China and the Global Economy

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Opportunities and Challenges in the Global Economy 2025

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- Concluding Remarks

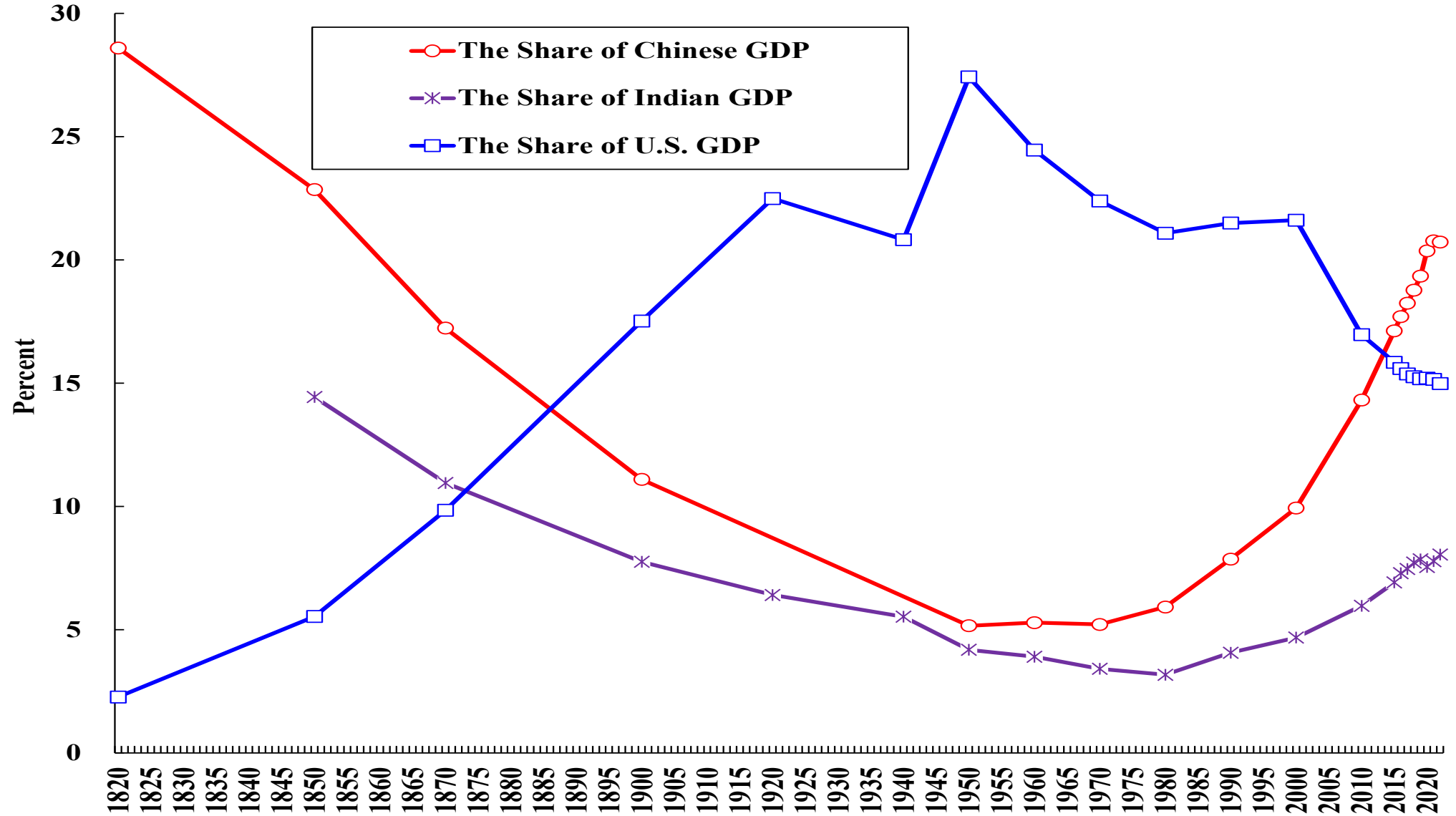
Introduction

- We begin with a historical overview of the Chinese economy from the early 19th Century to the present.
- We then examine briefly the development of the Chinese economy since 1949.
- This is followed by a review of the positions of China in different spheres of the global economy today.
- Then we present our long-term projections of the Chinese economy to 2050.
- We discuss briefly the impacts of U.S. tariff and export control policies on the Chinese economy.
- Finally, we conclude with some brief remarks.

The Fall and Rise of the Chinese Economy from 1820 to the Present

- We begin with a chart showing the shares of China, India and the U.S. of World GDP since 1820, using data from the (Angus) Maddison Project Database. The database was constructed on the basis of "Purchasing-Power-Parity (PPP)" international prices and hence generates slightly different results from those studies that use market prices at market exchange rates, including this one.
- In 1820, China supposedly accounted for more than 30% of the then world GDP, India somewhere between 20 and 25%, and the U.S., still a relatively young country, less than 3%. China and India together (and hence Asia) accounted for more than half of the then World GDP.
- The Chinese and Indian shares then declined continuously to below 5%, until 1950 for China, and 1980 for India, whereas the U.S. share rose steadily to reach a peak of over 30% in 1960. The Chinese and Indian shares then began to recover from their respective troughs.

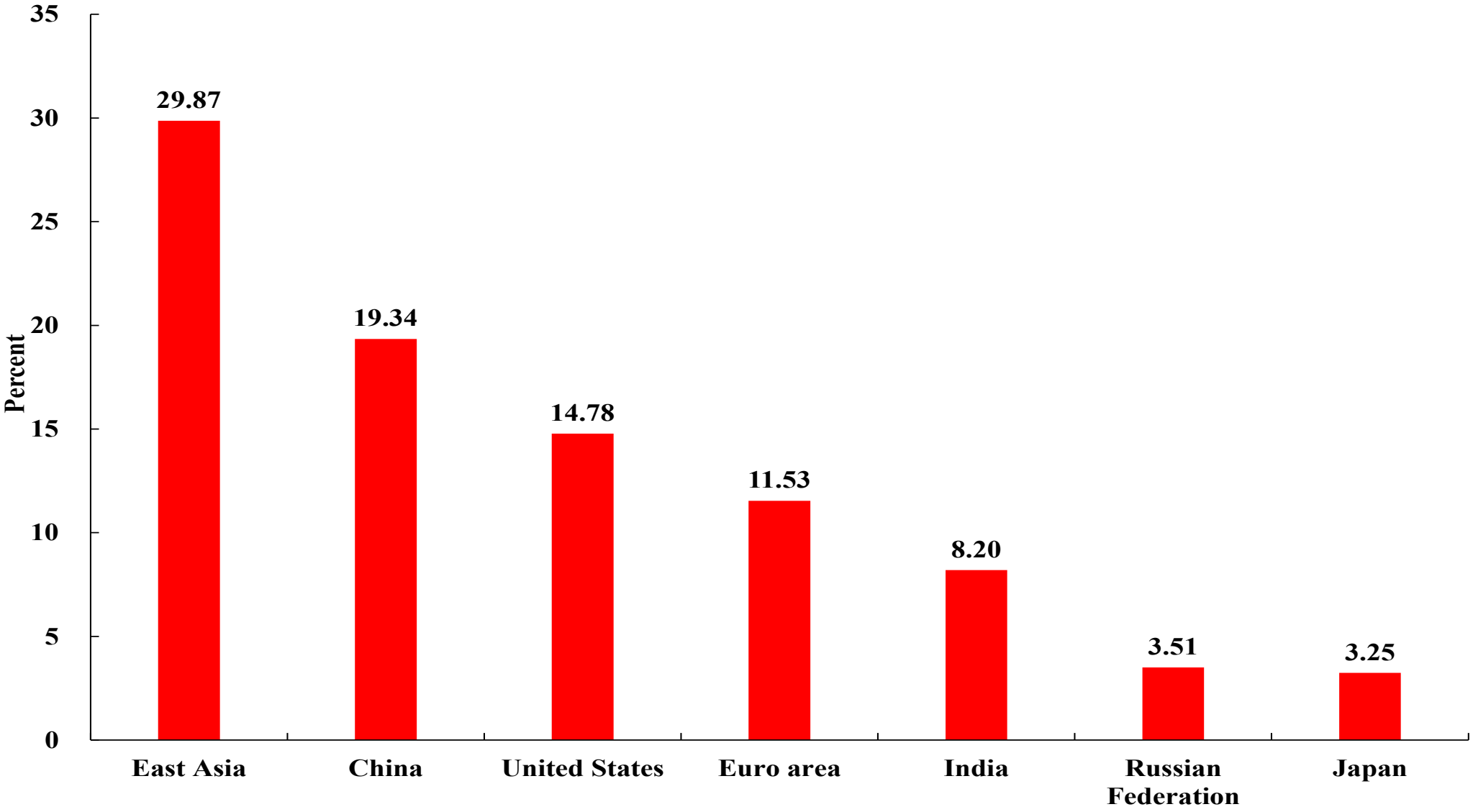
The Shares of World GDP of China, India and the U.S. since 1820 (Maddison Project Database) PPP



The Fall and the Rise of Economies from 1820 to the Present

- In 2014, in Purchasing-Power-Parity (PPP) terms, Chinese GDP reached parity with U.S. GDP, with each accounting for approximately 18% of World GDP. This finding was supported by both the International Monetary Fund and the World Bank.
- In PPP terms, by 2023, the Chinse and Indian shares rose to 18.7% and 7.9% respectively, but the U.S. share declined to 14.9%. Thus, the Chinese GDP was 126% of the U.S. GDP. East Asia's share was just shy of 30%, surpassing the U.S., the Euro Area and the U.K. combined (collectively, the "West").
- However, evaluated in 2024 market prices and at the year-end 2024 market exchange rate, the Chinese GDP of US$18.80 trillion was only 63.3% of the U.S. GDP of US$29.72 trillion in 2024.
- Around 1800, Chinese population may be estimated at 330 million (compared to 1.41 billion today), or approximately 37 percent of the then World population. The Chinese share of World population has since fallen to a little more than 17 percent.
- For various reasons, the Chinese real GDP per capita started to fall continuously in the 19th Century until the middle of the 20th Century, to US$85.7 in today's prices in 1949.

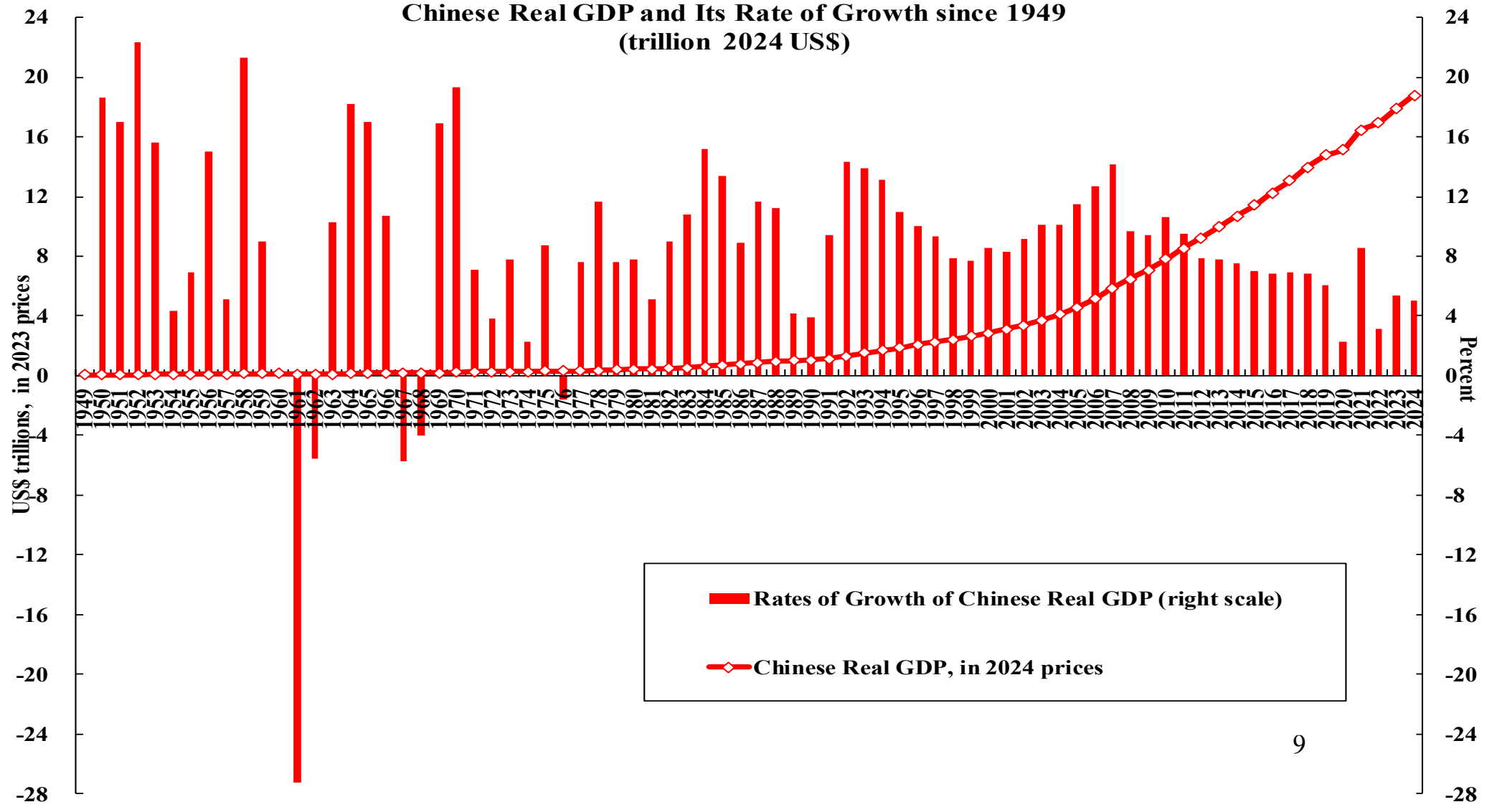
The Shares of World GDP, 2024 Purchasing-Power-Parity (PPP) International Prices (WDI)



Economic Performance since1949

- The performance of the Chinese economy since the establishment of the People's Republic of China in 1949 has been most impressive. Between 1949 and 2024, Chinese real GDP has grown from 333.9 billion Yuan to 134.9 trillion Yuan (in 2024 prices) (and from US$46.4 billion to US$18.8 trillion, converted at the Yuan/US$ exchange rate at year-end 2024), an over-400-fold increase (see chart).
- Chinese real GDP has grown at an average annual rate of **8.33**% over this long period of more than three-quarters of a century, which is historically unprecedented.
- Moreover, many qualitative indicators, such as educational attainments and life expectancies, have also improved significantly over the same period.

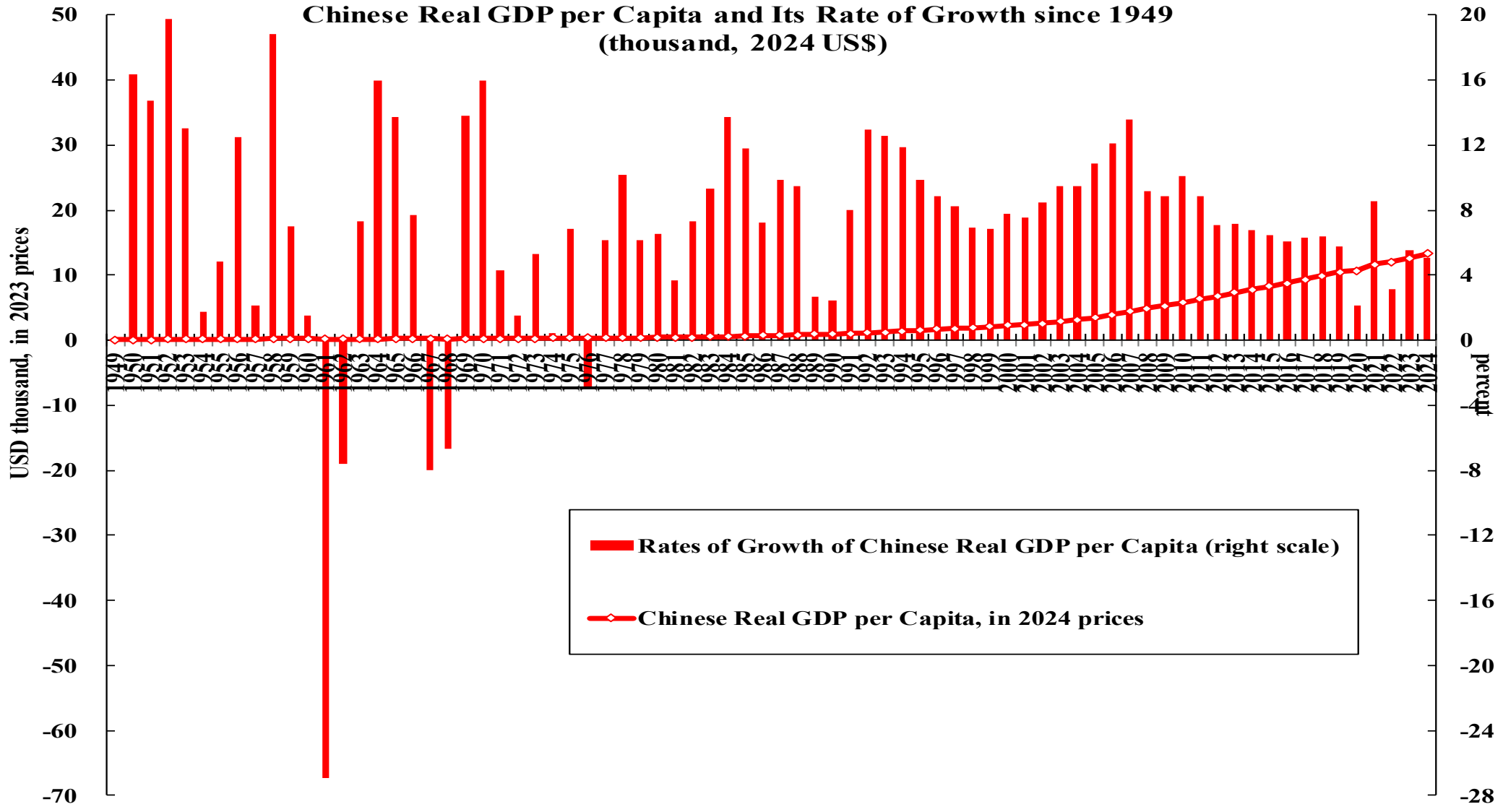
Chinese Real GDP and Its Annual Rate of Growth: 1949-present, 2024 prices



Economic Performance since1949

- Between 1949 and 2024, Chinese real GDP per capita has grown more than 155-fold, from 616 Yuan to 95,797 Yuan in 2024 prices (and from US$85.7 to US$13,327) (see chart). Even then, the Chinese real GDP per capita was less than one-sixth of that of the U.S. of US$85,785 and ranked below 70th among all economies in the world in 2024.
- Despite the significant fluctuations and volatility of the rates of growth during the 20 years from the late 1950s to the late 1970s, the average annual rates of growth of real GDP and real GDP per capita for the entire period of more than three quarters of a century from 1949 to 2024 were respectively **8.33%** and **6.96%**, a truly remarkable achievement over such a long period of time.
- We may also note that since the beginning of economic reform and opening to the World in 1978, there is not a single year in which the rate of growth of real GDP or real GDP per capita was negative or zero.

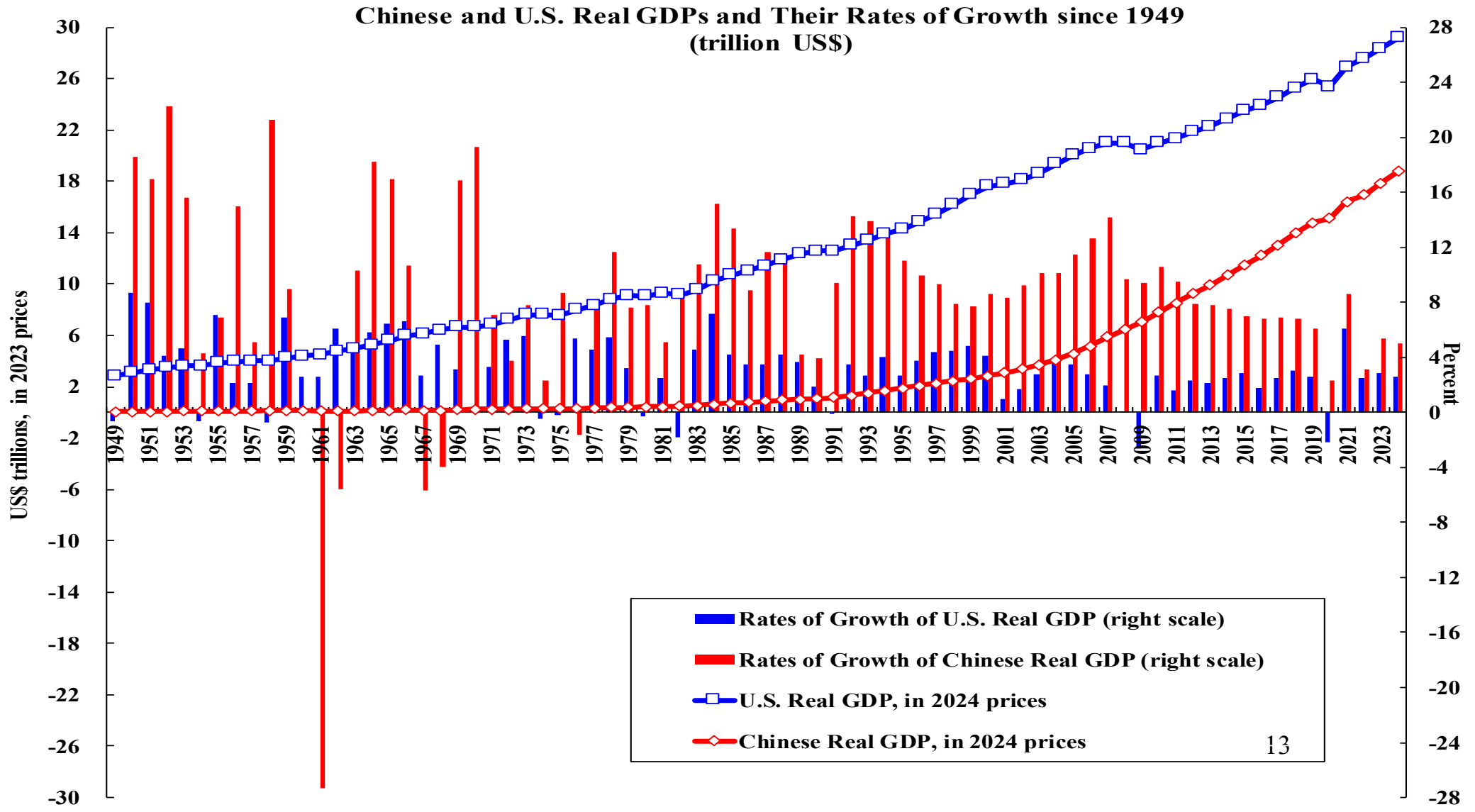
Chinese Real GDP per Capita and Its Annual Rate of Growth: 1949-present, 2024 prices



Economic Performance since1949

- We can attribute this success largely to the economic reform and opening undertaken by China in 1978, as well as to the long time-horizon of the Chinese economic policy makers and their single-minded focus on economic growth. With a long enough planning horizon, one can undertake investment in development-leading infrastructure, that is, infrastructure the demand for which has not yet materialised but can be created by the supply itself, infrastructure that may take a long time to pay off or pay off only through externalities. But very often "supply creates its own demand"! Such investment can stimulate demand and further development, but because of its typically long payback periods and inability to internalise the benefits, is unlikely to be undertaken privately.
- Chinese accession to the World Trade Organization (WTO) in 2001 was also pivotal because it enabled the export promotion strategy and the movement of the surplus labour in the agricultural sector to the industrial and service sectors.
- The Chinese GDP of US$18.80 trillion in 2024 was **63.26%** of the U.S. GDP of US$29.72 trillion, but the Chinese GDP per capita of US$13,327 remained far behind, at less than one-sixth of the U.S. GDP per capita of US$85,785.

Real GDPs and Their Annual Rates of Growth: China & the U.S.: 1949-present, 2024 prices



China in the Global Economy

- One of the most important developments in the global economy during the past almost half a century was the reform and opening of the Chinese economy and its participation in the World, beginning in 1978. As the most populous country in the World, China has always had the potential of having a large impact on both the supply and the demand sides of the global economy. However, the actual results of the Chinese entry into the global economy since 1978 have been surprisingly successful, as we shall show below.
- In this lecture, we review the position of China in the global economy today. First, we note that China's entry into the World has begun to shift, since 2000, the centres of gravity of the global economy, in terms of GDP, international trade, value-added in manufacturing, consumption and wealth, gradually but surely, from North America and Western Europe to East Asia, and within East Asia from Japan to China.
- China has managed to become, simultaneously, the "World's factory" as well as the "World's market". China has also become, in the process, the highest carbon dioxide emitter in the World. However, in terms of real GDP, aggregate wealth, and the sizes of the capital and consumer markets, the U.S. still remains by far the largest in the World.

China in the Global Economy

- Second, in terms of investments in intangible capital (human capital and R&D capital), China has also made great efforts. In 1986, China introduced universal 9-year mandatory education. In 1999, China vastly expanded the number of first-year students admitted to tertiary educational institutions. As a result, China has also achieved much in terms of the educational attainments of its population, reflected in the rising proportion of the tertiary educated in its labour force, and in innovation, reflected in the growth in its numbers of publications in international scientific and engineering journals and the number of patent awards received by Chinese nationals both in China and abroad. However, there is still a great deal of room for China to improve in these areas, especially in extending mandatory education to 12 years as in many other countries and in increasing basic research.
- Third, since 2010, the renminbi, the Chinese currency, has also begun to be accepted as an invoicing, clearing and settlement currency in bilateral international transactions involving China. Its share in world settlement has been increasing. However, the U.S. Dollar still remains, by a very large margin, the international medium of exchange and store of value of choice for many economies.

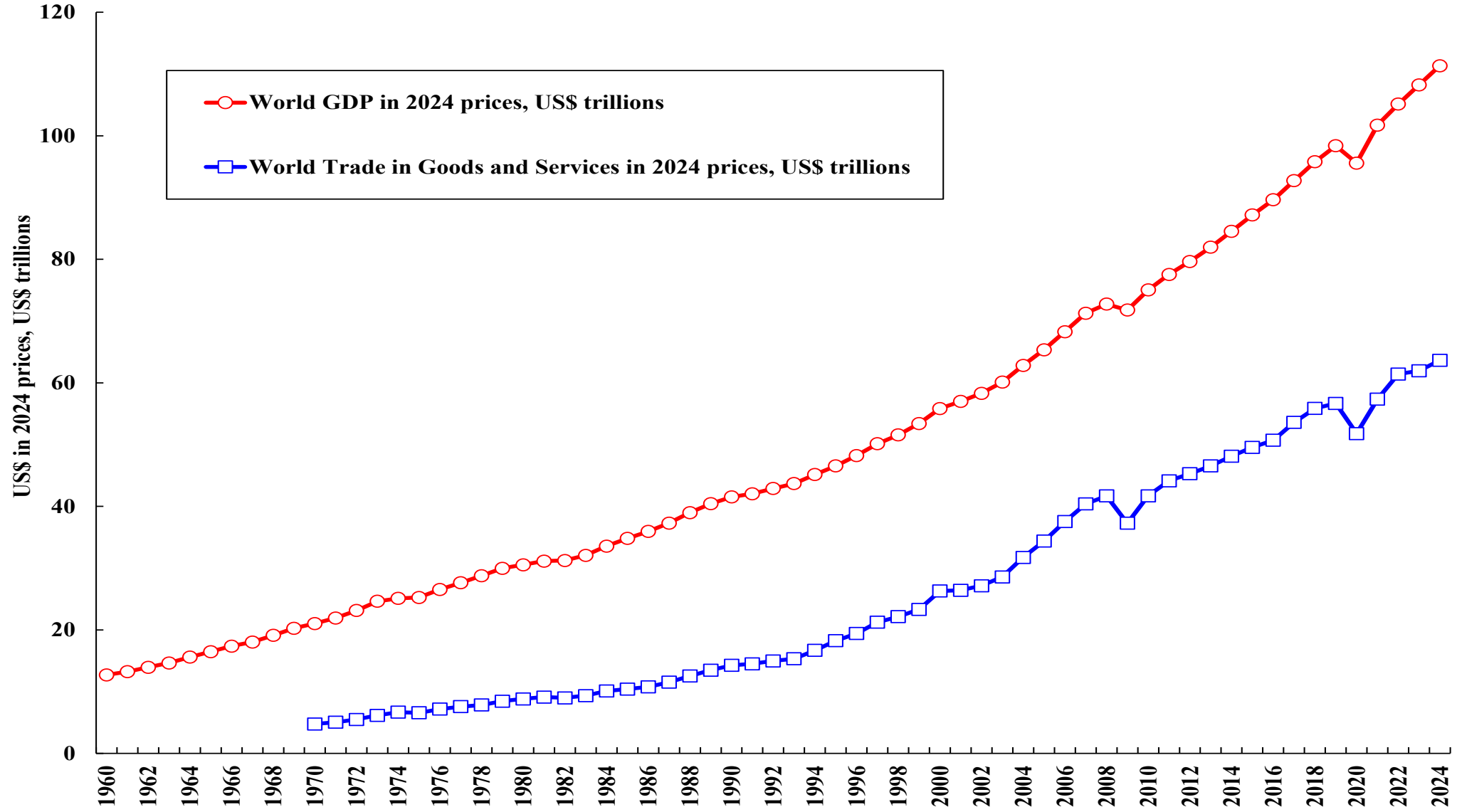
China in the Global Economy

- Fourth, because of its rapid economic growth, China has also become, since 2005, the highest carbon dioxide emitter in the World, overtaking the United States. However, China is committed to peaking its carbon emissions by 2030 and achieving net carbon neutrality by 2060.
- Recently, President Xi Jinping announced at a United Nations conference that the annual Chinese carbon emissions will be further reduced by 7-10% by 2035, with non-fossil fuels accounting for over 30% of Chinese energy consumption. These targets appear eminently feasible.
- Already in 2024, renewable energy (solar and wind) accounted for 20 percent of the annual Chinese electricity consumption and constituted 86 percent of the total new electricity generation capacity installed in China, surpassing thermal (fossil-fuel) energy. China is today the leading pioneer in the development and application of renewable energy, including both solar and wind, and also in nuclear fission and fusion.

The Growth Trends in World Real GDP and Real International Trade

- In the following chart, the total values of World real GDP and real international trade in goods and services, respectively, between 1960 and 2024, are presented. Between 1960 and 2024, World real GDP grew steadily and almost continuously, at an average annual rate of 3.45%.
- Between 1970 and 2024, the real quantity of World international trade, in constant 2024 U.S. Dollar, grew even faster, at an average annual rate of 5.11%.
- However, the growth of world trade appeared to have been stalled recently—it grew only 0.84% in 2023 and 2.72% in 2024, reflecting the effects of the COVID-19 pandemic as well as the more recent trends of economic de-globalisation, de-coupling, de-risking, rising protectionism, and more recently, the Trump tariffs.
- Given the so-called reciprocal tariffs of U.S. President-Elect Donald Trump against various countries, and their potential retaliation, it is likely that the rate of growth of the real quantity of World trade in goods and services and World GDP will continue to be low in the next few years.

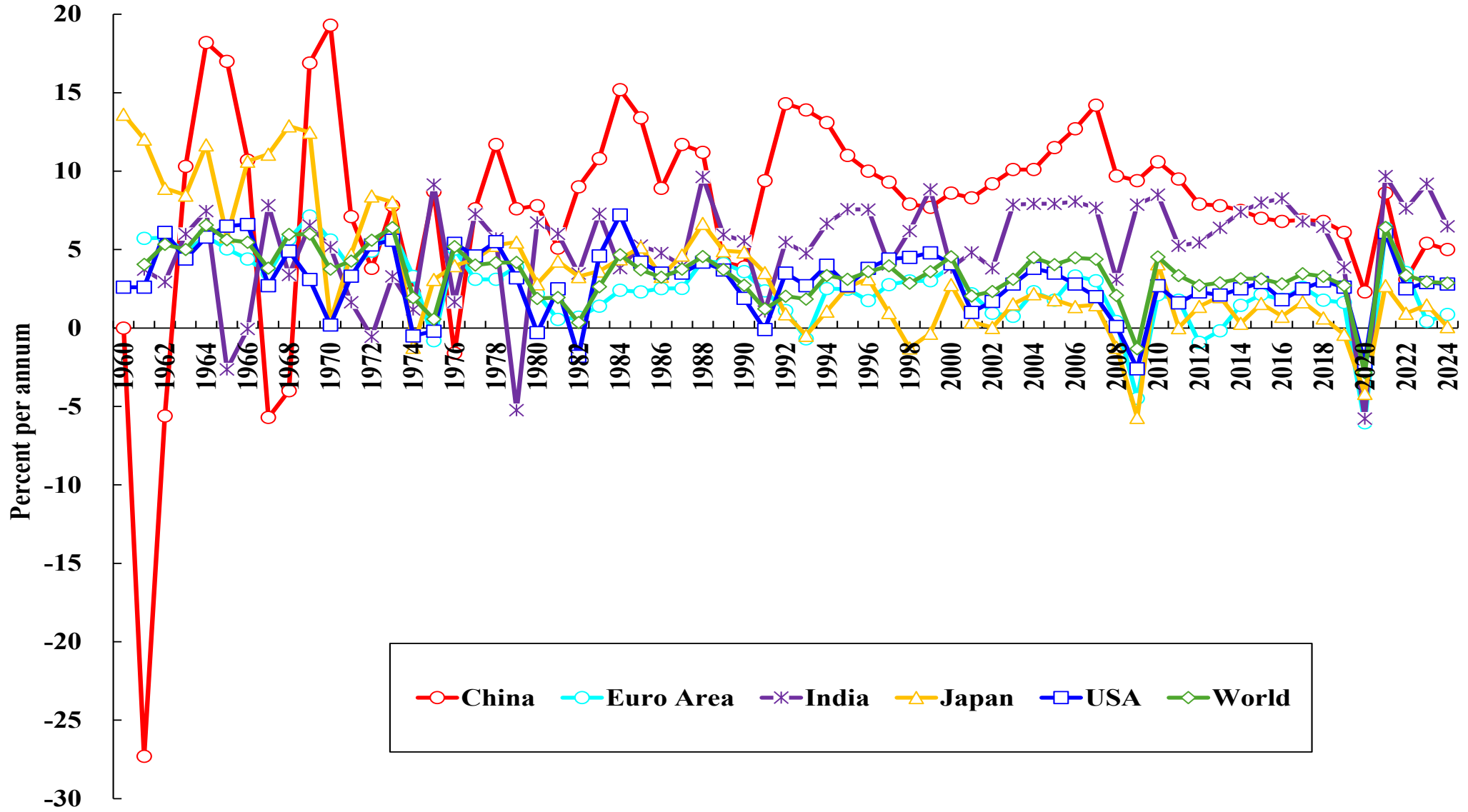
The Growth Trends in World Real GDP and International Trade in 2024 Prices, Tril. US$



Rates of Growth of Real GDP: China, the Euro Area, India, Japan, the U.S. and the World

- In the following chart, the annual rates of growth of the real GDPs of Mainland China, the Euro Area, India, Japan, the U.S. and the World between 1960 and 2024 (in 2024 prices) are presented.
- China is represented by the red line, which shows huge fluctuations, with large positive as well as negative rates, before the commencement of economic reform and opening in 1978. However, since 1978, China has stayed at the top until more recently, indicating that it has had the highest rate of growth among the included countries and regions most of the time.
- India, represented by the purple line, has since 1980 had the second highest rate of growth among this group of economies, and has even surpassed China in more recent years.
- The World as a whole, represented by the green line, is in the third place.
- The U.S., represented by the blue line, has been mostly just behind the World, in the fourth place, at around 3% per annum. The U.S. is followed by the Euro Area, represented by a turquoise line, in the fifth place, although it has fallen behind Japan in 2023. Japan, represented by the yellow line, has had high rates of growth between 1960 and 1973 (the first oil shock), moderate rates between 1973 and 1992, but the lowest rates of growth since 1992 among this group of economies.
- For all of the economies, there were major dips in their rates of growth in both 2008, the year of the Global Financial Crisis, and in 2020, the first year of the COVID-19 pandemic.

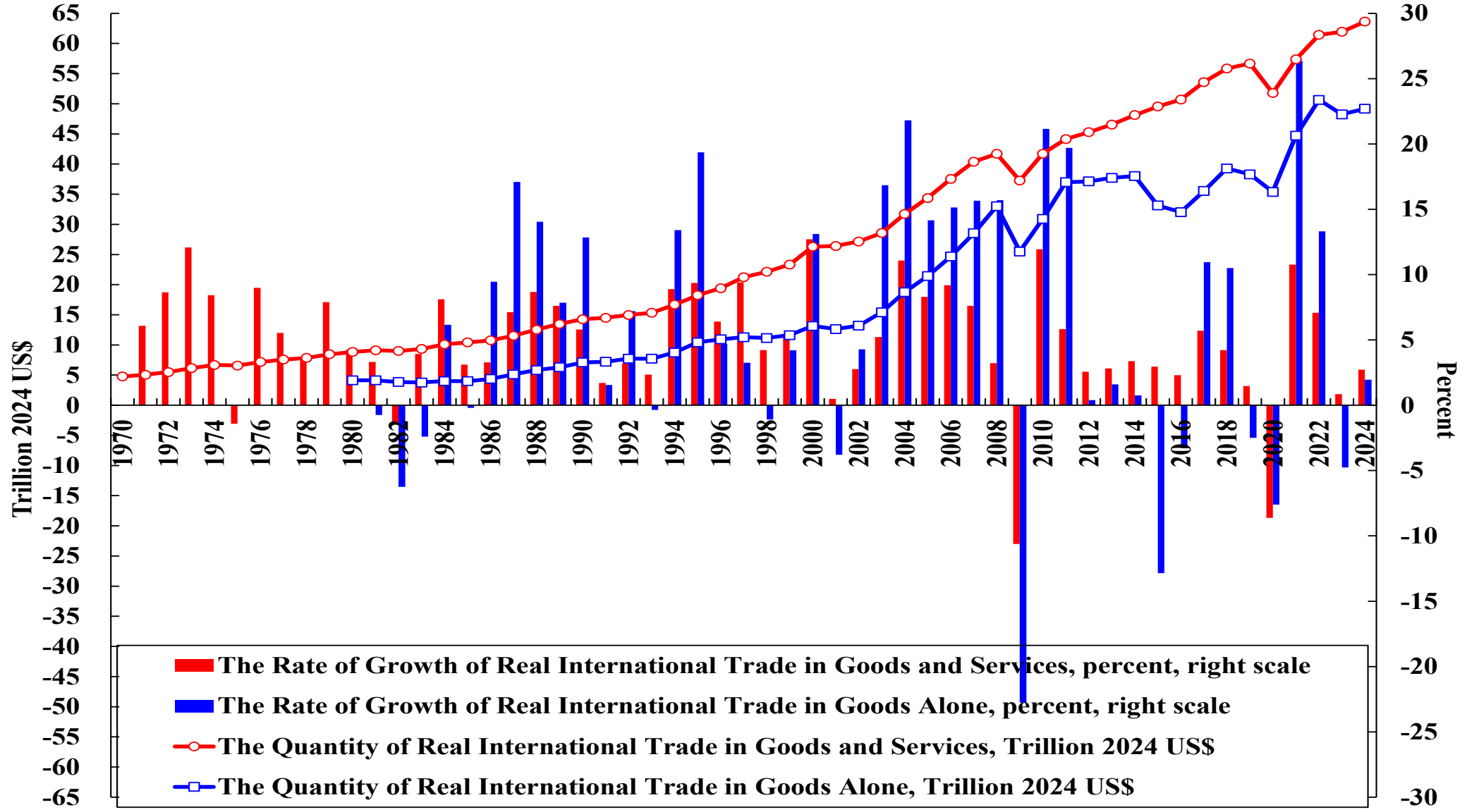
Rates of Growth of Real GDP: China, the Euro Area, India, Japan, the U.S. and the World



The Rates of Growth of Real International Trade in Goods and in Services, Tril. 2024 US$

- In the following chart, the total quantities of the World real international trade in goods and services, and in goods alone, respectively, as well as their rates of growth, between 1970 and 2024, in 2024 prices, are presented.
- Between 1970 and 2024, the quantity of World real international trade in goods and services has been growing at an average annual rate of **4.92%**. Between 1980 and 2024, the quantity of World real international trade in goods alone has been growing at an average annual rate of **5.78%**. Thus, it appears that the growth of World trade has been driven more by the growth of trade in goods, which also tends to fluctuate much more than trade in services.
- The growth of World real international trade, especially in goods, appeared to have slowed since the Global Financial Crisis of 2008 and is also negatively impacted by the COVID-19 pandemic and the recent rise of protectionism around the world.

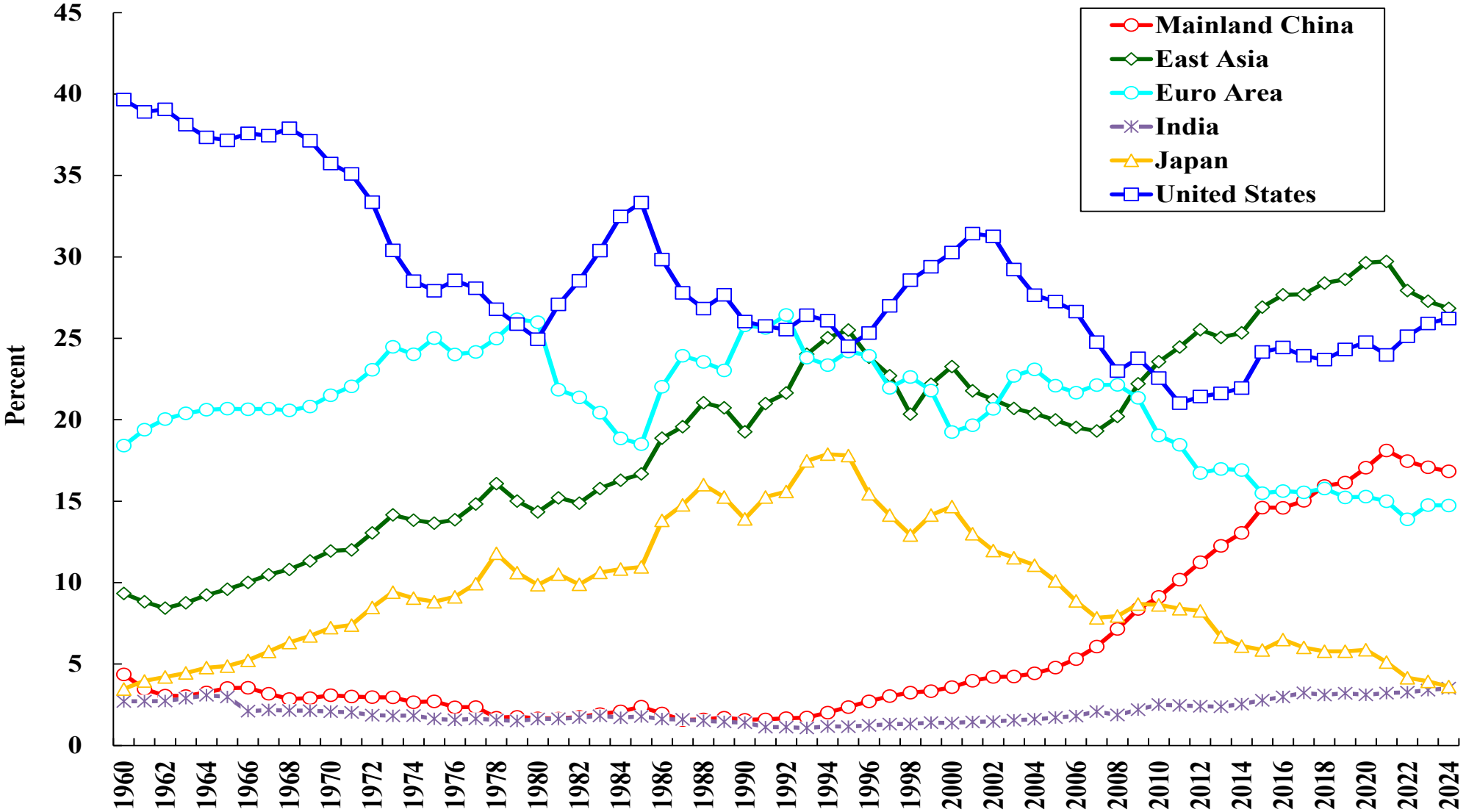
The Quantities and Rates of Growth of Real International Trade in Goods and Services and in Goods, Tril. 2024 US$



The Shifting Centres of Gravity of the Global Economy

- Already since 1960, the centres of gravity of the global economy have been shifting from North America and Western Europe to East Asia. And within East Asia, they have been shifting from Japan to China since the mid-1990s.
- With the rise of the Indian and other South Asian economies, it appears that the centres of gravity of the global economy will have been shifted to Asia in another decade or so, with Asia accounting for more than half of the World's real GDP, as it once did in the early 1800s.
- The shifts can also be seen in international trade, value-added in manufacturing, consumption, wealth, human capital and R&D capital and their outputs, and the choice of currency for the settlement of international transactions, to varying degrees. It can also be seen in terms of carbon dioxide emissions.

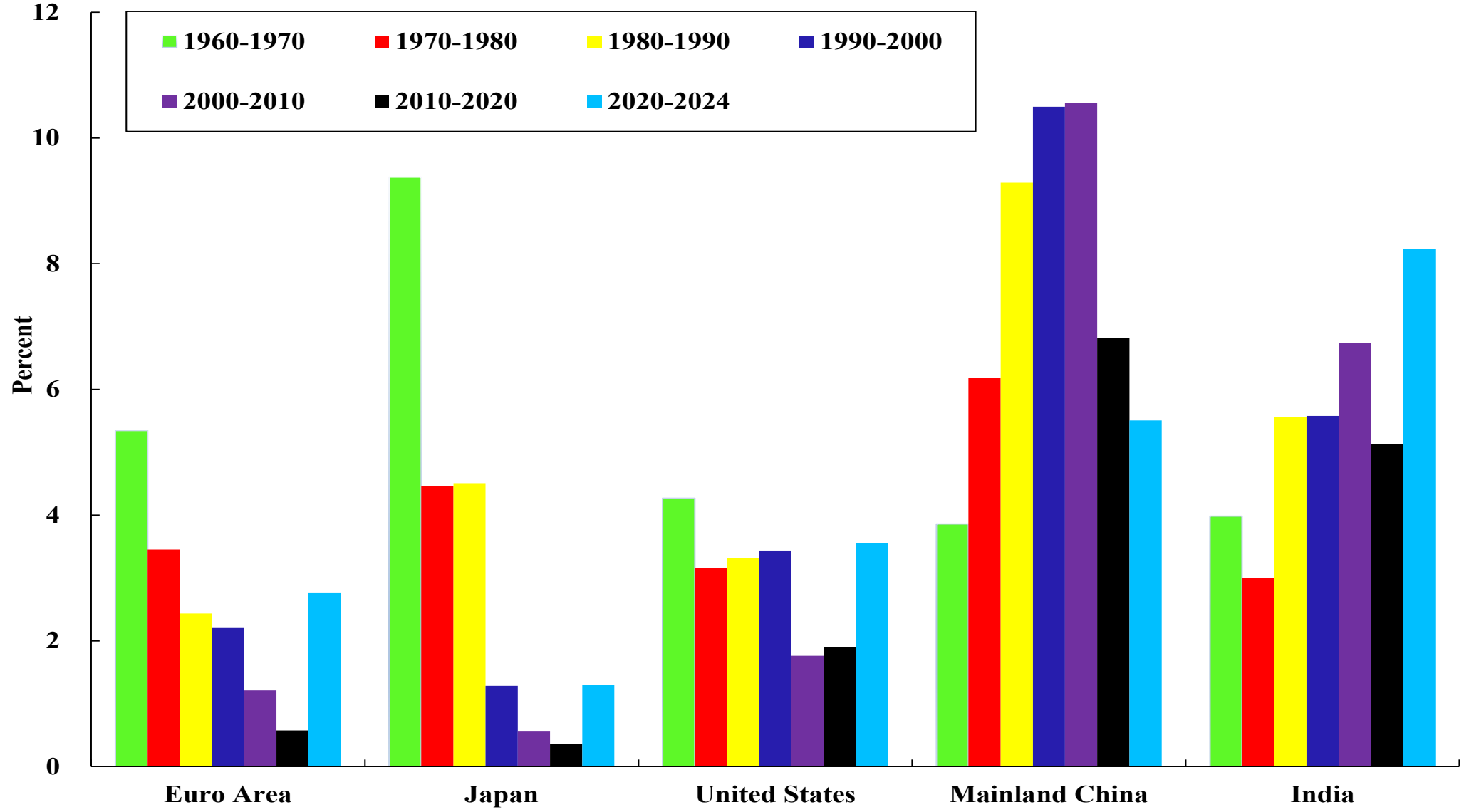
The Shares of China, East Asia, the Euro Area, India, Japan & the U.S. in World GDP, 1960-2024



The Shifting Centres of Gravity of the Global Economy: Real GDP

- In the following chart, the average annual rates of growth of the real GDP of selected economies in different decades are presented.
- Mainland China and India are among the fastest growing economies during the past four and a half decades. Average annual Chinese growth rates exceeded 10% in the two decades between 1990 and 2010. More recently, Indian annual economic growth has exceeded 8%.
- Japan was the fastest growing economy in the 1960s but has stagnated since 1990. The U.S. and the Euro Area, being mature developed economies, have had relatively low growth rates during the past decades.

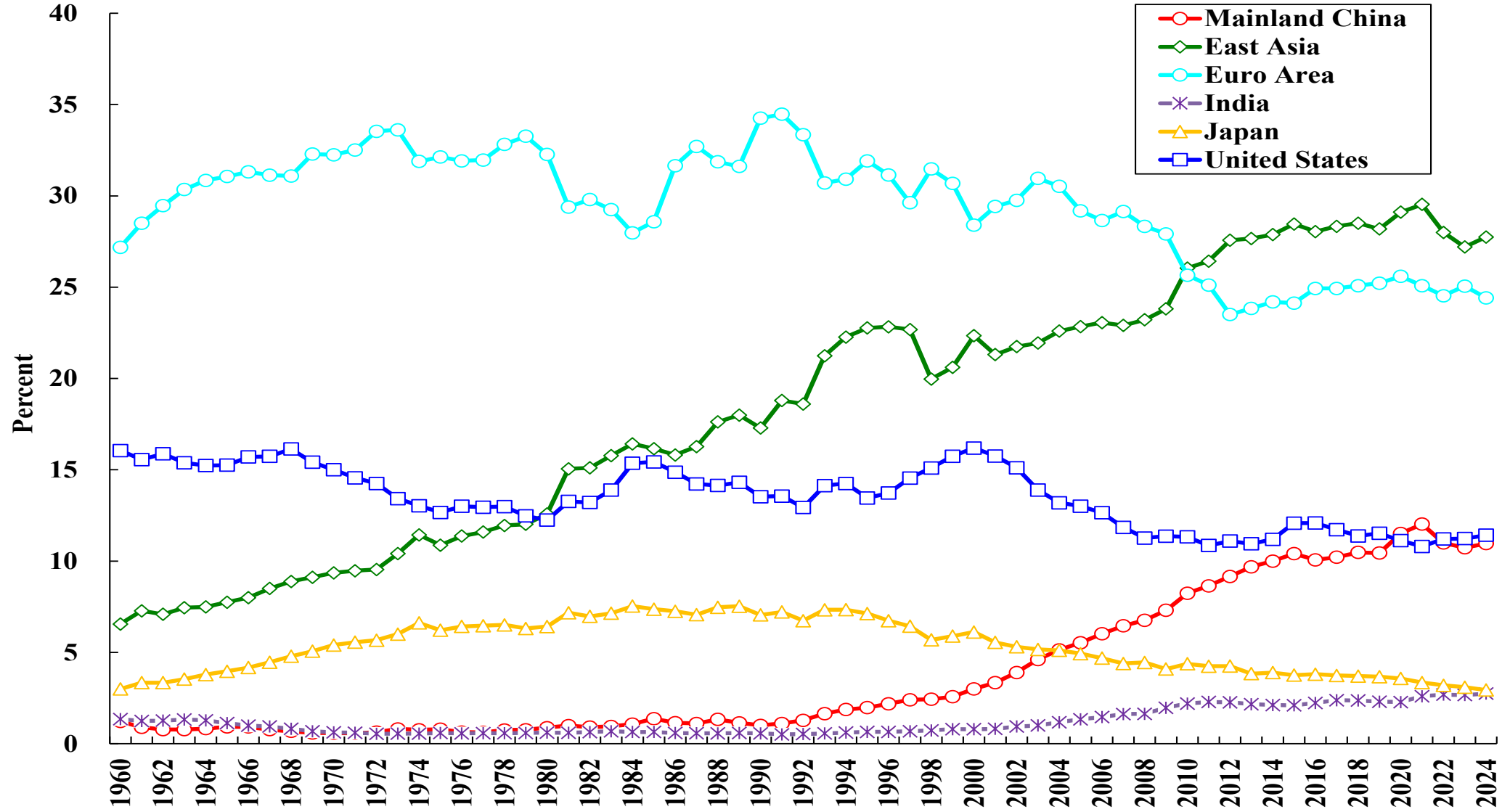
Decade Average Annual Rates of Growth of Real GDP of China, the Euro Area, India, Japan & the U.S, 1960-2024



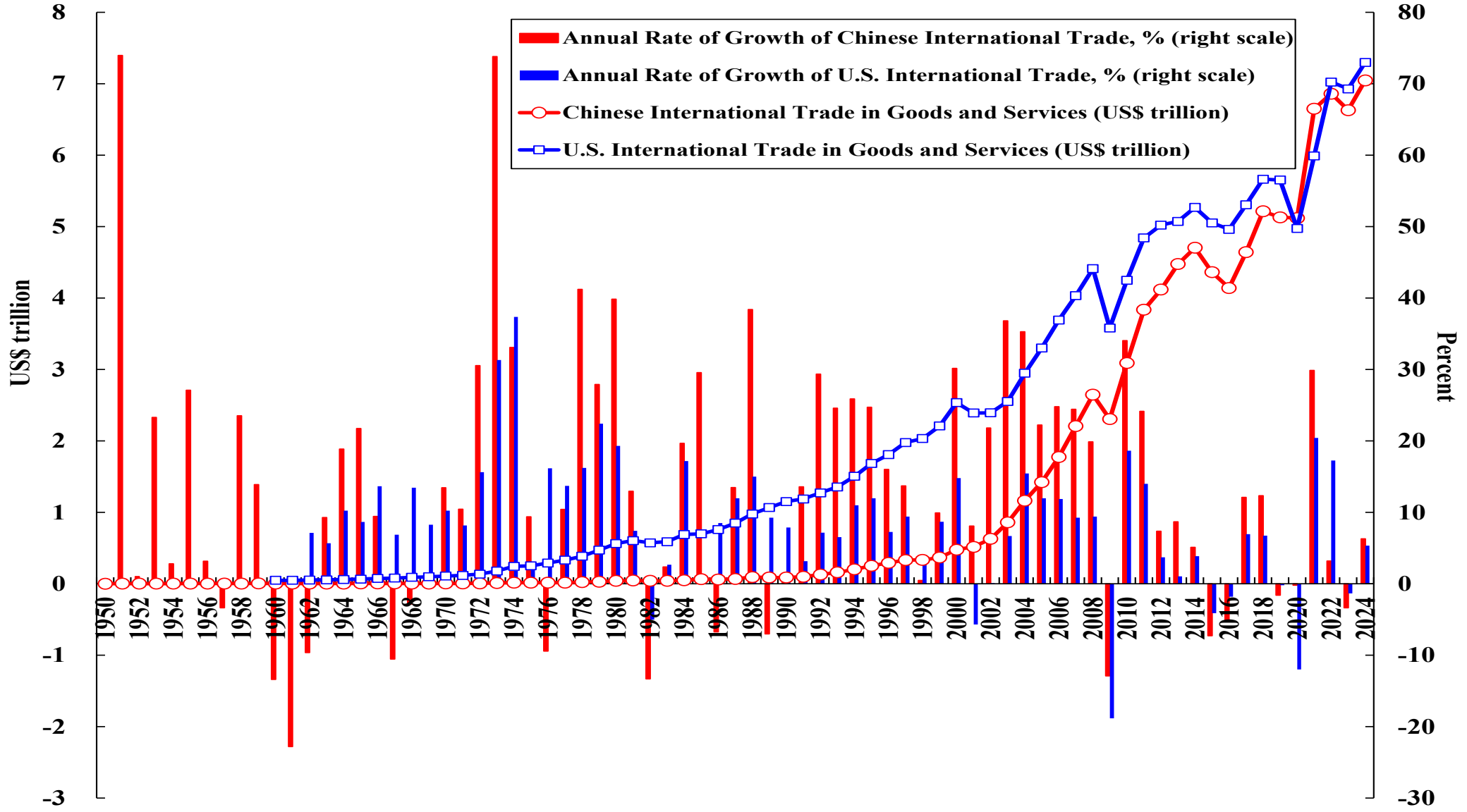
The Shifting Centres of Gravity of the Global Economy: International Trade

- In the following chart, we present the shares of world international trade in goods and services of the major economies from 1960 to 2024. In 1960, the United States and the Euro Area together accounted for almost **43%** of the value of total international trade in goods and services in the World. By comparison, East Asia accounted for only **6.6%** of total World trade. By 2024, the combined share of United States and the Euro Area in World trade declined to **35.8%** whereas the share of East Asia rose to almost **27.7%**.
- The Chinese share of World trade rose from **1.2%** in 1960 to **11.0%** in 2024. The growth in Chinese international trade may be attributed in part to the reform of the Chinese exchange rate system and the adoption of current-account convertibility in 1994, accompanied by a significant devaluation, as well as to Chinese accession to the World Trade Organization in 2001. Chinese international trade accounted for 40% of East Asian international trade in 2024.

The Shares of China, East Asia, the Euro Area, India, Japan & the U.S. in World Trade, 1960-2024



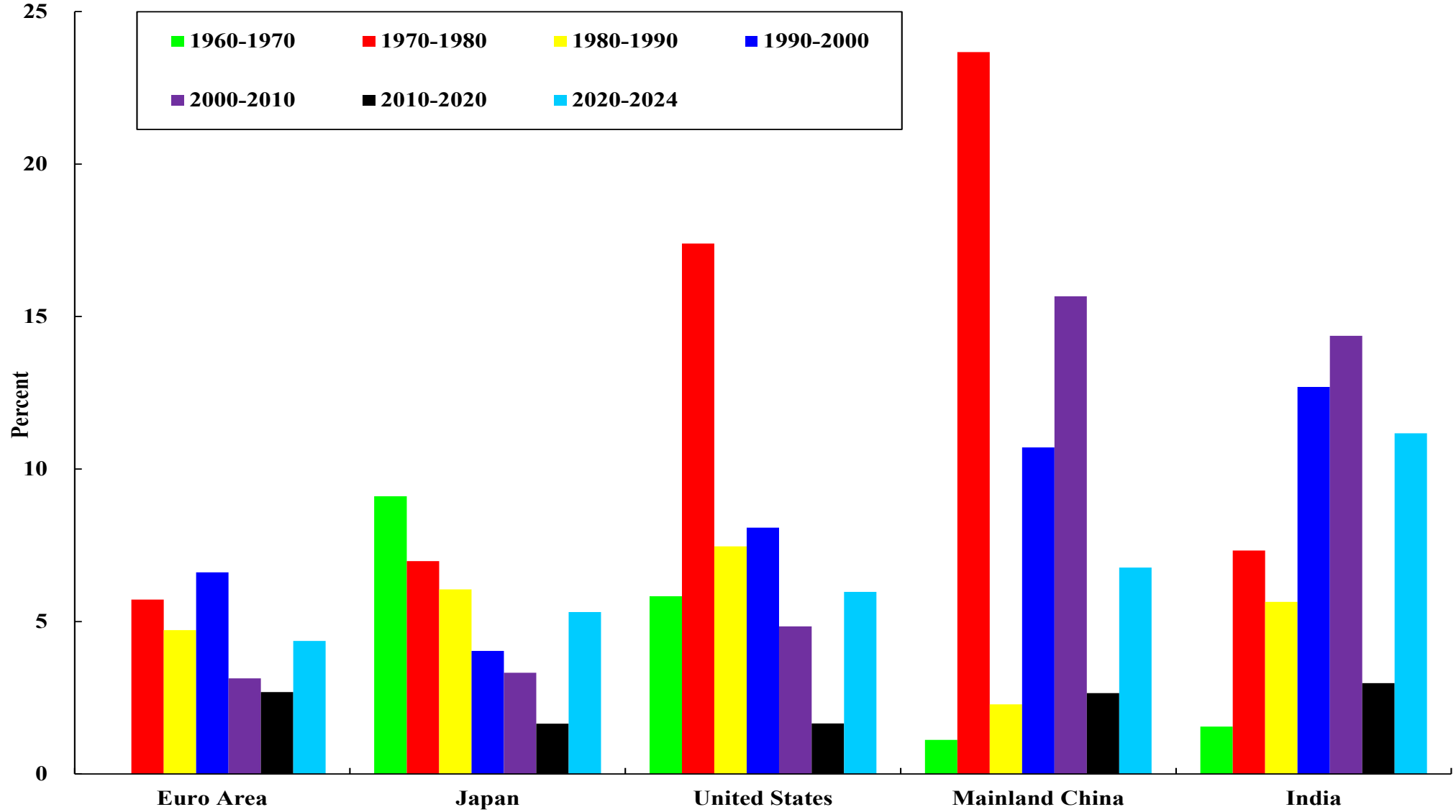
The Growth of Mainland Chinese and U.S. International Trade in Goods and Services



The Growth of Total Real International Trade in Goods and Services

- In the following chart, the average annual rates of growth of total real international trade in goods and services for selected economies for different decades are presented.
- China and India have had the highest rates of growth in international trade, especially since the 1990s. Growth in Chinese international trade was particularly rapid during the decade of 2000-2010 because of its accession to the World Trade Organization (WTO) in 2001 and because of the expiration of the Multi-Fibre Agreement governing World trade in textiles. India also had exceptionally high rates of growth in its real international trade and in fact exceeded China since 2020.
- However, all the developed economies—the U.S., the Euro Area, and Japan—had relatively low real rates of growth of international trade during the past several decades.

Decade Average Annual Rates of Growth of Total Real International Trade in Goods and Services



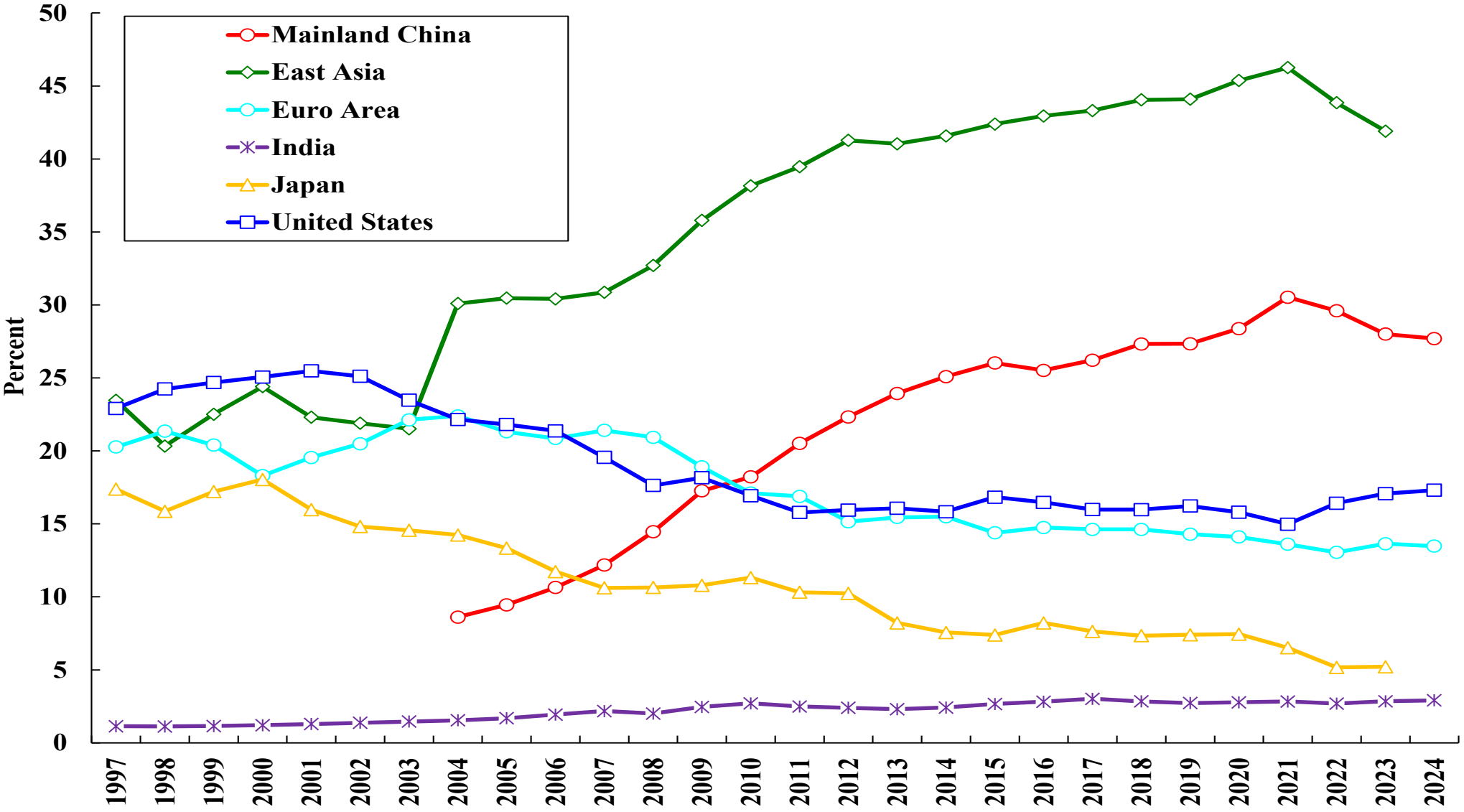
Rank of Country as Trading Partner of China of International Trade in Goods and Vice Versa (2024)

Country	Rank of Country as Trading Partner of Mainland of China (2024)	Mainland Chinese Rank as Trading Partner of Country (2024)
United States	1	3
Korea, Republic of	2	1
Japan	3	1
Vietnam	4	1
Russian Federation	5	1
Australia	6	1
Malaysia	7	1
Germany	8	5
Brazil	9	1
Indonesia	10	1

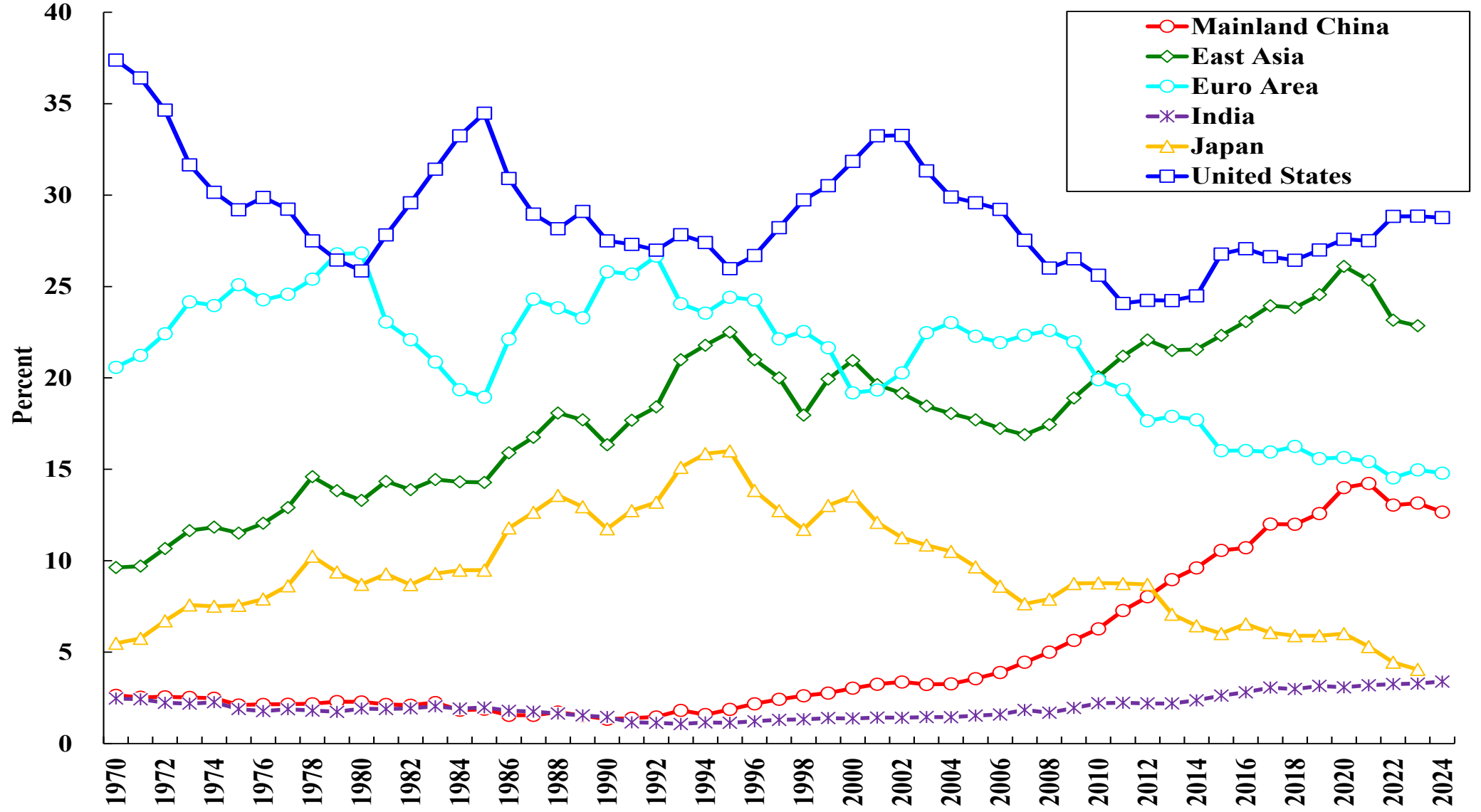
Rank of China as Trading Partner of ASEAN Countries in Goods & Vice Versa

ASEAN Country	Mainland Chinese Rank as Trading Partner of ASEAN Country (2024)	Rank of ASEAN Country as Trading Partner of Mainland of China (2024)
Brunei	3	106
Cambodia	1	48
Indonesia	1	10
Laos	1	75
Malaysia	1	7
Myanmar	1	51
Philippines	1	22
Singapore	1	13
Thailand	1	12
Vietnam	1	4

The Shares of China, East Asia, Euro Area, India, Japan & the U.S. in World Value-Added in Manufa.



The Shares of China, East Asia, the Euro Area, India, Japan & the U.S. in World Consumption, 1970-2024



The Shifting Centres of Gravity of Individual, Corporate and Sovereign Wealth in the World

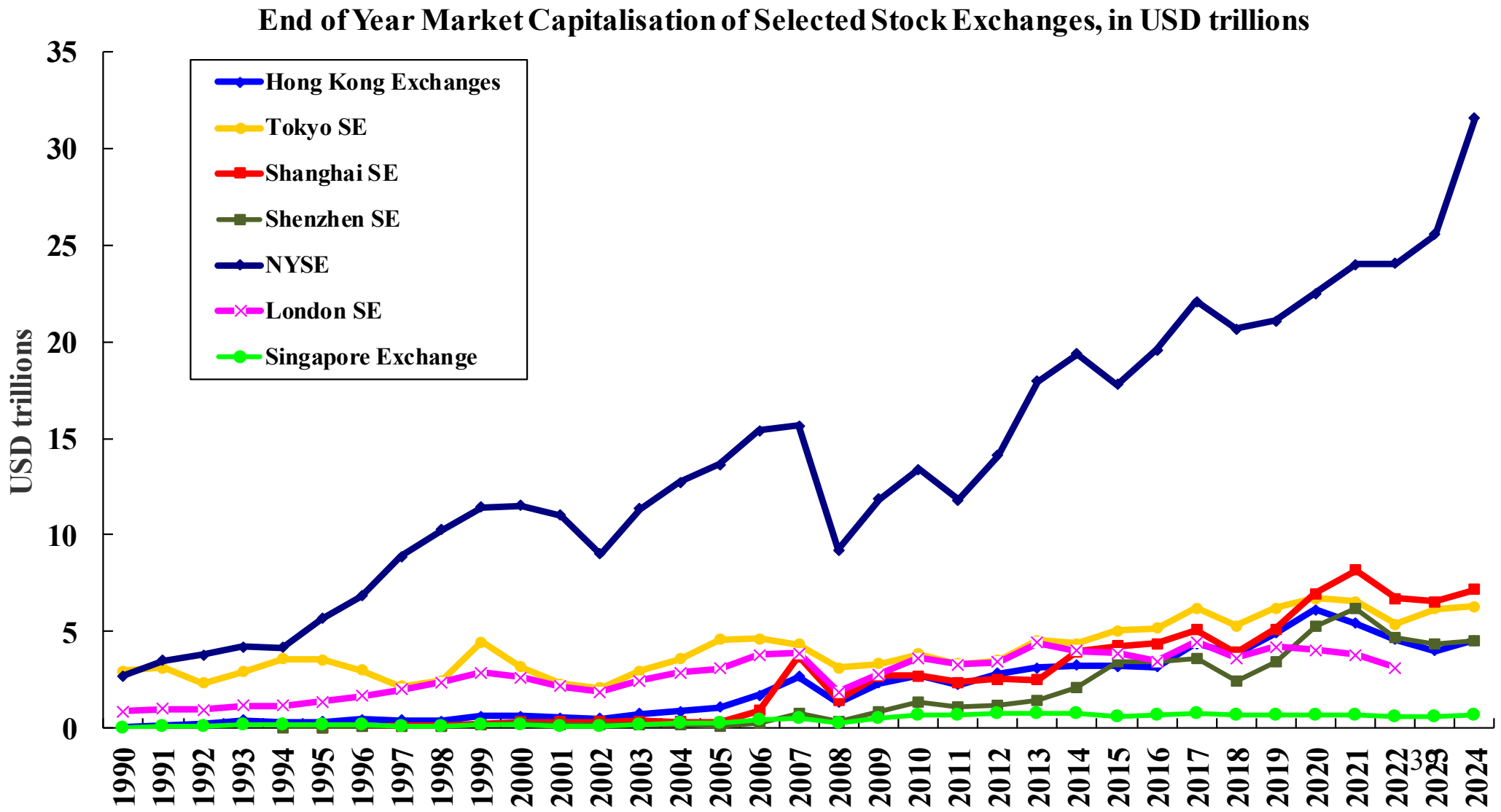
- According to the 2024 survey done by the Forbes magazine, there were a total of 2,781 US$ billionaires in the world, amongst whom U.S. citizens accounted for 813 (29.2%), Chinese (including Hong Kong and Macau) citizens accounted for 473 (17%), and 1ndian citizens 200 (7.2%).
- A similar survey by Hurun for 2024, based on data of January 2024, concluded that there were a total of just under 3,300 US$ billionaires in the world, amongst whom U.S. residents accounted for 800 (24.2%) and Chinese residents accounted for 814 (24.7%). Of course, there may well be even many more unknown US$ billionaires in China. There were also 271 US$ billionaires living in India (8.2%).
- Even though the exact numbers and rankings differ, it is unmistakable that aggregate Chinese household wealth is at least of the same order of magnitude as U.S. household wealth. The aggregate Chinese household wealth has also been increasing rapidly with the emergence of a sizeable middle class.
- Mainland China's stock market also has the second largest market capitalisation in the world, at US$11.71 trillion, after the U.S., with its US$62.19 trillion.

The Stock Market Capitalisation of Selected Economies, Year-End 2024

Economy	Market Capitalisation, US$ trillions
United States	62.19
Mainland China	11.71
Japan	6.31
India	5.12
Hong Kong, China	4.55

Source: World Federation of Exchanges Statistics Portal

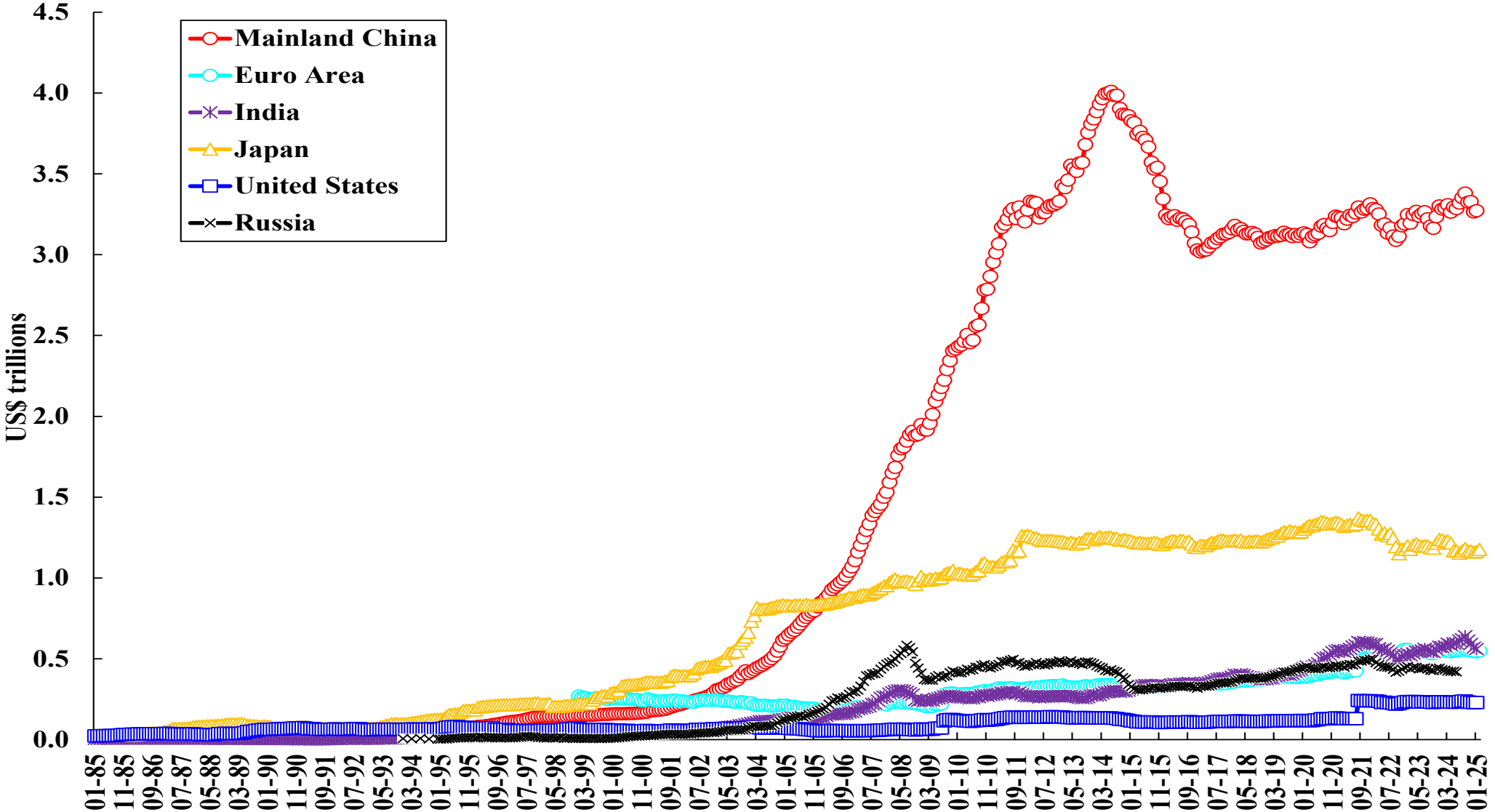
End of Year Market Capitalisation of Selected Stock Exchanges



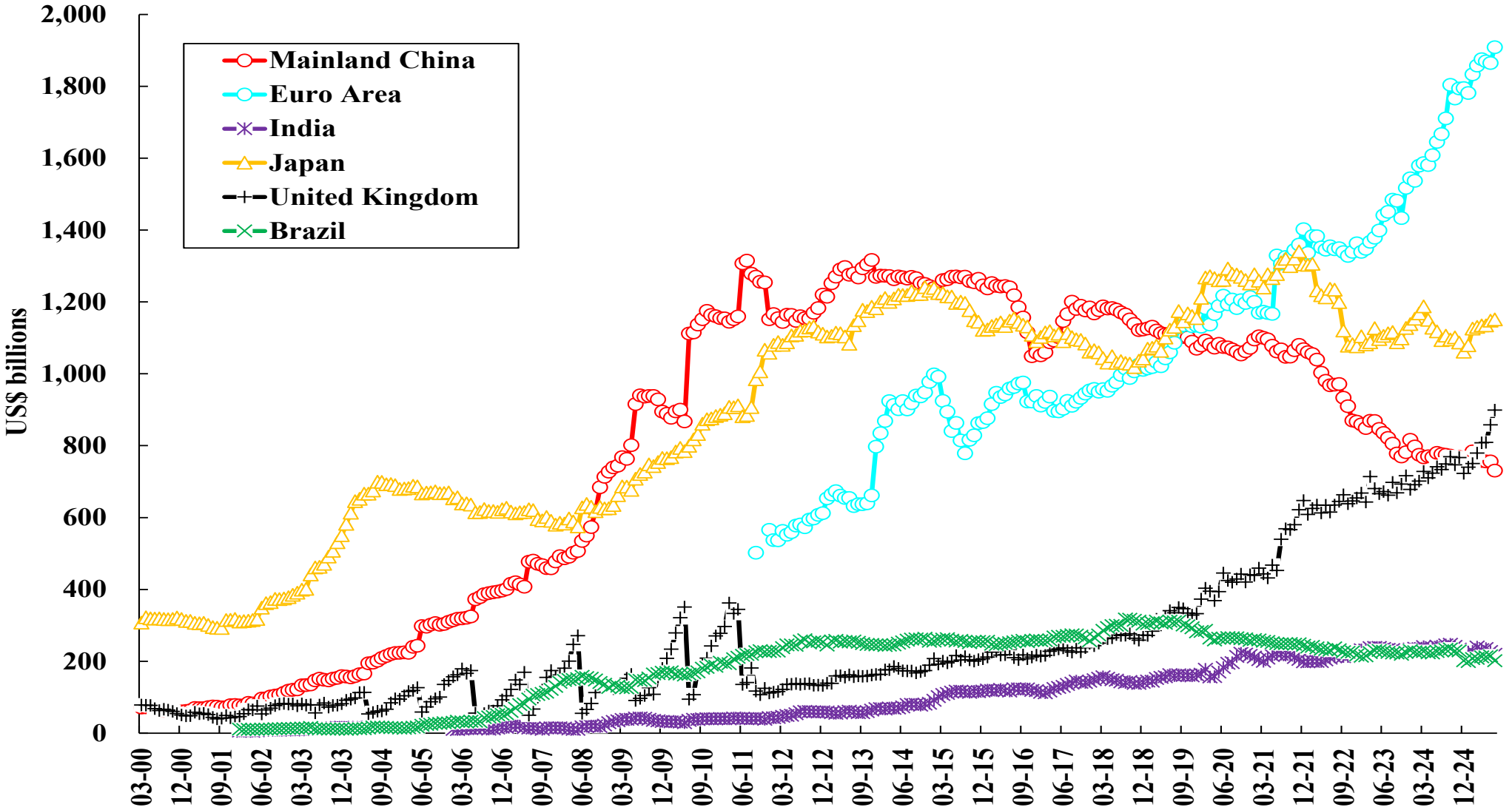
The Shifting Centres of Gravity of Individual, Corporate and Sovereign Wealth in the World

- China today has the world's largest official foreign exchange reserves, at approximately US$3.2 trillion, followed by Japan with approximately US$1 trillion. The central banks of Japan and China used to be the largest and second largest holders respectively of U.S. Treasury and Agency securities. However, the central banks of the Euro Area have recently taken over the top spot from the Bank of Japan, and the People's Bank of China has fallen behind the Bank of England to become the fourth largest holder.
- In addition, at year-end 2023, the assets of the Chinese state-owned enterprises totaled 271.9 trillion Yuan, or almost US$ 40 trillion, more than twice the annual Chinese GDP.

Total Foreign Exchange Reserves minus Gold: Selected Economies



U.S. Treasury and Agency Securities Held by the Central Banks of Selected Economies



Economic Globalisation and De-Globalisation

- Just as economic globalisation increases the welfare of all participating economies because of the enlargement of their choice sets, economic de-globalisation will reduce the welfare of all the formerly participating economies because of the shrinkage of their choice sets. When the choice sets expand, welfare cannot decrease; when the choice sets contract, welfare cannot increase.
- However, just as economic globalisation creates winners and losers in every participating economy, economic de-globalisation will also create winners and losers in every formerly participating economy. The free market will reward the winners but not the losers. It is up to the individual governments to compensate the losers.
- De-coupling or de-risking may be viewed as a form of diversification and is not all bad. It has costs but also benefits. In the short term, it will cause disruptions of the existing supply chains and increase costs. However, it will eventually make economies more resilient and markets much more competitive through having multiple sources of supply for almost every product and service. The competition among the multiple sources will lower prices and improve quality of products and services for consumers and users worldwide, and reduce the risks of supply interruption for whatever reason, and everyone will be better off. It will also make export restrictions ineffective.

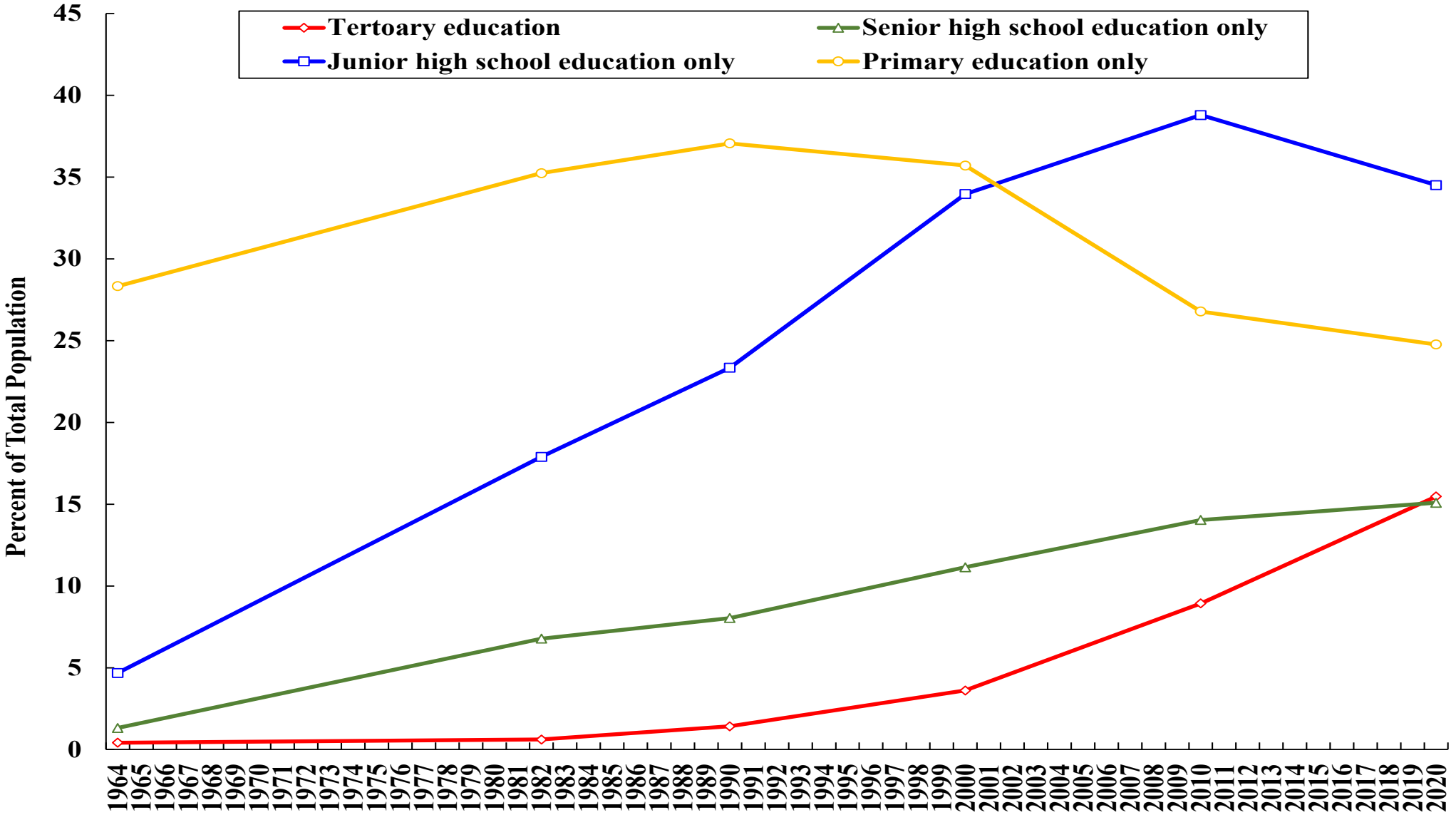
Intangible Capital

- The productive capacity of an economy depends on its tangible capital (structures and equipment, and physical infrastructure), intangible capital, and labour.
- Two types of intangible capital may be distinguished: human capital and technology capital. Human capital may be measured as the discounted present value of the stream of future labour earnings. An important indicator of the quantity of human capital is the number of years of schooling per person in the labour force or working-age population.
- Technology capital may also be measured as the discounted present value of the stream of future earnings from intellectual capital (property). An important indicator of the quantity of technology capital is the stock of real R&D capital, which may be measured as the cumulative real R&D expenditures less an annual depreciation of 10%.
- R&D may be further distinguished by basic research, applied research and development. Basic research is essential for any break-through discovery or invention but is not expected to have a positive real internal rate of return. Thus, it is mostly financed by grants from the government or non-profit organisations.

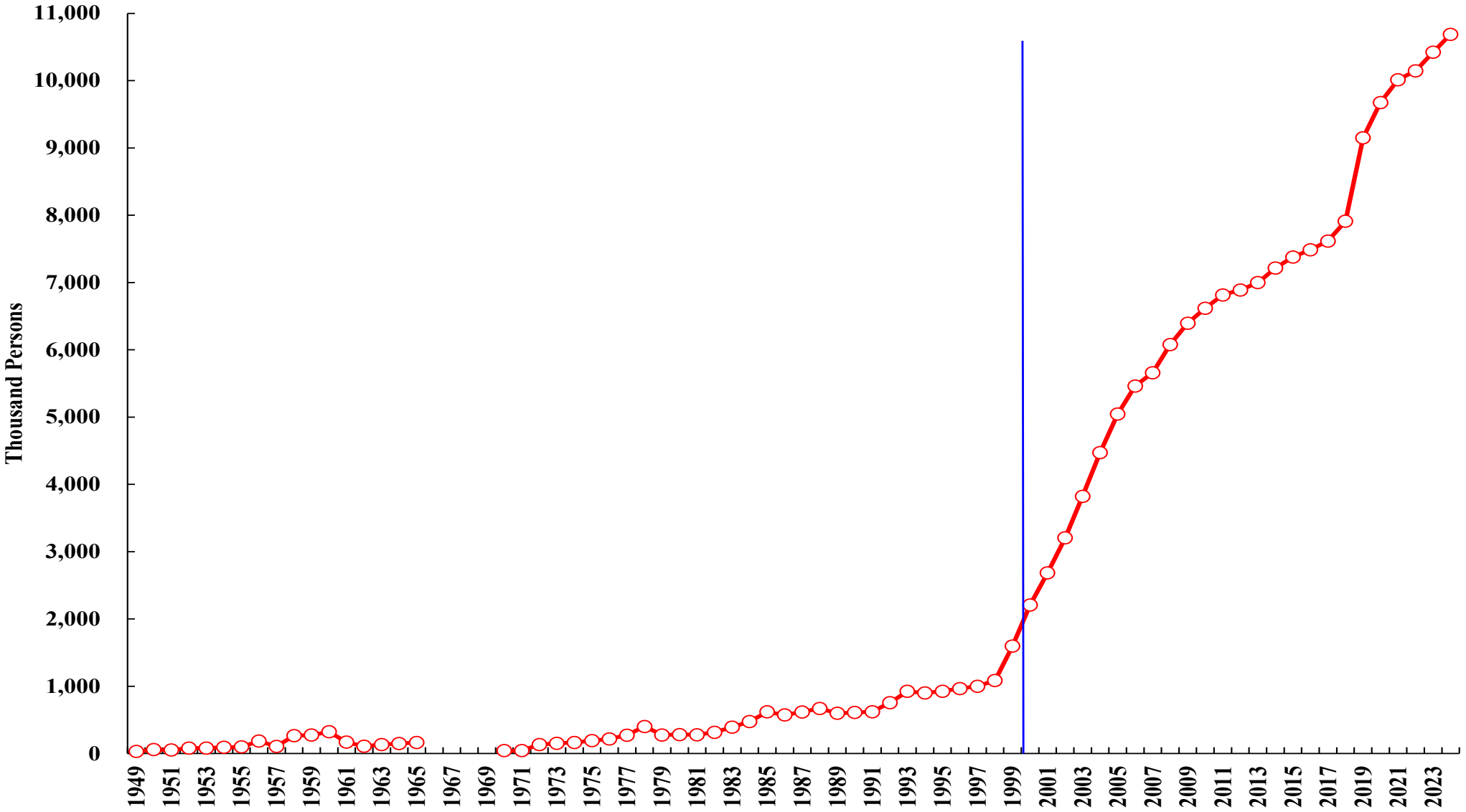
Educational Attainments

- Universal mandatory (publicly provided) 9-year education was introduced in China in 1986. Today, most young people have had at least 12 years of education, even though senior secondary education is still not yet mandatory at the present time.
- The proportions of people with only primary education (the yellow line) or junior secondary education (the blue line) have already peaked and begun to decline.
- The tertiary enrolment rates of graduates of secondary schools was 24.6% in 1989 and rose to 94.5% in 2016. This means almost everyone who wishes to attend a tertiary educational institution is now able to do so. (However, the proportion of the population aged 18-22 that were enrolled in tertiary education institutions in 2021 was only 57.8%, indicating that not everyone in that age cohort was able to complete senior secondary education.)
- The proportion of the total population with tertiary education (the red line), which was only 0.42% in 1964, rose to 15.47% in 2020, and is expected to increase further with time, given the massive expansion of tertiary educational enrolment since 1999.

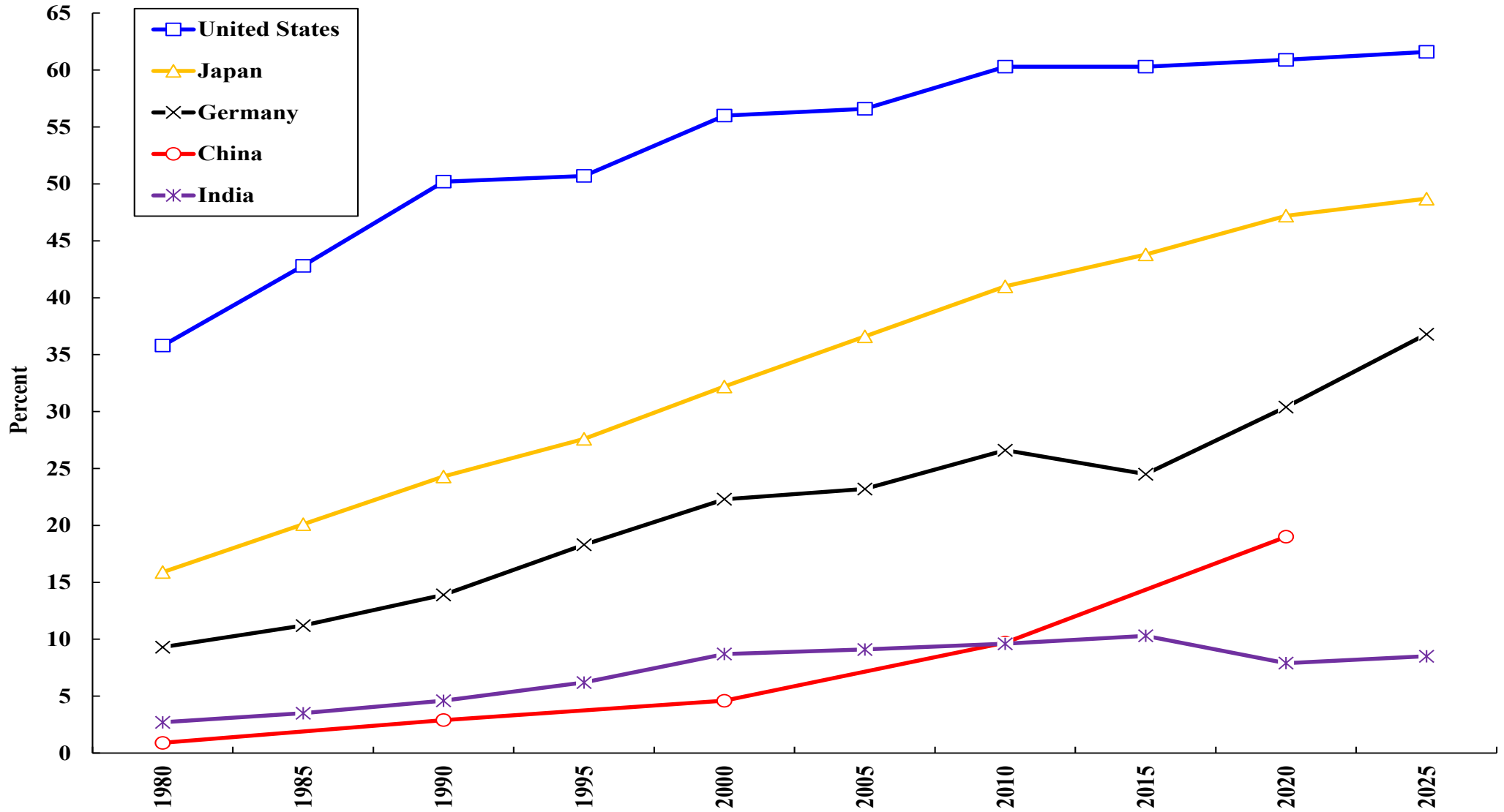
Educational Attainment Rates (Percent)



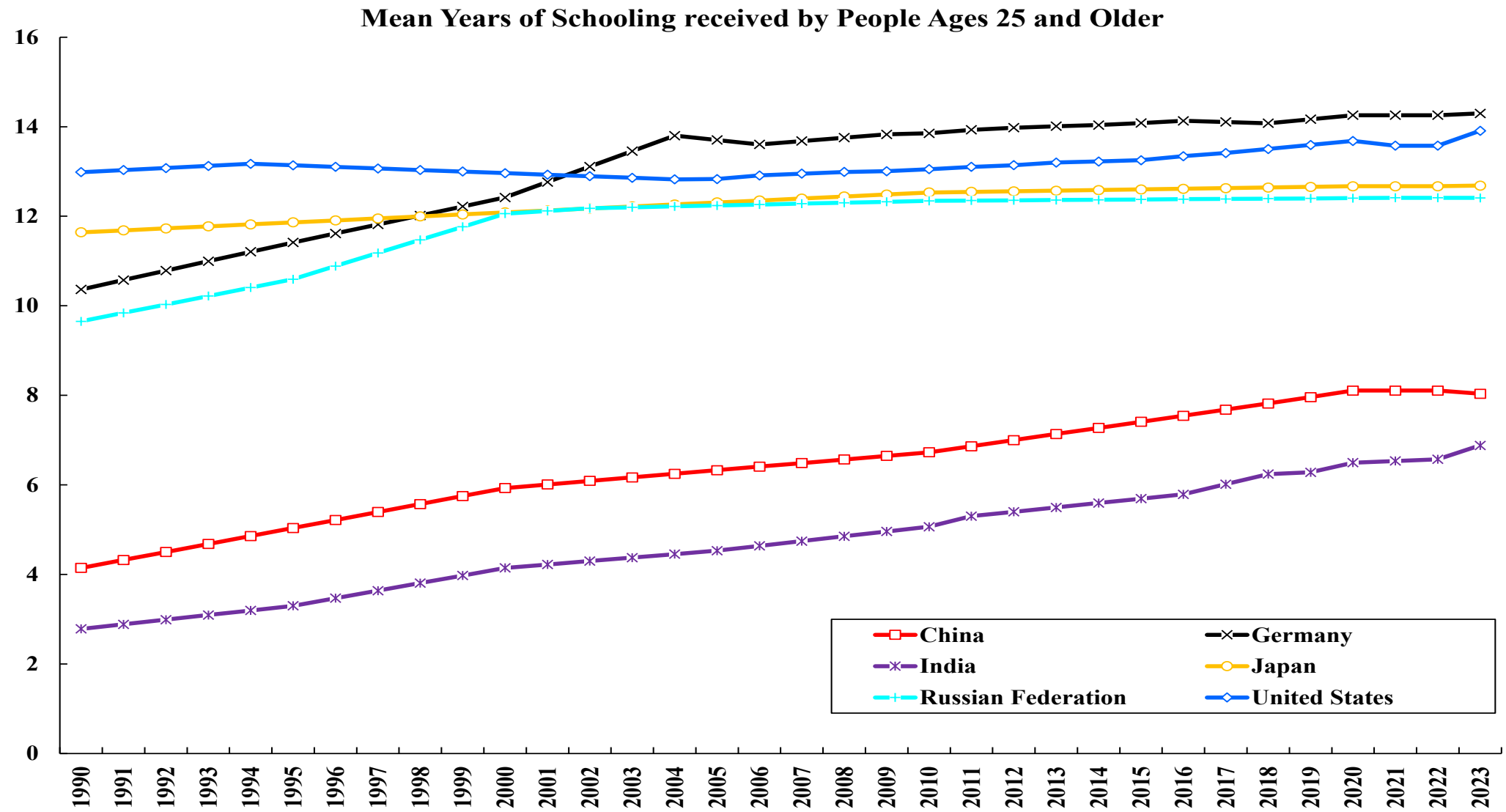
The Number of Freshman Students Admitted by Tertiary Educational Institutions, 1949-2024



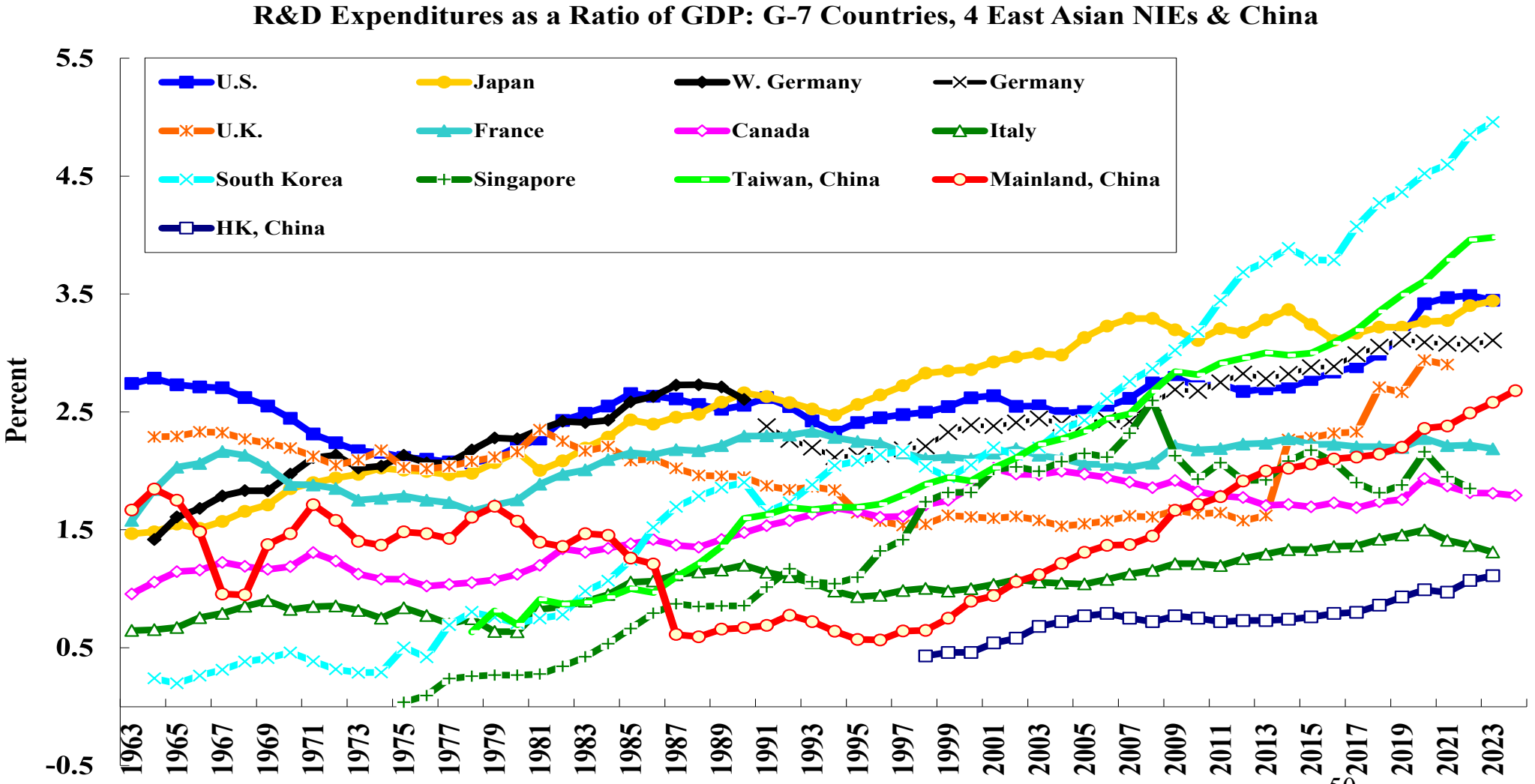
The Share of Population Aged 25-64 with Tertiary Education, 1980-2025



Average Number of Years of Education of the Population Aged 25 or Above (HDR)



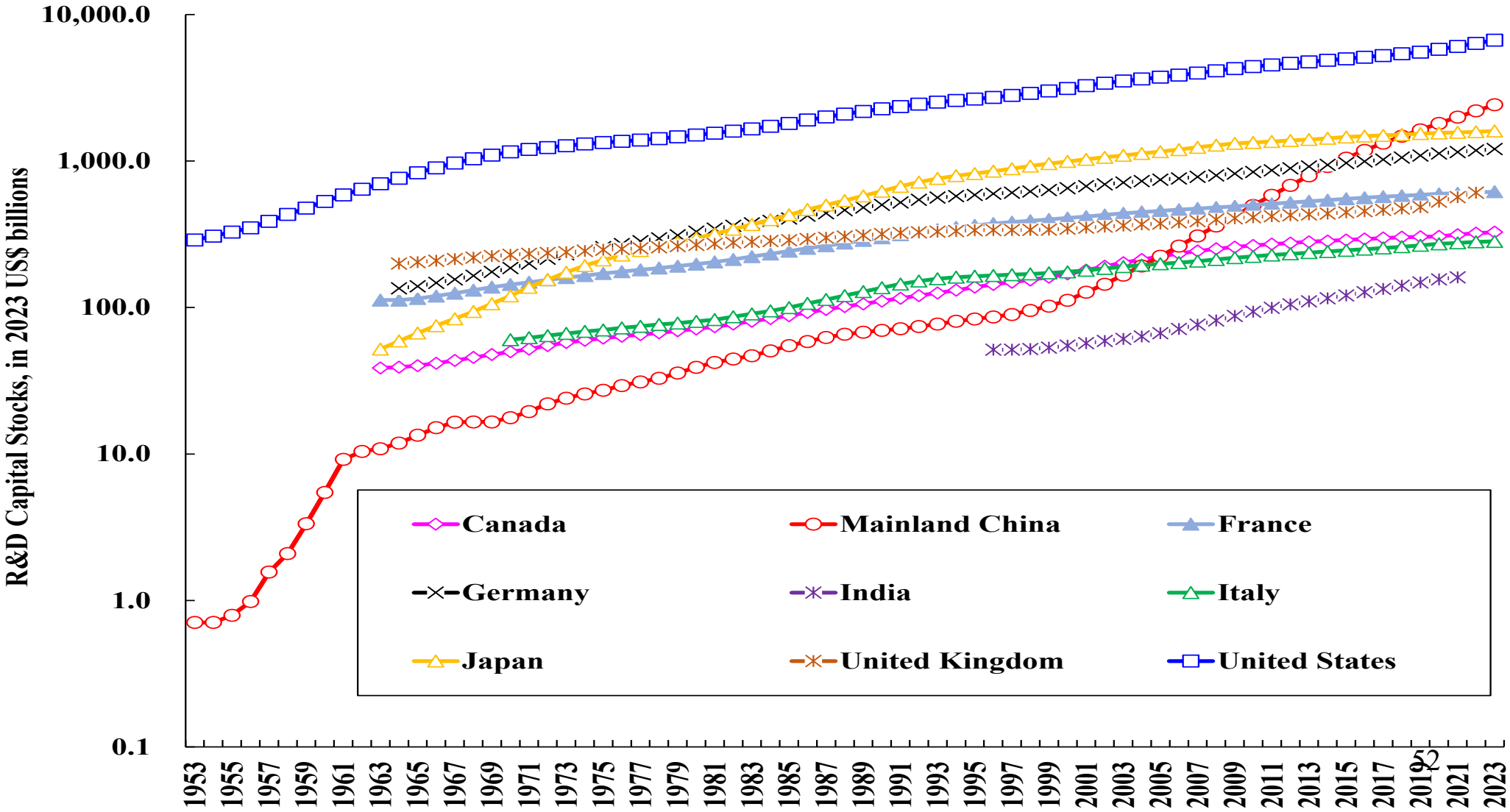
R&D Expenditures as a Percent of GDP: G-7 Countries, 4 East Asian NIES & China



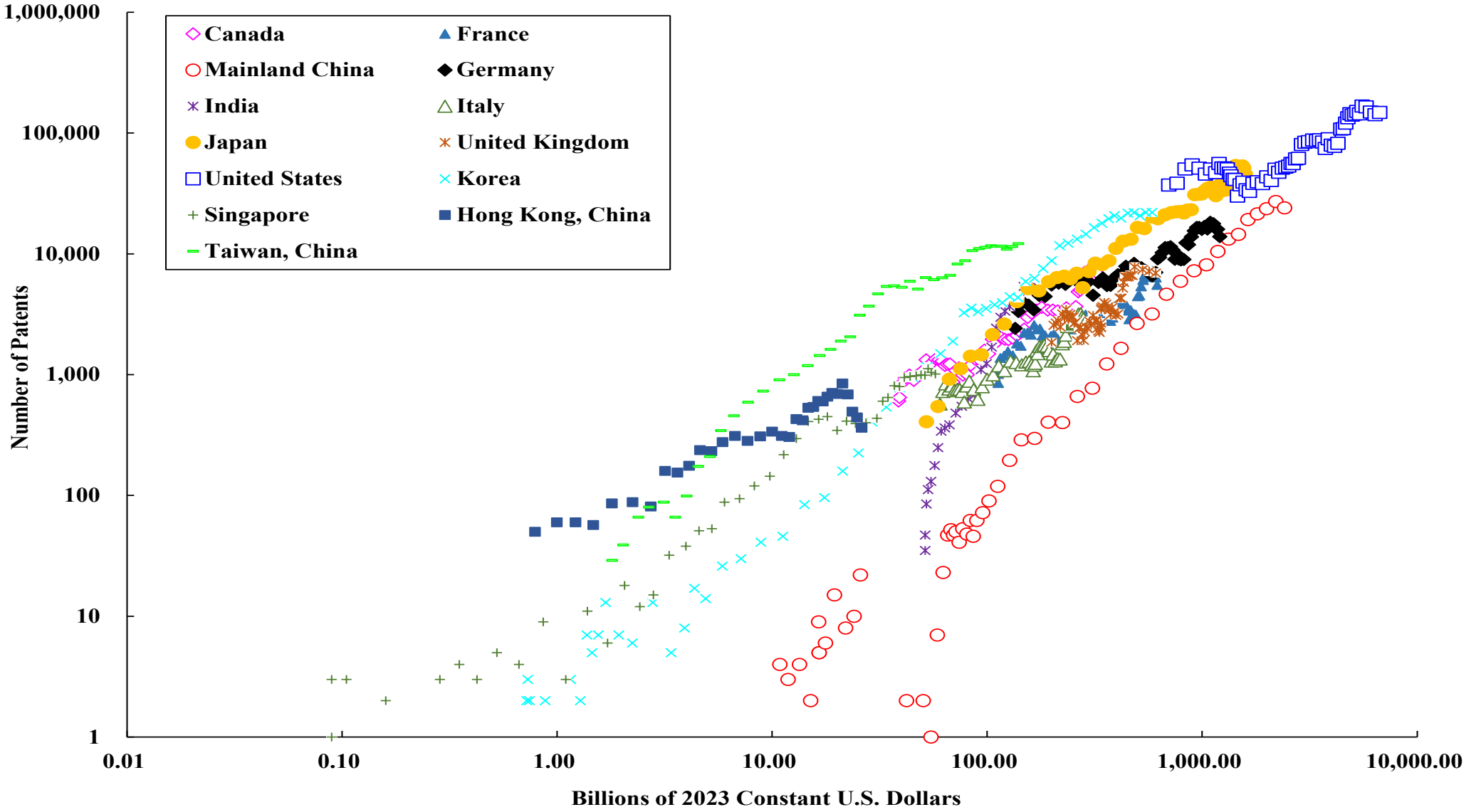
The Real R&D Capital Stock

- The R&D capital stock of an economy may be defined as the cumulative real expenditure on R&D less a depreciation of 10% per annum.
- Lawrence J. Lau and Yanyan Xiong have established a positive and monotonically increasing relationship between the number of patents granted by the U.S. Patent and Trademark Office (USPTO) and the quantity of real R&D capital stock for a selection of developed and developing economies in their book, ***Are There Laws of Innovation?***, Singapore: World Scientific Publishing Company, 2022.
- Basically, the larger the quantity of real R&D capital stock of an economy is, the greater the number of USPTO patents received by it will be.

The Stock of Real R&D Capital, in 2023 US$ billions, Selected Economies



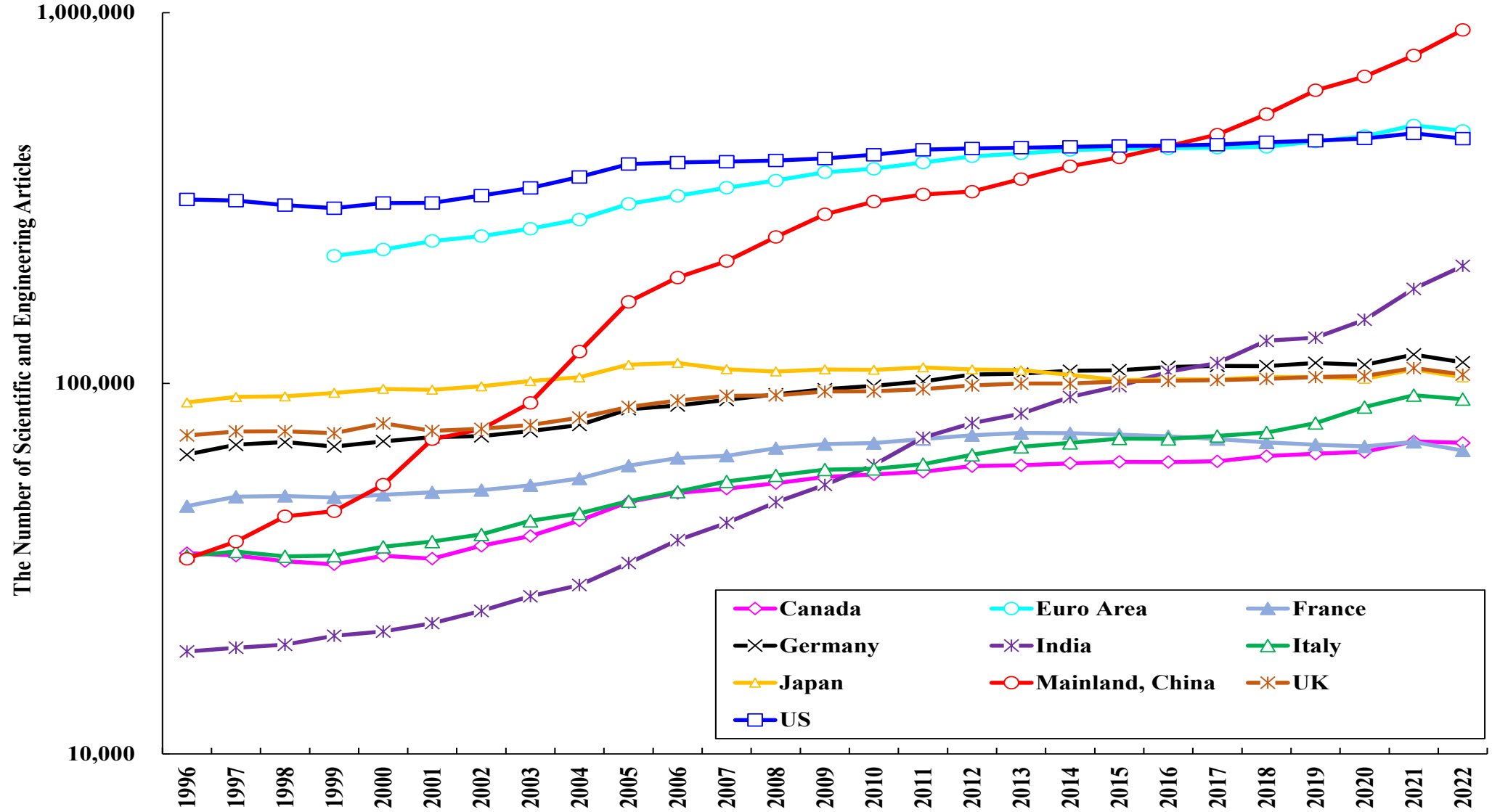
Patents Granted in the United States and R&D Capital Stocks, Selected Economies



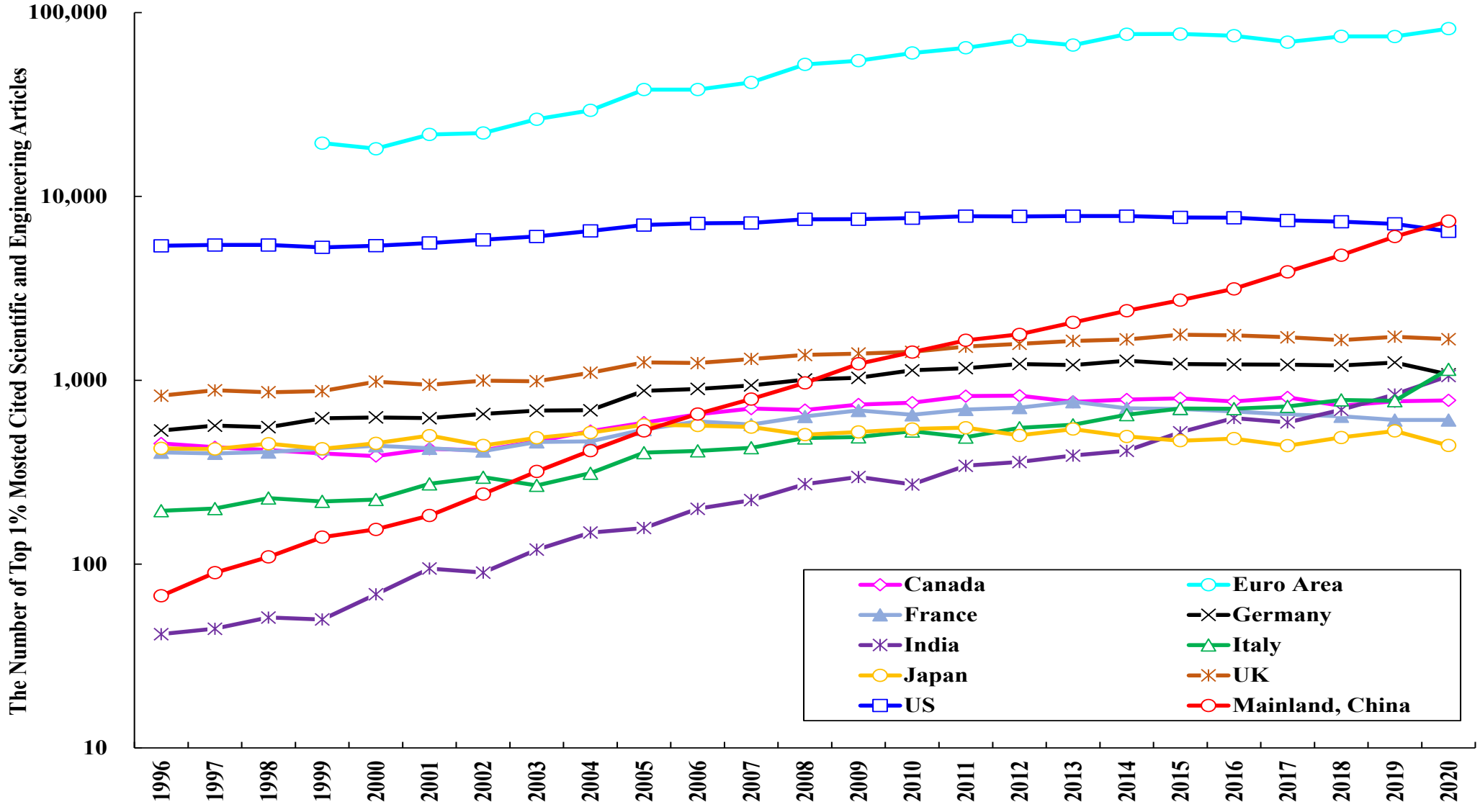
Science and Engineering Articles Published

- Since 2014, China has strengthened intellectual property right protection significantly by establishing special intellectual property courts with sole nationwide jurisdiction over such matters.
- One of the outputs of R&D is science and engineering scholarly publications. The total number of science and engineering articles published in international professional journals by Chinese authors has exceeded that by U.S. authors since 2017. Chinese authors now collectively publish the largest number of such articles in the world.
- Chinese authors also surpassed U.S. authors in the number of top 1% most cited scientific articles in 2020. China trailed the U.S. and the European Union countries for many years.

The Number of Science and Engineering Articles Published



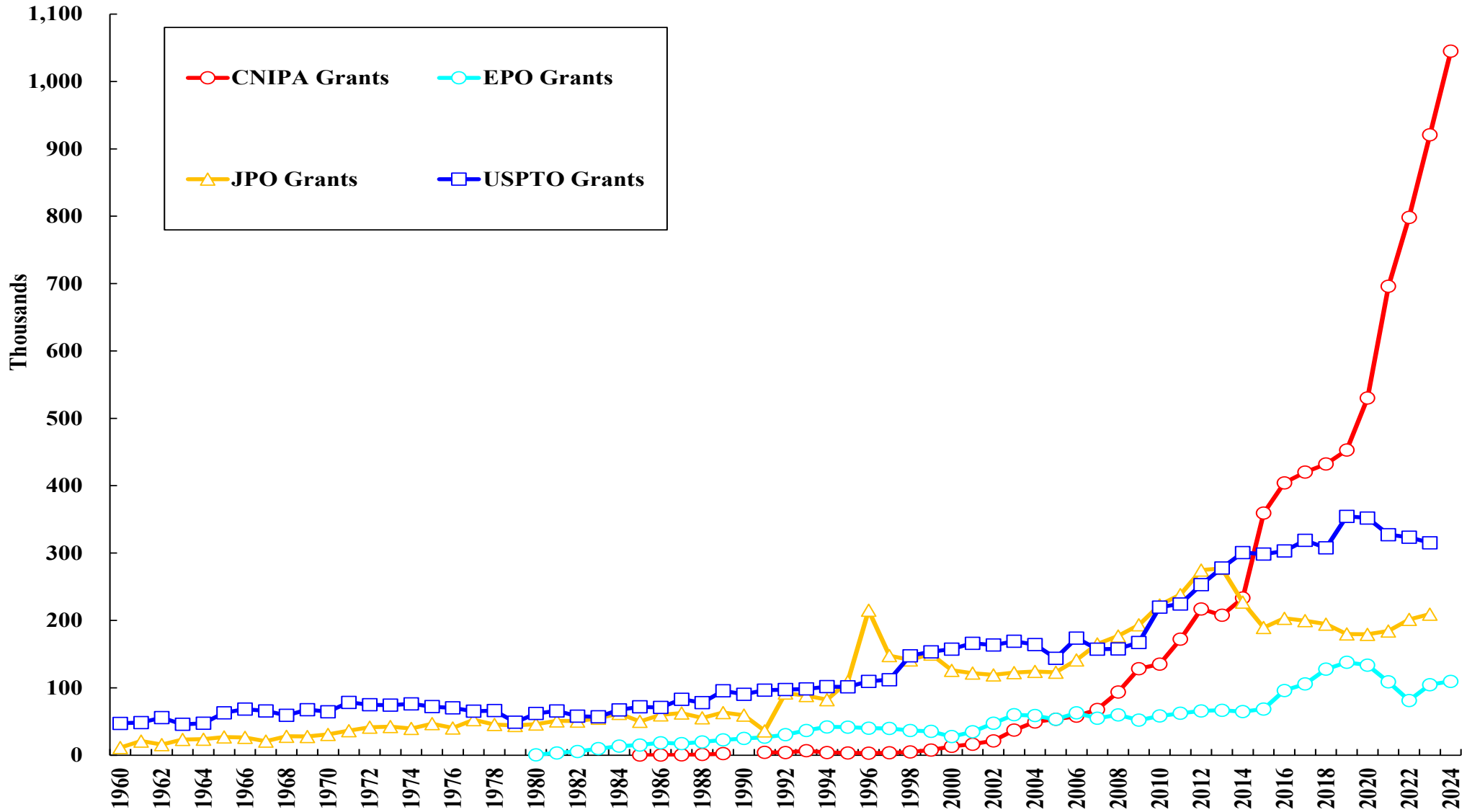
The Number of Top 1% Most Cited Articles



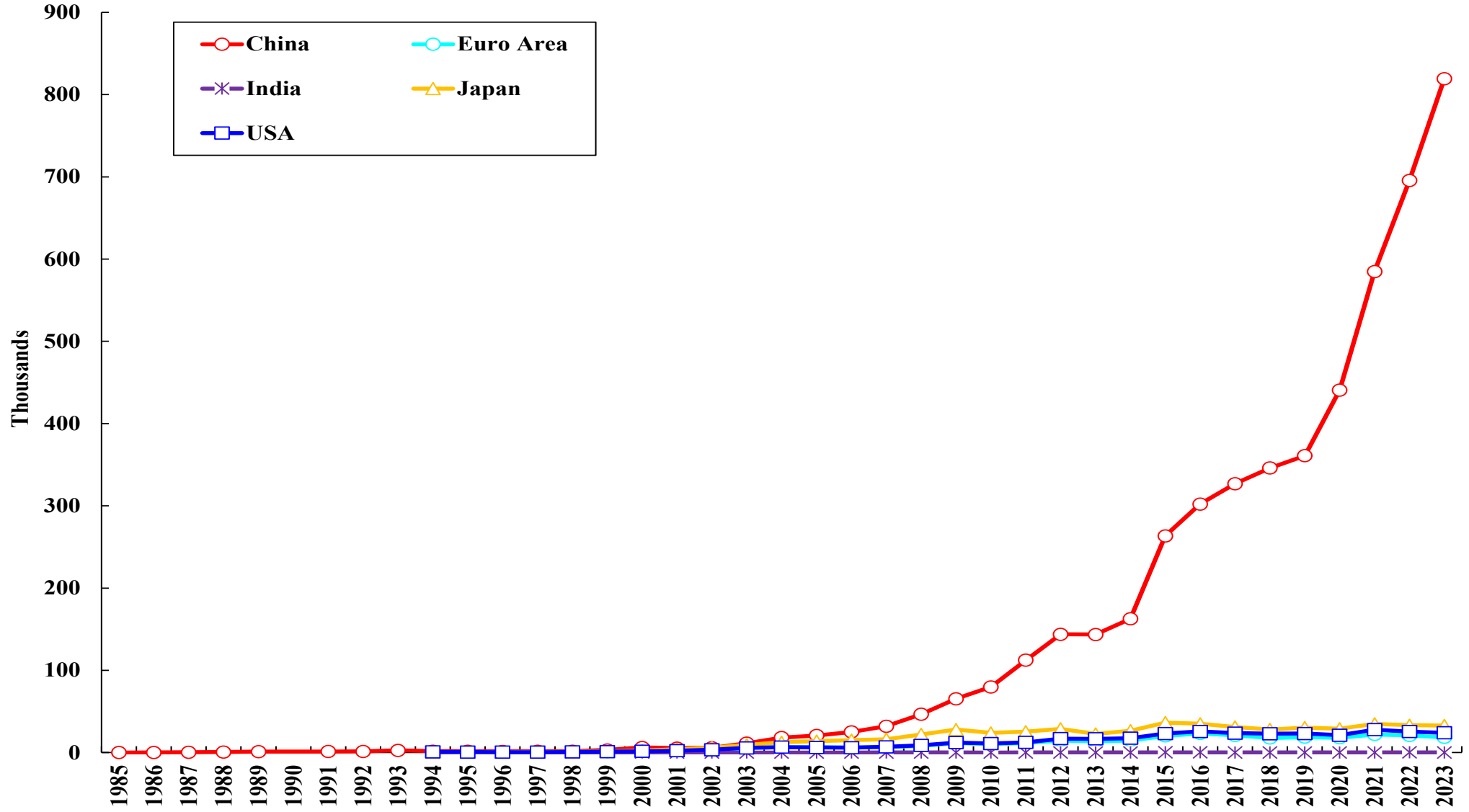
Patent Grants Awarded

- The total numbers of patents awarded to discoverers and inventors worldwide by respectively the United States Patent and Trademark Office (USPTO) (blue line), the European Patent Office (EPO) (turquoise line), and the China National Intellectual Property Administration (CNIPA) (red line), have all been increasing by leaps and bounds in recent years, and especially for CNIPA, but not so much for the Japan Patent Office (JPO) (yellow line).
- China is today the largest awarder of patent grants. Chinese inventors and discoverers have also received the highest number of patent grants worldwide (but mostly from CNIPA). Thus China has every incentive to protect intellectual property rights.
- However, in terms of patents granted by the United States Patent and Trademark Office (USPTO), China is still considerably behind the U.S., Japan and the European Union. China also lags behind these economies in terms of patents granted by EPO and JPO,

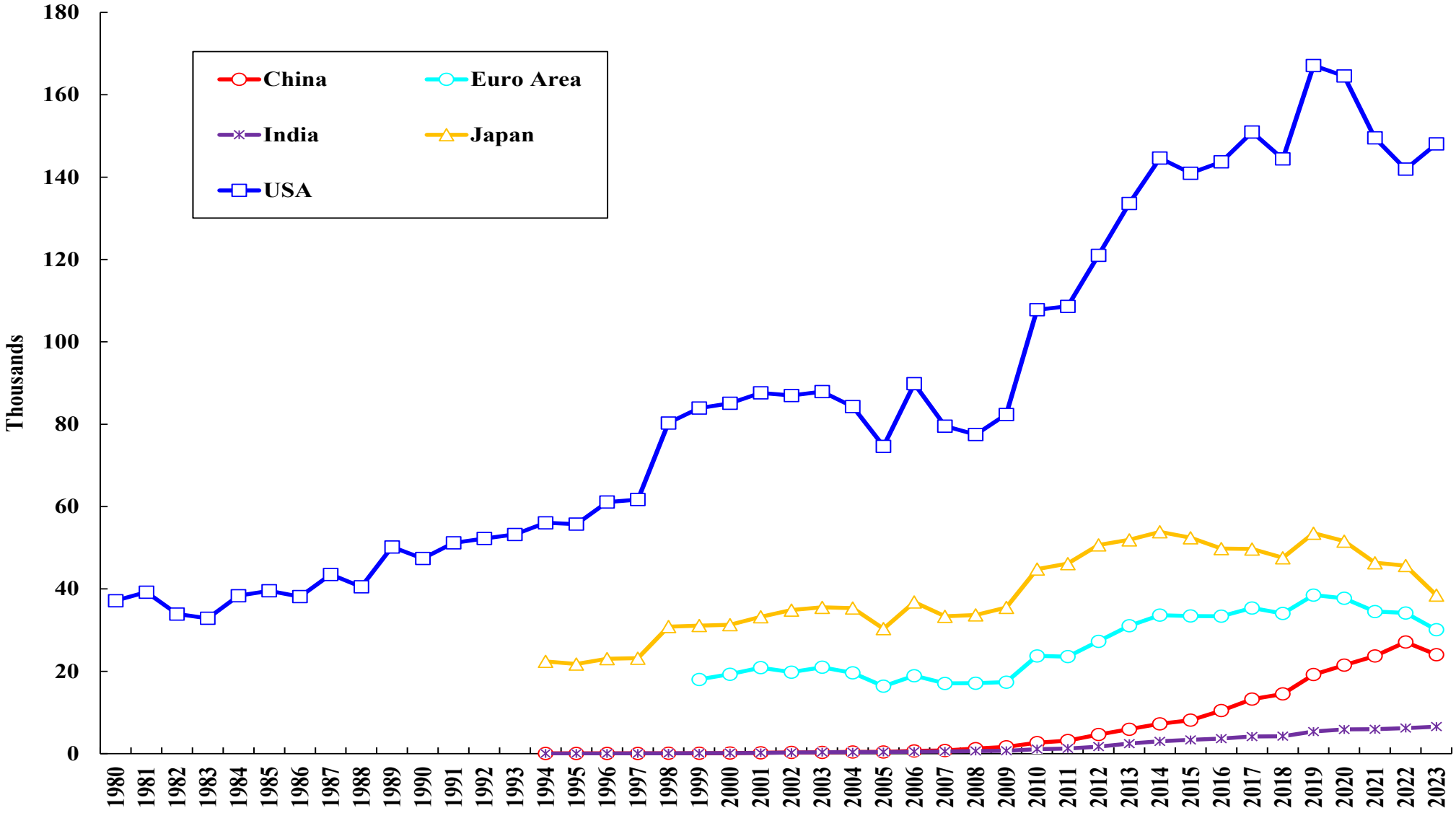
Total Number of Patent Grants Awarded by USPTO, EPO, CNIPA and Japan Patent Office



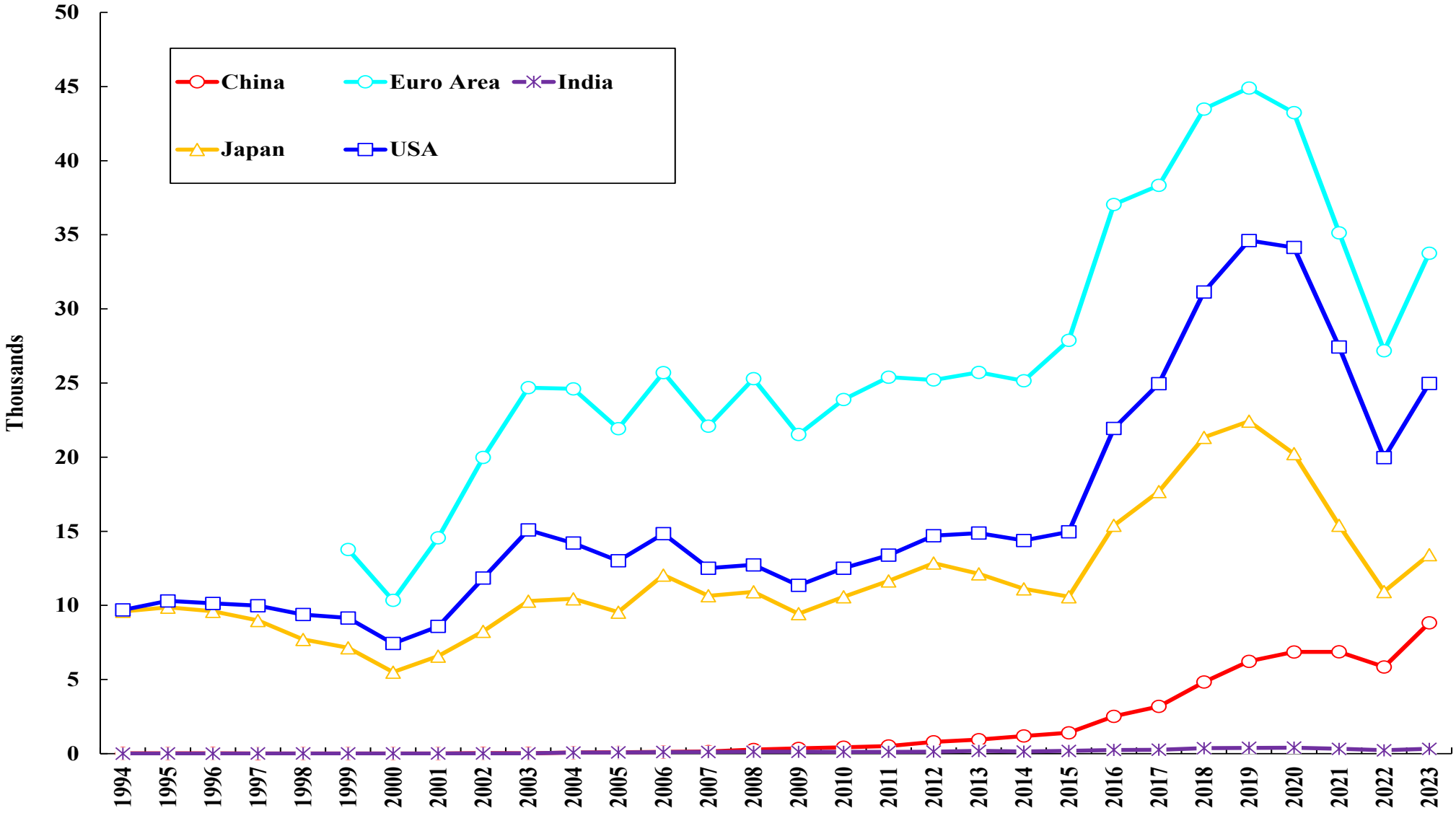
The Number of CNIPA Patents Received by China, the Euro Area, India, Japan and the U.S.



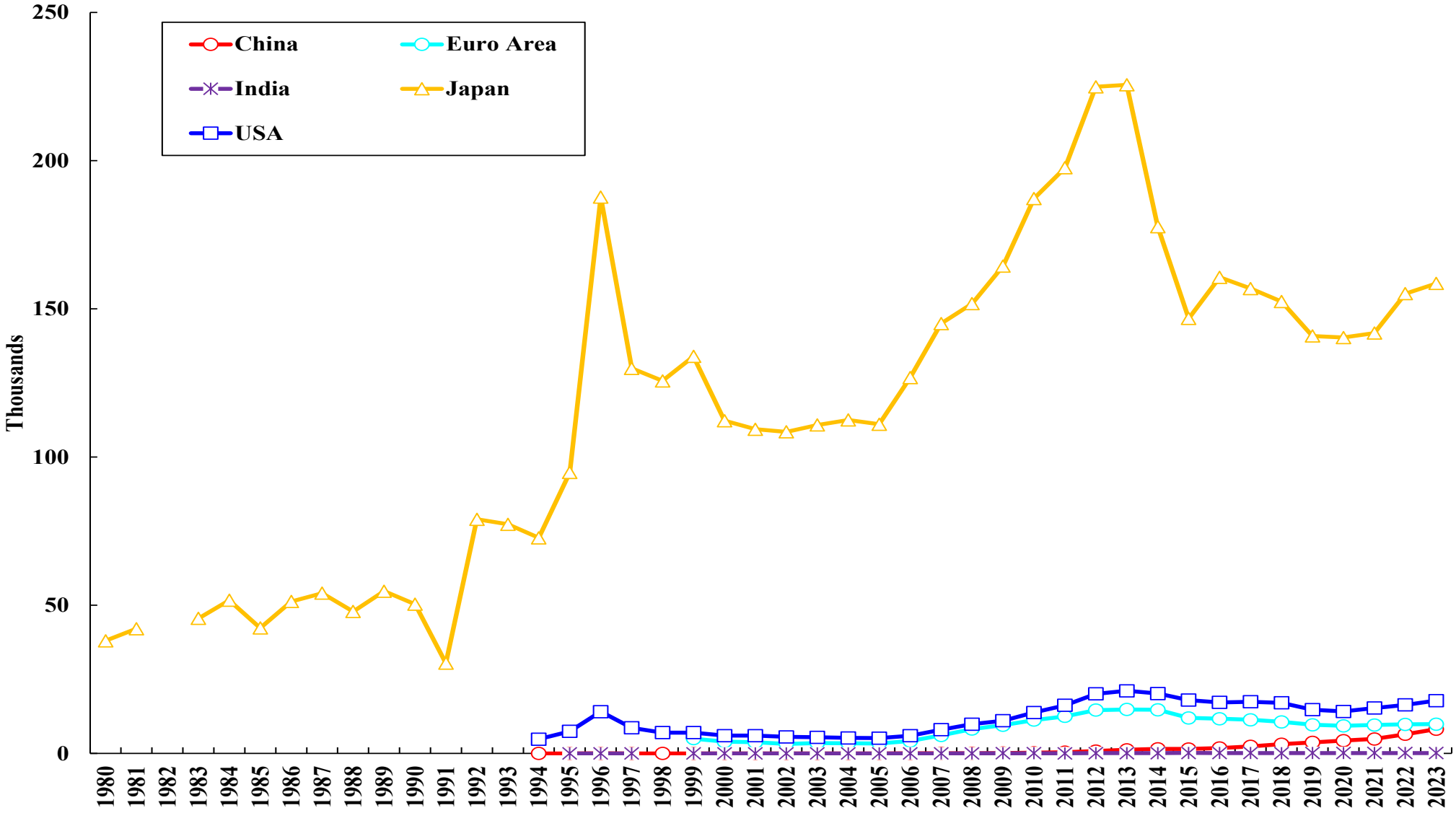
The Number of USPTO Patents Received by China, the Euro Area, India, Japan and the U.S.



The Number of EPO Patents Received by China, the Euro Area, India, Japan and the U.S.



The Number of Japanese Patents Received by China, the Euro Area, India, Japan and the U.S.



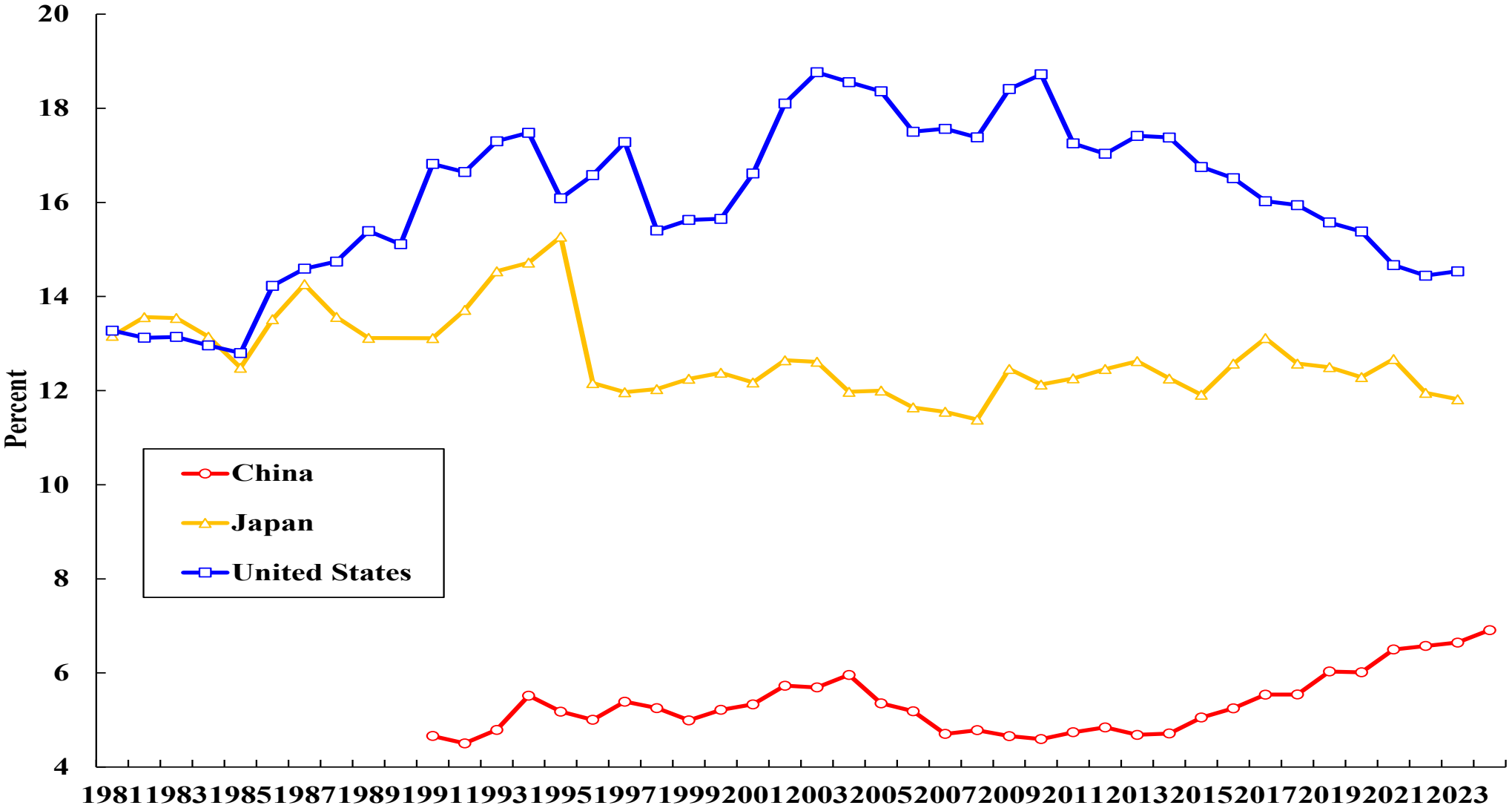
Self-Reliance in Science and Technology

- China today is not only subject to U.S. export controls on high-technology hardware and software, but also faces restrictions by other countries such as Japan and the Netherlands, which are also participating in U.S.-advocated sanctions against China, especially if related to advanced semiconductor manufacturing. This may slow down China's economic growth to some extent, but it will not stop it completely. China will make significant new investments in these areas in order to produce the necessary components locally. For example, Huawei has been reasonably successful in overcoming the effects of U.S. sanctions against it and its suppliers.
- Past experiences of innovation catch-up indicate that once a technology proves to be feasible, alternative paths to the same outcome will be discovered. It is just a matter of time. The emergence of Chinese start-ups in the fields of artificial intelligence, such as DeepSeek, and semiconductor design and manufacturing are examples.
- In addition, there are different ways of achieving the same effect. During the Cold War in the last Century, the former Soviet Union has more powerful rockets that can deliver any payload to the U.S. and so did not develop the micro-electronics. The U/S. had less powerful rockets and had to miniaturise its electronics to reduce the payload. The net result is that both countries could deliver warheads to each other.

The Importance of Basic Research

- However, breakthrough discoveries and inventions depend on sustained long-term investment in basic research. In 2023, China devoted less than 7% of its R&D expenditures on basic research, while the United States spent nearly 15%. China should significantly increase its investment in long-term basic research. The most important thing to recognise is that self-reliance and independent innovation should not be equated with autarky or total self-sufficiency.

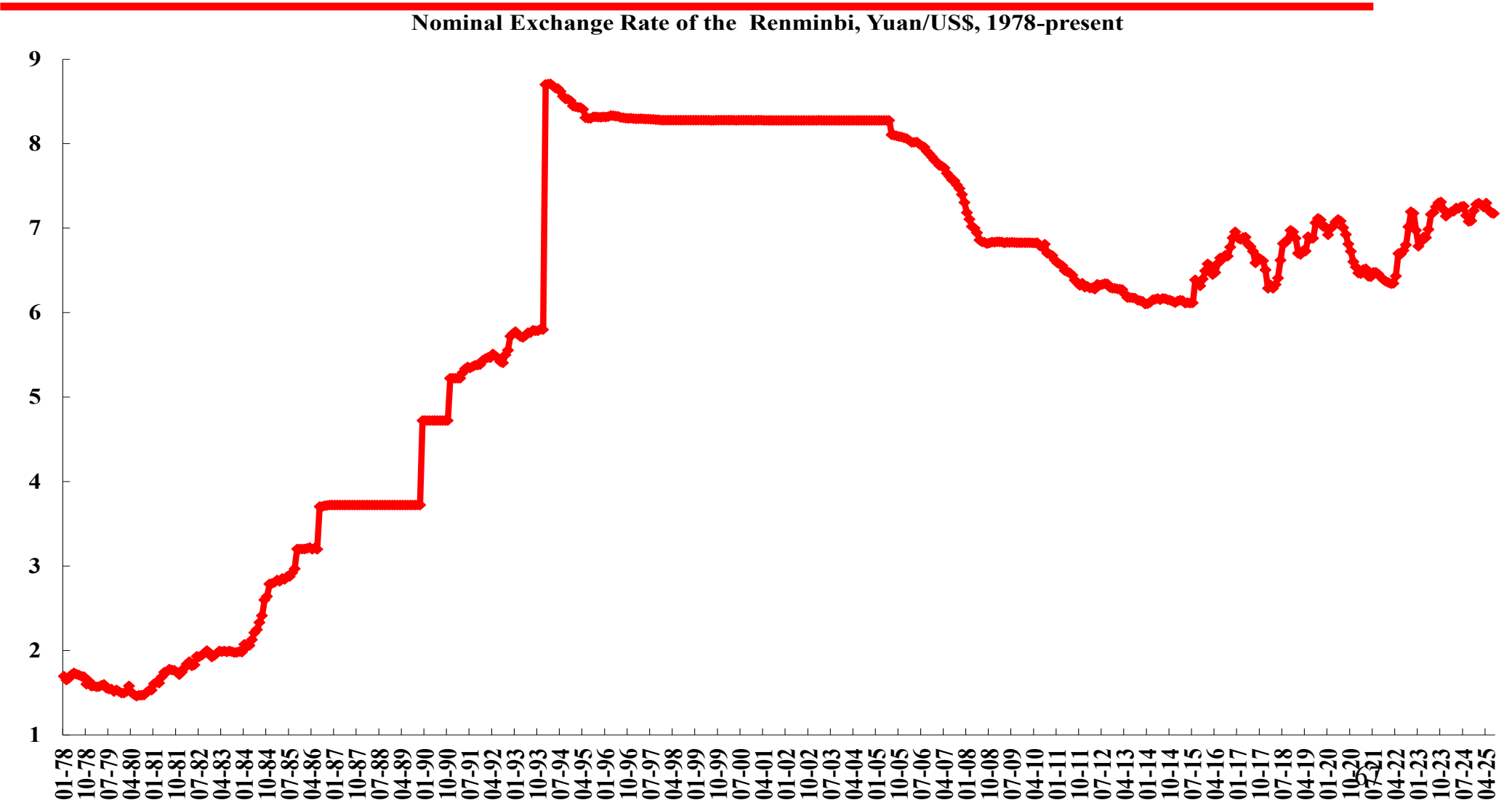
Basic Research Expenditure as a Percent of Gross Expenditure on R&D



The Use of the Renminbi in International Transactions

- One notable development is the gradual internationalisation of the renminbi. The renminbi has been a current-account convertible currency since 1994. Its value comes from the Renminbi's purchasing power over Chinese goods, services and assets. In fact, offshore renminbi is fully convertible in Hong Kong. China's capital controls only apply to certain capital flows into and out of Mainland China.
- If bilateral cross-border transactions between two economies can be settled in their own currencies rather than in a third-country currency like the U.S. Dollar, the transaction costs and the exchange rate risks are both reduced, because only one currency exchange is required and hence there is only one exchange rate risk. If the settlement is made in a third-country currency, two currency conversions are required, doubling the transaction costs, and exchange rate risks are also incurred by both the exporter and the importer. Thus, own-currency settlement benefits both the exporting and the importing economy.

The Nominal Exchange Rate of the Renminbi, Yuan/US$, 1978-present



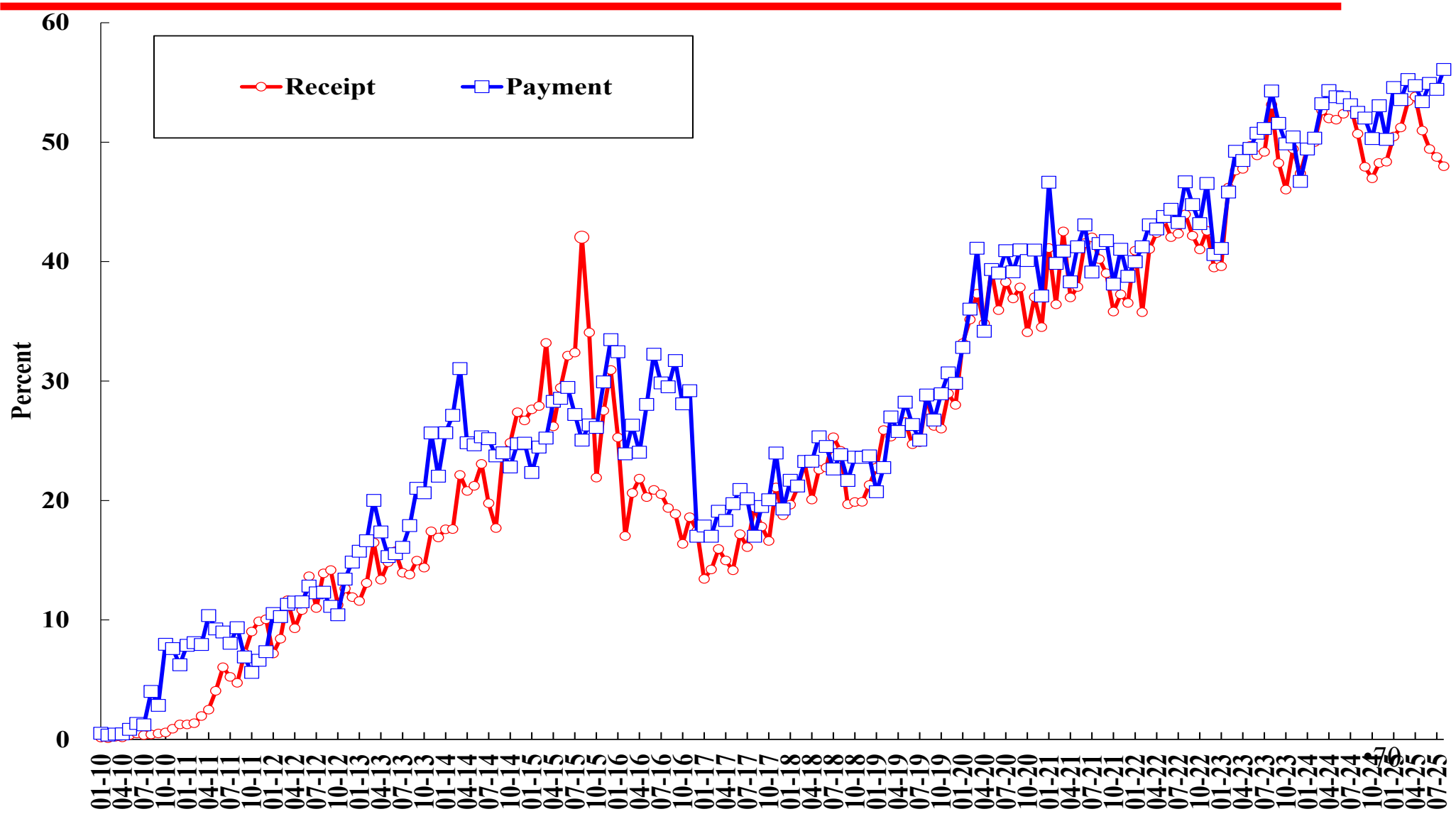
The Use of the Renminbi in International Transactions

- Since the early 1970s, the invoicing, clearing and settlement of bilateral trade between two countries has mostly been done in U.S. Dollar.
- In 2000, after the establishment of the Euro Area, the invoicing, clearing and settlement of bilateral trade between two countries in the Euro Area is done exclusively in Euro.
- Clearing and settlement of bilateral trade transactions in own currencies as opposed to a third-country currency like the U.S. Dollar reduce transaction costs and exchange rate risks to both the exporting and the importing countries. The practice is gaining wider international acceptance.
- One principal use of the foreign exchange reserves of am economy is to pay for imports. If imports can be paid for in an economy's own currency, the level of foreign exchange reserves that has to be maintained for transaction purposes can be significantly reduced.

The Use of the Renminbi in International Transactions

- Before 2010, almost all of Mainland China's foreign-related transactions, including international trade and inbound and outbound foreign direct and portfolio investment, were settled in U.S. Dollar.
- The share of renminbi settlement began to rise from zero in 2010 and reached a peak of approximately 40% in mid-2015. However, a sudden and unexpected devaluation of the renminbi coupled with a large decline in the Chinese stock market led to a retreat from renminbi settlement. It took about five years for the share of renminbi settlement to recover to the level of 40%. Since then, the share of renminbi settlement has continued to rise and currently stands at over 50% (see chart).
- The main impetus for the wider use of the renminbi in world settlement comes from the fact that international trade between China and many of its trading partner countries is increasingly settled in each other's own national currencies.

The Share of Renminbi Settlement in Mainland China's Foreign-Related Transactions



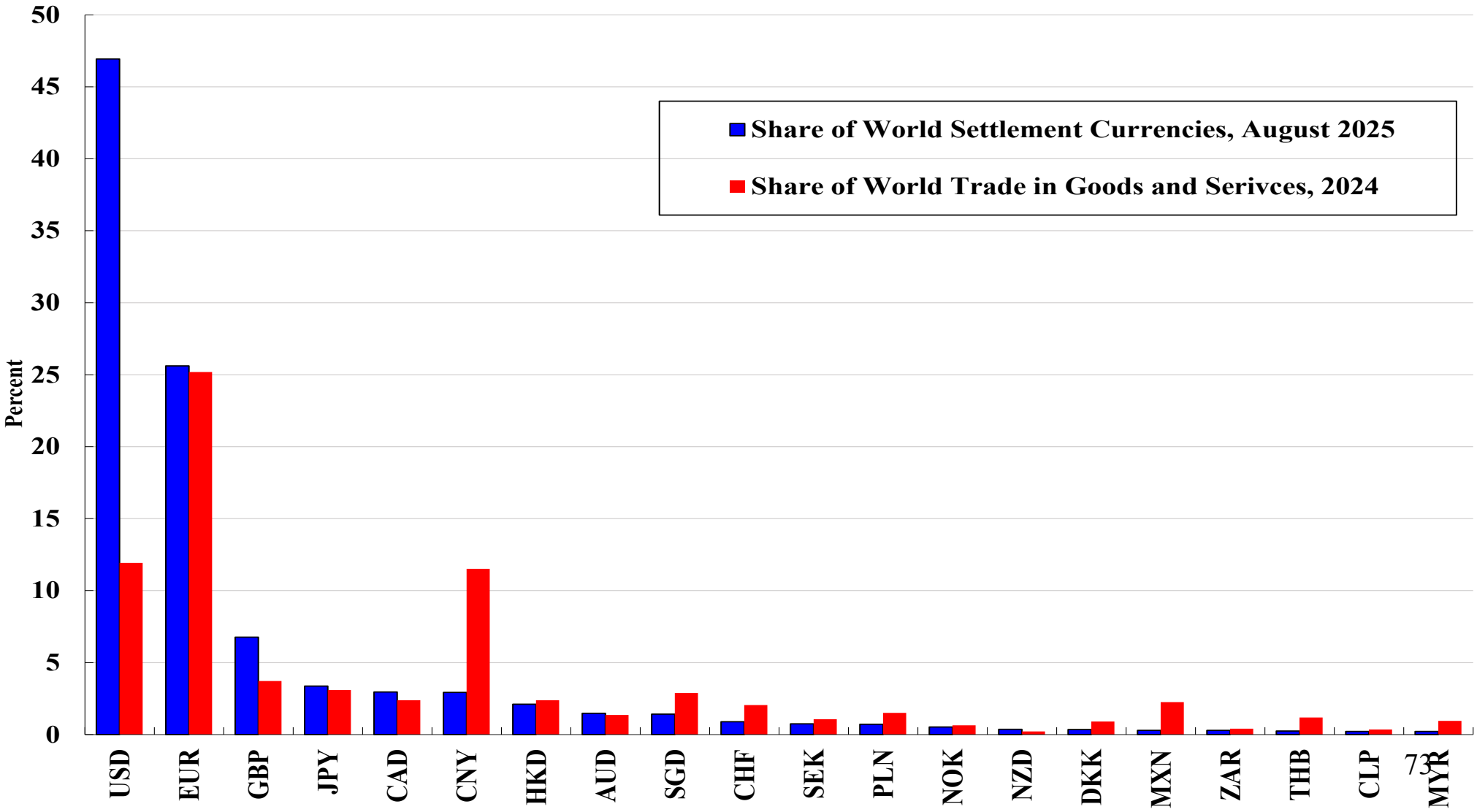
The Use of the Renminbi in International Transactions

- More and more countries have signed own-currency settlement agreements with China. For example, in trade with China, both Indonesia and Russia use their own respective national currencies, the rupee or the ruble, together with the Chinese yuan, to settle. More recently, countries such as Argentina, Brazil and Saudi Arabia have also agreed with China to settle their bilateral trade with China in their own respective national currencies and the Yuan.
- With more and more settlement done in own currencies, the need for the maintenance of a large foreign exchange reserves consisting of U.S. Dollar-denominated assets is reduced.
- The Society for Worldwide Interbank Financial Telecommunication (SWIFT) international payment system for the U.S. Dollar is increasingly weaponised under U.S. pressure, forcing many countries, such as Iran and Russia, to look for alternatives. The use of the United States dollar as an international medium of exchange or store of value by third countries is likely to decline gradually over time.
- An alternative system, the Cross-border Interbank Payment System (CIPS), has been developed by the People's Bank of China to provide clearing and settlement services for its financial institution participants in cross-border transactions in different currencies. As of December 2024, CIPS has 168 Direct Participants and 1461 Indirect Participants.

Share of World Settlement versus Share of World Trade

- In the following chart, we compare the share of world settlement of the currency of a country or region (blue column) in August 2025, with the share of world trade in goods and services of that country or region (red column) in 2024. The settlement data are taken from SWIFT. Thus, transactions that do not involve SWIFT, e.g., trade between China and Russia, will not be included.
- In 2024, the Euro Area accounted for the largest share of world trade in goods and services, 25.2%, followed by the U.S, with 11.9%, and Mainland China, with 11.5%. (We note that these shares are sensitive to changes in exchange rates.)
- In August 2025, the U.S. Dollar continued to account for the largest share of world settlement, at 46.94%, the Euro accounted for 25.61%, and the British Pound accounted for 6.76%. The renminbi share in world settlement had been increasing gradually, from 2.3% in March 2023, to 3.1% in July 2023, 4.1% in December 2023, 4.5% in January 2024, 3.9% in November 2024, and then 4.33% in February 2025. It then fell to 2.93% in August 2025 to become the sixth most frequently used settlement currency. The Japanese Yen was in fourth place, accounting for 3.37%, followed by Canadian Dollar, with 2.96% and RMB, with 2.93%. (These percentages are also sensitive to relative exchange rate changes and to the time of the year.)
- This recent fall in the use of the RMB as a settlement currency is probably due to the omission of settlements that do not involve the SWIFT system.
- We note that for the U.S. Dollar, the Euro, the British Pound, the Japanese Yen and the Canadian Dollar, their shares of settlement were all higher than the respective shares of these countries in world trade. The share of renminbi in world settlement is expected to continue to grow given its large share of world trade. But is not expected to catch up to that of the U.S. Dollar, which currently stands at almost 47%, any time soon.

Share of World Settlement versus 2024 Share of World Trade, August 2025



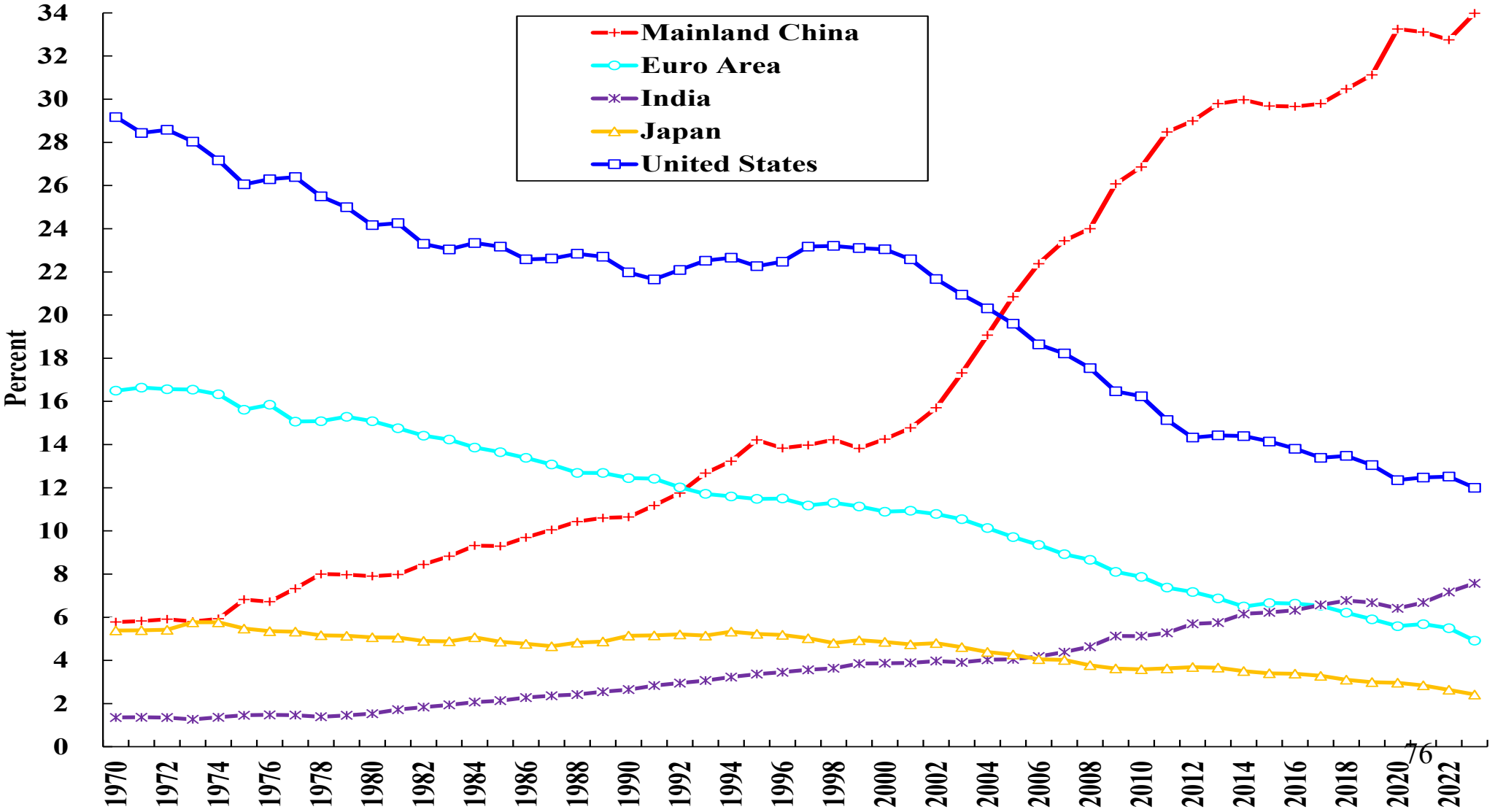
Share of World Settlement versus Share of World Trade

- In world settlement, the Japanese Yen's share was 3.4%, which was higher than Japan's share in world trade of 3.1%, while the renminbi share in world settlement was only 2.9% even though China's share in world trade was 11.5%.
- If the share of renminbi settlement could eventually reach China's share of world trade, it would become 11.5%, surpassing the share of the British Pound to become the third most widely used settlement currency. There is a great deal of room for the renminbi share of world settlement to continue to grow.
- However, replacing the U.S. Dollar with the renminbi as a medium of international exchange between other countries may not be in China's own best national interests. Instead, China should promote the settlement between bilateral trading-partner countries in their own respective national currencies, as they did under the Bretton Woods system before 1971.

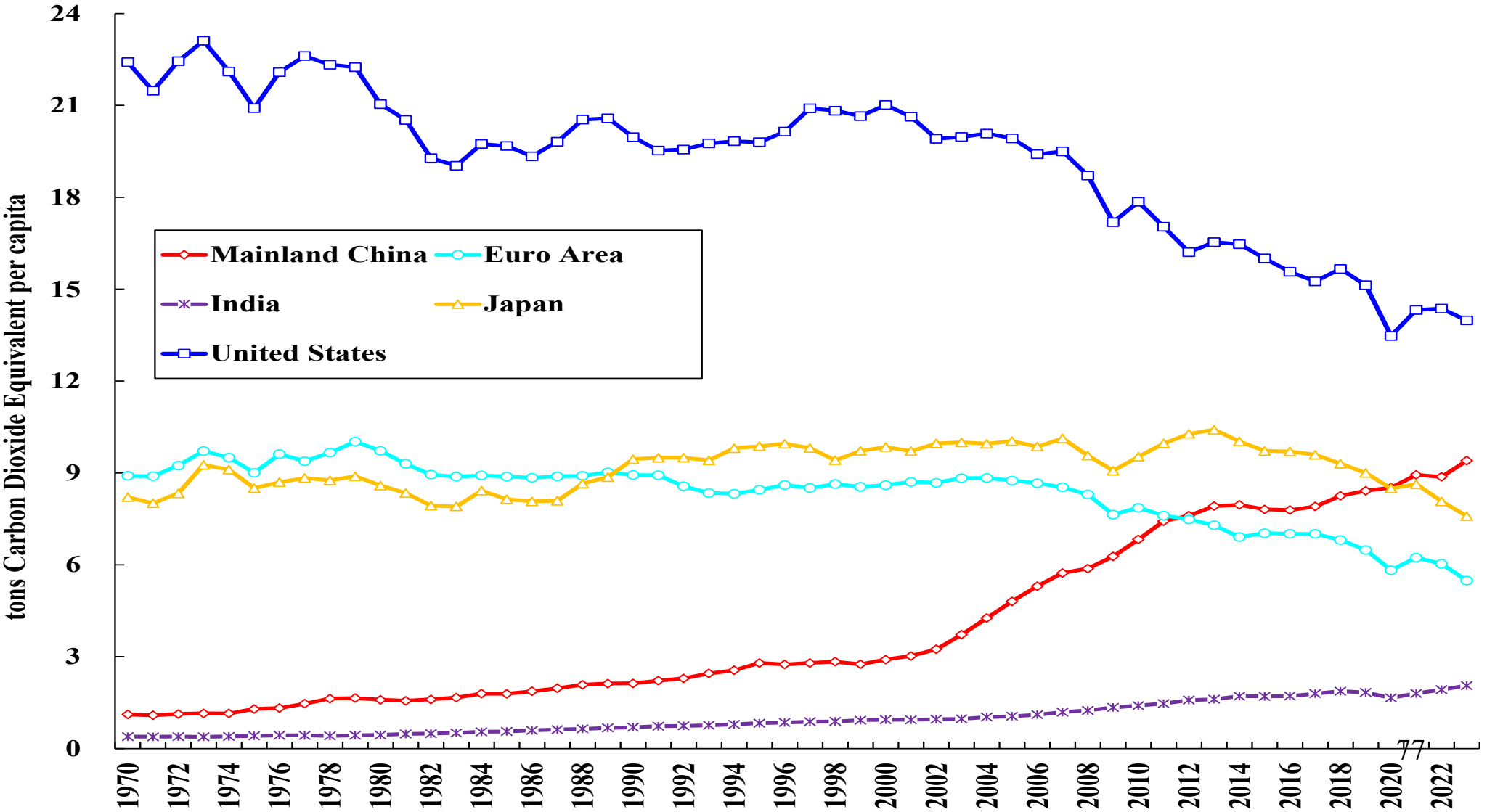
Mitigation of Global Climate Change: The Shares of World Carbon Dioxide Emissions

- Since 2005, China has been the largest carbon dioxide emitter in the World, overtaking the United States. They are followed by the Euro Area, India and Japan, in that order (see the following chart). In order to prevent further climate change, China has the responsibility of reducing its carbon emissions significantly. Chinese total emission has begun to stabilize. (Source: The World Development Indicators (WDI) Database.)
- The emissions of the developed economies, the United States, the Euro Area and Japan, have all been declining over time, in part because of the rising share of the service sector in their GDPs. The emissions of China and India, driven by their growing GDPs, have been rising.
- However, on a per capita basis, the U.S. still has the highest, albeit declining, carbon emission in the world, followed by China and Japan (see chart).
- On an efficiency basis, that is, carbon emissions per unit real GDP, India is the worst emitter, followed by China, which has made a great deal of progress. The developed economies of the U.S., the Euro Area and Japan have significantly lower emissions per unit real GDP because of the dominance of the service sector in their economies (see chart).

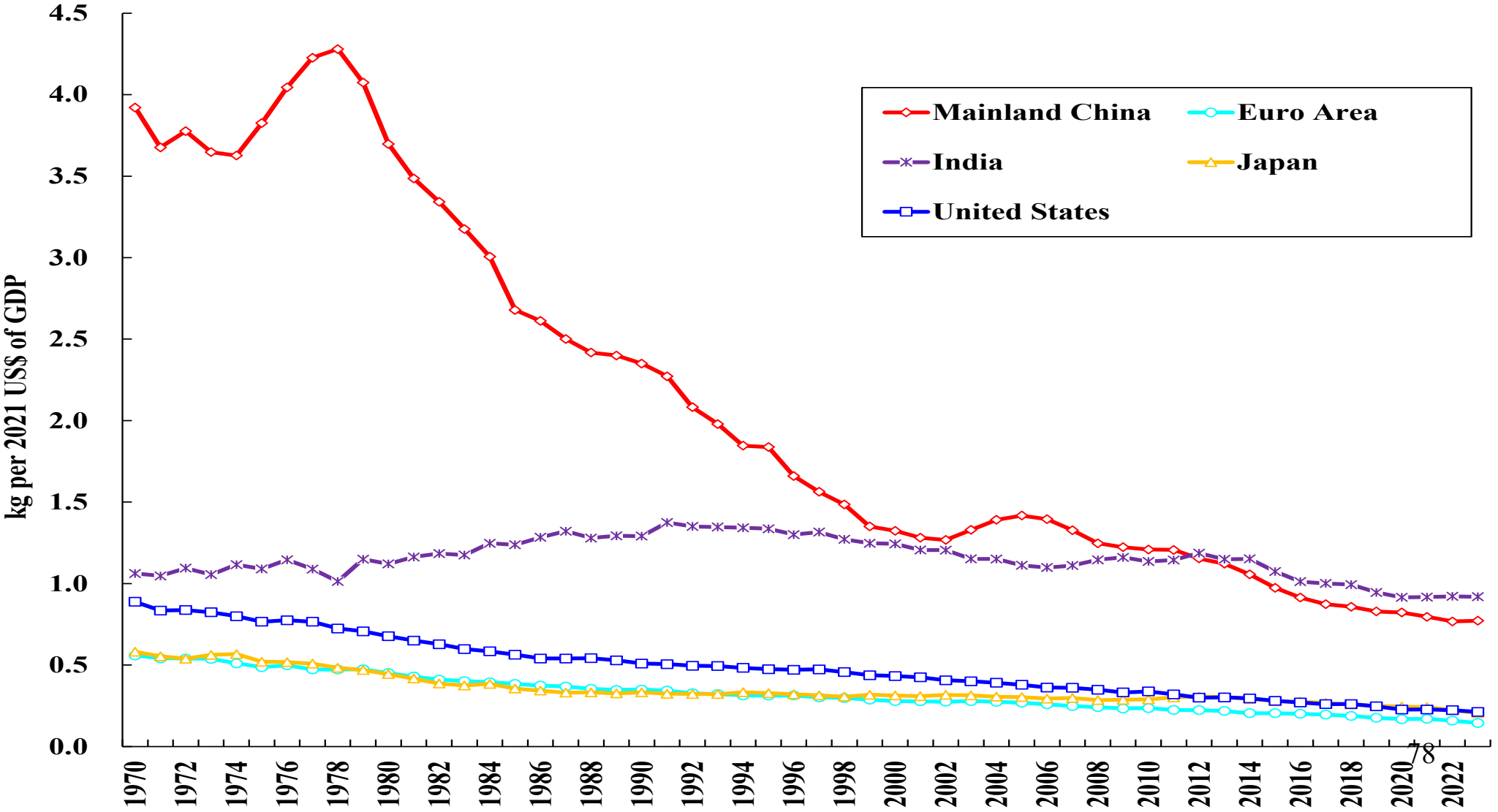
The Shares of World Carbon Dioxide Emissions, Selected Economies



Carbon Dioxide Emissions per Capita, metric tons, Selected Economies



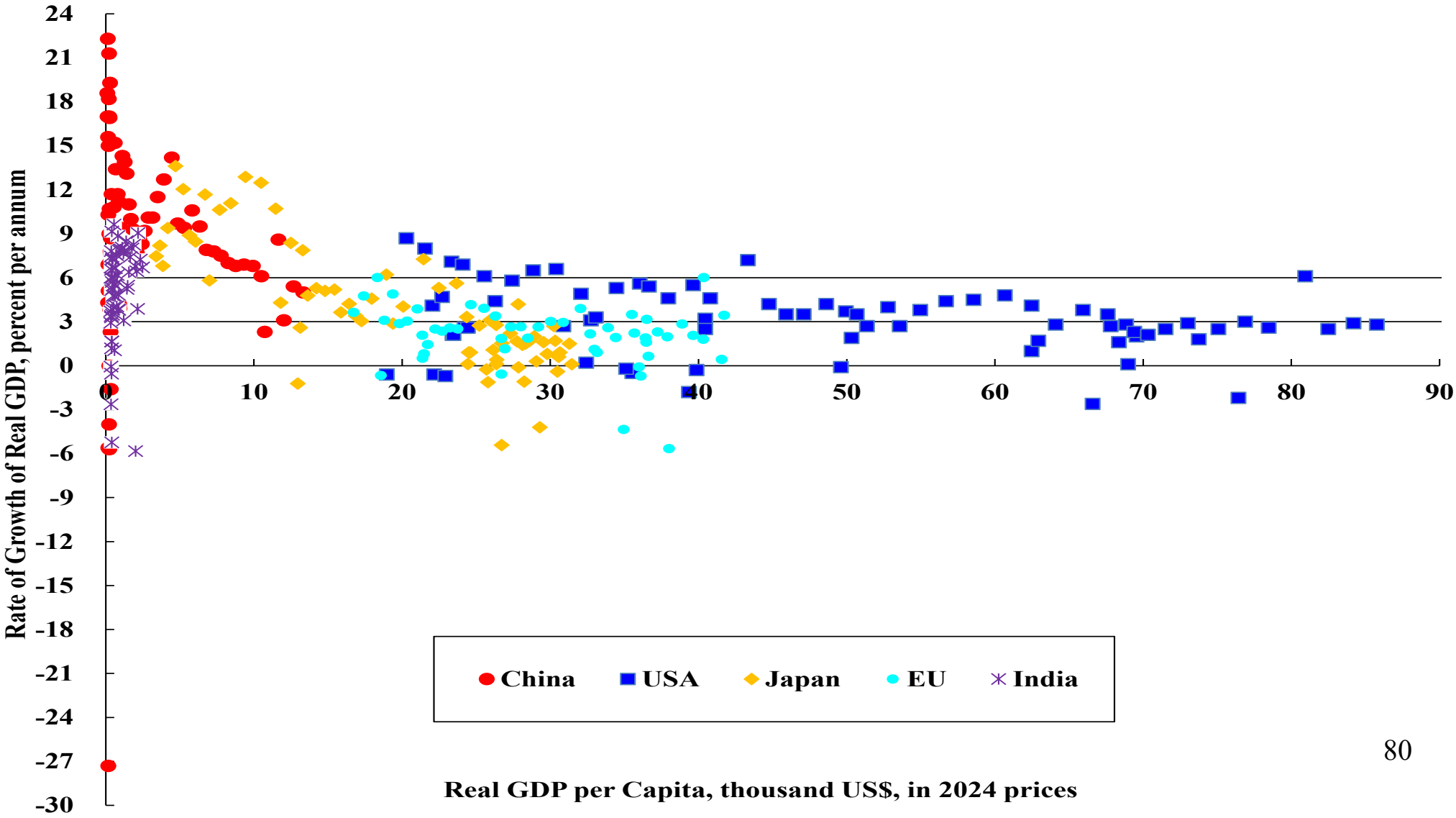
Carbon Dioxide Emissions per Unit Real GDP, Kg. per 2021 US$ GDP, Selected Economies



The Long-Term Prospects of the Chinese Economy

- We conclude with some long-term projections of the Chinese economy to 2050.
- It is an empirical regularity that as the real GDP per capita of an economy rises, the real rate of growth of the economy will fall. There are many different reasons why this is the case, but we do not have the time to discuss them here.
- This is demonstrated in the following chart in which the real rates of economic growth of China (red), the Euro Area (turquoise), India (purple), Japan (yellow) and the U.S. (blue) are plotted against their respective real GDPs per capita's (all measured in 2024 US$). As expected, there is a negative relationship between the rate of growth of real GDP and the level of real GDP per capita. (Data for the Euro Area as a whole only go back to 1970 and miss the earlier, truly high-growth years of the 1950s and 1960s.)

Rate of Growth of Real GDP vs Real GDP per Capita: Selected Economies



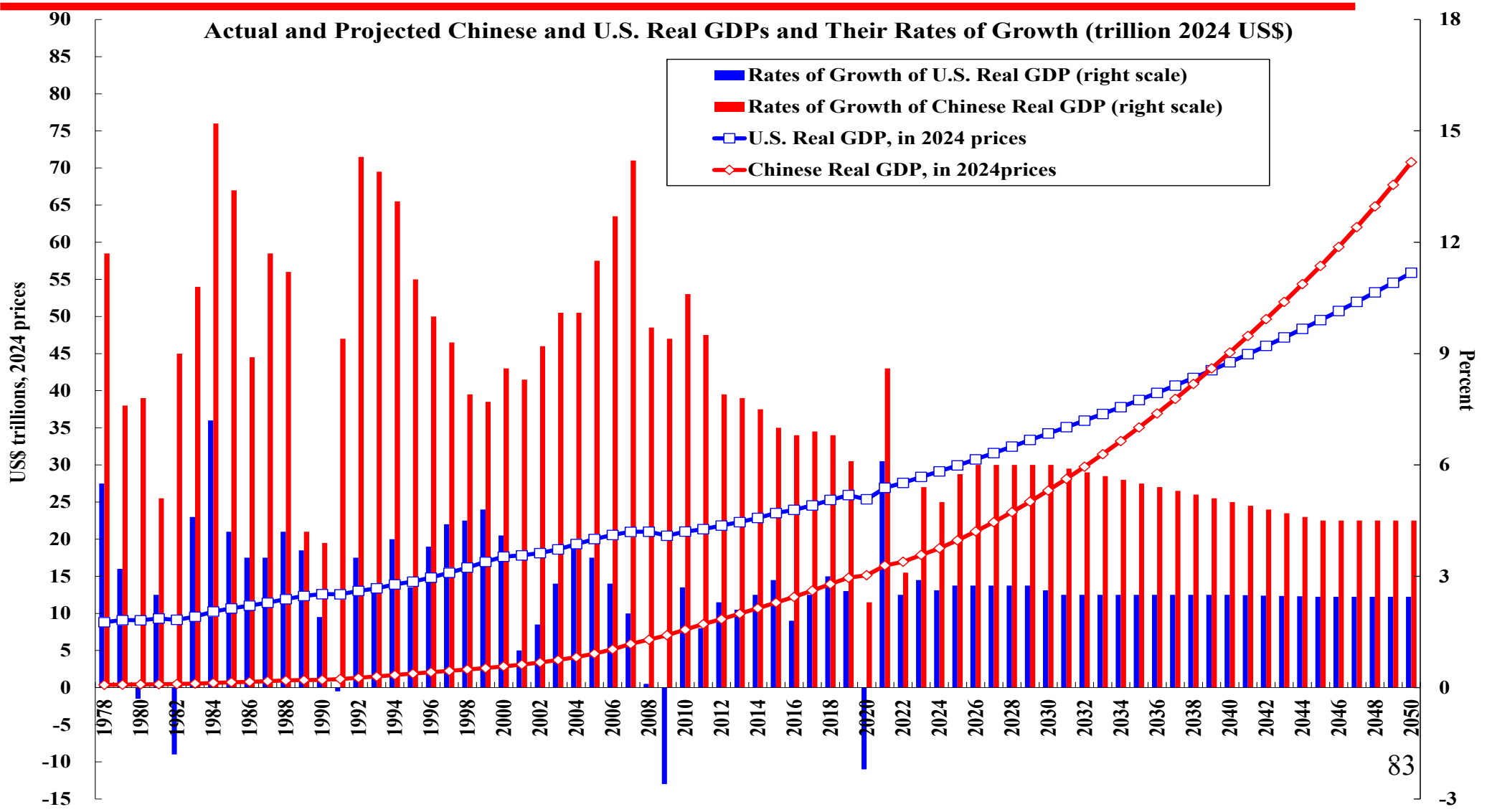
The Long-Term Prospects of the Chinese Economy

- However, we note that China, with a GDP per capita of US$13,327 in 2024, is currently still operating in the range that permitted average annual rates of growth much higher than 6% for the Euro Area, Japan and the U.S. in earlier periods. The real GDP per capita of the U.S. was US$85,785 in 2024, with its economy operating within a range below 3% average annual rate of growth. India, with a per capita real GDP of around US$2,500 in 2024, still operates in the high-growth range.
- Perhaps when Chinese real GDP per capita reaches US$30,000 in 2024 prices, projected to occur around 2040, the Chinese average annual real rate of economic growth will begin to decline to 5% or below.

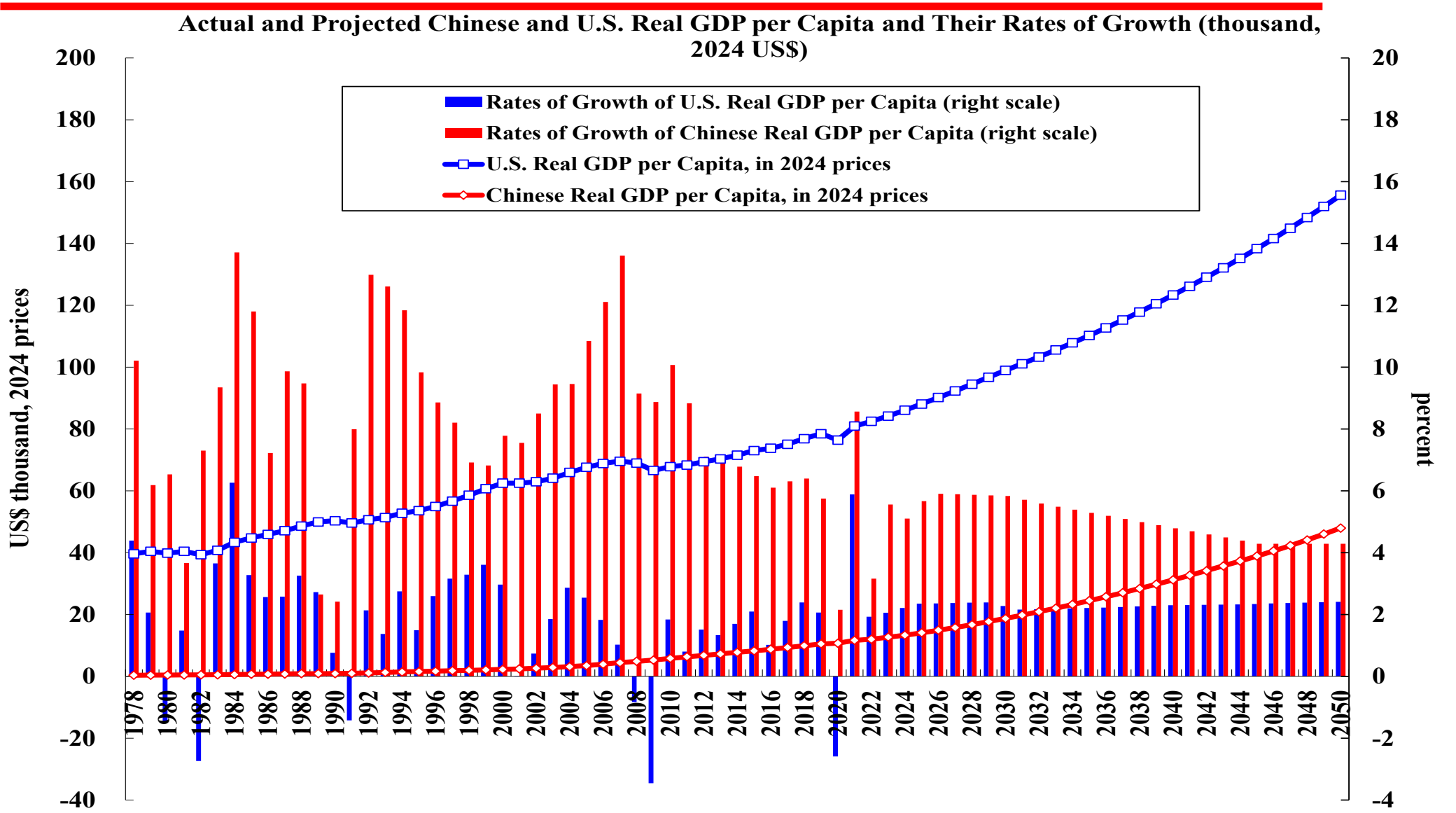
The Long-Term Prospects of the Chinese Economy

- Over the next decade, China's economy will continue to grow faster than North America and Europe, although growth will slow in all three. My personal forecast is that by **2039**, real GDP on the Chinese Mainland will reach US$43.0 trillion at 2024 prices, slightly higher than the US$42.8 trillion of the United States. Even so, the projected then Chinese real GDP per capita, US$**29,790**, would still be not quite one quarter of the real GDP per capita of the United States, US$120,154, at that time.
- In fact, in which year Chinese real GDP will catch up with the U.S. real GDP is very much related to the exchange rate of the renminbi against the US$. In March 2023, the exchange rate of the renminbi against the US$ was 6.32 Yuan per US$. At yearend 2024, the exchange rate of the renminbi against the US$ was 7.19 Yuan per US$, a difference of almost 14%. Thus, at 2024 prices and exchange rate, the Chinese GDP is projected to catch up with U.S. GDP in 2039, much later than some of my previous forecasts. But the renminbi is expected to appreciate with regard to the U.S. Dollar in the long run so that that date may arrive sooner..
- Of course, in Purchasing-Power-Parity (PPP) terms, Chinese GDP already reached parity with U.S. GDP in 2014, a finding supported by both the International Monetary Fund and the World Bank.
- China's natural resources per capita, such as arable land, clean water, mineral deposits, etc., are far less than that of the United States, so it is not easy for its real GDP per capita to surpass that of the United States. If it can be done at all, it will likely be at the very end of this century.

Actual and Projected Chinese and U.S. Real GDPs and Their Rates of Growth (2024 US$)



Actual and Projected Chinese and U.S. Real GDPs per Capita and Rates of Growth, ‘24US$

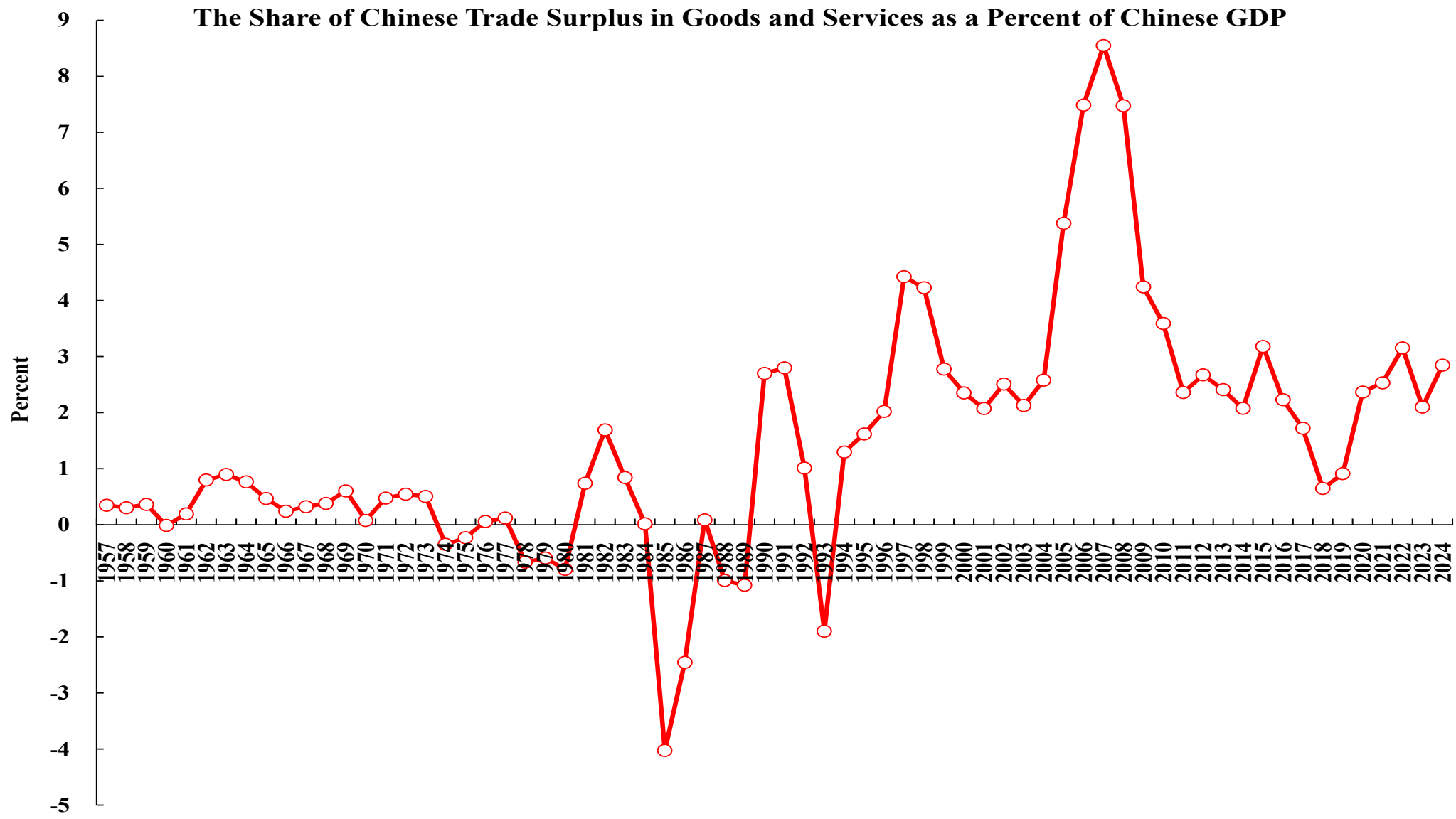


The Short-Term Impacts of President Donald Trump's Tariff War

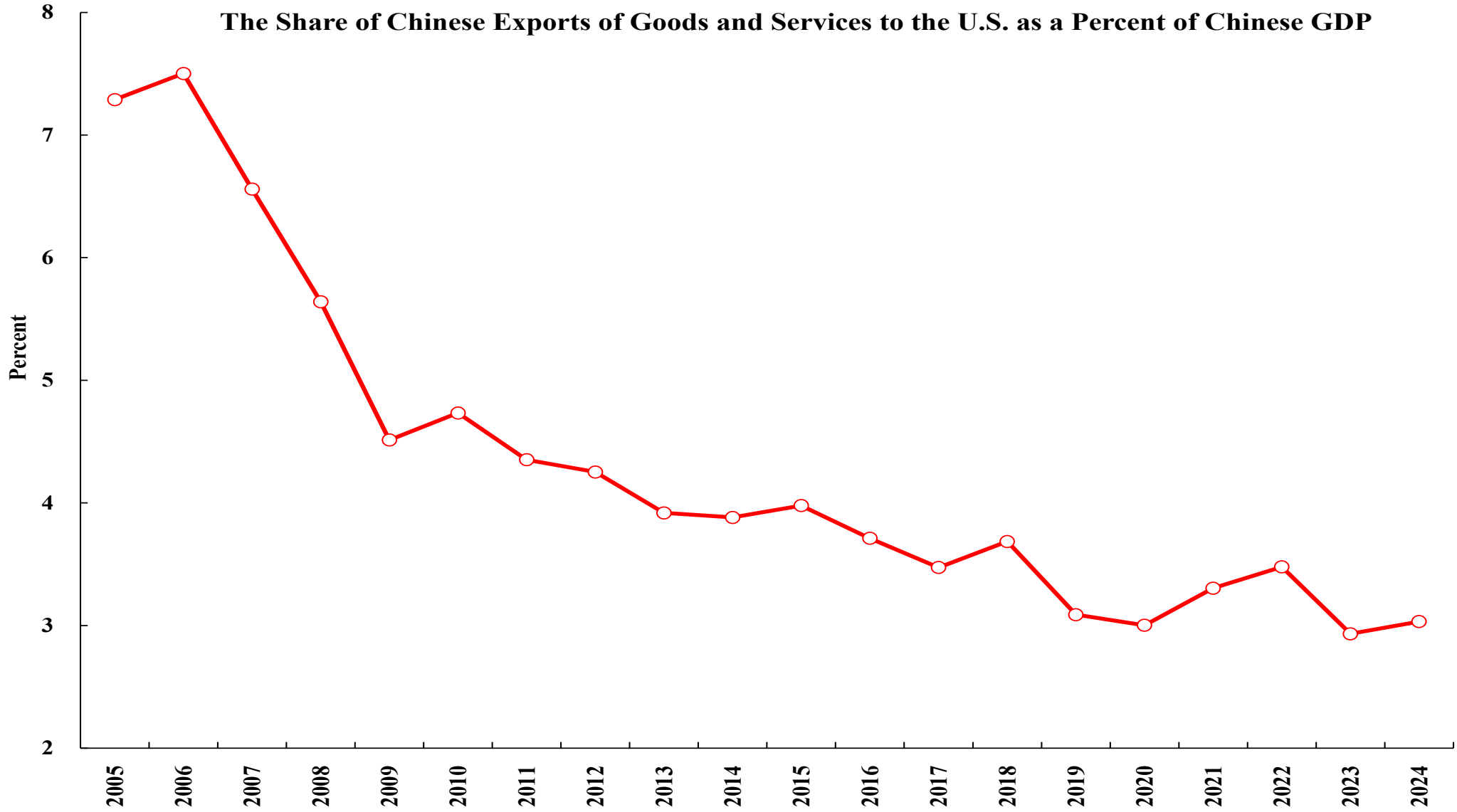
- It should be noted that the dependence of the Chinese economy on exports, and in particular, on exports to the U.S., has declined significantly over time.
- Chinese exports of goods and services as a percent of Chinese GDP was 20.0% in 2024, compared to a peak of 35.5% in 2006.
- Chinese net exports (exports minus imports, the trade surplus) of goods and services as a percent of Chinese GDP was 2.85% in 2024 compared to a peak of 8.55% in 2007.
- Chinese exports of goods and services to the U.S. as a percent of Chinese GDP was 3.0% in 2024 compared to a peak of 7.5% in 2006. (The share of Chinese exports to the U.S. in total Chinese exports is less than 15%.)
- Chinese net exports (exports minus imports) of goods and services to the U.S. as a percent of Chinese GDP was 1.73% in 2024 compared to a peak of 5% in 2006.
- We should also take into account that the 2024 export to U.S. numbers are probably above normal because of the acceleration of exports in anticipation of the U.S. tariffs. All of this suggests that the impacts of Trump tariffs on the Chinese economy will not be as large as may have been expected.

Chinese Exports of Goods and Services as a Percent of Chinese GDP

Chinese Net Exports of Goods and Services (Trade Surplus) as a Percent of Chinese GDP



Chinese Exports of Goods and Services to the U.S. as a Percent of Chinese GDP



Chinese Net Exports of Goods and Services to the U.S. as a Percent of Chinese GDP

The Short-Term Impacts of President Donald Trump's Tariff War

- At the current additional tariff rates set by both countries, 104(20+34+50)%, or 145% including the latest additions, on Chinese imports into the U.S. and 84(34+50)%, or 125% including the latest additions, on U.S. imports into China, there is no real possibility of trade because no enterprise in either country, whether exporting or importing, can absorb the cost of the tariffs. Third-country trans-shipment is unlikely to be successful as the "rules of origin" are expected to be applied stringently. It is therefore reasonable to suppose that the bilateral trade may effectively cease.
- However, negotiations between China and the U.S. are still continuing. The total cessation of trade between the two countries, while a real possibility under the "new normal", is probably unlikely to actually happen.
- The U.S. would like China to relax its controls on rare-earth exports to the U.S. and to resume buying its airplanes and agricultural products. China would like to see export controls on advanced manufacturing equipment and semiconductors relaxed, although China has recently developed misgivings on using imported semiconductors in critical applications for fear of the existence of unknown "back-doors". China is as much concerned with the use of U.S. semiconductors as the U.S. with the use of Huawei equipment.

The Value-Added Content of Chinese Exports of Goods to the U.S.

- The value-added content of Chinese exports of goods to the U.S. has been increasing over time. It rose from 0.564 in 2010 to 0.713 in 2023. Thus, other things being equal, a US$1 reduction in Chinese exports to the U.S. results in a reduction of approximately US$0.713 in Chinese GDP.
- In contrast, the value-added content of U.S. exports to China has always been quite high. For example, U.S. exports of agricultural goods to China such as beef, corn and soybeans, have almost 100% domestic value-added content.
- The maximum percentage damage of the tariff war to the Chinese real GDP resulting from a total economic de-coupling with the U.S. may therefore be approximately estimated as the net trade surplus times the value-added content, 1.73% times 0.713 = 1.2%, other things being equal.

Chinese Economic Growth under the Tariff War

- The Chinese economy will be able to survive with zero exports to and imports from the U.S. because of its relatively complete domestic supply chains. Its exporters will explore domestic and other markets than the U.S., and import-substituting innovation will be accelerated. In addition, China is likely to launch additional stimulative measures to increase domestic aggregate demand through public investment to counter the decline in exports and to more fully utilise the idled production capacity due to the tariff war.
- China's announced target growth rate for 2025 is around 5%. The weighted average of the target growth rates of the provinces/municipalities/autonomous regions announced earlier this year is 5.26%. For the first half of 2025, the real rate of growth achieved as 5.37%. This suggests that there is still some residual resilience in the economy. I would venture to predict a rate of growth of around 5% for the year, and higher if there is additional domestic stimulus in 2025.

Concluding Remarks

- The major economies have all recovered from the COVID-19 pandemic to varying degrees. However, the ongoing war in Ukraine has prevented the return to normalcy for the European Union, Russia and Ukraine. A ceasefire in Ukraine will be positive for them and for the World.
- As the China-U.S. strategic competition is likely to be the new normal in the next five to ten years, some degree of economic de-globalisation, de-coupling and de-risking is inevitable. In the short term, it will lower economic welfare in every economy. However, in the long term, when all is done and settled, the net result is likely to be multiple supply chains, greater resilience for the world economy, and perhaps even greater welfare for all.
- Of course, the world economy will do better if China, U.S. and all the other countries can cooperate to promote a global economic recovery, as they did in the aftermath of the Global Financial Crisis of 2008. Collectively, they can also make much more progress in the prevention of climate change.

Concluding Remarks

- My personal forecast is that the growth of Chinese real GDP in 2025 will be around 5%, given the many uncertainties. If achieved, it is a very respectable real rate of growth for a major economy. The truth is that the Chinese economy, like the U.S. economy, is no longer dependent on its exports or export surplus.
- For the decade beyond 2025, an average rate of growth between 5% and 6% for the Chinese economy is feasible.
- While the development of new-quality productivity is important for long-term growth, the key to maintaining an adequate rate of growth in the short and medium term is the expansion of aggregate demand, including public investment.
- However, despite the continuing geo-political tensions, China should maintain the policy of openness not only with respect to its economy, but also in the fields of education and science and technology, insofar as possible.

Concluding Remarks

- Without economic globalisation and Chinese accession to the World Trade Organization (WTO) in 2001, the Chinese economy would not be where it is today. Self-reliance and independent innovation should not be equated with autarky or total self-sufficiency. We should always keep in mind that China is implementing a dual-circulation rather than a mono-circulation development strategy.
- Past successes of Chinese scientific and technological breakthroughs have benefitted from the contributions of scientists and engineers who studied and/or worked overseas, such as Deng Jiaxian, Qian Sanqiang, Qian Xuesen, Sun Jiadong, Wang Ganchang, Zhou Guangzhao and Zhu Guangya. Without them, the efforts to develop the "two bombs and one satellite“ might have taken much longer.
- The China-U.S. strategic competition will eventually end with both countries accepting each other under the principles of peaceful coexistence, mutual respect, and win-win cooperation, and the relationship will be sustained by "economic interdependence“ as well as “mutually assured destruction”.
- **The Sky Is Not Falling! 天塌不下来！**