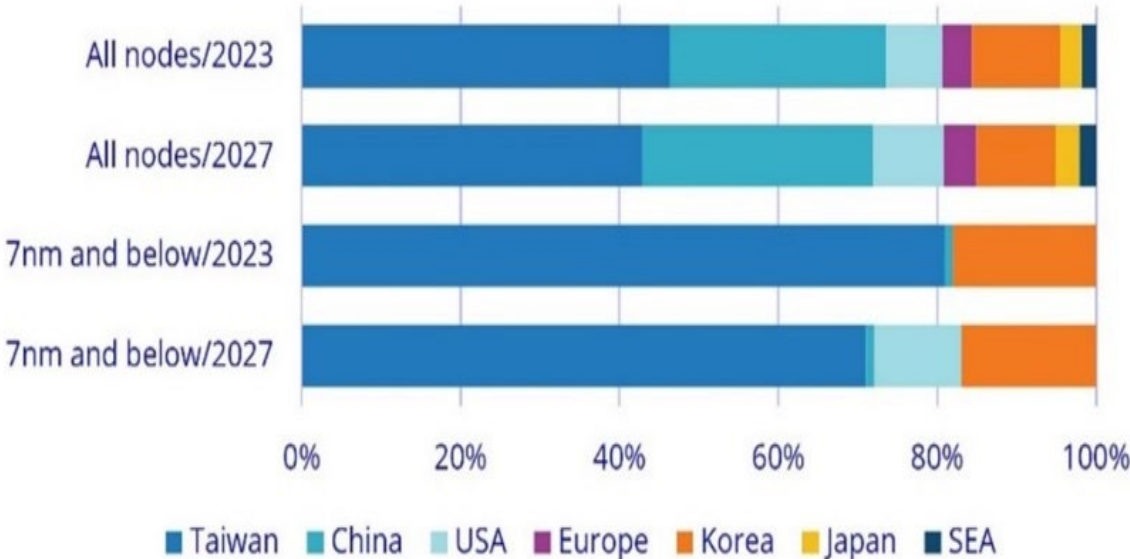
## SPREAD OF SPECIALISATION IN THE SEMICONDUCTOR VALUE CHAIN ACROSS ASEAN



Sources: SEMICONDUCTOR INDUSTRY ASSOCIATION, BOSTON CONSULTING GROUP, MCKINSEY & COMPANY, EY STRAITS TIMES GRAPHICS

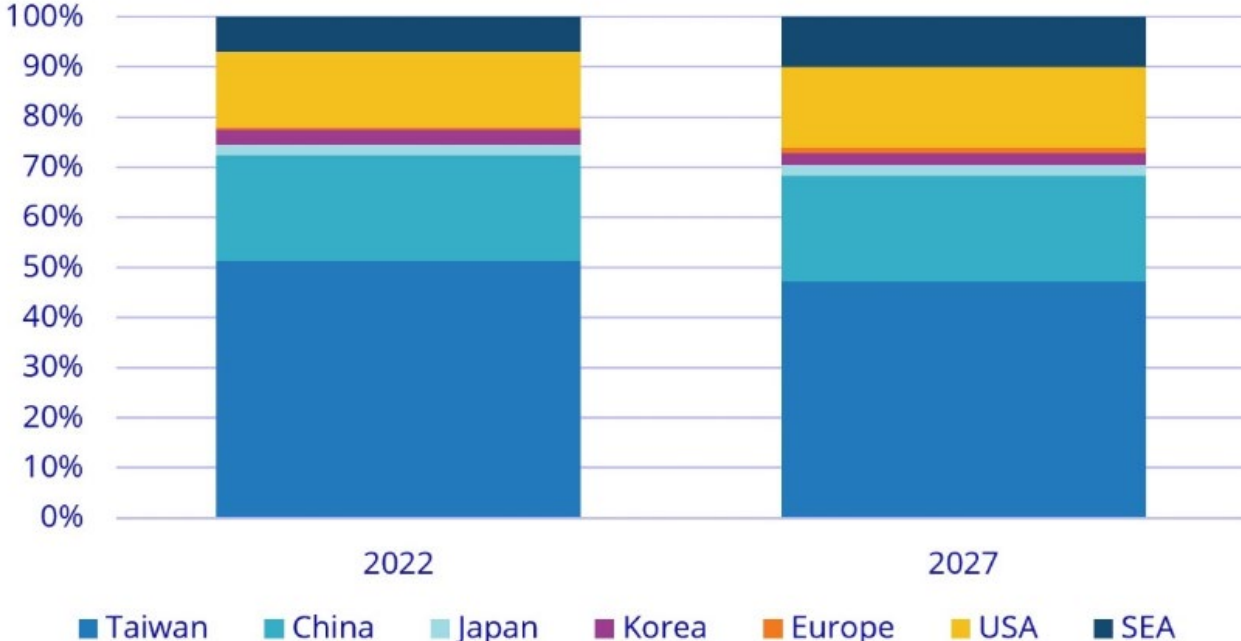
# Southeast Asia (Malaysia and Vietnam) will reach 10% of global semiconductor share by 2027

Worldwide Semiconductor Foundry Market by Location, 2023-2027



Source: IDC 2023

Worldwide Semiconductor Assembly and Test Market Share by Location, 2022-2027



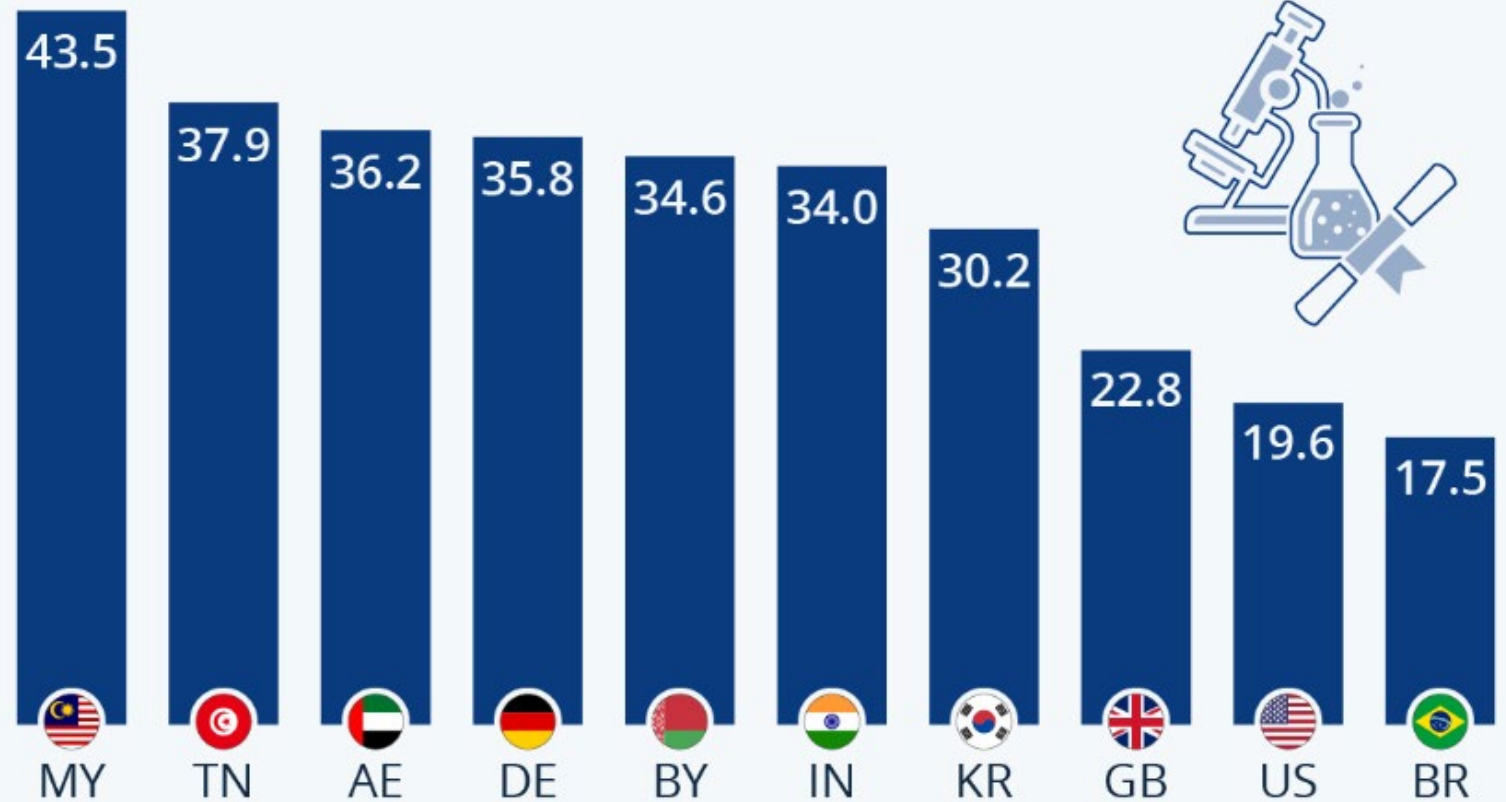
Source: IDC 2023



More STEM graduates from emerging than advanced economies

## Where Students Choose STEM Degrees

STEM graduates as a share of all tertiary education degree recipients in selected countries in 2022 (in percent)\*



\* or latest available. No data published for China

Source: UNESCO Institute for Statistics

# ASEAN looking to work with Chinese investors to upgrade Asia market

Chart 32: The resources that surveyed ASEAN enterprises expect from Chinese investors

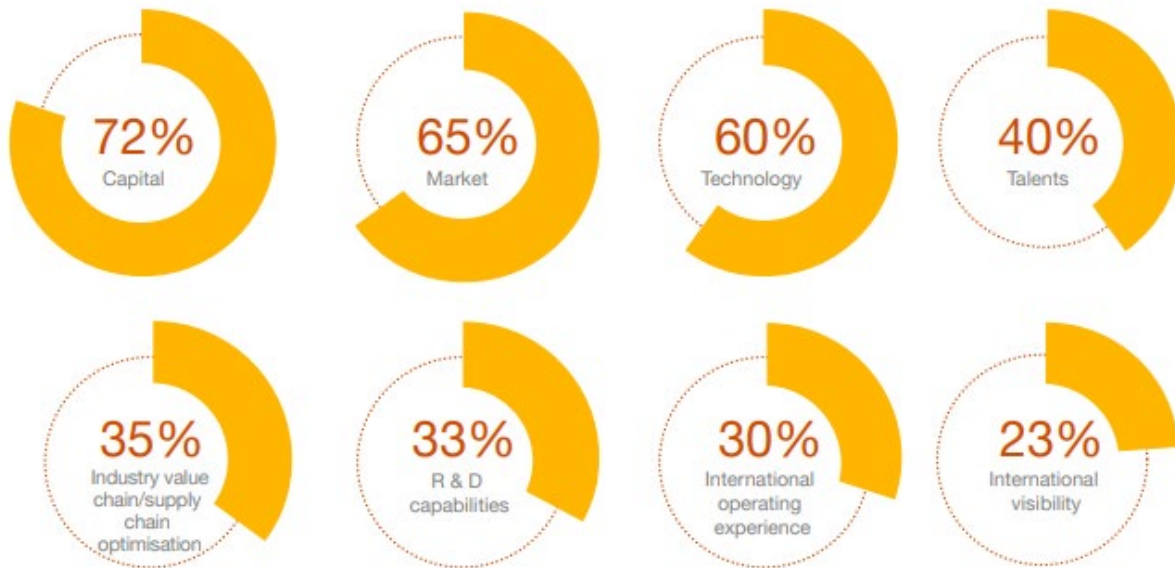
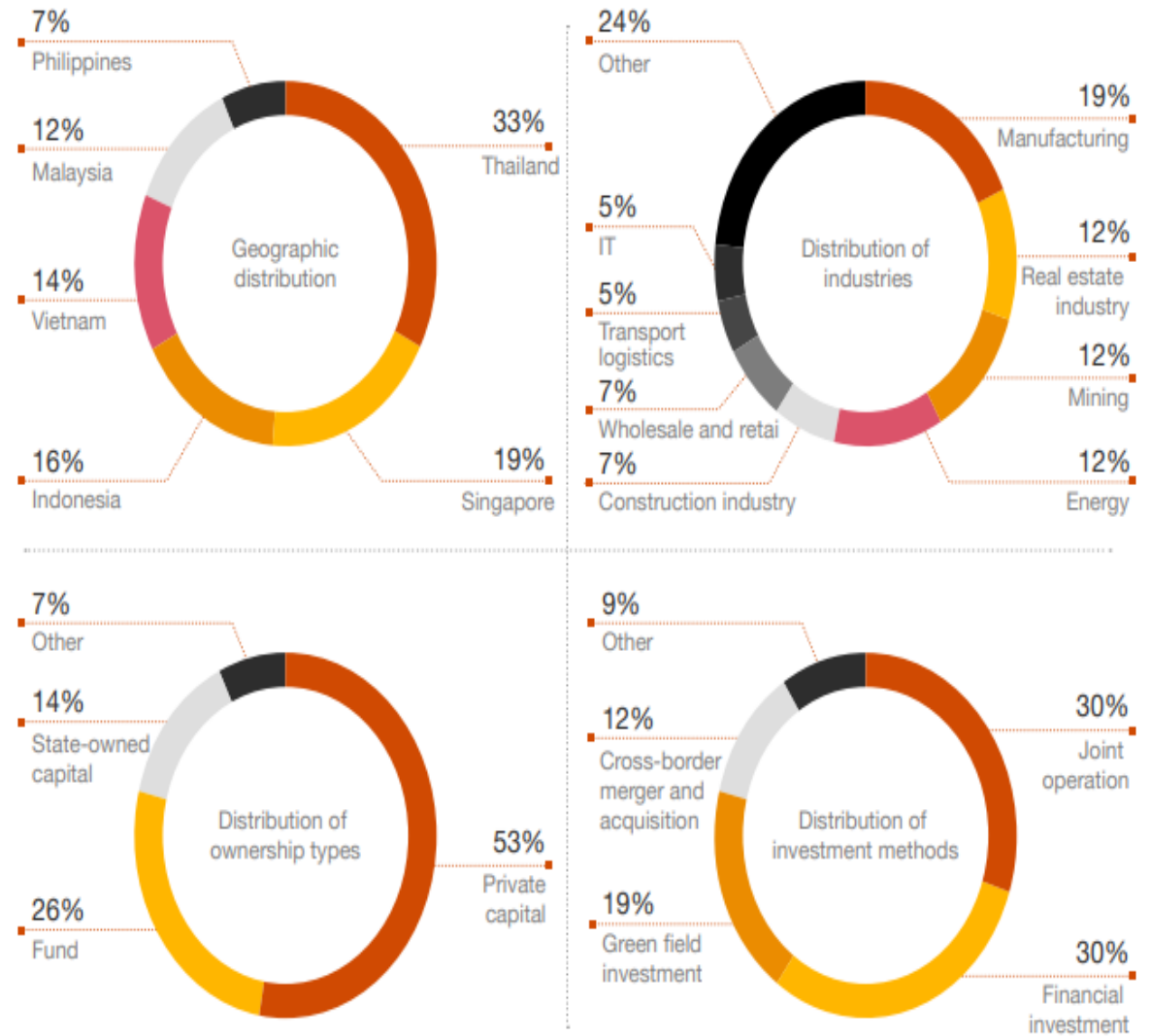


Chart 31: Distribution of characteristics of the surveyed ASEAN enterprises willing to accept Chinese investment





**Thank you**

**Q&A to**

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<https://www.noemamag.com/the-one-earth-balance-sheet/>

Academic  
freedom and  
opportunities  
for critical and  
creative thinking  
attract talent  
reshoring

**Table 1.** Net flows of scientific authors, top publishing countries, '000, 2015 and 2021

	2015	2021
US	2,920.4	-896.0
China	-336.1	3,108.8
EU27	-4,101.8	2,256.3
Canada	64.0	559.0
Germany	-52.4	616.2
Australia	773.4	5.7
Spain	-1,608.2	-318.5
Russia	162.3	-424.4
Japan	-534.0	-255.0
South Korea	102.7	-177.5
Italy	-1,274.5	-450.5
France	-563.0	-538.8
Brazil	-253.2	-1,216.5
UK	91.5	-1,658.0
India	-1,314.1	-1,831.4

# Asia has 6-7% capacity growth: 14% of EVs

## Global semiconductor chip shortage factors across metrics

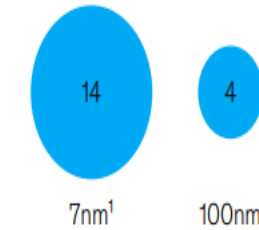
Global chip revenue, % change



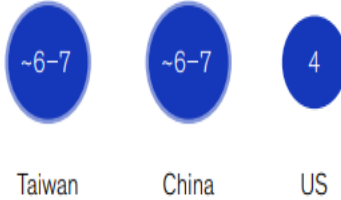
Global chip CAPEX for FABs, % change



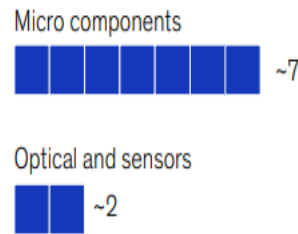
Production growth 2022-26 by node size, % CAGR



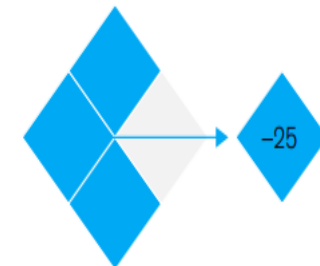
Production growth 2022-26 by geography, % CAGR



Lead times 2022-26 by device type, months



Capital spending for memory market 2022-26, % change

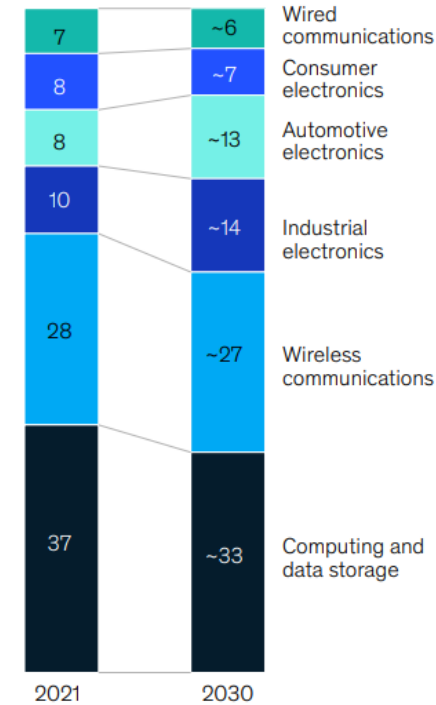


<sup>1</sup>Nanometer.

## The fastest demand growth will be in automotive and industrial sectors.

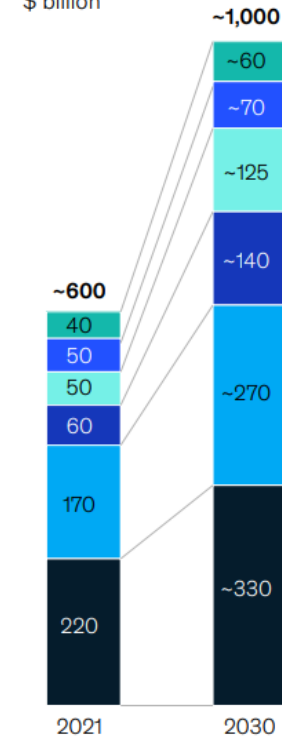
### Global semiconductor market 2021-30

Market by vertical, % share

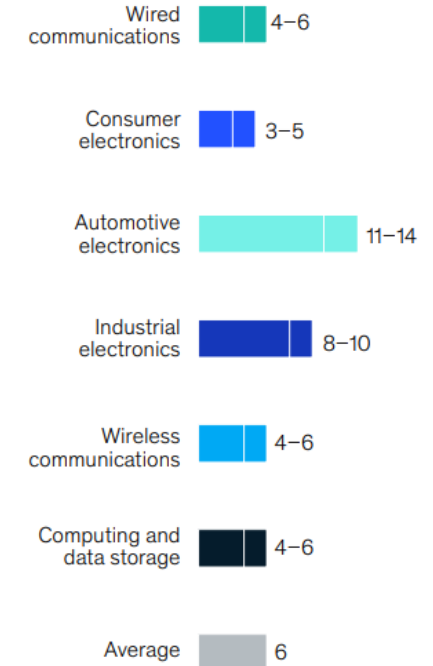


McKinsey & Company

Market by vertical, \$ billion



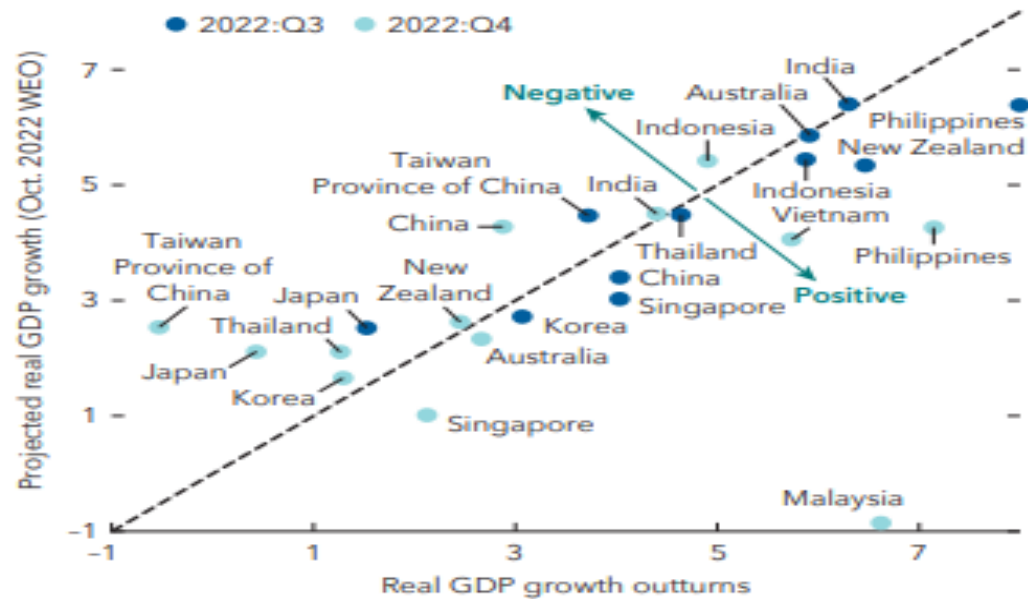
2021-30 % CAGR



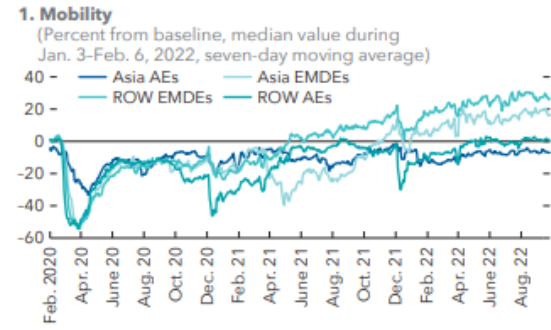
# Mixed growth-lower external demand on advanced Asia while booming service sectors in ASEAN-5 economies

Growth in Asia surprised to the upside in 2022:Q3, while 2022:Q4 was mixed.

**Figure 1. Growth Surprises**  
(Percent, year-over-year growth)



Sources: Haver Analytics; and IMF, World Economic Outlook (WEO) database.  
Note: Real GDP growth rates of Malaysia and Vietnam in 2022:Q3 both exceed 10 percent and are higher than October 2022 World Economic Outlook projections.



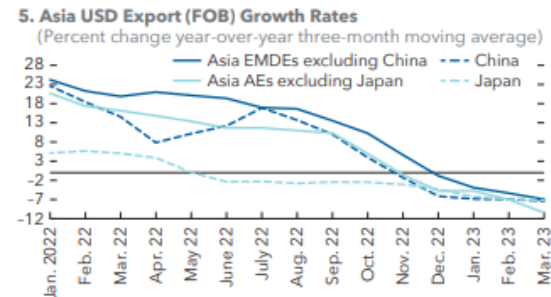
Sources: Google COVID-19 Community Mobility Report; and IMF staff calculations.  
Note: The figure displays the seven-day moving average of the overall mobility index. Overall mobility index computed as the average of the percentage changes from pre-pandemic baseline day in retail, grocery and pharmacy, parks, transit, workplaces, and residential. Latest data as of October 15, 2022. AEs = advanced economies; EMDEs = emerging market and developing economies; ROW = rest of the world.

... while declining logistics costs eased supply constraints.

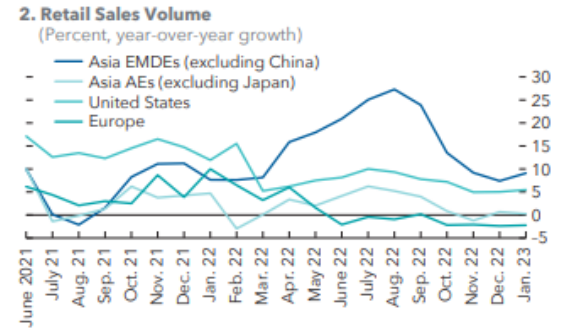


Sources: Haver Analytics; and IMF staff calculations.

... but exports, particularly electronics, have contracted from the end of 2022.

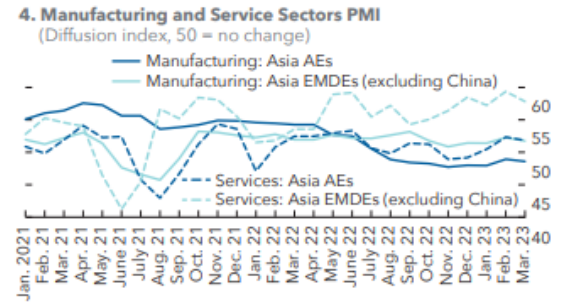


Sources: Haver Analytics; and IMF staff calculations.  
Note: Asia EMDEs include India, Indonesia, Korea, Malaysia, the Philippines, Thailand, and Vietnam. Asia AEs include Australia, Hong Kong SAR, New Zealand, Singapore, and Taiwan Province of China. AEs = advanced economies; EMDEs = emerging market and developing economies.



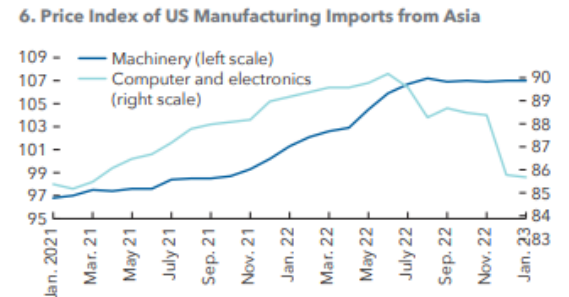
Sources: Haver Analytics; and IMF staff calculations.  
Note: AEs = advanced economies; EMDEs = emerging market and developing economies.

Manufacturing and services also picked up ...



Sources: Haver Analytics; and IMF staff calculations.  
Note: AEs = advanced economies; EMDEs = emerging market and developing economies; PMI = purchasing managers' index.

Prices for technology exports from Asia (for example, semiconductors) are down from recent peaks.



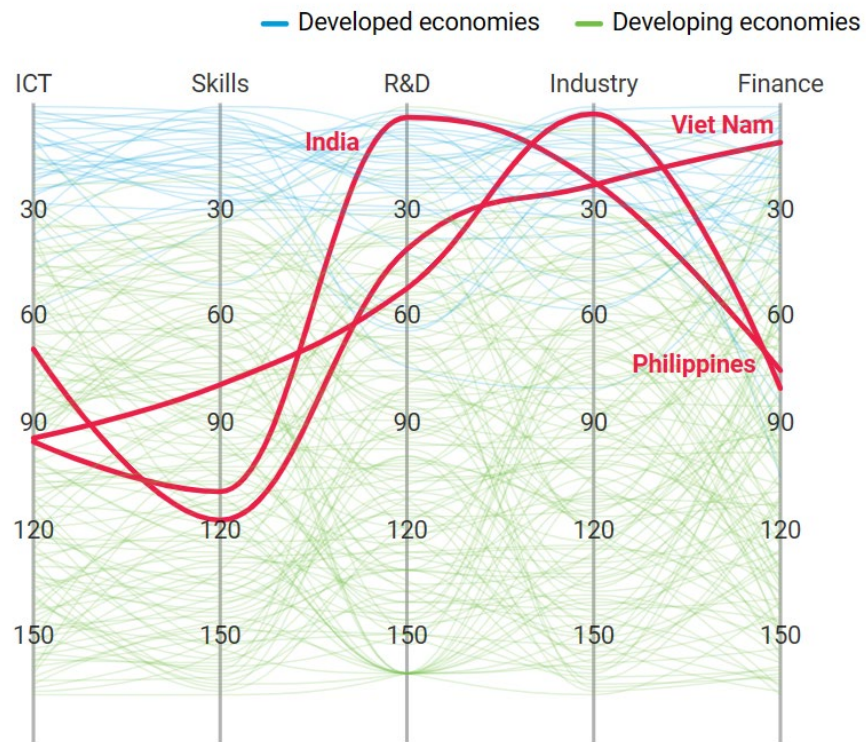
Source: US Bureau of Labor Statistics.

# Asian Developing Countries – Notably India, Philippines and Vietnam – Performing Better than Expected



## The overperformers on frontier technologies

Countries showing stronger capabilities than their per capita GDPs suggest



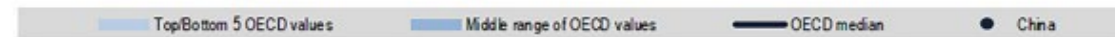
## Frontier technologies readiness index

A ranking of 166 countries' readiness to use frontier technologies

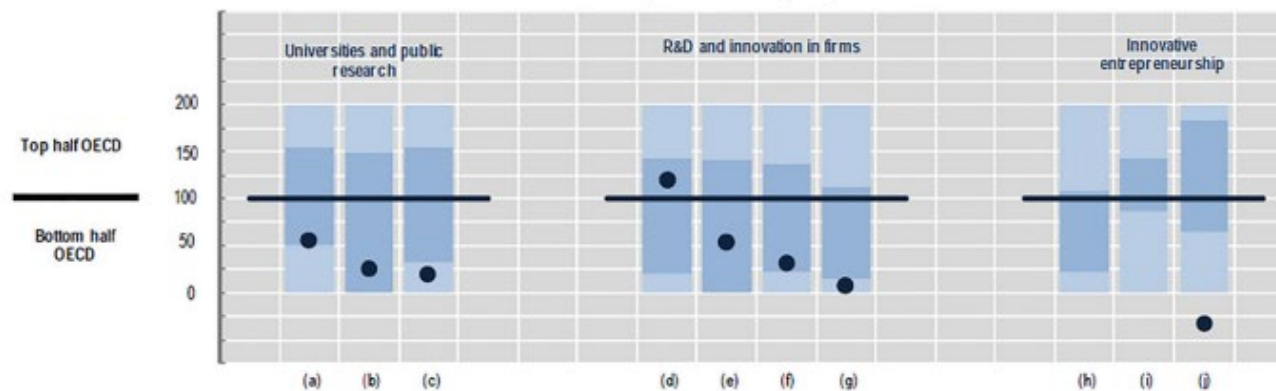
Name	2023 rank	2021 rank	Change in rank
▼ United States of America	1	1	±0
▶ Sweden	2	4	+2
▶ Singapore	3	5	+2
▶ Switzerland, Liechtenstein	4	2	-2
▶ Netherlands (Kingdom of the)	5	6	+1
▶ Korea (Republic of)	6	7	+1
▶ Germany	7	9	+2
▶ Finland	8	17	+9
▶ China, Hong Kong SAR	9	15	+6
▶ Belgium	10	11	+1



Innovation capacity far from international standards but firms self funded

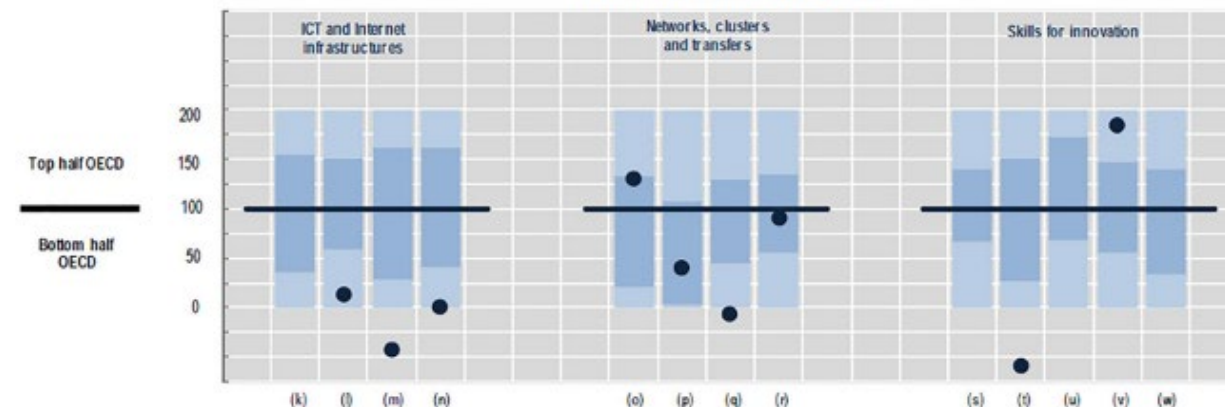


a. Competences and capacity to innovate



- (a) Public R&D expenditure (per GDP)
- (b) Top 500 universities (per GDP)
- (c) Publications in the top journals (per GDP)
- (d) Business R&D expenditure (per GDP)
- (e) Top 500 corporate R&D investors (per GDP)
- (f) Triadic patent families (per GDP)
- (g) Trademarks (per GDP)
- (h) Venture capital (per GDP)
- (i) Young patenting firms (per GDP)
- (j) Ease of entrepreneurship index

b. Interactions and skills for innovation



- (k) ICT investment (per GDP)
- (l) Fixed broadband subscriptions (per population)
- (m) Wireless broadband subscriptions (per population)
- (n) E-government development index
- (o) Industry-financed public R&D expenditure (per GDP)
- (p) Patents filed by universities and public labs (per GDP)
- (q) International co-authorship (%)
- (r) International co-invention (%)
- (s) Tertiary education expenditure (per GDP)
- (t) Adult population at tertiary education level (%)
- (u) Top adult performers in technology problem-solving (%)
- (v) Top 15 year-old performers in science (%)
- (w) Doctoral graduate rate in science and engineering (%)