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INTERNATIONAL FINANCE FORUM (IFF)

# GLOBAL FINANCE AND DEVELOPMENT REPORT 2024

October 2024



國際金融論壇  
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The International Financial Forum (IFF) is a non-profit, non-governmental, independent international organization. It was founded in October 2003 by G20 countries and international organizations such as the United Nations, the World Bank, and the International Monetary Fund. It is a high-level permanent institution for dialogue and multilateral cooperation in the field of global finance and is known as the 'F20 (Finance 20).'

The IFF advocates an international and market-oriented operation mechanism to advance the supportive role of finance in sustainable development through its platforms of strategic dialog, cooperation, communication, practice and innovation, research and training program.

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Upholding the spirit of "Comprehensive and Sustainable Development - New Capital, New Value, New World", since the founding in 2003, the International Finance Forum (IFF) has been committed to building itself into a world-class academic think-tank and multilateral dialogue platform with strategic insight.

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The International Finance Forum (IFF) operates based on an open, transparent and fair mechanism to ensure its independence, objectivity, foresight and inclusiveness and to facilitate global financial co-operation and exchanges. Through in-depth research on global finance, IFF is committed to promoting sustainable development of China and the world economy. Our targets include:

1. International Financial Strategic Dialogue Platform
2. International Financial Cooperation & Exchange Platform
3. International Financial Innovation & Practice Platform
4. International Financial Strategic Think-Tank Platform
5. International Financial Talents Platform



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## 2024 IFF Global Finance and Development Report

The 2024 IFF Global Finance and Development Report consists of four chapters and is authored by the team from the University of International Business and Economics (UIBE). The report is led by Professor Zhao Zhongxiu, President of UIBE. Researcher Wang Ying is responsible for the overall organization and coordination of the report. Chapter One, Global Economy, is jointly written by Liu Bin, Bian Yang, Zheng Xiuxiu, Gong Bing, Bian Jiangze, Zhou Hang, and Huang Shaopeng, with Liu Bin responsible for coordination. Chapter Two, The Chinese Economy, is jointly written by Xu Zhaoyang, Peng Yulei, Bian Yang, and Zheng Xiuxiu, with Xu Zhaoyang responsible for coordination. Chapter Three, Green Finance, is jointly written by Li Yong, Liu Jinyu, and Gong Bing, with Li Yong responsible for coordination. Chapter Four, Technology Finance and New Quality Productivity in China, is jointly written by Jiang Ping, Bian Jiangze, and Yu Mei, with Jiang Ping responsible for coordination. Huang Shaopeng is responsible for language coordination of the report.

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# Executive Summary of the 2024 IFF Global Finance and Development Report

The 2024 IFF Global Finance and Development Report provides a comprehensive analysis of the critical factors shaping the global economy and emerging trends in key financial and developmental sectors. This summary integrates the findings across four pivotal chapters, covering the global economic landscape, China's economic outlook, the expanding role of green finance, and technology finance as a driver of productivity in China.

**Chapter 1** addresses key issues affecting the global economy, including sluggish recovery, persistent inflation, and escalating geopolitical tensions. With the growth forecast remaining at a lukewarm 3.2% in 2024, the chapter identifies pandemic aftershocks, rising protectionism, and inward-focused policies as major factors undermining economic momentum. Foreign direct investment (FDI) is decreasing, especially impacting emerging economies where FDI inflows have dropped by 7%. Global trade dynamics are shifting, with merchandise export growth turning negative in 2023, though value-added exports within global value chains have shown resilience. Heightened geopolitical risks in the Middle East and Ukraine are destabilizing energy markets and straining global capital flows, while rising debt-to-GDP ratios in advanced economies are constraining fiscal flexibility. The resurgence of industrial policies, particularly in strategic sectors like semiconductors, underscores a trend toward economic fragmentation. The chapter emphasizes the need for coordinated, adaptable policies to stabilize markets, support investment, and manage inflation in this complex environment.

**Chapter 2** examines the Chinese economy, which continues to grow at over 5% despite facing significant structural challenges. The chapter outlines China's shift from an investment-driven growth model, particularly in real estate, toward new economic drivers. China's GDP, estimated to be above RMB 126 trillion in 2023, is under pressure due to declining real estate investments and consumer spending. Nonetheless, China's high-tech manufacturing sector, with growth rates exceeding 7% in 2023, highlights the potential of innovation-driven industries. The chapter also addresses external trade shifts, noting a 6.3% increase in exports to Belt and Road Initiative countries in 2024. China's economic strategy emphasizes boosting domestic demand, upgrading industries, and fostering technological innovation while managing risks associated with real estate and overcapacity, which are critical steps for ensuring long-term stability amid a complex global landscape.

**Chapter 3** explores the expansion of green finance as a cornerstone of sustainable development, with green bonds, green loans, and carbon markets playing essential roles in tackling climate challenges. In 2023, global green bond issuance totaled USD 587.7 billion, led by China, Germany, and the United States. Green loans saw an 80% increase, reaching USD 206.8 billion, primarily in North America, funding projects in clean energy, low-carbon transportation, and pollution control. Carbon markets are growing as effective emissions regulation tools, supported by systems like the EU Emissions Trading System and China's expanding carbon market. China has been at the forefront of

green finance expansion, exemplified by the 2024 Green and Low-Carbon Transformation Industry Guideline. However, the absence of standardized global taxonomy frameworks continues to impede cross-border investments. The chapter advocates greater transparency, stronger regulatory frameworks, and public-private partnerships to advance green finance, calling for global collaboration to establish unified standards that streamline investments and reduce legal risks.

**Chapter 4** delves into the role of technology finance in China, identifying critical gaps in supporting innovation and pathways for improvement. While technology finance is crucial in fostering priority industries and strengthening innovation capacity, substantial challenges remain, particularly in advancing high-tech startups and basic research. High-tech enterprises continue to face significant financing barriers, with limited direct financing channels and insufficient investment in basic research. Currently, R&D spending accounts for 2.54% of GDP, with the majority directed toward experimental development, restricting foundational progress and impeding breakthroughs in technological bottlenecks. The chapter emphasizes that enhancing technology finance's effectiveness requires optimizing funding structures, including expanding government-guided funds, establishing venture capital and seed funds for "hard tech" fields, and securing long-term, low-cost capital to support sustained innovation. Increasing investment in basic research is also essential to enhance firms' ability to integrate advanced technologies and strengthen core innovation capabilities. To foster a collaborative innovation ecosystem, the chapter calls for deeper public-private partnerships, diversification of financial products, and more sophisticated risk assessment models, aligning financial resources with China's national innovation agenda.

Collectively, these chapters underscore the interconnected nature of economic growth, technological advancement, and sustainable development in today's global economy. The report calls on policymakers, investors, and industry leaders to pursue coordinated strategies that balance economic resilience, environmental goals, and technological progress—paving the way for a stable, innovative, and sustainable global future.



ZHAO Zhongxiu

Co-chairman of IFF Academic Committee

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# Chapter 1 Global Economy

Global economic growth is stable but facing increasing uncertainties. Global investment sentiment remains cautious, financial market volatility is increasing, geopolitical tensions are threatening trade system, and industrial policies are shifting toward more inward-oriented, posing new challenges to the global economic recovery. In light of these developments, this chapter examines the recent global economic developments and presents a forecast of the global economy.

## 1.1 Global Economic Review and Outlook

### 1.1.1 Economic Growth

The momentum of the global economic recovery has slowed. According to the International Monetary Fund (IMF), global growth is projected at 3.2% in 2024, similar to that of 2023. As shown in Fig. 1-1, the global economy was significantly affected by the impact of the COVID-19 pandemic, with growth declining to -2.9% in 2020. The global economy recovered in 2021, and since then the growth rate has been relatively stable but shows a slowing trend year on year. This is due to a combination of factors, including geopolitical tensions, rising trade protectionism, high global debt levels and monetary policy adjustments.

### 1.1.2 Global inflation

Since 2009, the global economy has experienced a transition from the recovery and slowdown in economic growth after the financial crisis, to a new economic cycle, with multiple rounds of inflation fluctuations in major economies. In 2022, global supply chain tensions, geopolitical conflicts, and production disruptions caused by the pandemic collectively pushed up energy and commodity prices, leading to a general increase in global inflation. Since 2023, major economies have actively adjusted their fiscal and monetary policies, and inflationary pressures were alleviated consequently. According to data from the European Statistical Office, the annual inflation rate in the EU was 2.1% in September 2024, lower than the 2.4% in August. The same period last year was 4.9%. On September 18, 2024, the U.S. Federal Reserve announced a cut of 50 basis points in the target range of the federal funds rate, bringing the policy rate down to 4.75% -5.00%. This is the first interest rate cut by the Federal Reserve since March 2020, marking a shift from a tightening to an easing monetary policy cycle.

### 1.1.3 Global Investment

Global foreign direct investment (FDI) experienced a decline of 2% in 2023 according to the World Investment Report released by the United Nations Conference on Trade and Development (UNCTAD). FDI flows to emerging markets, representing 65% of global FDI flows, decreased by 7% year on year. Specifically, FDI inflows to emerging markets, particularly in Asia and Africa declined by 8% and 3%, respectively. FDI flows to advanced economies, excluding conduit FDI flows (those funneled through multiple jurisdictions), witnessed a more pronounced decline of 15%. The U.S. remained the largest FDI recipient, followed by China and Singapore in 2023.

#### (1) Overview

Announcements of greenfield projects, which are new business ventures undertaken in a foreign country, increased in both value and number in 2023, driven primarily by a significant expansion of manufacturing projects in emerging markets. This increase can be attributed to the pressing need for supply chain diversification, which significantly influenced the growth of greenfield project announcements in key sectors such as automotive, metals, petroleum, and chemicals.

The value of these projects increased by 20% in emerging markets, compared to an 8% decrease in advanced economies.

The value of cross-border mergers and acquisitions (M&A) fell sharply by 46%, particularly in the services sector. This decrease can be attributed to a combination of factors including challenging financial conditions and financial market volatility. Antitrust authorities and foreign investment regulators also played a role in influencing potential transactions in the United States, the largest M&A market.

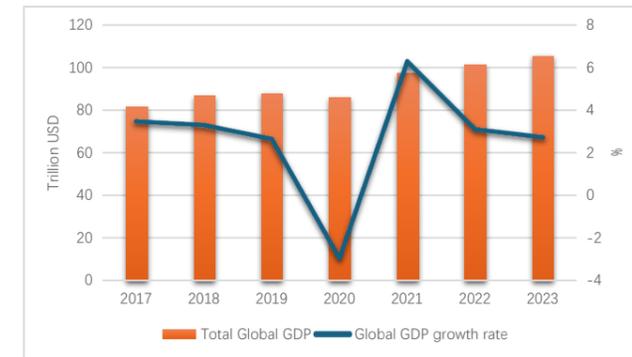
The value of international project finance deals<sup>1</sup> declined by 26% in 2023. Deals in the top three industries, renewable energy, industrial real estate and power, declined by 12%, 45%, and 41%, respectively. Both the number and the value of public-private partnership (PPP) announcements fell in 2023. The value of international projects in emerging markets declined by 31%, exacerbating the financing gap in investment needed to achieve the Sustainable Development Goals in these countries.

#### (2) International Investment Policies

In 2023, the total number of new investment policy measures was in line with the five-year average, despite a decrease of 25% from 2022. Significant differences remain between developing and advanced economies. 86% of the measures adopted by emerging economies were favorable to investors, and aimed at promoting and facilitating investment. Conversely, measures less favorable to investors and adopted by advanced economies made up two-thirds of the global total. Many of these measures were related to national security concerns about foreign ownership of critical infrastructure and technologies, and core products such as metals and mining.

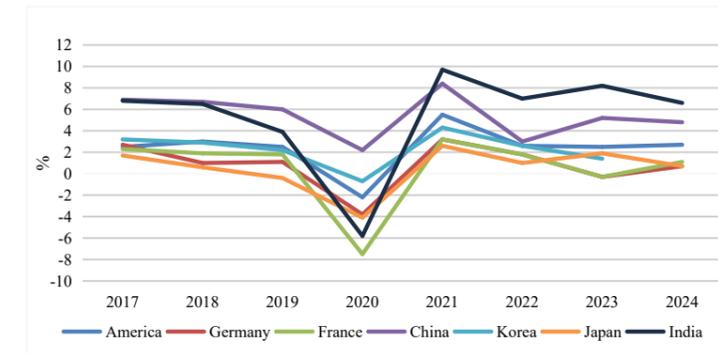
<sup>1</sup> Complex financial arrangements supporting large-scale infrastructure projects across borders.

Fig. 1-1 Global Economic Growth Trends, 2017-2023



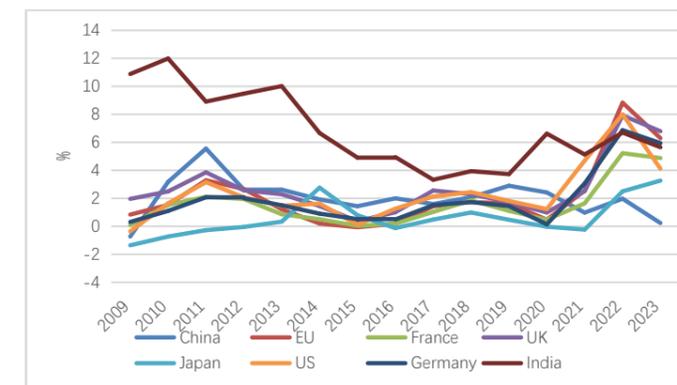
Data Source: World Bank.

Fig. 1-2 GDP Growth Rate of the World's Major Economies, 2017-2023



Data Source: International Monetary Fund public database.

Fig. 1-3 Chart of Inflation Level Changes of Major World Economies, 2009-2023



Data Source: IMF World Economic Outlook Database  
<https://www.imf.org/en/Publications/WEO/weo-database/2024/April>

A total of 29 new-generation International Investment Agreements (IIAs)<sup>2</sup> were signed by countries and regional organizations in 2023, including 12 Bilateral Investment Treaties (BITs) and 17 Treaties with Investment Provisions (TIPs). The number of Investor-State Dispute Settlement (ISDS) cases reached 1332, and 60 new arbitrations were

initiated during the year. By the end of 2023, at least 958 ISDS cases had been concluded with varying outcomes. 38% of the cases were decided in favor of the state, while 28% were decided in favor of the investors.

<sup>2</sup> New-generation IIAs are modern investment treaties designed to address the shortcomings of traditional IIAs. These agreements aim to balance investor protection with sustainable development goals, environmental considerations, and host countries' regulatory autonomy.

(3) Global Investment Outlook

Global FDI experienced mixed results in 2024. According to preliminary UNCTAD data, global FDI flows witnessed a marginal increase of 1% year - on - year in the first half of 2024, excluding financial flows through European conduit economies. Top recipients of global FDI inflows were the U.S., Brazil and Mexico, while FDI inflows to China declined significantly, according to OECD data. The recent interest rate cut by the U.S. Federal Reserve may have stimulated FDI flows to emerging markets in search for higher returns. However, the growing influence of geopolitical tensions, climate change, and other factors are increasingly complicating traditional approaches to investment promotion.

In the era of Global Value Chain (GVC) development, trade in intermediate goods has surged. Traditional customs statistics can double-count these repeated imports and exports, while the GVC accounting framework focuses on value-added. Exports of value-added in the global non-services sectors have shown remarkable resilience, with strong growth over the past three years. Although these exports were volatile from 2014 to 2020, they quickly rebounded despite challenges like the COVID-19 pandemic. From 2021 to 2023, exports remained elevated and continued to grow (see Figure 1-5).

Merchandise exports are led by China, the U.S., and Germany, which consistently occupy the top three positions, and the Netherlands overtook Japan for the fourth place. In 2023, seven of the top ten exporting economies were advanced economies (see Figure 1-6). Under the GVC framework, with the exception of China which leads by a wide margin, advanced economies also dominate non-services value-added exports, led by the U.S., Germany, and Japan.

## 1.2 Global Trade Pattern

### 1.2.1 Development of Trade in Merchandise Goods

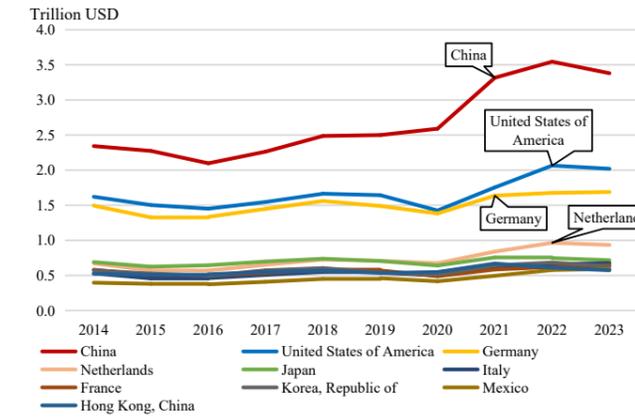
Global merchandise exports have become increasingly volatile, with a sharp decline in 2020 due to the COVID-19 pandemic, followed quickly by a rebound. However, growth began to slow in 2022 and turned negative in 2023, indicating potential challenges ahead. (see Figure 1-4).

### 1.2.2 Development of Trade in Services

Global services exports have experienced increasing volatility. Services exports increased by 50% from 2014 to 2023, in terms of balance of payments (BoP) statistics. Although there was a drop in

2020 due to the global COVID-19 pandemic, it quickly recovered and has continued to grow since then (see Figure 1-7).

Fig. 1-6 Merchandise Exports under Traditional Customs Statistics: Top 10 Economies in 2023



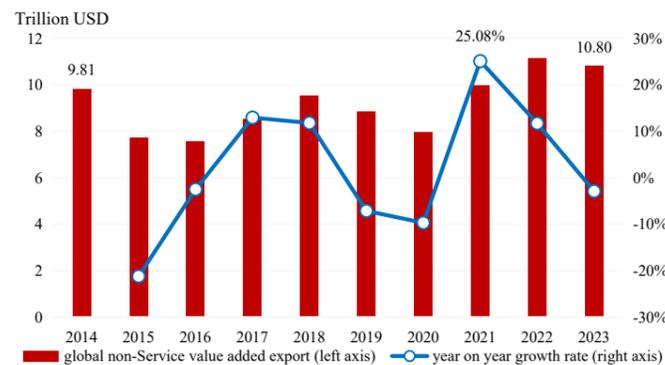
Data Source: Calculated based on WTO database indicators.

Fig. 1-4 Global Merchandise Exports from Customs Statistics and Growth Rate, 2017-2024



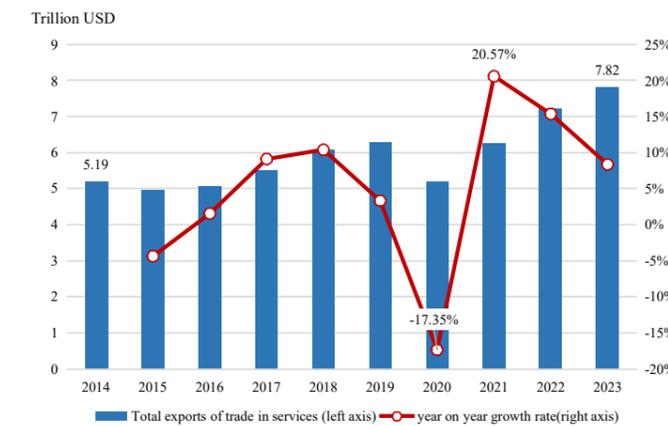
Data Source: Calculated based on WTO database indicators.

Fig. 1-5 Global Non-Services Value-Added Exports and Growth Rate under GVC Framework, 2014-2023



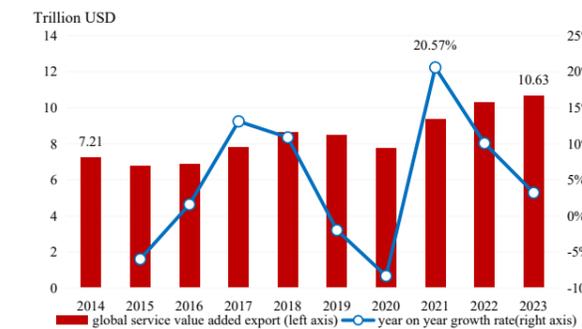
Data Source: Calculated based on data from ADB MRIO Input-Output Tables (current price USD).

Fig. 1-7 Global Service Exports and Growth Rate under BoP Framework, 2014-2023



Data Source: Calculated based on WTO database indicators.

Fig. 1-8 Global Services Value-Added Exports and Growth Rate under GVC Framework, 2014-2023



Data Source: Calculated based on data from ADB MRIO Input-Output Tables (current price USD).

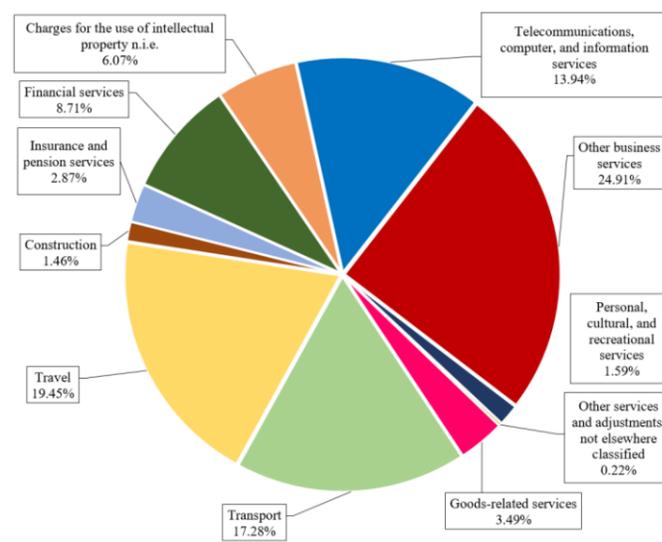
Under the GVC framework, global value-added exports for the services sectors increased by 21% in 2021 and continued to grow in 2022 and 2023 (see Figure 1-8). This trend is in line with the BoP statistics with less volatility. Value-added services exports are generally higher than BoP figures, as the latter exclude services provided through commercial presence. In both frameworks, services exports are dominated by advanced economies, particularly the United States.

In 2023, under the BoP framework, other business services, transportation, and travel services have the highest shares, with financial services accounting for over 8% (see Figure 1-9). The importance of business services is also observed in value-added exports under the GVC framework. In 2023, "Financial intermediation" emerged as a key driver of global service value-added exports, alongside "Renting of Machinery and Equipment and Other Business Activities" and "Wholesale Trade and Commission Trade." Together, these three sectors captured 60% of the market (see Figure 1-10). A

significant part of the value added in services is exported embedded in merchandise goods; therefore, changes in the pattern of trade in goods due to global shifts in production will also affect the flow of services. Consequently, the value added in commercial services, such as finance and transportation, is expected to rise.

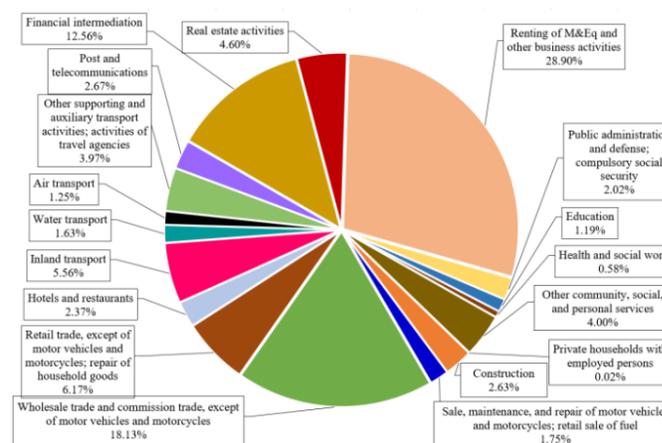
Looking ahead, geopolitical tensions, rising tariff and non-tariff barriers, and related shifts in global supply chains—such as the rise of reshoring, nearshoring, and friend-shoring—are likely to further disrupt trade patterns. However, the fundamental incentive for multinational corporations to pursue globally efficient product mixes and optimize production locations in order to maximize profits will remain unchanged. From this perspective, while global value chains may face challenges from increased short-term economic policy uncertainty and adjustments related to high-level development goals such as climate change and improved environmental governance, a fundamental reversal is not expected.

Fig. 1-9 Global Services Exports Under BoP Framework: Sub-sector Structure



Data Source: Calculated based on WTO database indicators.

Fig. 1-10 Global Services Exports Under the GVC Accounting Framework: Sub-sector Structure



Data Source: Calculated by the author based on data from the UIBE GVC Database and ADB MRIO Input-Output Tables (current price USD).

### 1.3 Potential Risks in the Global Financial Markets

Global financial markets face growing risks that threaten both stability and growth. Geopolitical conflicts, such as those in the Middle East and the Russia-Ukraine war, have disrupted energy markets, heightened volatility, and created barriers to cross-border trade and capital flows. Rising global debt and uncertainties surrounding fiscal sustainability also pose significant challenges to financial stability.

Fluctuations in capital flows, driven by economic uncertainties and shifting monetary policies, further complicate the financial market landscape. These interrelated risks increase the potential for economic disruption, making careful management essential. This section examines how geopolitical events, debt levels, and volatile capital flows shape the risks in global markets.

#### 1.3.1 Geopolitical Risks and Global Financial Stability

##### (1) Impact of Middle East Conflicts on the Energy Market

Geopolitical conflicts since late 2023, especially in the Middle East, have caused oil prices to surge temporarily, with brief spikes such as the \$94.3 per barrel peak. Although prices stabilized after initial disruptions, ongoing tensions continue to pose risks of further short-term fluctuations. Disruptions in Libya's oil production in August 2024, triggered by OPEC's forced shutdown, further exacerbated global supply concerns and widened the premium between Brent and Dubai crude to \$3 per barrel. These disruptions affected both European and Asian refiners and increased competition for alternative energy sources.

In addition, geopolitical risks and policy changes have introduced significant uncertainty into energy market forecasts. Despite declining U.S. crude inventories and tensions in the Middle East, a global economic slowdown has put downward pressures on prices. Leading financial institutions, such as Goldman Sachs and Morgan Stanley, have downgraded their 2025 oil price forecast, citing concerns about potential oversupply. These concerns are particularly relevant if OPEC+ stops its voluntary production cuts or if demand from major economies such as China falls short of expectations. These

developments, coupled with rising capital flow barriers, highlight how geopolitical tensions are creating obstacles to cross-border trade and capital flows, exacerbating global market volatility.

##### (2) Impact of Russia-Ukraine conflict on the Energy Market

The ongoing Russia-Ukraine conflict has severely disrupted global natural gas supplies, driving European gas prices up by 36%<sup>3</sup> to EUR45.15 per MWh by August 2024. This disruption, along with escalating tensions in the Middle East, has further destabilized energy markets, pushing Europe toward greater reliance on liquefied natural gas (LNG). This increased dependence on LNG, combined with the risk of supply shortages during a harsh winter, is likely to increase market volatility.

Geopolitical tensions have also contributed to rising global inflation, particularly in energy and food prices, with emerging markets being most affected. Capital outflows from these markets have led to currency depreciation and higher borrowing costs, further straining their economies. Central banks, including the U.S. Federal Reserve, have maintained high interest rates to control inflation, slowing global economic growth and exacerbating financial market instability.

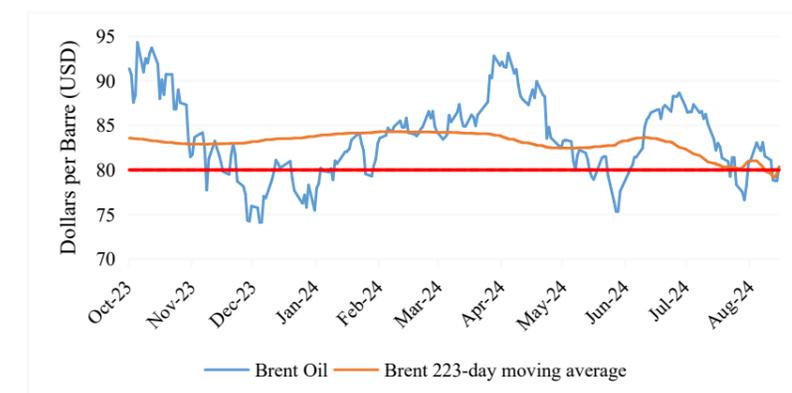
#### 1.3.2 Global Debt Levels and Fiscal Risks

##### (1) Continuously Rising Global Debt Levels

By the end of 2023, government debt levels increased significantly in many countries. In the G7 countries, the general government gross debt to GDP ratio has risen from 118% in 2019 to 126% in 2023 and is projected to increase to 127% in 2024. This persisted pattern of escalating debt underscores significant fiscal challenges facing these countries in the post-pandemic era. The implementation of extensive fiscal expenditures to stimulate economic growth and support social welfare has exacerbated rising debt levels.

In the euro area, the debt level saw a slight increase, rising from 84% in 2019 to 89% in 2024. While the increase in debt in the euro area is relatively moderate, the persistently high level of debt indicates that the euro area countries are still confronting significant challenges in stabilizing their economies and managing external shocks.

Fig. 1-11 Brent Oil Price vs. 233-Day Moving Average



Data Source: The EIA website. Accessed 23 August 2023.

<sup>3</sup> Agriculture and Horticulture Development Board. (n.d.). Natural gas prices are rising again. Grain Market Daily. Retrieved from <https://ahdb.org.uk/news/natural-gas-prices-are-rising-again-grain-market-daily>

Debt levels of emerging markets have increased significantly, with the government debt-to-GDP ratio of the ASEAN-5 countries rising from 50% in 2019 to 68% in 2024. This substantial uptick is primarily attributed to large-scale infrastructure development and regional economic growth investments. While this bold fiscal approach has driven economic progress, it has also considerably elevated the region's fiscal risks.

China's government debt is projected to rise significantly by 28 percentage points between 2019 and 2024. This rapid expansion is primarily attributed to the extensive fiscal stimulus measures implemented by the Chinese government during and after the pandemic. While this expansion demonstrated the government's ability to provide fiscal support, it also poses potential debt risks, particularly amid heightened global economic uncertainty.

The sustained escalation of global debt levels poses a dual challenge for domestic fiscal management and the broader global economy. Elevated public debt has the potential to constrain countries' capacity to implement proactive fiscal strategies during future economic downturns, as well as to raise financial market concerns about fiscal-monetary stability, leading to higher borrowing costs. Ultimately, these factors could exert downward pressure on global economic growth, amplifying future economic uncertainties and risks.

(2) Sustainability of Fiscal Policies and Risk Management

As global debt levels continue to increase, fiscal sustainability and the risk management capacity face significant challenges. Although global real interest rates have generally been lower than economic growth rates in recent decades, allowing governments to maintain high debt levels, new challenges arise as the macroeconomic landscape evolves. Factors such as slowing productivity growth, aging populations, and weak investment could reduce medium-term economic growth rates. The rise in long-term real interest rates will also exert significant pressure on debt management.

Against this backdrop, debt management in major economies must adapt to an increasingly intricate interest rate landscape. While short-term real interest rates remain low, the risk premium embedded in long-term interest rates is on the rise. This indicates that government borrowing cost may increase in the future, particularly in the face of inflationary forces and tighter central bank policies.

In the context of the United States, the gradual increase in long-term interest rates is leading to a rise in financing costs. It poses a significant challenge to future fiscal sustainability due to the increased debt burden. This challenge is not unique to the United States. It is also expected in other highly indebted countries such as Japan, where the debt level reached 255% of GDP by 2024, ranking among the

highest in the world. Consequently, these economies face the difficult task of balancing debt management and financial stability.

Moreover, the implementation of expansionary fiscal policies with long-term fiscal vulnerabilities might evoke investor concerns regarding the sustainability of the countries' debt, resulting in a rise in long-term interest rates and financing costs. Particularly during periods of high inflation, central banks may need to pursue more assertive monetary policies, contributing to higher public debt burden and fiscal vulnerabilities.

In emerging markets, particularly those with substantial debt burdens, there are growing concerns about the long-term sustainability of fiscal policies. High debt levels may reduce these governments' capacity to weather economic downturns while increasing the fragility of the financial system. This is particularly true when banks have significant exposure to their government's debt, as it could amplify the financial system's vulnerability to fiscal risks.

1.3.3 Global Capital Flows and Market Risks

Global capital flows, a key indicator of financial market health, experienced significant volatility in 2023 due to global economic uncertainty and geopolitical tensions. Investment levels fell to 75% of the ten-year average<sup>4</sup> as markets responded to these challenges.

As inflationary pressures eased toward the end of 2023, central banks in advanced economies shifted to more accommodative monetary policies. Eurobond issuance recovered to \$40<sup>5</sup> billion in the first quarter of 2024, due to lower borrowing costs resulting in interest rate cuts. While this boosted capital flows, it also introduced

risks for emerging markets, where the search for higher yields could lead to greater volatility and capital flow reversals. Global capital flows continued to adjust amid continued interest rate cuts. In the first half of 2024, cross-border capital flows totaled \$267 billion, down 10% year-on-year. From an investment perspective, the industrial and logistics sectors led cross-border investments, while office investments remained sluggish, signaling potential vulnerabilities in the commercial real estate sector.

Notable Regional Trends in 2024:

- North America: Cross-border capital inflows plunged by 58% to \$52.5 billion, largely due to Asia-Pacific investors focusing more on their domestic markets. Despite a 44% increase in inflows from Europe, North America's cross-border capital levels remained below the five-year average, pointing to the challenges of recovery.

- Europe: European FDI reversed from a net outflow of \$106 billion in 2022 to a positive inflow of \$16<sup>6</sup> billion in 2023, reflecting improved market conditions. This trend continued in 2024, with cross-border capital inflows up 30%, reaching \$184 billion in the first half. Despite high debt costs and widening pricing spreads are limiting some flows, the ECB's June rate cut is expected to boost investment, though highly indebted economies still face risks of financial instability.

- Asia-Pacific: Cross-border flows increased by 1.6% to \$31.6 billion, with foreign investment levels remaining low. In India, however, saw foreign investment more than doubled to \$13.9 billion, led by capital from the States. Although rebalancing in the region has been slower compared to the U.S. and Europe, the United States Federal Reserve's interest rate cut in September was expected to revive capital flows to emerging economies, including parts of the Asia Pacific.

Fig. 1-12 (a): Gross Government Debt, Developed Economies (% of GDP)

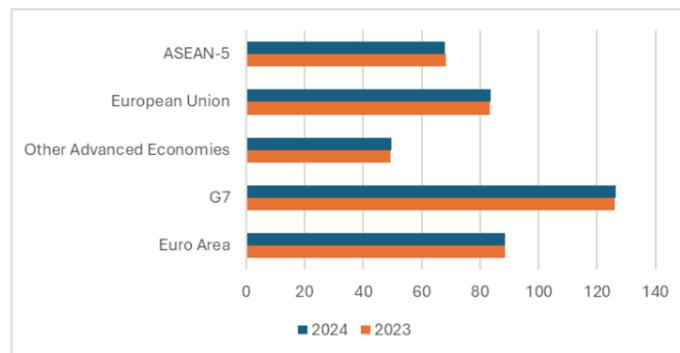
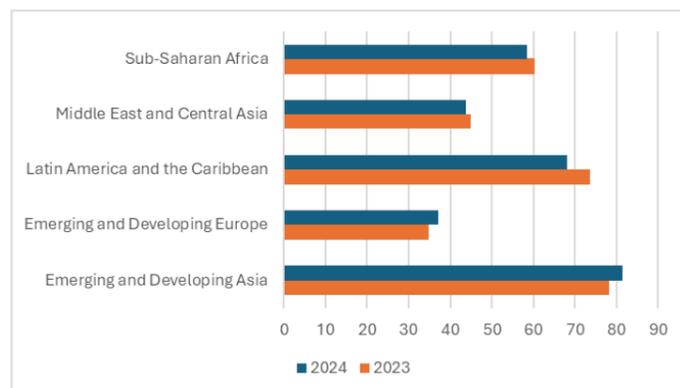


Fig. 1-12 (b): Gross Government Debt, Developing Economies (% of GDP)



Data Source: The IMF website. Accessed 28 August 2023.



<sup>4</sup> Colliers. (2023). Global capital flows H2 2023. <https://www.colliers.com/en-xe/research/global-capital-flows-h2-2023>

<sup>5</sup> International Monetary Fund. (2024, September 5). Fed rate cuts may help revive bond flows to emerging and developing economies. IMF Blog. <https://www.imf.org/en/Blogs/Articles/2024/09/05/fed-rate-cuts-may-help-revive-bond-flows-to-emerging-developing-economies>

<sup>6</sup> United Nations Conference on Trade and Development. (2024). World investment report 2024: Trends in global investment. [https://unctad.org/system/files/official-document/wir2024\\_ch01\\_en.pdf](https://unctad.org/system/files/official-document/wir2024_ch01_en.pdf)

## 1.4 Monetary Policy and its Impacts on Global Markets

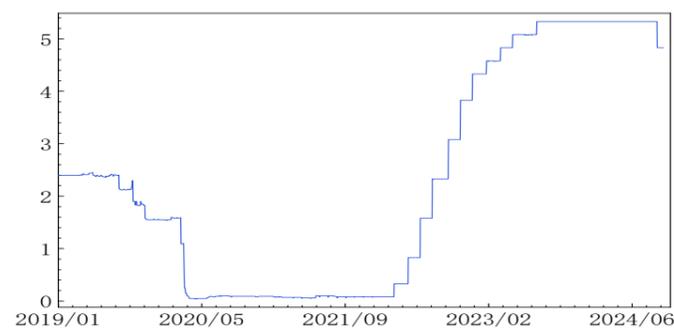
Monetary policy is an important tool by which government authorities in a market economy regularly influence the pace and direction of overall economic activity. This primary objectives of monetary policy in the modern era typically have been to maintain stability of the general price level in a country—that is, to prevent either inflation or deflation—and to promote maximum levels of output and employment. Other commonly accepted goals of monetary policy include maintaining trade balances, preserving stability of the financial markets, and fostering capital investment to enhance the economic growth over time. As one of the core economies in the world, monetary policy of the United State may generate strong spillover effects to the rest of the world, even though its goal is to stabilize domestic price and unemployment levels.

### 1.4.1 The behavior of US monetary policy

Since 2019, the global economic situation has been rather unpredictable, and the Federal Reserve has been constantly changing its interest rate policy in response to the complex economic environment. The following figure shows the trend of the US federal funds rate since 2019:

The trajectory of U.S. Federal Reserve interest rates since 2019 encompasses a number of pivotal inflection points. At the beginning of 2019, interest rates were relatively high, approaching 2.5%. This reflected the Federal Reserve's policy of gradually raising interest rates in previous years to cope with strong economic growth and control potential inflationary pressures. However, starting from the mid 2019, the Federal Reserve initiated a series of interest rate cuts, gradually lowering the rate to around 1.75%. The primary rationale behind this series of interest rate cuts is the global economic slowdown and the uncertainty introduced by the trade war. Although the robust performance of the economy, the Federal Reserve has taken preventive measures to support economic growth by reducing borrowing costs. In 2020, the interest rate in the figure exhibited a sudden and sharp decline, approaching zero. This change is obviously attributed to the outbreak of the COVID-19 epidemic. The rapid spread of the epidemic has led to a stagnation of global economic activity, with the U.S. economy being no exception. The unemployment rate has soared, and the economy is at risk of a severe recession. In response to this unprecedented crisis, the Federal Reserve cut interest rates twice in March, lowering them to historically low levels

Fig. 1-13: Time Series of US Federal Funds Rate



Data Source: WIND Inc.v

of 0% to 0.25%. At the same time, the Federal Reserve has enacted quantitative easing program with the objective of stabilizing financial markets and providing support for economic recovery through the purchase of bonds and the injection of liquidity. At this stage, low interest rates have become an important measure for stimulating economic recovery. In 2021, as the epidemic gradually came under control and economic activity gradually began to recover after large-scale vaccination program, while the graph shows that interest rates remained close to zero. However, a significant shift occurred during this period, marked by the emergence of inflationary pressures. Due to supply chain issues and an increase in consumer demand, the inflation rate in the United States has continued to rise. Although the Federal Reserve continued to maintain low interest rates to prevent disruptions to the recovery process, market participants have begun to express concerns regarding inflationary pressures. In 2022, there was a sharp increase in interest rates as shown in the chart. This interest rate hike cycle is a measure taken by the Federal Reserve to address the issue of high inflation. The inflation reached a 40 year high, which compelled the Federal Reserve to implement an interest rate increase beginning in March. It is evident that throughout the year 2022, the Federal Reserve has implemented an increase in interest rates at nearly every meeting, with rates reaching a peak of over 4%. By August 2023, interest rates had reached their peak and remained at the level for over a year until September 2024, when the Federal Reserve initiated an interest rate cut by 50 basis points in response to high unemployment and mounting debt pressures. Furthermore, the Federal Reserve signaled that interest rates would continue to decline, albeit at a slower pace, and that monetary policy would gradually shift towards a more neutral stance.

### 1.4.2 The consequence of the U.S. monetary policy

The significant change in the U.S. interest rates has had a drastic impact on the global economy. In terms of monetary policy, the Federal Reserve's aggressive interest rate hikes have forced countries around the world to adjust their monetary policies to maintain stability in inflation, employment, and economic growth. The following chart shows the trend of policy interest rate changes in China, the United States, Europe, the United Kingdom, and Japan. We use effective federal funds rate (EFFR) for the United States interest rate, standing lending facility (LPR) for China's interest rate, European benchmark interest rate (EBR) for UK interest rate, Benchmark rate (Main Refinancing Rate) (MRO) for other European countries, and Japanese policy target interest rate (base currency) (JPR) for Japan interest rate.

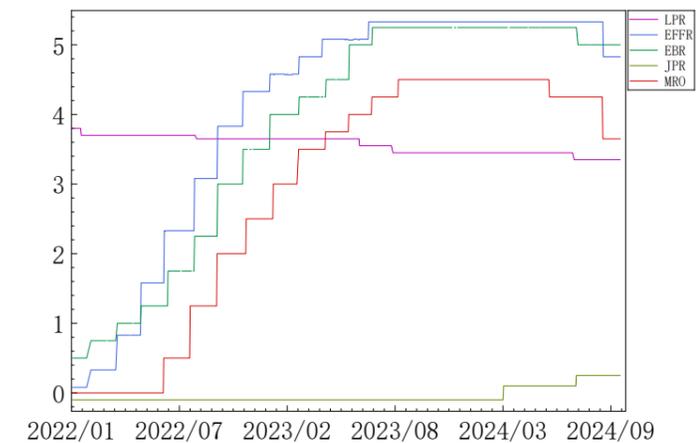
According to the chart, it can be observed that the trend of policy interest rates in the United States, European Union, and United Kingdom has been very similar since 2022: they all gradually increase to high levels and then begin to decrease in 2024. The overall changes in benchmark interest rates between China and Japan are not significant, with the main difference being that the former has gradually lowered interest rates since 2022, while the latter has gradually increased interest rates since March 2024. Obviously, major advanced economies led by the United States have encountered significant inflationary and exchange rate depreciation pressures under the influence of the Federal Reserve's aggressive monetary policy, and need to continuously adjust their own interest rates to narrow the interest rate differential with the United States in order to maintain relative economic stability. As a country with zero or even negative interest rates for decades, Japan has also begun to feel overwhelmed by the aggressive monetary policy of the United States and has chosen to raise interest rates to curb the depreciation on Yen; Benefiting from its greater tolerance on exchange rate fluctuations, China, however, keeps on lowering the interest rate so as to support the economic growth.

In addition to its impact on the monetary policies of various countries, the Fed's interest rate hike will further affect the stability of global financial markets. Due to higher interest income, the

investment willingness of global investors continued to decrease, which will exacerbating financial market volatility. The following chart compares the changes in major stock markets in China, the United States, Japan, the United Kingdom, and the European Union since the beginning of 2022. For comparison, the stock prices of each country in the chart are normalized to equal to 100 in 1st Jan 2022. According to the chart, the volatility trends of stock markets in various countries were relatively similar until the middle of 2023. Since 2022, stock prices in all countries have experienced significant declines, with prices starting to pick up by the end of the year. Since the first quarter of 2023, Japan and China have indicated different patterns compare to other major economies. Such a result is consistent with the discrepancy on the monetary policy among these two countries and the western countries.

During the second quarter of 2024, major advanced economies started to cut the policy interest rates, with a significant impact to the rest of the world. Stock prices in these countries show patterns of an upward trend. In particular, the interest rate cut by the United State Federal Reserve in September generate strong impacts on Asia financial markets, and the volatility of both Japanese and Chinese financial markets hikes, indicating the important role of the U.S. expansionary monetary policy on the global markets.

Fig. 1-14: Changes in Benchmark Interest Rates in Various Countries



Data Source: WIND Inc. and the Monetary Policy Department of People's Bank of China.

Fig. 1-15: Time Series of Major Stock Indices in Various Countries



Data Source: WIND Inc.

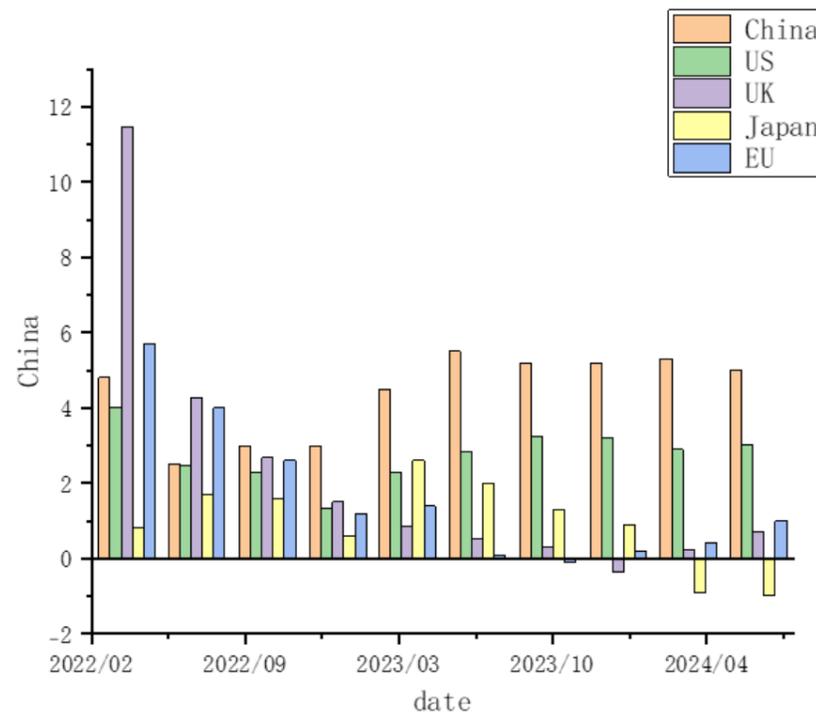
The impact of the rising interest rates in the U.S. will ultimately affect economic growth in many countries. The following bar chart shows the cumulative year-on-year changes in real GDP in various countries since 2022. It is obvious that the United States has been continuously raising interest rates since 2022, the GDP growth rates of various countries have declined to varying degrees, with the EU countries and the United Kingdom showing the most pronounced decline. Their GDP growth rates are on a downward trend, even reaching negative growth in October 2023 and January 2024 respectively, before slowly recovering. However, the impact on China and Japan is relatively small, which may be due to the strong internal growth trend of the Chinese economy and the slow growth rate of the Japanese economy itself. In summary, fluctuations in the Federal Reserve's interest rates will ultimately affect the economic growth of various countries, leading to changes in economic growth rates.

### 1.4.3 The global transmission mechanism of the U.S. monetary policy

The fluctuations of short-term interest rates serve as an indicator of the central bank's monetary policy stance and provide insight into its future direction. Consequently, the United States' monetary policy can exert an influence on the global economy in two distinct ways: First, the conventional impact of an increase in the federal funds rate is to stimulate economic activity, whereas a reduction in the federal funds rate results in a decline in economic activity. Secondly, a modification in the federal funds rate can also elucidate the central bank's perspective on the prospective economic landscape. These interpretations, in fact, contravene the conventional interpretations of conventional monetary policy shocks. For example, the implementation of monetary easing may be indicative of a central bank's concern that the economy is unable to recover without external

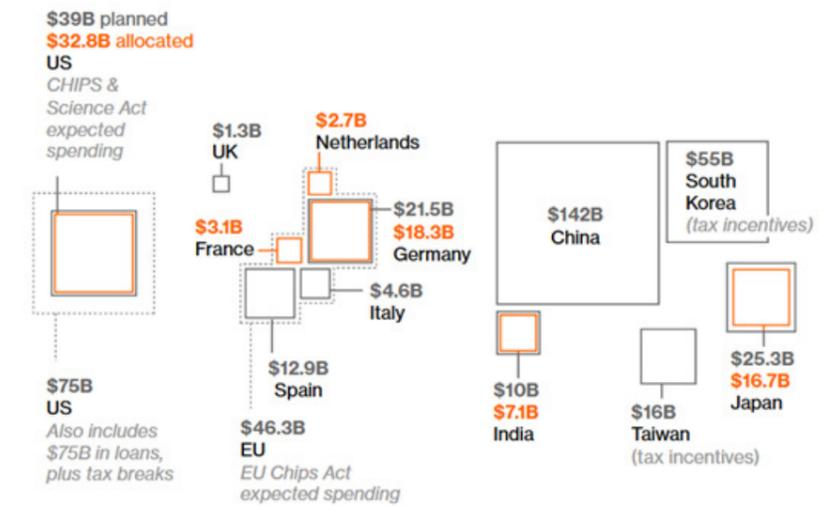
assistance. In such instances, the lowering of interest rates can be perceived as an effort to facilitate economic recovery. Consequently, from the perspective of information content, monetary easing functions as a negative signal to the public, thereby discouraging spending. Consequently, when attempting to comprehend the monetary policies of central banks, it is essential to recognize the coexistence of both types of effects and the influence of their respective dominance on the resulting outcome. Furthermore, the United States' monetary policy can exert influence over other countries through two distinct channels. In the direct channel, the monetary policy of one country can exert an influence on another country through the occurrence of bilateral cross-border flows. For countries of considerable economic scale, such as the United States or the European Union, the implementation of monetary policy can exert a considerable influence on trade and financial flows with emerging market economies and other advanced economies. In the indirect channel, the monetary policy of one country can affect other countries through channels such as international trade, financial and production networks. It is important to acknowledge that, in recent years, there has emerged a further indirect channel through which the monetary policies of major countries may exert an influence on the network structures among countries. Moreover, the characteristics of the network structure may influence the transmission of monetary policies on an international scale. Nevertheless, this indirect channel is particularly significant for major countries, including the United States and European Union member states. Recent research has identified that the indirect channel of monetary policy transmission, in general, originates from developed markets and affects emerging markets. This is primarily due to the fact that, within the network structure, advanced economies are more closely interconnected with one another than they are with developed and emerging countries, particularly in the aftermath of the 2008 global financial crisis

Fig. 1-16: Cumulative year-by-year changes in constant GDP prices of various countries



Data Source: WIND Inc.

Fig. 1-17: Financial incentives provided in various economies for semiconductors under industrial policies schemes



Data Sources: Bloomberg reporting and research, Semiconductor Industry Association

## 1.5 Industrial Policy

### 1.5.1 The rise of techno-nationalism and the return of new industrial policy

Since the 2020s, the global economy has clearly reached a new critical juncture, where techno-nationalist industrial policies are regaining popularity, while de-risking and the fragmentation of global value chains seem to be the prevailing trends. The resurgence of a new wave of techno-nationalism (Capri, 2019; Luo, 2022), which can be attributed to three main driving forces (Yeung et al, 2023): (i) concerns over the resilience of GVCs (Global Value Chains) in the context of COVID-19; (ii) concerns over foundational and emerging technologies as a basis of national security; and (iii) the interactive process between the great powers, notably the Sino-U.S.. The United States' pursuit of technological superiority is restructuring global value chains and influencing the global economic landscape.

The aforementioned forces have contributed to a notable resurgence of industrial policy on a global scale, particularly within advanced economies, in recent years.

In the past, advanced economies tended to favor a policy of laissez-faire over government intervention, and were keen to promote the free-market doctrine known as the Washington Consensus to emerging markets. Those who advocate for free market often dismiss the necessity for industrial policy, citing information barriers and potential unproductive rent-seeking as powerful arguments against it.

In the context of intensifying competition for technological supremacy and increasing geopolitical complexity, advanced economies have reintroduced industrial policy as a strategic tool, including great power competitions, the resilience of supply chains, the transition to a green economy, and so on.

It is noteworthy that a number of major economies have implemented industrial policies with the objective of influencing the development of the semiconductor industry. Notable examples include the Chips and Science Act of the United States, the European

Chips Act of the European Union, and the Semicon India Program. Similar policies have been implemented with respect to the NEV industry. Techno-nationalist semiconductor industrial policies, primarily in the form of direct subsidies and tax credits (see Figure 1-17), have been implemented by most major economies in the world, particularly advanced economies. These policies have been designed to encourage the reshoring of essential and advanced manufacturing capacity, as well as the localization or friend-shoring of their respective essential and critical supply chains.

### 1.5.2 Two novel dimensions of the new industrial Policy: great-power competition and geopolitical/ideological rivalry

Two new dimensions of the recent surge in industrial policy appear to be emerging. First, it is primarily driven by competition over technological supremacy between major powers with markedly disparate values, institutions, and economic models. In a similar vein, the pursuit of the respective goals of industrial policy by the key players is underpinned by solid geopolitical and ideological considerations. To put it another way, concerns over geopolitical rivalry seems to outweigh the pursuit of higher economic efficiency.

### 1.5.3 How well does new industrial policy work?

(1) The effectiveness of U.S. industrial policy towards the semiconductor industry

This analysis will focus on the semiconductor industry, where the impact of new techno-nationalistic industrial policies is most evident.

In the near term, industrial policies in the United States, which encourage the reshoring of advanced semiconductor manufacturing with financial incentives, have been successful in attracting leading semiconductor manufacturing firms from East Asia, such as TSMC and Samsung to invest in advanced node fabrication facilities in the country (SIA, 2024). Conversely, the United States' imposition of export controls on relevant countries has created impediments to its advancement in the semiconductor industry.

Nevertheless, the U.S. semiconductor industrial policy may ultimately prove ineffective in achieving its intended outcomes. In contrast to other industries, the semiconductor industry is characterized by a high level of R&D and capital intensity (BCG & SIA, 2021). In the stages of semiconductor design, semiconductor equipment manufacturing, EDA software and core IP, substantial investments in research and development are necessary. In front-end semiconductor manufacturing, significant upfront capital investments are required to construct even a standard capacity fabrication facility at the cutting-edge node.

These characteristics suggest that the majority of value-adding stages in the semiconductor value chain will be indicative of a monopolistic market structure, dominated by a limited number of firms. The economic success of these firms is contingent upon their global market access. Any significant disruption to this global access could threaten the economic survival of the entire industry, as only through global market access can these leading semiconductor firms amortize their extremely high R&D and upfront capital expenditures over a substantial product throughput (Yeung et al., 2023).

As the global competition to establish fabs continues, the semiconductor value chain and market are undergoing significant changes. These changes have the potential to impede innovation, lead to overcapacity and underutilization, and even jeopardize the efficiency of the semiconductor industry's business and innovation model. This model has been based on intricate specialization along the semiconductor GVC. As a matter of fact, recent research conducted by the New York Fed (Crosignani et al., 2024) has revealed a statistically significant decline in revenue, profitability, bank credit, and employment rates among affected U.S. firms (whose market access to China has been constrained) following the implementation of the 2022 export controls.

(2) The broader question of the effectiveness of industrial policy in general

It is apparent that the implementation of industrial policy entails significant financial costs. An unfavorable industrial policy can impede innovation, result in overcapacity and misallocation of capital, generate significant inefficiencies, intensify market concentration and distortions, and waste valuable taxpayer funds (Rodrik, 2004). In this regard, it is evident that the Chinese government has gained valuable insights from its experience with industrial policy, as evidenced by the collapse of Zi Guang and Wuhan Hong Xin. Of particular relevance to the Chinese context is the research by Wei et al. (2023), which suggests that even under the assumption of mild government failure, the overall welfare effect of implementing industrial policy through a subsidy program in China is likely to be negative. This highlights that the conditions for effective industrial policy could be highly restrictive.

Nevertheless, recent years have witnessed a resurgence of interest in industrial policy among academics, resulting in the emergence of a substantial body of research that offers more robust empirical evidence on the functioning and impacts of industrial policy (for a review, see Juhasz, 2023). This analysis represents an improvement over the previous empirical work, which was marred by ambiguity in the causal relationships observed and interpretational issues. Consequently, it offers a more positive perspective on industrial policy. Recent research on the effectiveness of industrial policy in East Asia, in particular, indicates that while state support is beneficial during the initial stages of industrial development, it is not a sufficient factor for sustained success and dominance. Furthermore, recent studies indicate that the debate over industrial policy should prioritize the question of implementation over that of adoption.

#### 1.5.4 Prospects for establishing new international rules on industrial policy (in particular, industrial subsidies)

At the international level, industrial policies can also result in detrimental cross-border spillovers, increasing the likelihood of retaliation by other countries. This, in turn, can ultimately undermine the multilateral trading system and exacerbate geoeconomic fragmentation.

In particular, the recent increase in industrial policy has been driven by major economies that prioritize economic and national security over economic efficiency and competitiveness. These policies are often driven by geopolitical or even ideological motivations. In other words, industrial policy has been utilized not only for economic purposes, but also for geopolitical and social objectives (Spence, 2023). It would be erroneous, therefore, to consider economic efficiency as the sole or even the primary criterion for evaluating the efficacy of industrial policy. Given that a highly ideologically motivated objective is typically self-evident and self-perpetuating, it is imperative to engage in more dialogue and coordination to prevent costly missteps when the probability of resolving the underlying tensions is low.

The history of international trade, in particular the period preceding the conclusion of the Tokyo Round Subsidies Code in 1979, has demonstrated that competitive subsidization will inevitably result in mutually wasteful expenditures and a lose-lose situation, which would ultimately lead to a reduction in the overall welfare of the world. It is important that the major economies convene to establish a consensus on the regulations governing industrial subsidies within the multilateral framework, presumably within the WTO system. This is to prevent the detrimental effects of competitive subsidization on efficiency. It is widely acknowledged that the WTO system encompasses stringent regulations (SCM Agreement) pertaining to export subsidies and import substitution subsidies. However, the framework governing industrial subsidies, which are subsidies "specific" or limited to a firm, industry, or group of industries, is at best, a grey area. These subsidies are generally permitted, yet subject to scrutiny if they are deemed to have an adverse impact on trade. In conclusion, in light of the increasing prevalence of industrial policies worldwide, the WTO requires a revised set of tools. Indeed, major economies and relevant international organizations (the WTO, the IMF, and the OECD) have acknowledged the issues and initiated efforts to address them.



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# Chapter 2 The Chinese Economy

Considering that China maintains an actual GDP growth rate of around 5% despite the backdrop of deflation, it can be inferred that under normal condition, China has the potential to maintain a growth rate of more than 6% for the foreseeable future. The real challenge facing the Chinese economy today is on the demand side.

For more than a decade, China's economic growth has relied heavily on private sector investment in property and government investment in property-financed infrastructure projects. However, since 2021, the property market has entered a major adjustment period and the contraction in property investment and local government spending has significantly reduced the ability to support China's economic growth on the demand side.

The deep adjustment in the property market signals that China is at a critical juncture in its transition from old to new growth drivers. China is ramping up investment in its manufacturing sectors, focusing on developing new quality productive forces and upgrading its industries and value chains to fuel future economic growth. However, at this stage, the momentum generated by these new growth drivers is not yet sufficient to offset the decline in the old ones. Sluggish aggregate demand remains the key challenge to the Chinese economy's ability to sustain relatively high growth.

## 2.1 The Chinese Economy in 2023-2024

### 2.1.1 Overview of China's Economic Development in 2023-2024

With a real growth rate of 5.2%, China's nominal GDP exceeded RMB 126 trillion in 2023, making China's growth performance one of the best in the world in comparison with other major economies, consolidating its role as a key player in maintaining global economic stability and confidence.

In the first three quarters of 2024, China's real GDP growth is estimated to have reached 4.8%. The quarter-on-quarter growth rate dropped from 1.5% in Q1 to 0.5% in Q2, and then 0.9% in Q3. This decline contributed to a weaker-than-expected year-on-year growth rate of 4.7% in Q2 and 4.6% in Q3.

Given the significant impact of the pandemic on the Chinese economy in 2022, when real GDP growth was a mere 3%, it is generally expected that, due to the low base effect, China would experience faster growth in the following years. However, China's average real GDP growth rate since then has been around 5%, somewhat below the market expectations.

Figure 2-2 depicts China's monthly price index since January 2023, with both the Consumer Price Index (CPI) and the Producer Price

Index (PPI) hovering around 100. In particular, the growth rate of PPI has been negative for 24 consecutive months since September 2022. This indicates that China is currently facing a significant issue of insufficient demand, with the economy operating below its potential.

### 2.1.2 Insufficient Domestic Demand: The Main Challenge in the Process of Switching from Old to New Growth Drivers

Figure 2-3 outlines the quarterly contribution of China's three main demand drivers in 2022 and 2023, providing a preliminary overview of the breakdown of the country's aggregate demand gaps. Historically, China's economic growth was heavily investment-driven, with capital formation contributing 47% in 2022—a persistent pattern from the previous periods. However, from 2023 onwards, the contribution of capital formation has steadily declined each quarter, falling to 29% by the end of the year and further to 26% in the first three quarters in 2024. This steeper-than-expected decline in investment has been the key factor behind China's sluggish domestic demand over the past two years.

The decline in China's investment spending was largely driven by a significant adjustment in the property market. According to the National Bureau of Statistics of China, total fixed asset investment (excluding rural households) reached RMB 37.90 trillion, up 3.4% year-over-year in the first three quarters of 2024. However, if investment in property development is excluded, fixed asset investment grew by a solid 8.5%, indicating a much stronger performance in the relevant segments than what the overall figure suggests.

China's property market is currently undergoing a major adjustment, indicating a shift in the country's growth drivers. The previous major similar transition took place between 2008 and 2020, when the driver of economic growth shifted from external demand to a government-led investment boom in property and infrastructure. Fig 2-4 shows that net exports accounted for 9% of GDP in 2007. However, following the global financial crisis, China turned its focus to boosting domestic demand. Property investment surged from below 10% of GDP before 2008 to a peak of 14%. This boom also spurred rapid growth in government revenues which, in turn, fueled infrastructure investment and offset the fall in external demand.

In recent years, over-reliance on property market and the resulting bubble have posed significant risks to the long-term stability of the economy. Shifting away from this dependence is a painful but necessary step to achieving long-term sustainable growth.

Fig. 2-1. China's real GDP growth rate since the fourth quarter of 2022.

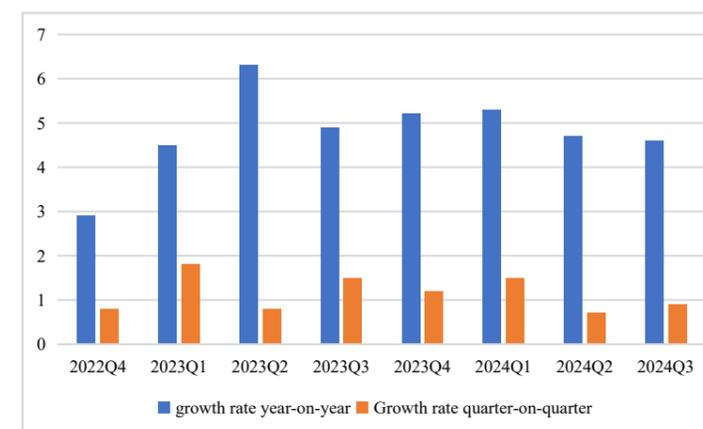


Fig. 2-2. The growth rate of China's price indexes since January 2022

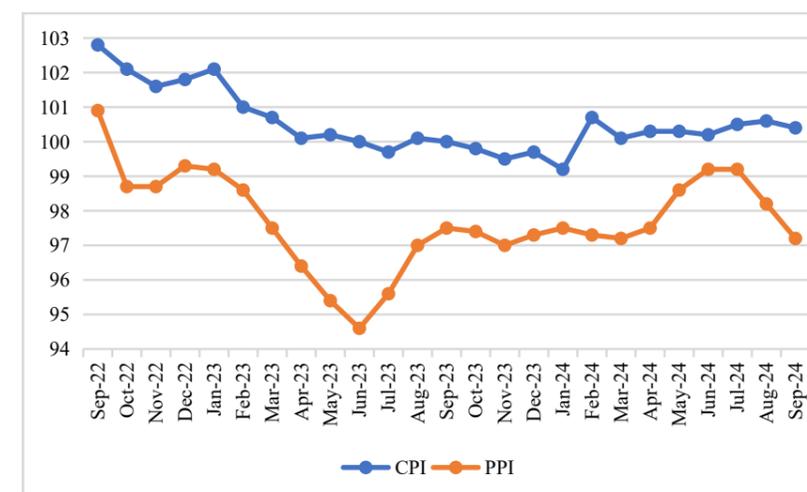


Fig. 2-3. The contribution of China's three main demand drivers since 2022

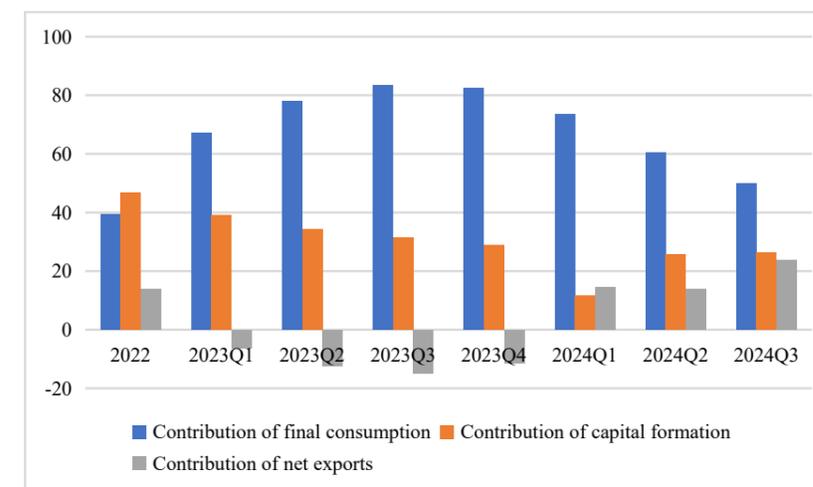
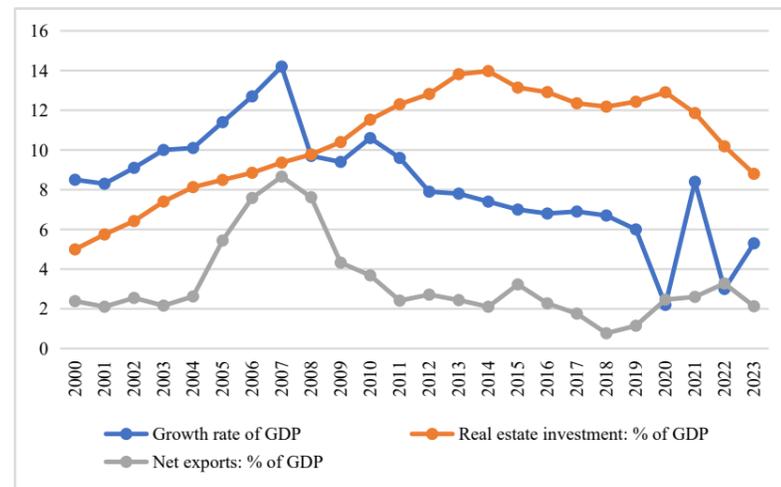


Fig. 2-4. The trend of changes in China's domestic and external demand since 2000



### 2.1.3 Prospect for China's Economic Growth

In 2024, an unexpected boost to China's economy has been the sharp improvement in external demand, which contributed 23.8% to real GDP growth in the first three quarters of the year, compared with -14.9% last year. However, the ongoing property market adjustment has kept investment demand weak. In addition, private consumption growth has been below expectations this year. As a result, the economy will likely grow by about 4.8%, or "around 5%."

Property sales are estimated to decline by 25% this year, pulling both sales and investment in the sector below RMB 10 trillion. Property investment as a share of GDP is projected to fall further to around 8%, returning to pre-2004 levels. Thereafter, the ratio of property investment to GDP is likely to stabilize, with little risk of further significant declines. Once the property market starts to stabilize, the cumulative effects of government policies aimed at boosting domestic demand should start to be felt, potentially sustaining economic growth at around 5% over the medium term.

Despite the challenges of weak domestic demand, China's manufacturing sector remains resilient, thanks to its massive domestic market and supportive industrial policies. The country is pushing forward with the development of new growth drivers, including key industries such as semiconductors, new energy, and advanced equipment manufacturing, all of which are showing robust momentum and will play a crucial role in facilitating China's recovery from this adjustment period.

While the peak of the negative impact of the property sector on aggregate demand may have passed, China is now facing a new risk: declining consumer demand. In 2024, the growth rate of total retail sales of consumer goods slowed progressively, starting at 4.7% in the first quarter, then decreasing to 3.7% in the second quarter, and further down to 3.3% in the third quarter. This downward trend is expected to continue in the third quarter. In some major cities such as Beijing, Shanghai and Guangzhou, retail sales have even seen negative growth. In late September, the Chinese government unveiled a series of new economic measures, which were well received by both the capital and property markets. These measures are expected to help stabilize the economy in the fourth quarter. In the long term, China will need to implement more aggressive counter-cyclical policies and

carry out structural reforms to address weak domestic demand as it moves through this crucial phase of the transition of its growth model.

## 2.2 Development of New Quality Productive Forces: Building up New Growth Drivers

China has made impressive progress in high-tech industries in recent years. In many cutting-edge technologies and sectors, the country can now compete on par with the world's most advanced economies. Given that China is still considered as a middle-to-upper-income nation, these achievements are truly unprecedented. It's clear that China has succeeded in cultivating new drivers of growth.

### 2.2.1 Contribution of New Quality Productive Forces to New Growth Drivers

Compared with the traditional production factors such as labor and capital, the new quality productive forces rely more on the advancement of knowledge, the accumulation of data, and the progress of technology, and have become a crucial engine for driving high-quality economic development in the new era.

First, these forces boost economic growth by enhancing total factor productivity (TFP). Take digital economy as an example, in 2023, the size of digital economy in China exceeded RMB 53.9 trillion, accounting for 42.8% of the GDP, an increase of 1.3% year on year. The percentage contribution of the digital economy to GDP growth reached 66.45%. From 2019 to 2023, the overall percentage contribution of TFP to economic growth is estimated at 43.2%, while the contribution of the digital economy accounts for 22.5% of the increase in TFP.<sup>7</sup>

Moreover, new quality productive forces have facilitated the optimization and upgrading of the economic structure. In 2023, the value-added of industrial enterprises above designated size increased by 4.6% compared with 2022, of which the annual growth

rates of value-added of equipment manufacturing and high-tech manufacturing were 6.8% and 7.4%, respectively. In particular, the value-added of semiconductor equipment manufacturing, spacecraft and rocket manufacturing, and aircraft manufacturing grew by 31.5%, 23.5%, and 10.8% over the same period. In the first half of 2024, the value-added of high-tech manufacturing enterprises above designated size increased by 8.7% year-on-year, with the output of smart products such as 3D printing equipment, service robots, and smart watches growing by 51.6%, 22.8%, and 10.9%, respectively.

In addition, new quality productive forces have played a significant role in promoting the green economy and sustainable development. In 2023, the output of new energy vehicles, solar panels, and automotive lithium-ion batteries—known as the "new trio"—increased by 30.3%, 54.0%, and 22.8% respectively year on year, and the export volume of these products increased by 29.9%.

It is important to note that the equipment manufacturing, particularly high-tech manufacturing, still accounts for a relatively modest proportion of the total value-added of industrial enterprises above designated size. In 2023, the value-added of equipment manufacturing and high-tech manufacturing accounted for only 33.6% and 15.7% of the total value added of industrial enterprises, respectively. Meanwhile, the value added of the information transmission, software, and information technology services accounted for only 8.02% of the total value added of the service sector.

### 2.2.2 Challenges Facing the AI and Semiconductor Industries

In recent years, China has made significant progress in the fields of artificial intelligence (AI) and the semiconductor industry, attracting global attention. However, several challenges remain.

First, China's capacity for independent innovation in AI and semiconductor technologies is somewhat limited.

In 2023, China's core AI industry grew by 13.9%, reaching a total of RMB 578.4 billion. The adoption rate of generative AI in enterprises reached 15%, with a market size of approximately RMB 14.4 trillion. However, China's progress in AI is more concentrated

on the application level, rather than in foundational areas such as core algorithms, chip design, and deep learning frameworks, where China still relies heavily on foreign technologies. Moreover, although China has accelerated its progress in chip design and manufacturing, it has yet to achieve breakthroughs in chip manufacturing at 5 nm and below process nodes.

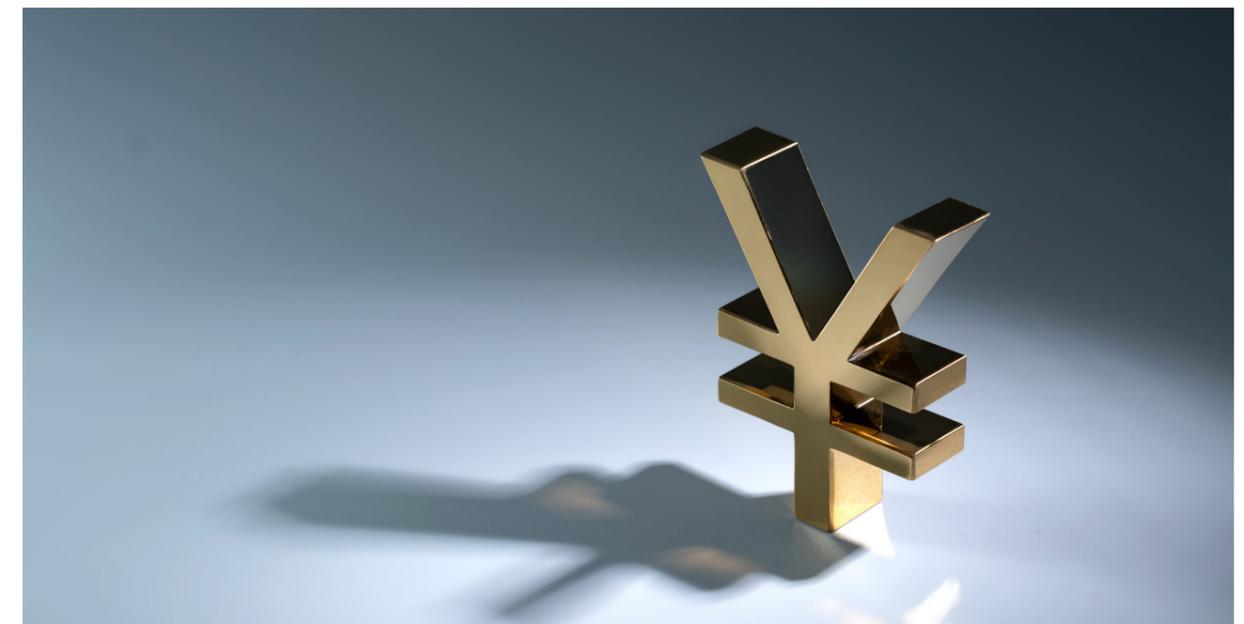
Secondly, geopolitical uncertainty continues to present challenges to China's AI and semiconductor industries. The current trade tension between China and the United States, along with export controls, have restricted Chinese enterprises to access to cutting-edge technologies and equipment. This has hindered China's ability to catch up and narrow the gap with major advanced economies.

### 2.2.3 Impact of the New Round of Underutilized Resources on the Development of New Quality Productive Forces

Given the current weak overall demand, an overemphasis on investment in the creation of excessive capacity which would ultimately undermine China's efforts to cultivate new growth drivers.

Based on capacity utilization rates, which reflect the status of production capacity, China's industrial capacity utilization for 2023 saw a gradual increase from 74.3% in Q1 to 75.9% in Q4. However, these levels remain relatively low in comparison to historical averages since 2016.

In the energy sector, China is experiencing significant imbalances between supply and demand in areas such as photovoltaic products and lithium-ion batteries. For example, the capacity utilization rate in the silicon wafer industry fell from 78% in 2019 to 57% in 2022. Meanwhile, the supply of automotive lithium-ion batteries was nearly twice the magnitude of domestic demand. By 2024, production capacity is projected to reach 4,800 GW while domestic demand is expected to be only 1,200 GW. This indicates that 75% of production will be dependent on exports. These imbalances undermine corporate liquidity, limiting their ability to invest in technological upgrades, and ultimately impeding the development of higher-quality, more innovative industries.



<sup>7</sup> Data Source: Annual Report on the Development of China's Digital Economy 2024, China Academy of Information and Communications Technology, page 24.

## 2.3 Insufficient Domestic Demand and Its Management: Adjusting Old Growth Drivers

### 2.3.1 Overview

In the third quarter of 2024, China's economy expanded at a lower-than-expected 4.6% year on year. It seems that the era of a rapid investment growth is no longer possible, as the financial system is not able to sustain the rapid credit expansion that has been the feature of the past decade. While there have been indications of recovery in fixed asset investment since the onset of the pandemic, growth rates remain below those recorded prior to the crisis. In 2023, fixed asset investment grew by just 3%, 2.4 percentage points below the 2019 level. The first three quarters of 2024 saw a 3.4% increase, but remained 2.0 percentage points lower than the same period in 2019.

In the first three quarters of 2024, China's three main drivers of fixed asset investment, manufacturing, infrastructure, and property, grew at 9.2%, 4.1%, and -10.1%, respectively. Notably, since 2021, manufacturing investment has outpaced both property and infrastructure, becoming the main driver of growth. However, this growth has not been sufficient to offset the overall decline, particularly the decline in property investment.

In China, household consumption makes up 53% of GDP, which is below the global average of over 70%. This is due to the combination of slow income growth and stark wealth inequality. While total retail sales of consumer goods increased by 7.2% in 2023, the rate remained below the levels prior to the pandemic in 2019. Since April 2022, the consumer confidence index has remained below 90 (with 100 being neutral), reflecting widespread concerns about the economic prospects. In September 2024, retail sales growth was merely 3.2%, accompanied by a notable decline in consumer confidence to a record low. The high unemployment rate, particularly the youth unemployment rate for 16-24 (excluding students), which reached 17.6% in September 2024, has further dampened consumer spending.

China's weak domestic demand is also reflected in its sluggish credit growth. After the pandemic, growth of narrow money supply (M1), an indicator of investment sentiment, fell to 1.3% in December 2023 from 4.4% in 2019, and subsequently reached a record low of -7.4% in September 2024. Broad money supply (M2) growth peaked in early 2023 at 12.9%, before declining to 6.8% in September 2024. The significant discrepancy between M2 and M1, more than 14%, indicates a lackluster business environment and an increase in precautionary savings. Total social financing (TSF) growth also fell to 8.0% in September. This was due to the slight increase in government debt financing being unable to compensate for the lack of credit demand from businesses and households.

The first three quarters of 2024 saw a number of factors that gave rise to concerns. The year-on-year growth of total retail sales continued to decline, with multiple cities such as Beijing and Shanghai experiencing negative growth. Insufficient investment demand and weak consumer purchasing power have resulted in a decline in credit demand.

### 2.3.2 The profound impact of China's property market downturn

Since mid-2021, China's property market has undergone a three-year period of adjustment, leading to declines in property investment and government-led spending. In 2023, property development investment, floor space, and sales of commercial buildings all saw a decline, with figures from the National Bureau of Statistics showing a 9.6%, 8.5%, and 6.5% reduction, respectively. Concurrently, the inventory of unsold commercial and residential space rose by 19% and 22.2%. Property developers have experienced challenges with liquidity, with investment down by 13.6% in 2023 and deteriorating further in early 2024. Major developers such as Evergrande have defaulted on their bonds, and have even filed for bankruptcy protection in the U.S.

The property downturn has led to a sharp decline in local governments' revenue from selling land use rights, which typically accounts for over 80% of their fiscal revenue. In 2023, government-managed funds revenue decreased by 9.2%, while revenue from selling land use rights declined by 13.2%. In the first three quarters of 2024, the two figures deteriorated further, reaching 22.5% and 24.6%, respectively. As revenue from selling land use rights declines, local governments are cutting expenditures, which has an indirect impact on employment, household incomes, and business profits. This has, in turn, led to a decline in private sector spending and an unfavorable outlook for the overall economy.

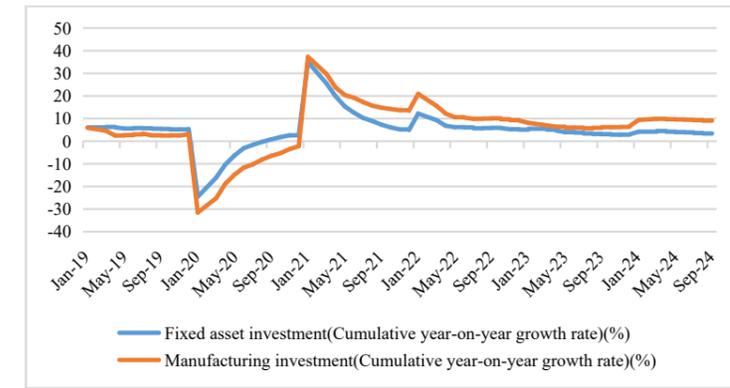
### 2.3.3 Government policies to stimulate domestic demand

The Chinese government has implemented measures to boost domestic demand in the post-pandemic era. In early 2024, the Ministry of Finance set a ceiling of RMB 3.9 trillion for new local government special bonds, mainly for infrastructure projects. It also announced the issuance of RMB 1 trillion in ultra-long-term special treasury bonds to fund major national strategies, enhance security capabilities, and finance equipment upgrades and consumer product trade-ins.

Since early 2023, the People's Bank of China (PBoC) has undertaken three reductions in reserve ratios and reduced both short and medium-term benchmark policy rates to lower loan prime rates (LPR). Additionally, structural monetary instruments have been employed, including targeted lending for scientific and technological innovation. In order to provide support to the property market, which was experiencing difficulties, the PBoC lowered the minimum down payment ratios, eliminated the mortgage floor rates, and reduced the personal housing loan interest rates.

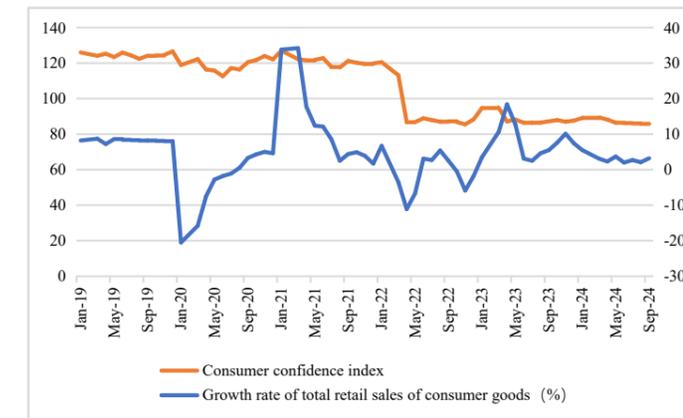
At a meeting of the Political Bureau of the Communist Party of China (CPC) Central Committee on September 26th, officials called for stronger counter-cyclical adjustments in fiscal and monetary policy. A series of new policies were introduced with the objective of stabilizing the property market and revitalizing the capital markets. These measures are expected to help bolster China's economy in the fourth quarter.

Fig. 2-5. Growth rates for fixed asset investment and manufacturing investment (2019-2024)



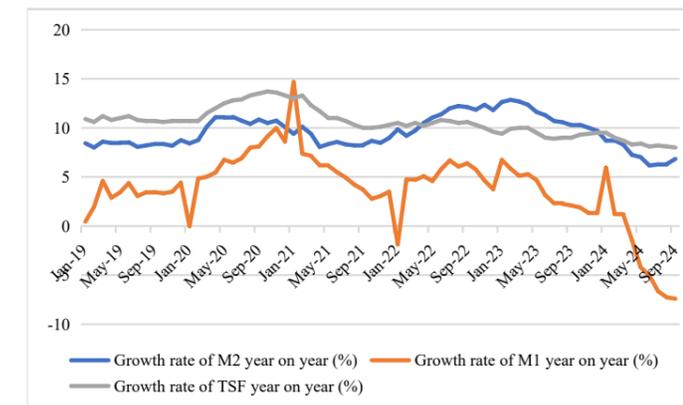
Data Source: National Bureau of Statistics

Fig. 2-6. Consumer confidence index and growth rates of total retail sales (2019-2024)



Data Source: National Bureau of Statistics, CSMAR

Fig. 2-7. Growth rates of M1, M2 and total social financing stock (2019-2024)



Data Source: PBoC

## 2.4 External Environment: Key Variables in Shifting Growth Drivers

### 2.4.1 Contribution of External Demand to China's Economic Growth

Net exports of goods and services have been a key driver of China's real GDP growth, albeit with high volatility. As shown in Figure 2-8, in terms of share, the contribution of net exports has exhibited considerable variations in terms of its share, peaking at 25.3% in 2020, declining to -11.4% in 2023, and subsequently rebounding to over 40% in 2024 Q3. In terms of real contribution, net exports contributed 1.9 points to GDP growth in 2021, but this fell to 0.6-0.8 points in the first half of 2024, before surging to 2.0 points in 2024 Q3. While net exports remain a vital growth driver, uncertainties in external demand remains. In order to sustain economic growth, China is suggested to pursue a strategy of diversification, focusing on stimulating domestic demand, facilitating industrial upgrading, and fostering innovation.

### 2.4.2 Highlights and Concerns of External Demand for 2023-2024

China's exports of diverse product categories have shown a multifaced trend, encompassing both expansion and contraction. In 2023-2024, 23 product categories under the HS 2-digit classification, including nickel products, ships, and vehicles, saw average export growth exceeding 20% (Table 2-1). Conversely, China saw a negative growth in exports of 28 product categories, including furs, chemicals, ceramic, and fertilizers, indicating challenges associated with weakening external demand (Table 2-2).

With regard to the regional distribution of China's bilateral merchandise trade, a contraction has been observed in the case of the United States and the European Union, whereas an expansion has been noted in the context of trade with neighboring countries and economies associated with the Belt and Road Initiative (BRI). From 2023 to the first three quarters of 2024, export values increased primarily with BRI countries, although some regional economies saw a decline. In the first three quarters of 2024, China's exports to the United States increased by 2.8% year-on-year, while imports increased only by 0.7%. There was a 0.9% increase in exports to the EU27, accompanied by a 3.9% reduction in imports. ASEAN remained China's largest trade partner, with trade increasing by 7.4%, accounting for 15.9% of total trade. Trade with BRI countries exhibited a 6.3% growth rate.

## 2.5 Overview of the Hong Kong Economy

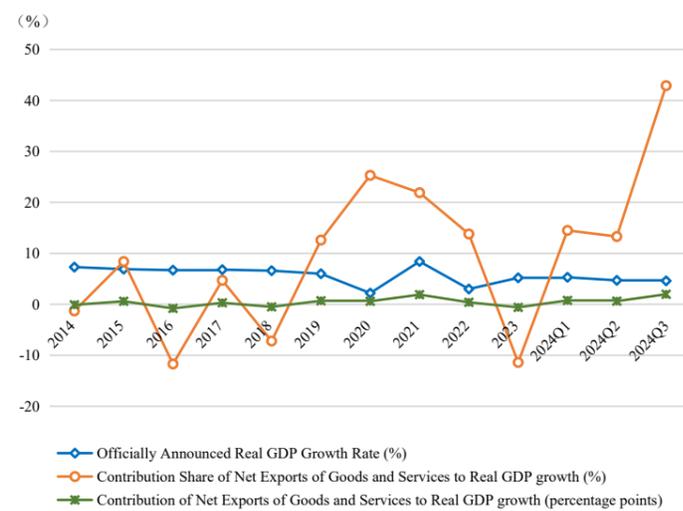
Hong Kong plays a vital role as a link between mainland China and international markets, functioning as a principal global hub for finance, trade, and shipping.

### 2.5.1 Hong Kong's Growth Prospects

Despite external shocks, Hong Kong has achieved overall growth and a rapid recovery. From 2005 to 2023, Hong Kong's GDP (in constant prices) showed an upward trend, as in Figure 2-9. The global financial crisis resulted in a negative GDP growth rate in 2009, yet a rapid rebound was observed in 2010, with a year-over-year growth of nearly 6.8%, reflecting the resilience and vitality of the economy.

Since then, the economy has maintained stable growth until 2019-2020, when external uncertainties, such as the COVID-19 pandemic, resulted in a year-over-year -6% growth in GDP in 2020. As the

Fig. 2-8. Contribution of Net Exports of Goods and Services to Real GDP growth



Note: The real GDP growth rate is calculated at constant prices. Contribution Share (%) refers to the ratio of the increase in net exports of goods and services to the increase in constant price GDP using the expenditure approach. Contribution (percentage points) refers to the real GDP growth rate multiplied by the contribution share of net exports of goods and services.

Table 2-1. Export Value Growth of China's HS 2-Digit Product in 2023 and Q1-Q3 2024: Top 10 Products with Consecutive Positive Growth

Rank	HS 2-digit Code	HS 2-digit Product Name	Average Growth Rate	Year-on-Year Growth Rate in 2023	Year-on-Year Growth Rate in 2024
1	75	Nickel and articles thereof	58.07%	28.71%	87.42%
2	89	Ships, boats and floating structures	43.46%	21.41%	65.52%
3	87	Vehicles; other than railway or tramway rolling stock, and parts and accessories thereof	21.25%	29.06%	13.44%
4	22	Beverages, spirits and vinegar	17.65%	27.36%	7.95%
5	08	Fruit and nuts, edible; peel of citrus fruit or melons	16.96%	8.33%	25.58%
6	17	Sugars and sugar confectionery	14.21%	17.62%	10.81%
7	24	Tobacco and manufactured tobacco substitutes; products, whether or not containing nicotine, intended for inhalation without combustion; other nicotine containing products intended for the intake of nicotine into the human body	12.42%	22.20%	2.65%
8	02	Meat and edible meat offal	11.42%	0.60%	22.25%
9	07	Vegetables and certain roots and tubers; edible	10.68%	8.54%	12.83%
10	71	Natural, cultured pearls; precious, semi-precious stones; precious metals, metals clad with precious metal, and articles thereof; imitation jewellery; coin	9.19%	5.25%	13.13%

Data Source: Calculated based on import and export data from the General Administration of Customs of the People's Republic of China.

Table 2-2. Export Value Growth of China's HS 2-Digit Product in 2023 and Q1-Q3 2024: Top 10 Products with Consecutive Negative Growth

Rank	HS 2-digit Code	HS 2-digit Product Name	Average Growth Rate	Year-on-Year Growth Rate in 2023	Year-on-Year Growth Rate in 2024
1	43	Furskins and artificial fur; manufactures thereof	-40.54%	-31.82%	-49.26%
2	38	Chemical products n.e.c.	-22.12%	-31.05%	-13.19%
3	28	Inorganic chemicals; organic and inorganic compounds of precious metals; of rare earth metals, of radio-active elements and of isotopes	-18.57%	-12.31%	-24.83%
4	69	Ceramic products	-15.60%	-15.48%	-15.71%
5	31	Fertilizers	-14.74%	-14.45%	-15.04%
6	51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric	-14.67%	-8.25%	-21.09%
7	46	Manufactures of straw, esparto or other plaiting materials; basketware and wickerwork	-14.53%	-16.73%	-12.32%
8	50	Silk	-14.41%	-14.02%	-14.80%
9	13	Lac; gums, resins and other vegetable saps and extracts	-13.70%	-15.57%	-11.82%
10	68	Stone, plaster, cement, asbestos, mica or similar materials; articles thereof	-13.23%	-12.80%	-13.66%

Data Source: Calculated based on import and export data from the General Administration of Customs of the People's Republic of China.

pandemic eased from 2021 to 2023, economic downward pressures lessened, and growth rates recovered, leading to a gradual recovery.

According to the forecast by the International Monetary Fund (IMF), Hong Kong's real GDP growth rate is estimated to reach 2.9% by 2024<sup>8</sup>. The Hong Kong government has projected (in its Budget for Fiscal Year 2024-2025) an average annual real growth rate of 3.2% from 2025 to 2028<sup>9</sup>. Despite these optimistic forecasts, Hong Kong continues to confront challenges from intricate international political landscape and the pressures associated with its economic transformation.

### 2.5.2 Economic Highlights of Hong Kong in the Past Year

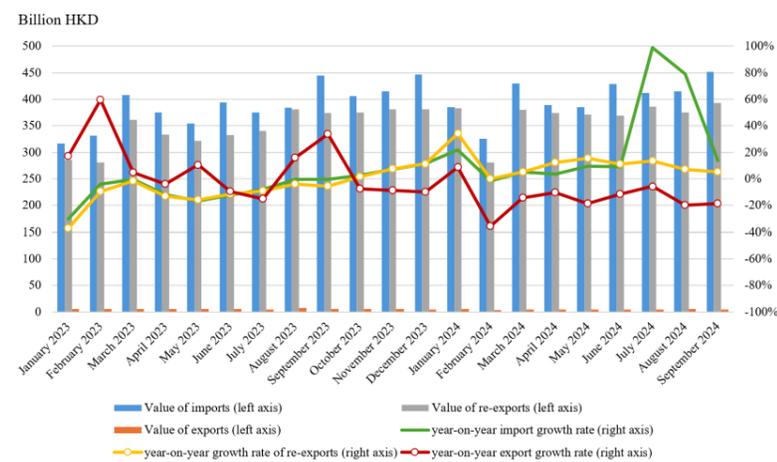
Hong Kong has further consolidated its role as a major global trade hub and international business center. According to the Hong Kong's Commerce and Economic Development Bureau, Hong Kong is the world's tenth largest merchandise trading economy and the 21st largest commercial services economy in the world in 2023<sup>10</sup>. This places Hong Kong at the forefront of global trade markets, offering significant advantages to businesses. Hong Kong's trade structure is predominantly driven by imports and re-exports, both of which have

Fig. 2-9. GDP Level and Growth Rate of Hong Kong, 2005–2023



Data Source: Calculated by the author based on World Bank WDI database indicators.

Fig. 2-10. Hong Kong's Merchandise Trade Performance, January 2023 – September 2024



Note: Re-exported goods refer to products that were imported into Hong Kong from abroad but were not subject to any manufacturing processes in Hong Kong that would permanently and materially alter their basic raw materials' shape, nature, structure, or utility<sup>11</sup>.

Data Source: Calculated by the author based on data released by The Hong Kong Trade and Industry Department.

<sup>8</sup> Data Source: IMF, October 2023, World Economic Outlook, <https://www.imf.org/en/Publications/WEO/Issues/2023/10/10/world-economic-outlook-october-2023>.  
<sup>9</sup> Data Source: The Financial Secretary of Hong Kong Special Administrative Region of the People's Republic of China, February 28, 2024, Budget for the Fiscal Year 2024-2025, <https://www.budget.gov.hk/2024/sim/speech.html>.  
<sup>10</sup> Data Source: Commerce and Economic Development Bureau, The Government of the Hong Kong Special Administrative Region of the People's Republic of China, <https://www.cedb.gov.hk/sc/trade-and-investment/hong-kong-in-global-trade.html>.  
<sup>11</sup> Data Source: Census and Statistics Department, The Government of the Hong Kong Special Administrative Region of the People's Republic of China, "Hong Kong External Merchandise Trade Statistics", December 30th 2020, <https://www.censtatd.gov.hk/sc/EIndexbySubject.html?pcode=B8XX0024&scode=230>.

shown persistent growth since October 2023. As shown in Figure 2-10, from January 2023 to September 2024, imports accounted for over 50% of the total trade, re-exports contributed nearly 50%, and direct exports were less than 1%. These statistics highlight that Hong Kong is more of an international trade hub rather than a production base.

Hong Kong has long been an important global financial center and a key investment hub. As one of the world's most advanced economies, it excels in both inward and outward foreign direct investment (FDI). According to World Investment Report 2024 published by the UNCTAD, Hong Kong attracted a \$112.7 billion FDI inflow in 2023, making it the world's fourth-largest investment destination, only after the United States, mainland China, and Singapore. In the same year, Hong Kong's total outward FDI was \$104.3 billion, ranking fifth in the world, preceded by only the United States, Japan, mainland China, and Switzerland<sup>12</sup>.

### 2.5.3 Hong Kong's Status as A Global Financial Center

As one of the world's leading international financial centers, Hong Kong is renowned for its sophisticated and well-developed financial market, sound legal framework, skilled financial professionals, favorable tax policies, and highly internationalized and open environment. These factors have reinforced its role as an important bridge connecting mainland China with the global capital markets<sup>13</sup>.

Hong Kong has consistently ranked fourth globally and second in Asia in the Global Financial Centers Index, behind New York, London, and Singapore. As shown in Table 2-3, despite slight fluctuations in ranking, Hong Kong remains one of the world's leading financial centers and, along with Singapore, forms the central hub of Asia's financial sector. According to the WTO, in terms of balance of payments (BoP) statistics, Hong Kong's financial services exports reached \$25.6 billion in 2023, ranking seventh in the world and accounting for about 26% of the total commercial services exports. In the same year, imports of financial services amounted to \$8 billion, ranking twelfth globally and accounting for about 10% of the total imports of trade in commercial services.

Table 2-3. Annual Changes in Hong Kong's Global Financial Center Index Ranking, March 2016 – September 2024

Time Period	Global Ranking	Change of the Ranking
March 2016	4	—
September 2016	4	0
March 2017	4	0
September 2017	3	+1
March 2018	3	0
September 2018	3	0
March 2019	3	0
September 2019	3	0
March 2020	6	-3
September 2020	5	+1
March 2021	4	+1
September 2021	3	+1
March 2022	3	0
September 2022	4	-1
March 2023	4	0
September 2023	4	0
March 2024	4	0
September 2024	3	+1

Data Source: Global Financial Centers Index Report jointly released by Z/Yen Group, a UK think tank, and the China (Shenzhen) Comprehensive Development Research Institute.

<sup>12</sup> Data Source: UNCTAD, Annex of World Investment Report 2024, June 20th 2024, <https://unctad.org/topic/investment/world-investment-report>.  
<sup>13</sup> Data Source: The State Council of the People's Republic of China, "Hong Kong: A 'Super Connector' and 'Super Value Creator'—Hong Kong's Active Promotion of High-Level Openness", August 8th 2024, [https://www.gov.cn/yaowen/liebiao/202408/content\\_6967324.htm](https://www.gov.cn/yaowen/liebiao/202408/content_6967324.htm).

# Chapter 3 Green Finance

As climate change worsens, global demand for green finance has surged, gaining widespread recognition from both the public and private sectors. Green finance has become a cornerstone of sustainable development, driven by technological innovation, supportive policies, and growing investor interest. The urgency to address climate change has further accelerated this growth, driving demand for clean energy and environmental projects. This expansion is being supported by stricter national regulations and legislation that increase transparency and boost investor confidence. Green finance is also expanding its reach into emerging economies, addressing critical issues such as climate change, biodiversity conservation, and pollution control. This chapter provides key insights into the evolution of international green finance, assessing global successes and challenges in its development.

## 3.1 Global Green Finance: Current Landscape and Future Outlook

In the year 2023, the pace of innovation in global green finance accelerated markedly. Governments, financial institutions, and corporations around the world intensified their efforts to promote green finance as part of the broader effort to combat climate change, thereby providing vital support to global sustainability objectives.

Following a temporary decline in 2022, the global green bond market demonstrated a resurgence in 2023. Concurrently, the green loan market has continued to demonstrate substantial growth since 2021. The European Union Emissions Trading System (EU-ETS), the world's largest carbon market, continued to exert a significant influence on the development of carbon pricing mechanisms. Meanwhile, the introduction of China's carbon market marked a milestone in the evolution of global carbon trading.

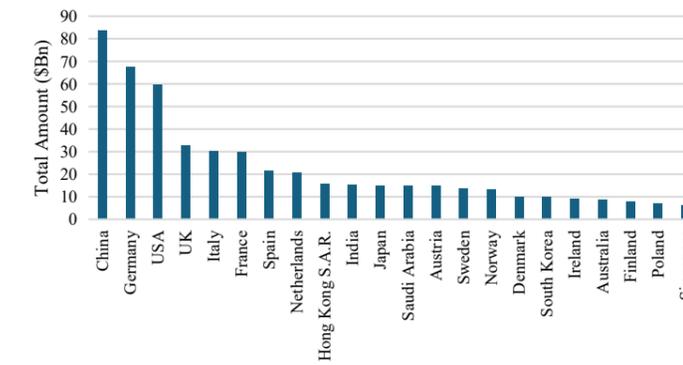
This chapter examines the most recent developments influencing the green finance sector, providing a comprehensive overview of the evolving landscape of green financial instruments. Furthermore, it analyses recent international policies and mechanisms, and provides forecasts for the future trajectory of the green finance market. The following section will examine the performance of key green financial instruments, namely green bonds, green loans and carbon markets, between year 2021 and 2023. Furthermore, this section will analyze the impact of significant green policies implemented by countries and regions during this period on the future of green finance.

### 3.1.1 Global Green Bonds

Green bonds, the most established and widely adopted financial product in the green finance sector, continue to exert a dominant influence on the market. Since 2020, there has been a notable increase in the issuance of green bonds, with 2023 demonstrating a sustained level of activity in this regard. As reported by the Climate Bonds Initiative (CBI), global green bond issuance in 2023 approached USD 587.7 billion, with 819 issuers by 96 countries. The leading issuers were China, Germany, and the United States. Notably, China surpassed the United States in 2022 to become the world's largest green bond issuer.

Following a contraction in 2022, the global green bond market demonstrated a robust recovery in 2023, despite the prevailing economic and financial uncertainty. Europe accounted for the majority of issuance, with 52.7% of the global total. North America accounted for 11%, while the Asia-Pacific region accounted for 32.4%. Latin America made a modest contribution of 0.8%.

Fig. 3-1. Green Bond Issuance by Country



Data Source: Climate Bonds Initiative

Fig. 3-2. Green Bond Issuance in Emerging and Advanced Markets

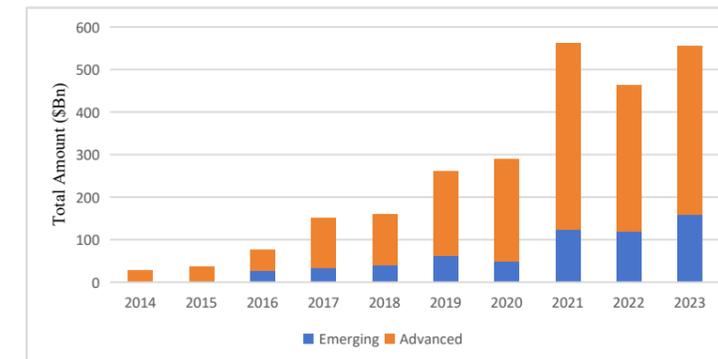
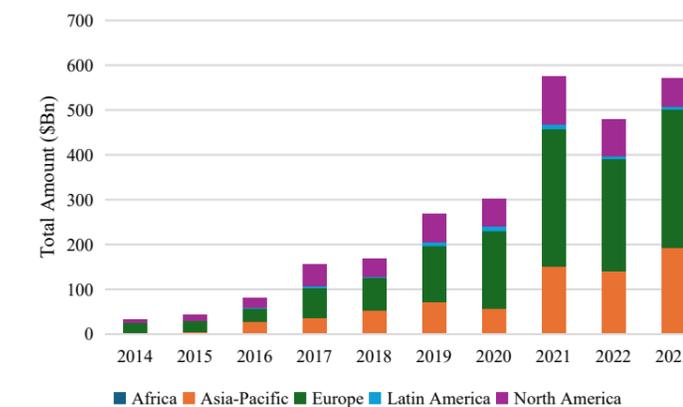


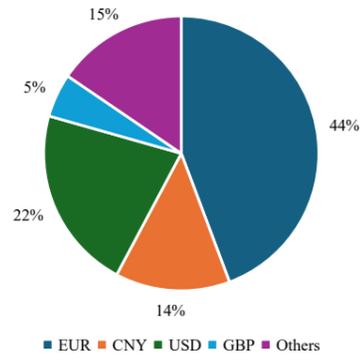
Fig. 3-3. Global Green Bonds Issued by Region



Data Source: Climate Bonds Initiative

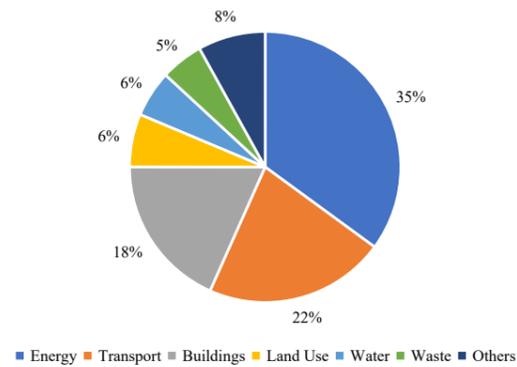


Fig. 3-4. Currency Composition of Newly Issued Global Green Bonds in 2023



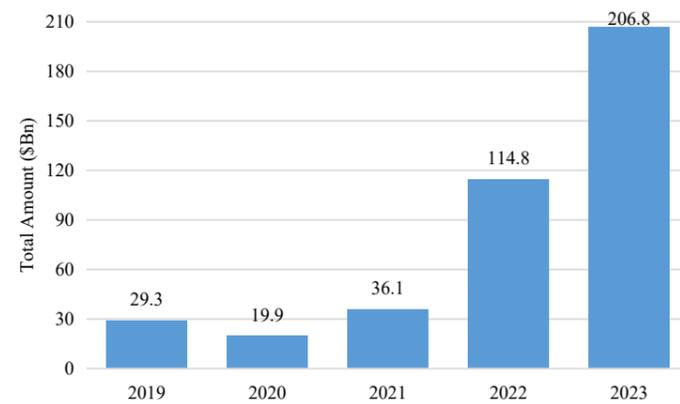
Data Source: Climate Bonds Initiative

Fig. 3-5. Sectoral Distribution of Green Bonds Issued in 2023



Data Source: Climate Bonds Initiative

Fig. 3-6. Time Trend of Global Green Loan Issuance



Data Source: Environmental Finance Database



With regard to the composition of currencies, the euro was the dominant currency in the market during the course of 2023, accounting for 47% of new issuances. This was followed by the U.S. dollar at 23% and the Chinese yuan at 14%.

In examining the distribution of funds across industry sectors, it is observed that 35% of the total capital raised through green bonds in 2023 was allocated to the energy sector, with 22% directed towards the transportation sector and 18% to the building sector.

### 3.1.2 Global Green Loans

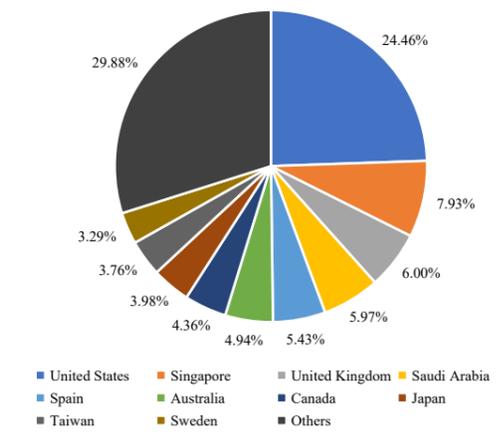
Green loans represent a significant development in global green finance, comprising financial instruments specifically designed to fund or refinance environmentally sustainable projects. These loans are typically directed towards initiatives pertaining to a range of environmental concerns, including clean energy, emissions reduction, ecological preservation, low-carbon transportation, pollution control, and the development of renewable energy sources. As one of the first practices in green finance, green loans have become a prominent feature of the global financial landscape.

In 2018, the International Capital Market Association (ICMA) introduced the Green Loan Principles, which provided a framework for the allocation of loan proceeds, project evaluation and selection, fund management, and transparency. Additionally, numerous countries have established their own green loan standards, which have led to the emergence of diverse, region-specific green loan markets.

The global green loan market demonstrated sustained growth in 2023. As reported by the Environmental Finance Database, global green loan issuances reached a record high of USD 206.8 billion, representing an approximately 80% increase from 2022. While the Asia-Pacific region was the leading issuer in 2021, Europe overtook it in 2022. In 2023, North America became the largest market for green loans in terms of issuance volume.

Bloomberg's green loan data for 2023 indicates that the United States accounted for approximately 24.5% of the global market, with Singapore and the United Kingdom representing 7.9% and 6%, respectively. Additionally, Saudi Arabia and Spain demonstrated a notable presence in the market, collectively accounting for over 5% of global activity.

Fig. 3-7. Regional Composition of Global Green Loan Issuance in 2023



Data Source: Bloomberg

In terms of sector allocation, approximately 33% of green loans issued in 2023 were directed towards the energy sector, 26% to utilities, 18% to financial services, and 7% to the industrial sector. This distribution is in close alignment with the guidelines set out in the Green Loan Principles.

China, a global leader in green lending, witnessed the accumulation of over RMB 30 trillion in green loans across both domestic and foreign currencies by the conclusion of 2023. This represented a year-on-year growth of over 36%. In early 2024, China published the Green and Low-Carbon Transformation Industry Guideline (2024 Edition), which introduced new provisions to provide support for low-carbon initiatives. This was further reinforced by the Opinions on Accelerating the Comprehensive Green Transformation of Economic and Social Development, issued by the State Council on July 31, 2024. The policy encourages banks to prioritize green lending while urging local governments to promote green finance through the implementation of financing guarantee mechanisms.

### 3.1.3 Carbon Markets

Carbon markets represent a crucial instrument in the global endeavour to regulate and diminish greenhouse gas emissions. These markets operate through two principal mechanisms: carbon allowance markets and voluntary carbon offset markets. In the context of allowance markets, governments or international bodies establish a cap on emissions and subsequently allocate allowances to companies or countries. The trading of these allowances provides a financial incentive for companies to reduce their emissions. In contrast, voluntary carbon markets facilitate the purchase of carbon credits by businesses and individuals for the purpose of offsetting their emissions. These credits are typically generated by certified environmental projects, including renewable energy initiatives and reforestation efforts.

The establishment of transparent pricing signals and effective market mechanisms enables carbon markets to facilitate emission reductions, supports the achievement of climate goals and accelerates the development of green technologies and sustainable projects.

#### (1) Carbon Allowance Markets

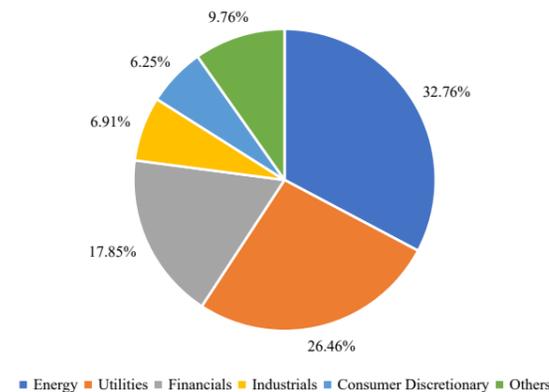
Carbon allowance markets, which are based on emissions trading schemes (ETS), have been developed with the objective of regulating emissions and facilitating the trading of allowances. This approach encourages companies to reduce their greenhouse gas emissions. The European Union Emissions Trading System (EU-ETS) represents the largest carbon market in the world, encompassing the EU's key industrial and energy sectors. The EU-ETS was launched in 2005 and has undergone several reforms. By 2023, it encompassed approximately 45% of the EU's total greenhouse gas emissions. In 2022, the EU-ETS facilitated trades amounting to approximately 670 million tons of carbon dioxide equivalent (tCO<sub>2</sub>e), with a market value exceeding €70 billion. The average price of allowances in 2023 was approximately €90 per ton of CO<sub>2</sub>.

In the United States, the California Cap-and-Trade Program, which was initiated in 2013, encompasses a significant proportion of the state's economy and is linked to the carbon market of Quebec, Canada. By 2023, the California market had reached a coverage of approximately 300 million tons of CO<sub>2</sub> emissions, with an average carbon price of \$30 per ton.

The development of carbon trading systems is progressing rapidly in emerging economies. China, which launched its national carbon market in 2021, now regulates approximately 4.5 billion tons of CO<sub>2</sub> emissions, thereby establishing itself as one of the largest carbon markets globally. In 2023, the Chinese market saw a trading volume of approximately 120 million tons of CO<sub>2</sub> equivalent, with the market price averaging ¥60 per ton (equivalent to approximately €8 per ton). The Carbon Emissions Trading Management Regulations, which were issued in May 2024, have established a legal framework for the Chinese carbon market. Plans for the future include the introduction of allowance auctions and the implementation of benchmark management systems.

Additionally, India is preparing to launch its compliance carbon market, which is anticipated to commence in 2026. This market will encompass not only CO<sub>2</sub> but also other greenhouse gases, including methane and nitrous oxide. Furthermore, countries such as Argentina, Brazil, and Vietnam are also exploring the implementation of carbon pricing mechanisms as part of their broader climate change strategies.

Fig. 3-8. Sectoral Composition of Global Green Loan Issuance in 2023



Data Source: Bloomberg

#### (2) Voluntary Carbon Markets

The voluntary carbon market provides corporations and individuals with the opportunity to purchase carbon credits, thereby offsetting their emissions. A carbon credit is typically defined as one ton of CO<sub>2</sub> that has been reduced or captured through certified projects. The veracity of these projects is confirmed through a variety of accreditation processes, including domestic voluntary programmes, international carbon mechanisms such as the Clean Development Mechanism (CDM), and third-party standards that are widely recognized, such as the Verified Carbon Standard (VCS) and the Gold Standard (GS). These mechanisms facilitate not only the reduction of emissions but also contribute to the advancement of sustainable development.

At the outset of the 2000s, voluntary carbon markets were relatively modest in scale and concentrated in specific sectors. However, they expanded rapidly in the subsequent decades, driven by a surge in corporate engagement. By 2023, global transactions in the voluntary carbon market had exceeded 500 million tons of CO<sub>2</sub> equivalent, with an estimated market value of approximately \$6 billion, thereby underscoring its growing significance.

## 3.2 Green Finance: China Practice

### 3.2.1 Introduction

Promoting green finance is a shared responsibility of the financial system and the ecosystem. As a major force in supporting the development of the green economy, green finance plays a crucial role in promoting economic growth and environmental protection in China. In the context of the green transformation of traditional industries, green finance has already become the most advanced trend in the development of the financial sector.

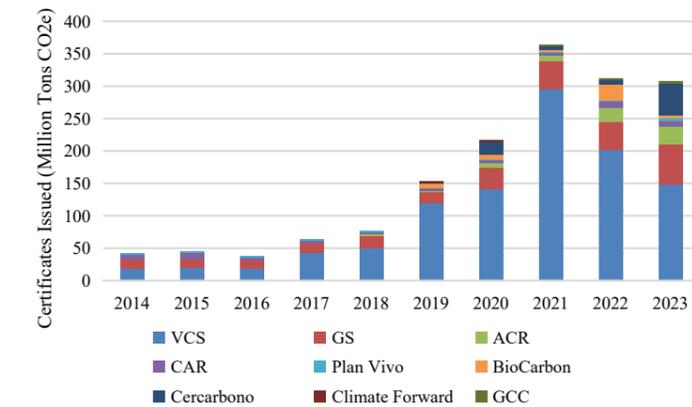
China's sustainable economic development hinges on the development of a green economy, the transition to a low-carbon economy, and the achievement of high-quality growth. With the increasing severity of climate change and the growing awareness of environmental protection, the 20th National Congress of the Communist Party of China proposed that "fiscal, taxation, financial, investment and pricing policies and standards systems will be improved to support green development". During the National Conference on Ecological and Environmental Protection, the

Fig. 3-9. Price Trends of Carbon Allowances in Major Global Carbon Markets



Data Source: International Carbon Action Partnership, ICAP

Fig. 3-10. Voluntary Carbon Offset Certificate Issuance



Data Source: Climate Focus Voluntary Carbon Market Dashboard

Chinese government emphasized the important role of green finance in realizing sustainable development and proposed the importance of innovation in green investment. This laid down basic guidelines for the development of green finance in China. China has launched pilot green finance zones, where financial institutions are given a variety of incentives to finance clean and low-carbon industries. The development of green finance is not driven by short-term policies or immediate gains, but requires long-term, sustained efforts. It is essential to achieve a balance between policy and market, risk and return, along with alignment with China and global standards.

In recent years, China has been striving to bring its economy into a new stage of high-quality development, in which green development is a high priority. China has made green finance an important part of its economic development strategy. Environmental problems have long been a major challenge to economic development. In the face of global climate change and environmental pollution, China needs to accelerate the construction of an ecological civilization and promote green development. Green finance is a key element in this process. As awareness of sustainable development continues to grow, traditional finance is no longer sufficient to meet the needs of environmental protection and economic growth. Developing green finance and promoting the development of green industries has become an urgent necessity for China to achieve high-quality development. Green finance has significant externalities, so it requires high level and deep government efforts throughout the implementation and innovation of rules and regulations. Moreover, the initiation and improvement of green finance-related policies can mobilize and motivate more social capital and international investment in green projects, discourage investment in traditional polluting industries, enhance effective risk management and promote sustainable economic growth. At the same time, the improvement of green finance standards has encouraged financial institutions to strengthen the innovation of green finance products and services, standardized the operation of the green finance market, and improved the transparency and credibility of the market.

### 3.2.2 Key Experiences in the Development of China's Green Finance

#### 3.2.2.1 Policy and Regulatory Frameworks

The development of China's green finance regulatory framework began in the early 21st century, with several notable milestones. The most important initial step was the publication of the "Opinions on the Implementation of Environmental Protection Measures to Prevent Credit Risks" in 2007. This document was issued jointly by environmental and financial regulators. This landmark policy was the first attempt by the Chinese government to establish a formal link between financial sector activities and environmental protection objectives, and laid a solid foundation for further integration of environmental risk management into financial practices.

Later in 2012, the (former) China Banking Regulatory Commission (CBRC) issued the 'Green Credit Guidelines', which required banks to integrate effective environmental sustainability considerations into their lending practices. The issuance of these guidelines signified a pivotal shift in the manner by which financial institutions allocate their resources, with a greater proportion of capital now directed towards green industries and projects that are aligned with environmentally friendly objectives.

In 2015, the Green Bond Issuance Guidelines further expanded the scope of green finance by establishing a regulatory framework for green bond issuance. In the following years, green bonds began

to flourish in China. These guidelines provided clear standards for projects eligible for green bond financing. They focus mainly on sectors such as clean energy, environmental protection, resource conservation, etc.. By introducing green bonds into China's burgeoning bond market, the issuance of these guidelines significantly improved the efficiency of financing green projects and contributed to the rapid growth of China's green bond market and the overall bond market.

In the following years, the concept of green finance gradually took shape in China. Key regulators, including the People's Bank of China (PBoC), the Ministry of Finance and the National Development and Reform Commission (NDRC), jointly issued the "Guidelines for Establishing a Green Financial System" in 2016. This comprehensive framework addressed multiple aspects of green finance, including green credit, green bonds, and green insurance, and aimed to facilitate the transition to sustainable development across various sectors of the financial industry. These guidelines highlighted the critical role of financial innovation in optimising resource allocation and promoting the development of green projects in China.

The framework was further strengthened in 2024 with the issuance of the "Guidelines on Strengthening Financial Support for Green and Low-Carbon Development". This document outlined the role of the financial sector in supporting China's goals of carbon peak by 2030 and carbon neutrality by 2060 (commonly referred to as "dual carbon" targets). It introduced key measures such as promoting the involvement of financial institutions in carbon accounting, enhancing the transparency of green project financing and encouraging the development of improved disclosure mechanisms. In addition, the guidelines emphasized the need for social capital and international capital to play a more active role in green financing.

Overall, China's green finance regulatory framework has gradually evolved from an initial focus on addressing environmental risks to supporting a more comprehensive system for green and low-carbon development goals that fits China's long-term development landscape. This evolution highlights China's ongoing efforts to align the development of the financial system with broader sustainability and climate change mitigation goals. Table 2-1 summarises the details of China's green finance policies.

#### 3.2.2.2 Green Bonds in China

The emergence of China's green bond market can be traced back to 2015, when Xinjiang Goldwind Science & Technology Co., Ltd. issued its first green bond on the Hong Kong Stock Exchange, marking a key moment in the Chinese government's efforts to use capital markets to support environmentally-oriented projects. The formal framework for green bonds was further defined later that year in September with the release of the "Overall Plan for the Reform of the Ecological Civilization System". This plan encouraged both financial institutions and enterprises to explore the issuance of green bonds, and promoted the securitisation of green credit assets.

In December 2015, the PBoC issued Announcement No. 39, which laid the regulatory foundation for green financial bonds by allowing financial institutions to raise capital specifically for green projects. This action marked the official establishment of China's regulatory regime for green bonds. Around the same time, the National Development and Reform Commission (NDRC) introduced the Green Bond Issuance Guidelines, which expanded the scope of green bonds to include corporate bonds. Corporate green bonds formally became an integral part of the capital market.

The development of green bonds accelerated in 2016 with the introduction of the 'Guidelines on Building a Green Finance System',

Table 3-1. China's Green Finance Related Policies

Classification	Year	Organization	Policy Document	Content Details
Core Documents on Green Finance	2015	Central Committee of the CPC, State Council	Ecological Civilization Reform Plan	First proposed the overall goal of establishing a green financial system, including promoting green credit, researching green stock indices and green bonds, and supporting green development funds.
	2016	People's Bank of China (PBoC), Ministry of Finance, National Development and Reform Commission (NDRC), and Other Ministries	Guidance on Building a Green Financial System	Clarified the key tasks and specific measures for constructing the green finance system, including developing green credit, green investments, and green insurance.
	2017	State Council	Green Finance Innovation and Reform Pilot Zone Overall Plan	Selected parts of Zhejiang, Jiangxi, Guangdong, and other provinces to construct pilot zones, exploring replicable and scalable green finance experiences.
	2020	Ministry of Ecology and Environment, NDRC, People's Bank of China (PBoC), and Others	Guidance on Promoting Climate Change Investment and Financing	Emphasized that climate investment and financing are essential components of green finance, requiring improved financial regulatory policies and the development of climate-friendly green financial products.
Early-stage Green Finance Policy Documents Focused on Green Credit	1995	People's Bank of China (PBoC)	Notification on Implementing Credit Policies and Strengthening Environmental Protection	Financial departments are required to focus on environmental protection in credit work.
	1995	State Environmental Protection Administration	Notification on Using Credit Policies to Promote Environmental Protection Work	Proposed that environmental departments should use credit policies to promote environmental protection.
	2004	Former China Banking Regulatory Commission (CBRC)	Notification on Further Strengthening Loan Risk Management	Required the banking industry to strictly approve loans for industries with overcapacity and high pollution and energy consumption ("two high" industries).
	2007	State Environmental Protection Administration, People's Bank of China (PBoC), CBRC	Opinion on Implementing Environmental Protection Policies and Regulations to Prevent Credit Risks	Called for coordinated efforts between environmental and credit management to promote pollution reduction and prevent credit risks.
	2007	CBRC	Guiding Opinions on Credit Work for Energy Conservation and Emission Reduction	Guided and supervised financial institutions in the banking industry to prevent risks associated with high energy consumption and high pollution, and to adjust and optimize credit structures.
	2013	Ministry of Environmental Protection, NDRC, People's Bank of China (PBoC), CBRC	Enterprise Environmental Credit Evaluation Measures (Trial)	Aimed to guide enterprises to continuously improve their environmental behaviors and fulfill their environmental protection duties and social responsibilities, promoting the construction of an environmental credit system.
	2015	CBRC, NDRC	Energy Efficiency Credit Guidelines	Encouraged financial institutions in the banking industry to actively carry out energy efficiency credit business, effectively preventing related risks, supporting industrial restructuring, and promoting energy conservation and emission reduction.

which positioned green bonds as an important financial tool for sectors such as renewable energy, pollution control and energy efficiency. These bonds became central to China's efforts to achieve its carbon peak and carbon neutrality targets, set for 2030 and 2060 respectively.

As the regulatory framework evolved, additional policies were gradually implemented to enhance market transparency and efficiency, ensuring the smooth operation of the green bond market. Both the Shanghai and Shenzhen stock exchanges launched pilot programmes for corporate green bonds, and the CSRC issued guidelines on corporate green bond issuance. In addition, the Interim Measures for the Evaluation and Certification of Green Bonds was introduced in 2017, setting clear standards for third-party evaluation and certification, thereby strengthening the credibility of green bond issuance.

An important update came in 2021 with the revision of the Green Bond Endorsed Project Catalogue. This revision introduced the Do No Significant Harm (DNSH) principle, bringing China's green bond framework more in line with international standards. The updated catalogue not only expanded the list of eligible projects, but also provided clearer guidelines on the environmental benefits required for project inclusion, thereby increasing the global recognition of China's green bond market. In 2021, China took an important step in joining international green finance initiatives by jointly publishing the Common Ground Taxonomy with the European Union. This taxonomy helped harmonise the classification of green economic activities between China and international markets, further integrating China's green bond standards with global best practices.

**Case Study: Green Bonds Issued by Chengdu Bank**

In March 2021, Chengdu Bank successfully issued RMB 3 billion of green financial bonds on the National Interbank Bond Market. The bonds, with a maturity of three years and an interest rate of 2.95%, were the first green financial bonds issued in Sichuan Province following the announcement of China's carbon peaking and carbon neutrality targets ("dual carbon" targets). Proceeds were used to support green carbon reduction projects, in line with China's strategic goals of sustainability and environmental improvement.

Chengdu Bank's green bond issuance strictly followed the guidelines of the Green Bond Endorsed Project Catalogue (2021 Edition) jointly issued by the People's Bank of China, the National Development and Reform Commission (NDRC) and the China Securities Regulatory Commission (CSRC). The funds were allocated to a range of projects, including new energy buses, waste-to-energy projects, solid waste recycling, wastewater treatment and urban water supply. These projects were selected not only for their environmental benefits, but also for their significant role in addressing pollution control, resource conservation and public health issues. All projects were independently assessed by third parties to ensure compliance with national and international green finance standards. Chengdu Bank emphasised transparency and the selection of high quality projects with clear environmental and social benefits.

The environmental impact of Chengdu Bank's green bond was significant. For example, the new energy bus project is expected to save 171,600 tons of standard coal per year and reduce carbon dioxide emissions by 336,400 tons. Similarly, the waste-to-energy project is expected to save 25,400 tons of standard coal per year, further reducing greenhouse gas emissions and promoting the use of clean energy. The solid waste recycling project is expected to recycle 35,000 tons of industrial waste per year, relieving pressure on landfills and promoting resource efficiency. The wastewater treatment project is expected to achieve annual reductions of 2,847 tons of biochemical

oxygen demand (BOD), 1,474.6 tons of chemical oxygen demand (COD), 1,971 tons of suspended solids, 222.65 tons of ammonia nitrogen, 292 tons of total nitrogen and 37.33 tons of total phosphorus, leading to significant improvements in water quality and public health. In addition, the Urban Water Supply Project is expected to provide 9.125 million tons of water annually, improving water supply efficiency and contributing to sustainable urban development.

From a financial perspective, Chengdu Bank's green bond also brought significant benefits. The bank capitalized on the strong demand for green financial instruments and secured long-term, low-cost funding for its green projects. This allowed Chengdu Bank to expand its financing channels while benefiting from more favorable terms compared to traditional financing options. Through this issuance, the bank not only supported its green credit initiatives, but also contributed to China's broader dual carbon goals. Chengdu Bank's leadership in green finance reflects a growing trend among Chinese financial institutions to prioritize sustainable finance and support the country's transition to a low-carbon economy.

**3.2.2.3 Transition Finance in China**

Carbon-neutral bonds are a relatively recent development in China's green finance market, introduced in 2021 to fund projects directly aimed at achieving carbon neutrality. These bonds are intended to support projects that reduce or offset carbon emissions, such as renewable energy development, carbon capture and storage (CCS), and energy efficiency improvements. Their issuance aligns with China's "dual carbon" goals of peaking carbon emissions by 2030 and achieving carbon neutrality by 2060. Unlike general green bonds, which can finance a broader range of environmental projects, carbon neutral bonds focus exclusively on initiatives that contribute to carbon neutrality.

Issuers of carbon neutral bonds are subject to strict reporting and monitoring requirements. These bonds require detailed disclosure of the environmental impact of the projects they finance, particularly in terms of carbon reduction or offset results. Third-party certification or verification is required to ensure that these projects meet established carbon reduction standards. This level of scrutiny helps build investor confidence in the environmental credentials of the bonds.

As China intensifies its efforts to reduce greenhouse gas emissions, carbon neutral bonds have quickly emerged as an important financial tool for financing decarbonization efforts. These bonds support a wide range of carbon reduction projects, including large-scale solar and wind power development and CCS technologies. By focusing on carbon neutrality, they contribute to China's broader environmental goals and facilitate the transition to a low-carbon economy. Carbon neutral bonds are regarded as essential to mobilize the capital needed to meet China's ambitious sustainability goals in key sectors such as energy, industry and transportation.

**Case: Carbon-neutral Bonds Issued by Hebei Iron and Steel Group**

In 2022, Hebei Iron and Steel Group, one of China's largest steel producers, successfully issued its first carbon-neutral corporate bond. Led by Caida Securities as the sole lead underwriter, this was the first carbon neutral corporate bond issued in Hebei Province. The bond was privately placed on the Shanghai Stock Exchange with an issue size of RMB 1.5 billion (approximately USD 215 million), a maturity of two years and a coupon rate of 3.68%. The funds raised will be used to support Hebei Iron and Steel Group's carbon neutral initiatives, specifically focusing on: (a) Waste Heat Recovery Projects: These projects aim to capture the excess heat generated during steel production processes and convert it into usable energy, thereby improving overall energy efficiency. (b) Waste Pressure

Power Generation Projects: These initiatives focus on using excess pressure from industrial operations to generate electricity, further supporting the company's sustainability goals. (c) Hydrogen Energy Development Projects: These projects explore the integration of hydrogen as a clean energy source in steel production, contributing to the reduction of carbon emissions.

The successful issuance of this carbon neutral bond plays a critical role in helping Hebei Iron and Steel Group strengthen its position as a green and low carbon leader in the steel industry. It provides the necessary financial resources to fund critical carbon reduction projects, supporting the company's goal of reaching peak carbon emissions by 2022, reducing emissions by 10% from peak levels by 2025, and reducing emissions by 30% by 2030. Ultimately, the Group aims to achieve full carbon neutrality by 2050. This issuance also reflects the broader green transformation in China's steel industry, where more companies are utilizing green financing tools to support their decarbonization efforts.

**3.2.2.4 Cases of Green Bond Innovations in China**

**ABS Case 1: Green Bond ABS Issued by State Power Investment Group**

In February 2021, the State Power Investment Corporation (SPIC) successfully issued its first batch of "carbon neutral" bonds, marking an important milestone in the development of green asset-backed securities (ABS) in China. The first issuance of 2021 green medium-term notes (carbon neutral bonds) had a total issue size of RMB 600 million, a maturity of two years and an interest rate of 3.4%. This bond was included in the ChinaBond Green Bond Index, further demonstrating its role as a high-quality green financial product. The funds raised were fully allocated to photovoltaic (solar) and wind power projects of Jilin Electric Power Co., Ltd, a subsidiary of SPIC. These projects, known for their significant carbon reduction benefits, contribute to the company's clean energy transition and support China's dual carbon goals of peaking carbon emissions by 2030 and achieving carbon neutrality by 2060. SPIC was established in 2015 and is one of China's three largest nuclear power developers and operators, as well as a state-designated demonstration enterprise for smart energy construction. Its business covers a wide range of energy sectors, including nuclear, thermal, hydro, wind and photovoltaic power. As one of the largest integrated energy companies in China, SPIC actively participates in and supports China's "dual carbon" goals, and is committed to achieving its own carbon-peak by 2023, well ahead of the national 2030 target. The issuance of this carbon neutral bond exemplifies SPIC's use of green financial instruments to support the country's carbon peak and carbon neutrality efforts. It highlights the company's ability to leverage financial innovation to contribute to national climate goals, and demonstrates the role that state-owned enterprises can play in advancing China's green financial agenda.

**ABS Case 2: Green Bond ABS Issued by BYD**

As a market leader in China's new energy vehicle (NEV) industry, BYD has employed a range of green asset-backed securities (ABS) issuance to finance its growth in the NEV sector. These green ABS issuances have played an instrumental role in facilitating BYD's business expansion and have made a substantial contribution to the advancement of green finance in China's automotive sector.

In 2018, BYD International Financial Leasing Co. Ltd. was the first entity in the market to issue a green auto finance ABS, raising RMB 3 billion. The proceeds from this ABS were utilized to promote and sell NEVs, thereby establishing an industry benchmark for the combination of the NEV sector and green finance in China. This

issuance marked a significant milestone, exemplifying the potential of green finance to accelerate the growth of the electric vehicle industry.

In 2021, BYD Auto Finance introduced a new financial instrument, the "Shengshi Rongdi 2021 Second Phase Green ABS," with an issuance size of RMB 2 billion. This ABS was noteworthy for being China's first personal auto mortgage loan green ABS to receive an international rating, attaining an AAA (EXP)sf rating from Fitch Ratings. The proceeds were allocated to finance NEV loans, with the underlying assets expected to reduce carbon emissions by 20,400 tons annually and save 15,300 tons of standard coal, according to third-party assessments. This issuance represented a substantial advance in the financing of BYD's NEV business and established a pioneering example of green ABS in the automotive sector.

In 2022, BYD Auto Finance continued its green financing strategy with additional green ABS issuances, though specific financial details were not fully disclosed. These issuances reinforced BYD's leadership in green auto finance and provided crucial funding for its NEV business, thereby further supporting the broader development of China's NEV industry.

In 2023, BYD Auto Finance issued the "Shengshi Rongdi 2023 First Phase Green ABS," with a total issuance size of RMB 6.2 billion. The ABS consisted of RMB 5.58 billion in senior securities (representing 90% of the total) and RMB 620 million in subordinated securities (representing 10% of the total). The senior tranche was assigned an AAA rating, had a coupon rate of 2.5%, and was set to mature on January 26, 2025. The underlying assets consisted of 86,514 individual auto loans, with a total outstanding principal of RMB 6.5 billion and an average interest rate of 2.23%. This issuance provided substantial financial support for BYD's NEV sales, further solidifying its position as a leader in green finance.

In 2023, BYD Auto Finance set a new record with the issuance of the "Shengshi Rongdi 2023 Third Phase Green ABS," which had an unparalleled issuance size of RMB 10 billion—the largest green auto loan ABS issuance in China's capital markets to date. The senior tranche amounted to RMB 9 billion, with a weighted average maturity of 0.67 years and a coupon rate of 1.96%. The issuance was met with considerable market recognition, as evidenced by subscription multiples exceeding two times. The entirety of the proceeds were allocated to NEV projects that were in compliance with the Green Bond Endorsed Project Catalogue (2021 version), thereby further exemplifying BYD's profound dedication to green finance and sustainable development.

BYD's issuance of multiple green ABS has not only provided crucial financial backing for the promotion of NEVs but has also played a pivotal role in advancing China's green finance development. These issuances are assisting China in achieving its carbon reduction and green economic transition objectives while simultaneously fostering financial innovation within the NEV industry. BYD's pioneering utilization of green ABS as a financing instrument serves to illustrate the company's pivotal role in the development of sustainable transportation and green finance in China.



## 3.3 Global Experiences and Case Studies in Green Finance Development

### 3.3.1 Policy and Regulatory Framework

Effective regulatory frameworks are indispensable for the growth of green finance. They provide clear guidelines that mitigate greenwashing and enhance transparency, thus fostering a conducive environment for the development of sustainable financial practices. Regulatory measures, including financial incentives such as tax breaks, serve to encourage private sector investments and foster market confidence.

#### Case Study: EU Green Taxonomy

In June 2020, the European Union implemented the Taxonomy Regulation, which provides a framework for directing investments towards environmental and climate goals. The regulation sets forth criteria for six key objectives, thereby enabling investors to identify sustainable opportunities. By 2023, it is estimated that 20% of corporate capital investments will have been aligned with the taxonomy, with over 60% alignment in the utility sector. Furthermore, the taxonomy has enhanced market transparency, as evidenced by the reporting of €2.5<sup>14</sup> trillion in capital investments by EU-listed companies by May 2024. The Leaders and Transition Indices have demonstrated robust market performance, with returns of 110%<sup>15</sup> and 116%<sup>16</sup>, respectively. These indices are focused on companies that adhere to green finance principles and EU Taxonomy compliance. In comparison to the STOXX 600 and MSCI ACWI, this outperformance is indicative of a growing market confidence in the investment potential of companies that are compliant with the Taxonomy Regulation. Moreover, in 2023, 90% of EU public entities referenced the taxonomy when issuing green bonds, thereby enhancing investor confidence and preventing the practice of "greenwashing."

### 3.3.2 Innovative Green Financial Instruments

#### Case Study: Green Investment Funds and ETFs

Green investment funds and exchange-traded funds (ETFs) represent a crucial element of the global sustainable finance ecosystem, offering investors a means of deploying capital into environmentally sustainable initiatives. These funds are primarily oriented towards sectors such as renewable energy, energy efficiency, and sustainable agriculture, all of which are of paramount importance in the transition to a low-carbon economy.

As of June 2024, the total assets in global sustainable funds were estimated to be approximately USD 3.1 trillion<sup>17</sup>, indicating a persistent demand for green investment products in the context of global market volatility. Europe continues to be the preeminent leader in sustainable fund assets, representing 84% of the global total. This

is largely attributable to regulatory frameworks such as the EU Green Taxonomy, which provide a robust foundation for sustainable finance initiatives. The United States accounts for 11% of global sustainable fund assets, representing a 7% year-on-year growth. In the Asia-Pacific region (excluding Japan), sustainable fund assets constitute 2% of the total, reflecting a steady commitment to renewable energy and low-carbon technologies. Canada, Japan, and Australia/New Zealand collectively represent 1% of the global market share.

It is noteworthy that Canada has experienced a remarkable 44% surge in assets compared to 2023. This exemplifies the country's robust momentum in its sustainable finance sector, which has been driven primarily by government initiatives, including the Canada Growth Fund (CGF) and the Clean Technology Investment Tax Credit. These initiatives have attracted private capital, which has in turn bolstered investments in clean energy and green technology.

Moreover, the global ESG ETF market has experienced a notable expansion, with assets increasing by 19%<sup>18</sup> from 2022 to November 2023. This reflects a growing preference for passive investment vehicles that align with ESG principles, a trend that is expected to further drive the market forward.

#### Case Study: Green Insurance

Green insurance offers financial security for projects that address climate risks. In regions such as the United States and Europe, it has facilitated the growth of renewable energy, energy-efficient infrastructure, and eco-friendly transportation. Additionally, green insurance has been adopted in emerging economies. For instance, India has implemented measures to safeguard investments in renewable energy, while Kenya has introduced a drought insurance program for farmers. Global insurance providers such as Allianz and AXA are active in high-risk sectors, including energy and agriculture. By 2029, the global green insurance market is projected to reach USD 346.88 billion<sup>19</sup>, which serves to underscore the growing influence of environmental regulations and frameworks.

### 3.3.3 Public-Private Partnerships (PPP) Driving Green Investment

The formation of public-private partnerships (PPPs) enables the private sector to provide funding for green infrastructure projects. This is achieved through the implementation of policies that offer support and mitigate risks, thereby enhancing the sustainability and efficiency of the projects.

#### Case Study: Climate Finance Partnership (CFP)

The Climate Finance Partnership (CFP) was established in 2018 with the objective of leveraging private capital for environmentally sustainable projects in developing economies. By 2023, the partnership had successfully secured \$673 million<sup>20</sup> through collaborative efforts between the public and private sectors, with notable contributions from the governments of Germany, France, and Japan. This accomplishment effectively mitigated investment risks and

facilitated increased private-sector involvement. By the conclusion of 2023, the CFP had allocated 53% of its financial resources to wind and solar initiatives in Africa, Southeast Asia, and Latin America. A prominent example is the Lake Turkana Wind Power project in Kenya, which now generates 14%<sup>21</sup> of the country's electricity, and CFP's ongoing development of over 1 GW<sup>22</sup> of solar projects in the Philippines and Thailand. This approach highlights the potential of public-private partnerships in promoting investments in sustainable infrastructure.

### 3.3.4 Risk Management and Transparency in Green Finance

Effective risk management and transparency are essential elements in the field of green finance, as they provide a means of addressing climate-related risks. These risks, including those pertaining to physical phenomena and the transition to a low-carbon economy, present challenges to investors. By effectively managing these risks, companies can avoid high-risk investments and ensure sustainable outcomes. Concurrently, augmented transparency, particularly through ESG disclosures, facilitates the establishment of trust and the attraction of investment by means of the clear communication of environmental, social, and governance commitments. Collectively, these factors cultivate resilience in long-term green investments and facilitate market stability.

#### Case Study: Task Force on Climate-related Financial Disclosures (TCFD)

The TCFD framework facilitates the disclosure of climate-related risks and opportunities by companies, thereby enhancing transparency and investor confidence. HSBC, among other companies, has adopted the recommendations set forth by the TCFD, integrating climate risks into its overall risk management strategy through the use of scenario analysis and stress testing. By the conclusion of 2023, HSBC had facilitated the provision of \$294.4 billion in sustainable finance, representing a 39.7% increase from the preceding year. In addition, the bank has made \$3.71 billion in green investments, a 96% increase since 2020, and achieved a 57.3%<sup>23</sup> reduction in greenhouse gas emissions compared to 2019 levels. The TCFD framework has enhanced the management of climate-related risks and facilitated more well-informed investment decisions, thereby advancing global sustainability.

In mid-2023, the ISSB introduced the IFRS sustainability disclosure standards, building upon the success of TCFD. These standards integrate the requirements set forth by the TCFD and SASB, thereby simplifying ESG compliance and enabling cross-border comparisons. These standards are supported by organizations such as the G20 and IOSCO, and are designed to streamline capital allocation to sustainable initiatives. It is anticipated that they will improve ESG ratings, reduce financing costs, and enhance the competitiveness of green supply chains on a global scale.

### 3.3.5 Challenges and Barriers in the Development of Green Finance

#### 3.3.5.1 Differences in Green Taxonomy Standards Across Countries

The increasing global demand for green finance is encountering obstacles due to the existence of disparate green taxonomy standards across regions. For instance, China places significant emphasis on low-carbon technologies, energy optimization, and green manufacturing, with relatively flexible standards, particularly with regard to clean coal utilization. The United States lacks a unified standard; instead, it relies on voluntary guidelines, such as the Green Bond Principles. In contrast, the EU Green Taxonomy offers a more rigorous and transparent framework, which restricts access to green finance for high-carbon sectors. These discrepancies result in reduced transparency, increased compliance costs associated with cross-border investments, and impeded global flows of green capital, which collectively impact the ability to achieve climate goals.

#### 3.3.5.2 Impact on Cross-Border Investments

The absence of uniform green finance standards gives rise to heightened legal risks and transaction costs for international investments, which in turn serve to deter investor confidence. The lack of uniformity in taxonomies contributes to the complexity of cross-border financing, which in turn discourages investors from pursuing global green projects. The establishment of consistent standards across regions is of critical importance for the streamlining of investments and the acceleration of global green finance integration.

## Conclusion

Green finance is rapidly expanding and innovating across green bonds, green loans, and carbon markets, playing a crucial role in tackling climate challenges, promoting sustainability, and driving global economic growth. Emerging economies, such as China, have catalyzed this progress by implementing extensive regulatory frameworks and pilot programs to encourage sustainable investment. Green bonds have gained momentum as a widely adopted financial instrument, with issuance surging worldwide, particularly led by China, Germany, and the United States. Green loans, too, have seen significant growth, especially in North America, as they fund clean energy, low-carbon transportation, and pollution control initiatives. Carbon markets are key mechanisms for emissions regulation and reduction, facilitated by trading systems like the EU-ETS and China's new carbon market. Nevertheless, green finance faces challenges, notably the lack of standardized taxonomy frameworks globally, which impedes cross-border investments and escalates compliance costs. This chapter calls for increased transparency, stronger regulatory frameworks, and public-private partnerships to strengthen the sustainable finance landscape. As green finance gathers momentum, collaborative efforts toward unified standards are essential to streamline investments, mitigate legal risks, and enhance green finance's role in advancing global sustainability and climate objectives. This comprehensive synthesis of findings and challenges serves as a guiding framework for advancing green finance within and across regions.

<sup>14</sup> All data in the case come from: EU Sustainable Finance. (2024, June). The EU taxonomy's uptake on the ground. European Commission. [https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities/eu-taxonomy-uptake-ground\\_en](https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities/eu-taxonomy-uptake-ground_en)

<sup>15</sup> The classification for companies belonging to Leaders: Companies whose revenue exceeds 25%, or those in the top quintile relative to their peers, with a revenue of at least 5%

<sup>16</sup> The classification for companies belonging to Transition: Companies whose capital expenditures exceed current consensus revenue by more than 20% (must be >0%), or those in the top quintile in terms of incremental (green capital expenditure - green revenue) compared to their peers, while having at least 5% consensus capital expenditure and >0% consensus revenue.

<sup>17</sup> Morningstar, Inc. (2024). Global ESG flows Q2 2024 report. Retrieved from <https://www.morningstar.com/lp/global-esg-flows>

<sup>18</sup> Data from statista

<sup>19</sup> ENR Market Research. (2024). Global Green Insurance Market Research Report 2024. ENR Market Research. <https://www.enrmarketresearch.com/global-green-insurance-2024-890-7915098>

<sup>20</sup> Climate Finance Partnership. (n.d.). Climate Finance Partnership. International Climate Initiative. <https://www.international-climate-initiative.com/en/project/climate-finance-partnership-20-i-395-global-k-climate-finance-partnership/>

<sup>21</sup> Renew Africa. (n.d.). BlackRock buys shares in 310MW Lake Turkana wind farm in Kenya. <https://renewafrica.biz/news/wind/blackrock-buys-shares-in-310mw-lake-turkana-wind-farm-in-kenya/>

<sup>22</sup> IPE Real Assets. (n.d.). BlackRock's emerging markets climate finance fund supports Chow Energy. <https://realassets.ipe.com/news/blackrocks-emerging-markets-climate-finance-fund-supports-chow-energy/10068705.article>

<sup>23</sup> HSBC Holdings plc. (2024). Annual report and accounts 2024. <https://www.hsbc.com/content/dam/hsbc/annual-reports/240226-annual-report-and-accounts-2023.pdf>

# Chapter 4

## Technology Finance and New Quality Productivity in China

In the contemporary era of globalization, technological innovation has emerged as the central driving force behind national development. The Chinese government has placed technological innovation of vital importance for the long-term development of the country, as well as for securing a proactive position in the context of intense international competition. In light of these developments, the advancement of technology, financial resources, and innovation in China has become a matter of significant interest, with a complex and interdependent relationship that collectively influences the future trajectory of the Chinese economy.

### 4.1 Technological Innovation in China and New Quality Productivity

The Chinese government has consistently emphasized the importance of technological innovation in the country's development. This began with the 18th National Party Congress, which identified innovation as a strategic support for enhancing social productivity and comprehensive national strength, followed by the 19th National Party Congress, which underscored the pivotal role of science and technology as the primary productive force. The 20th National Party Congress further called for the comprehensive implementation of the strategy of rejuvenating the country through science and education, with a series of policy measures demonstrated the important position of technological innovation in China's development blueprint.

In particular, the report of the 20th National Party Congress highlighted the following: "It is imperative to adhere to science and technology as the primary productive force and to implement the strategy of rejuvenating the country through science and education in a comprehensive manner." In 2023, as emphasized by the Central Financial Work Conference, China will establish a robust and sustainable financial services system by propelling the development of technology finance, green finance, inclusive finance, pension finance (or aging finance), and digital finance. These will channel more financial resources into the real economy and areas of innovation. Among these, technology finance is at the forefront.

#### 4.1.1 Current Status of Technological Innovations in China

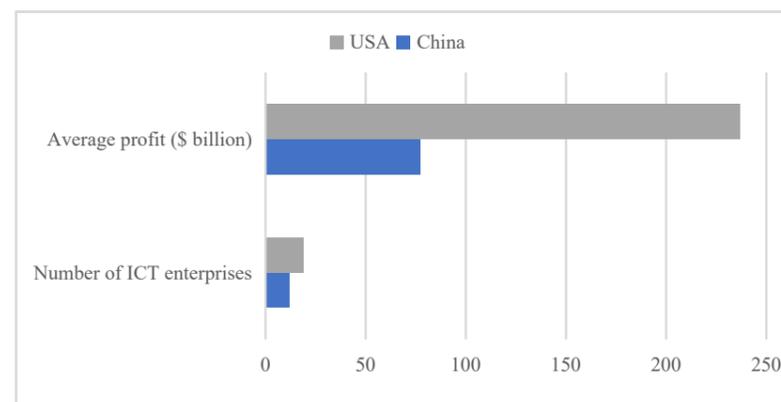
In 2020, China's expenditure on research and development (R&D) as a proportion of gross domestic product (GDP) was 2.4%, approaching the average level observed in Organization for Economic Co-operation and Development (OECD) countries. Of the total R&D investment, 80% was allocated to experimental development. Over the past two decades, the proportion of investment allocated to basic research has remained relatively low at 5%, while the proportion allocated to applied research has been considerably lower at 16%. This is in stark contrast to the United States, where the respective proportions are 17% and 20%<sup>14</sup>. Furthermore, Chinese leaders have recognized the significance of basic research and have consistently underscored the necessity of prioritizing this area of inquiry. On

September 11, 2020, the Chinese government proposed at the symposium for scientists that "basic research is the source of scientific and technological innovation." "A significant number of the technical challenges currently hindering China's progress can be attributed to the inability of fundamental theoretical research to keep pace with advancements in the field, and the lack of clarity surrounding the underlying principles and mechanisms."

The latest data from the 2022 Fortune Global 500 indicates that 19 information and communication technology (ICT) enterprises from the United States were included on the list, with an average profit of \$23.7 billion. A total of 12 ICT enterprises from China are included on the list, with an average profit of \$7.7 billion. In 2023, the number of Chinese companies on the list reached 142, exceeding that of the United States. Of the top five companies in terms of profitability, three are technology-focused: Apple, Microsoft, and Alphabet, the parent company of Google. Despite fluctuations in financial data, Apple generated a net profit of approximately \$100 billion, while Microsoft's was \$73 billion and Alphabet's was also at the upper end

of the range. These companies were generating substantial profits due to their robust capabilities in core business areas, including operating systems, search engines, and office software, as well as their extensive global market presence. In contrast, the two Chinese companies that were on the top-ten profit list were the Industrial and Commercial Bank of China and the China Construction Bank, neither of which were technology-focused. The aggregate profit scale of Chinese technology companies was relatively modest. Chinese internet giants such as Tencent and Alibaba occupy a significant position in the domestic market; however, there is still a discrepancy in profitability when compared to the leading technology companies in the United States. To elaborate, Tencent's profits for 2023 were \$16.3 billion, while Alibaba made a profit of \$11.2 billion for the same period.

Fig 4-1: Information and Communication Technology Industry (ICT)



Data source: Fortune 500 Ranking 2022

Data source: Bureau of Statistics, BCG Henderson Institute analysis.



Table 4-1: STI-Related Policies

Time	Policies
2018	The new round of reform of Party and State institutions has reorganized the Ministry of Science and Technology by integrating the former Ministry of Science and Technology and the State Administration of Foreign Experts. During the same period, the National Science and Technology Leading Group was established in accordance with the unified deployment of deepening the reform of Party and State institutions.
2018.01.31	The State Council issued Several Opinions on Comprehensively Strengthening Basic Scientific Research (Guo Fa [2018] No. 4), pointing out that the shortcomings of China's basic scientific research are still prominent, the basic disciplines are still the weakest link, there is a lack of major original achievements, the investment in basic research is insufficient and structurally irrational, there is a scarcity of top talents and teams, the evaluation and incentive system is in urgent need of improvement, the enterprises do not pay enough attention to the situation, and the whole society's support for basic research The environment for the whole society to support basic research needs to be further optimized.
2019.05.17	China's Ministry of Finance (MOF) has announced that it will calculate the preferential period from December 31, 2018, and implement an enterprise income tax reduction and exemption policy for qualified integrated circuit design enterprises and software enterprises, with the first two years exempted from taxation and the subsequent three years subject to a 50% reduction in enterprise income tax.
2020.08.28	The Ministry of Commerce and the Ministry of Science and Technology have adjusted and released China's Catalog of Prohibited and Restricted Export Technologies, and the adjustment of the Catalog has solicited the opinions of the relevant departments, industry associations, industry and academia, and the public, which involves a total of 53 technology entries.
2020.12.19	China's National Development and Reform Commission (NDRC) and the Ministry of Commerce (MOFCOM) issued the Measures for Security Review of Foreign Investments, which provide for security review of foreign investments that affect or may affect national security.
2021.06.10	The Law of the People's Republic of China on Anti-Foreign Sanctions was adopted at the twenty-ninth meeting of the Standing Committee of the Thirteenth National People's Congress of China.
2021.12.24	The 32nd meeting of the Standing Committee of the Thirteenth National People's Congress adopted the amended Law of the People's Republic of China on Scientific and Technological Progress.
2021.08.02	The General Office of the State Council issued the Guiding Opinions on Improving the Evaluation Mechanism of Scientific and Technological Achievements (Guo Ban Fa [2021] No. 26). The Guiding Opinions adhere to the evaluation orientation centered on the quality, performance and contribution of scientific and technological innovation, scientific categorization and multi-dimensional evaluation, correct handling of the relationship between the government and the market, and respect for the laws of scientific and technological innovation, and put forward initiatives in 10 areas.
2021.12.24	The Law on Scientific and Technological Progress was amended for the second time, with a special chapter on "Applied Research and Transformation of Achievements", which, while substantially increasing the number of legal provisions relating to applied research, was articulated with the Law on Promoting the Transformation of Scientific and Technological Achievements to make it clear that "the State shall implement a distribution policy oriented towards increasing the value of knowledge. The State shall implement a distribution policy oriented towards increasing the value of knowledge, and promote the reform of the mechanism for the attribution of intellectual property rights and the distribution of rights and interests in accordance with the relevant State regulations."
2022.08.05	Ministry of Science and Technology and Ministry of Finance Jointly Issue Action Program for Upgrading the Technological Innovation Capability of Enterprises (2022-2023).
2022.09.30	The Ministry of Finance and the General Administration of Taxation issued the Announcement on Preferential Tax Policies for Enterprises Investing in Basic Research to encourage enterprises to increase their investment in innovation.
2022.11.09	The Ministry of Science and Technology on the issuance of the "14th Five-Year Plan" for the development of national high-tech industrial development zones, to promote the high-quality development of high-tech zones.

Data Source: www.gov.cn



#### 4.1.1.1 Chinese Government Policies Related to Technological Innovation

The Chinese government has introduced a series of policies to encourage scientific and technological innovation.

#### 4.1.1.2 Strengths and Weaknesses of Technological Innovations in China

China has demonstrated consistent growth in its innovation capacity, outperforming countries at similar stages of economic development. However, there is still a gap between China and leading advanced economies such as the United States. The National Innovation Index Report 2022-2023 released by the Chinese Academy of Science and Technology Development Strategy points out, that North America continues to lead the world in innovation capacity, with total R&D (research and experimental development) investment accounting for 39.2% of the global total. China's R&D investment accounts for 18.5% of the world's R&D expenditure, ranking the second in the world. However, when expressed as a percentage of the U.S. expenditure, it accounted for a mere 49%. In terms of innovation index rankings, China has consistently trailed the United States. In 2023, China ranked 12th, while the United States ranked third. While there has been a narrowing of the gap in recent years, China still lags behind other countries in this regard.

#### 4.1.2 Technological Firms in China Face Severe Problems

China's financial support for the development of science and technology enterprises is delivered through two channels: direct and indirect channels. The direct channel refers to equity investment and the construction of multi-level capital markets. Indirect investment includes science and technology branches<sup>15</sup> through

commercial banks, small and micro loans, supply chain finance, credit guarantee, and so on. Xie Xin, Director of the Department of Resource Allocation and Management of the Ministry of Science and Technology, noted that China's current financing of science and technology enterprises was insufficient in terms of direct financing. Direct financing, such as equity investment, is suitable for supporting frontier exploratory technological innovation, while indirect financing, such as credit, is better suited to supporting gradual technological diffusion. As China continues to advance towards the realm of science and technology as well as upgrade its industrial structure, the demand for equity financing for scientific and technological innovation continues to grow. However, China's financial supply is still dominated by indirect financing at this stage. There is a large number of seed-stage and start-up technology enterprises with limited access to financing and a high level of risk. The traditional credit review model presents a challenge for banks, as the costs associated with risk and process do not align with the returns they receive. This creates an obstacle for banks to provide adequate support to science and technology-based small and medium enterprises (SMEs). Additionally, the threshold for issuing bonds by science and technology enterprises is high, and the bond market's role in directly financing these SMEs is limited.

#### 4.1.2.1 Limited R&D Inputs

China's R&D investment accounted for 2.54% of its GDP in 2022, which was close to the average level of OECD countries in proportion, but still a significantly below that of major advanced economies such as the U.S., Germany and Japan. In China, 82.1% of R&D investment was allocated to experimental development investment, while applied research made up 11.3%, and basic research funding accounted for only 6.57%. In comparison, basic research funding represented approximately 17% of total R&D investment in the United States in 2019.

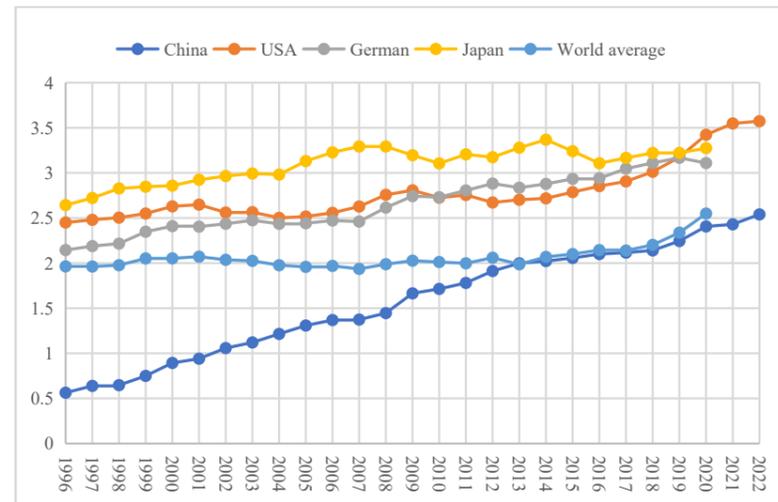
Table 4-2: Global Innovation Index Ranking

	2015	2016	2017	2018	2019	2020	2021	2022	2023
USA	5	4	4	6	3	3	3	2	3
China	29	25	22	17	14	14	12	11	12

Data Source: World Intellectual Property Organization

<sup>15</sup> Since 2009, a number of leading commercial banks, including China Construction Bank, China Merchant Bank, and Agriculture Bank of China, have established science and technology branches with the objective of providing financial support to start-up enterprises in the sector. By mid-2024, the number of such branches is expected to reach approximately 500.

Fig. 4-2: R&D Investment as a Share of GDP



Data source: National Statistical Office, OECD, U.S. Bureau of Economic Analysis

Fig. 4-3 (a): Rate of Industrialization of Invention Patents

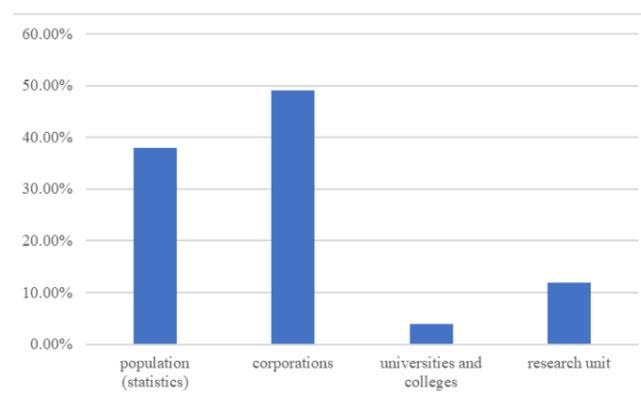
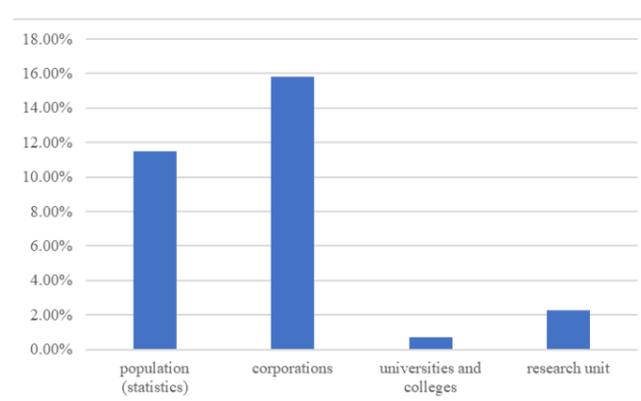


Fig. 4-3 (b): Patent Transfer Ratio



Data source: State Intellectual Property Office, China Patent Survey Report 2023

### 4.1.2.2 Low Achievement Transformation

The "Patent Survey Report of China 2023," published by the Intellectual Property Office of China, reveals that the industrialization rate of invention patents held by domestic enterprises is more than 40%, and the rate of patent transfer is greater than 15%. It is noteworthy that the industrialization rate and transfer rate of colleges, universities, and scientific research units lagged significantly behind that of enterprises. Universities and research institutes often receive substantial research funding, yet their research results are not effectively transformed into tangible productivity. This low rate of transformation in Chinese universities and research institutions, and the difficulty of basic research results in serving actual production and industrial development, represents a significant challenge to the advancement of science and technology in China.

### 4.1.2.3 Need More Diversity, Balance and Technological in Industry Distribution

China's scientific and technological achievements have not kept pace with the needs of the industrial structure, resulting in a lack of innovation and a misalignment of resources. The 2023 Fortune 500 list saw China's enterprises make up 142 of the total, overtaking the

United States. However, Chinese technology firms did not achieve a high ranking on the list. Some studies indicate that China's technology industry is only 42% as strong as the U.S. technology industry, and its total market capitalization is only 32% of that of the U.S. technology industry. From the perspective of publicly traded companies, research from CICC indicates that traditional sectors such as finance, real estate, energy, materials, utilities, and industry contributed approximately 80% of profits, while the information technology industry accounted for a relatively minor share. In comparison, the U.S. information technology industry represented 21% of profits. Apple, Microsoft, Google, GE, Intel, Facebook, Cisco and other technology-based companies accounted for the vast majority of the top companies in the United States in terms of net profit. On the other hand, almost all of China's top net profit enterprises are in the banking and insurance sectors, with no technology-based enterprises featured on the list.

Fig. 4-4 (a): MSCI China Sector Net Profit Share

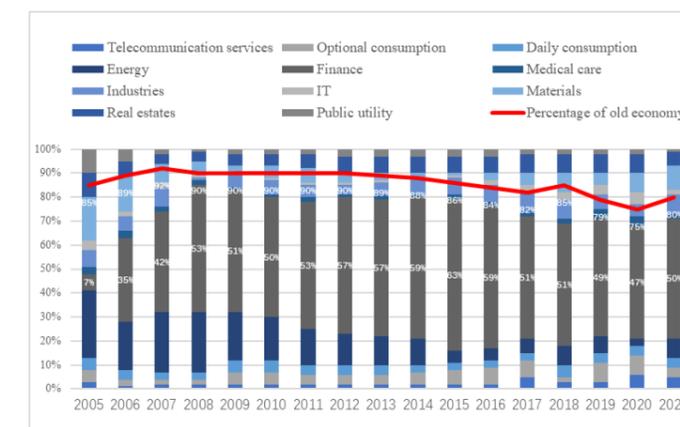
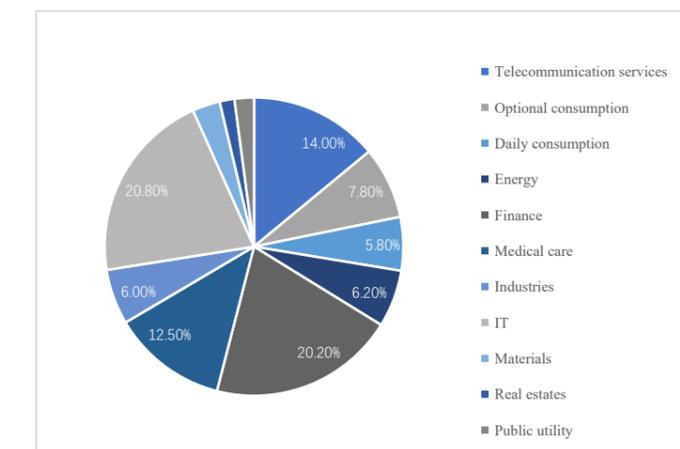


Fig. 4-4 (b): S&P 500 Non-Index Weighted Sector Net Profit Share



Data source: CICC 2022, Comparison of Earnings of Listed Companies in the U.S. and China

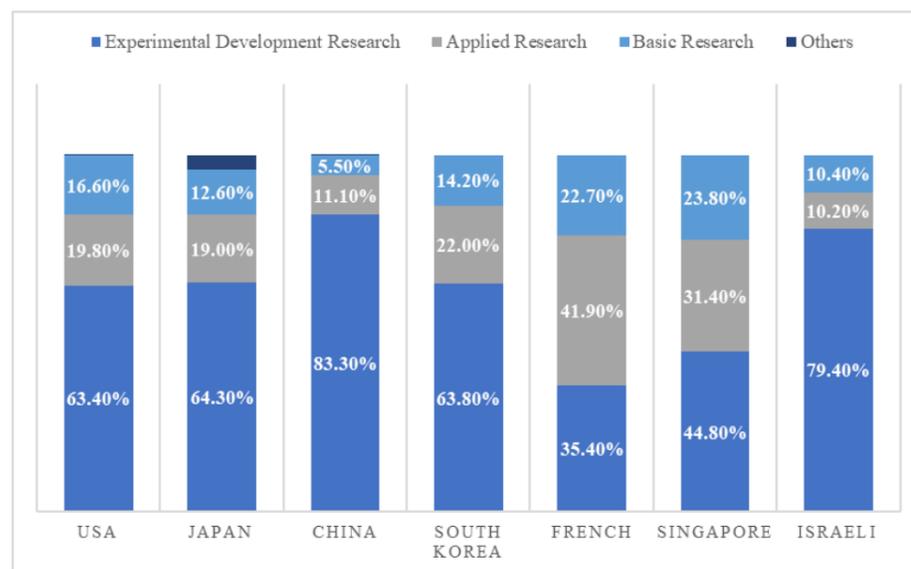
## 4.2 Technology Finance in China

### 4.2.1 Current Status of Technology Finance in China

To achieve industrial upgrading, transformation, and innovation-driven development, governments at all levels have established government-guided funds. These funds aim to attract and direct social capital that supports strategic emerging industries, fostering local, distinctive industries. By 2021, China had established a total of 1,988 government-guided funds, with a target size of about RMB 12.45 trillion, and a subscribed size (or initial size) of RMB 6.16 trillion. However, there has been a notable decline in the number of government-guided funds investing in startups and hard-tech<sup>26</sup> enterprises.

Currently, the operational approach of Chinese government-guided funds can be broadly classified into three main categories: venture capital funds, industrial investment funds, and PPP (public-private partnership) investment funds. Venture capital funds primarily invest in startup companies, industrial investment funds invest in the development of specific industries, and PPP investment funds invest in infrastructure and public services. As of 2021, there were 535 venture capital funds, representing 27.21% of the total, but with the smallest target size (8.1%) and paid-up size (10.6%). A total of 1,233 industrial investment funds were recorded, representing 62.7% of the total. These funds had a target size and paid-in scale of 68.9% and 70.5%, respectively. The average target size and paid-in scale of PPP investment funds were the highest, with the average target size of a single fund reaching RMB 14.2 billion—7.7 times that of VC funds. Similarly, the average paid-in scale of a single fund was RMB 4.7 billion, representing a 4.9 times increase compared to VC funds.

Fig. 4-5: Distribution of R&D Expenditures by Type in 2018



Data source: White Paper on Hard Technology Development 2020

<sup>26</sup> Refers to science and technology in strategically important fields such as AI, integrated circuit, special computing, etc..

### 4.2.2 Problems in Technology Finance in China

A significant number of small and medium-sized technology-based enterprises in China continue to encounter challenges related to securing adequate financing. At the outset of their technology research and development phase, especially for key hard science and technology enterprises, it is challenging for these businesses to generate profits. This makes it difficult for them to secure bank loans, and they often rely on their own funds and venture capital to maintain operations. However, the extremely high technology threshold and long R&D cycle also require investors to have highly developed screening abilities, and the greater risk makes many investors reluctant to invest.

There is a lack of investment in basic research, as well as insufficient funding for applied research. According to the "linear model" of scientific and technological innovation, basic research is a foundational element, providing new knowledge. This is followed by applied research, which utilizes the new knowledge discovered to explore new application methods. Finally, experimental development utilizes the knowledge gained from basic research, applied research, and practical experience to establish new processes, systems, and services. China's science and technology innovation capability lags behind that of advanced economies since investment in scientific research is more focused on the experimental development of products rather than on higher-level basic research and applied research. In the long term, Chinese enterprises will face challenges in acquiring core technologies, and their capacity to adopt emerging technologies from external sources will also be constrained. Figure 4.1-4 illustrates that China's investment in basic research accounts for only 5.5%, which is one-third of that of the United States, less than one-half of that of Japan and South Korea, and significantly below that of France and Singapore.

High-tech startups in need of more government-guided funds. According to the authoritative Zero2IPO database, the "Equity Investment Market Report 2023" reveals that only 149 early-stage investment funds were among the newly raised equity funds in 2023,

representing a mere 2% of the total. Additionally, RMB 26.7 billion was raised, accounting for a similarly insignificant 2% of the total.

Fig.4-6 (a): Equity Market Funds in 2023 (Number of Funds)

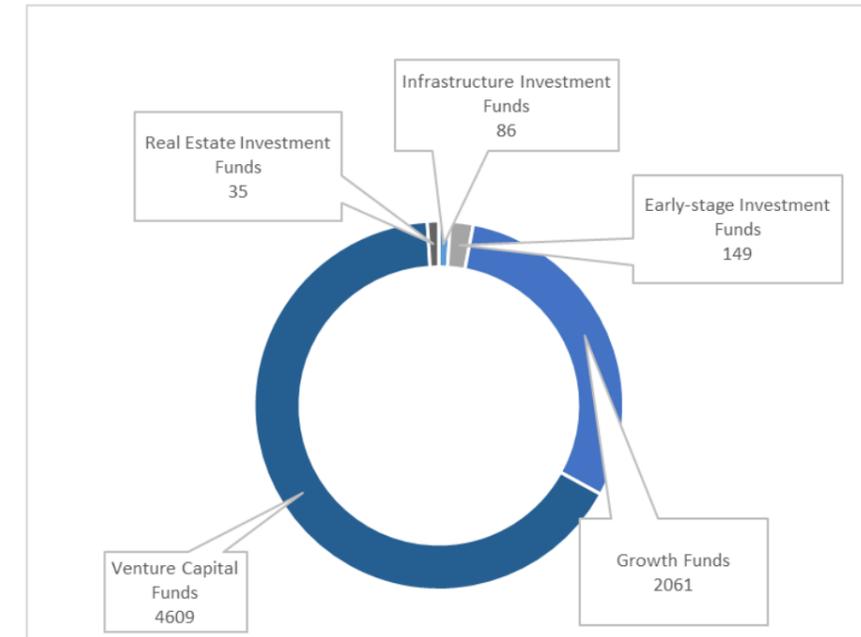
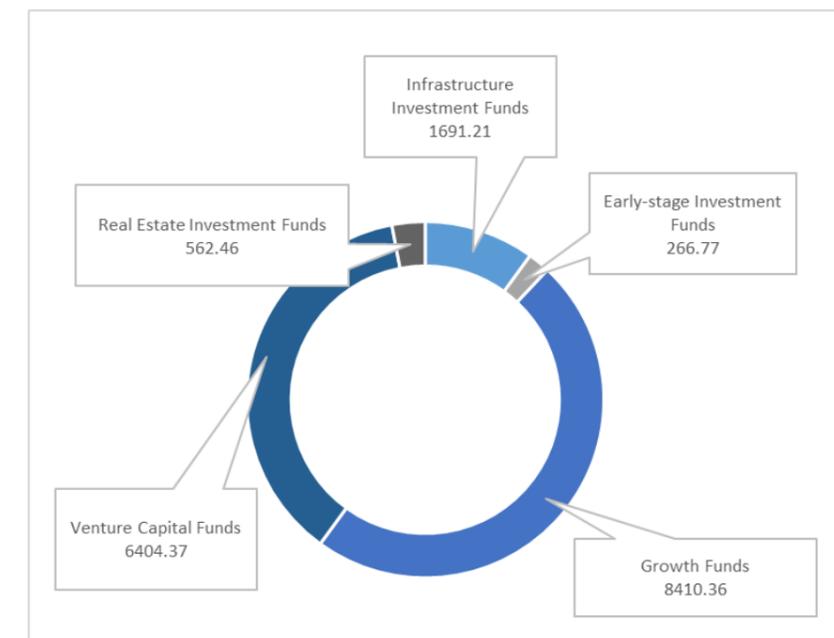
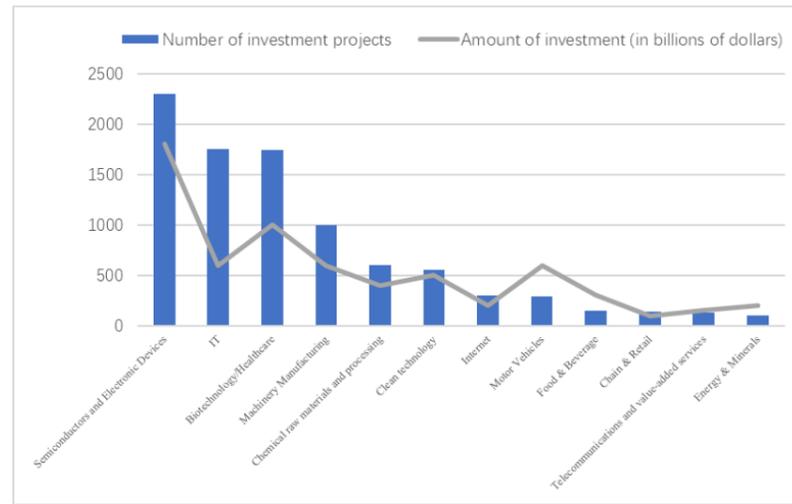


Fig.4-6(b): Equity Market Funds in 2023 (Fund Size in Billion USD)



Data source: Equity Investment Market Report 2023, Zero2IPO Database

Fig.4-7: Distribution of Equity Investment Amount and Projects in 2023



Data source: Equity Investment Market Report 2023, Zero2IPO Database

Figure 4-8 (a): Stages of Equity Investment in 2023 (Investment Projects)

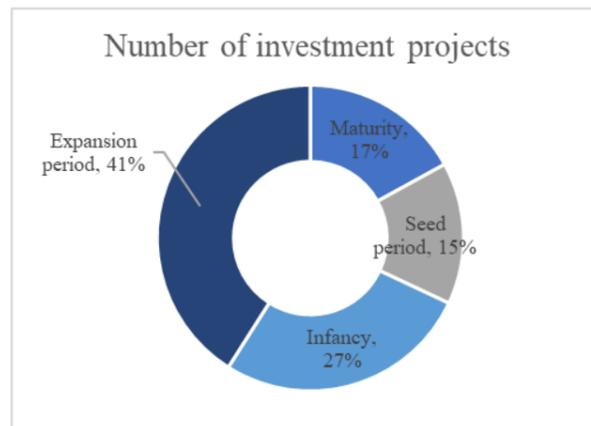
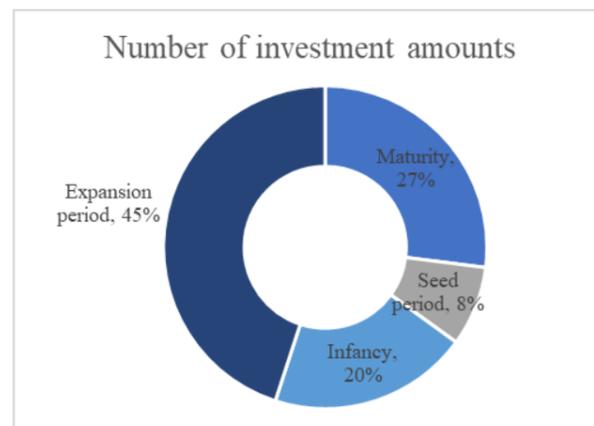


Figure 4-8(b): Stages of Equity Investment in 2023 (Investment Amounts)



Data source: Equity Investment Market Report 2023, Zero2IPO Database

In 2023, there were over 2,000 equity investment projects in the semiconductor field, representing a total investment of over \$190 billion. However, when viewed from the perspective of enterprise development stage, nearly 60% of the projects and 72% of the invested capital were in the middle and late stages of enterprise development, with a relatively small portion invested in the early stages. Despite the influx of capital into sectors such as semiconductors, biotechnology and other areas of science and technology, investment in the seed and start-up stages remains relatively limited. This presents a challenge for hard science and technology enterprises seeking to overcome the "first kilometer" problem.

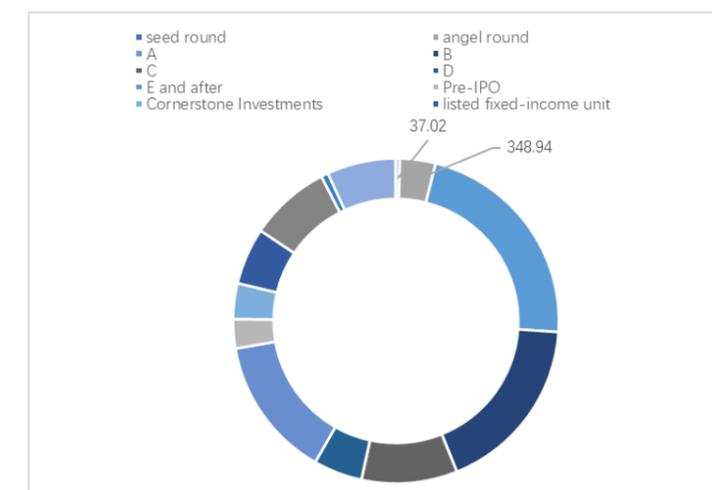
Currently, small and medium-sized science and technology enterprises in China continue to encounter the challenge of difficult financing. Science and technology enterprises, particularly those in the field of hard science and technology at the outset of technology research and development, often lack the capacity to generate profits. This makes it challenging for them to secure bank loans, with many relying on their own funds and venture capital to sustain operations. However, the extremely high technological threshold and long R&D cycle also require investors to have highly developed screening abilities, and the significant risk makes many investors reluctant to invest. Again, the Zero2IPO database shows that, seed round investment in 2022 reached RMB 3.7 billion, while angel round investment reached RMB 34.9 billion. However, these figures represent only 0.2% and 2.1% of the total investment in that year, respectively. This makes it challenging to address the issue of enterprise financing.

to as Xi'an OPMRI) in 2013, the platform helps scientific research enterprises accelerate commercialization and landing through an innovative development mode. This mode involves removing walls, opening up the institute, professional incubation, and an entrepreneurial ecology. On February 15, 2015, Chinese government officials went to Xi'an Institute of Optics and Mechanics for research and study, noted that Xiguang has made useful explorations and attempts in the transformation of scientific and technological achievements. In July 2016, the Shanxi Provincial Government formulated and issued the 2016 Work Program for the Replication and Promotion of the Innovation Models of Xiguang Research Institute and a Research Institute in Northwest China, pointing out that the replication of the innovation models of Xiguang Research Institute and a Research Institute in Northwest China of the Chinese Academy of Sciences (referred to as the "one-institution-one-model") across the entire province. The "Xiguang Model" has been instrumental in fostering the growth of high-tech enterprises, facilitating corporate innovation, enhancing the efficacy of scientific and technological transformation, stimulating regional economic development, and improving the quality of life for local communities. CSTC has undergone a process of transformation from an all-in-one development model to an ecological development model as it has evolved into an incubator for key science and technology enterprise. The initial stage of WKSI's establishment involved a significant amount of one-piece development, with the institute holding over 90% of the shares. However, the company has been experiencing stagnation for over a decade since its inception, despite lacking a market-oriented operational approach. The Xiguang Institute has undergone a shift in its approach to business, moving away from the traditional "run by the enterprise" model. Instead, it is focusing on fostering the independent growth of businesses while maintaining a hands-off approach to their operations. The Institute's involvement in these businesses is not controlling but rather supportive, with a focus on guiding their development in line with the principles of industrialization. This marks a significant shift from the previous approach, which was centered on integrated development and now is evolving towards an ecological development mode. The

### 4.3 How can Finance Best Serve High-Tech Start-ups (Case Study)

The case study enterprise "China Science and Technology Innovation Star"<sup>27</sup> is an innovation platform for industrialization of hard science and technology achievements. Created by Xi'an Optical Precision Machinery Research Institute (hereinafter referred

Fig.4-9: Equity Investment Events in 2022



Data source: Zero2IPO Database

<sup>27</sup> Founded in 1962, Xi'an Institute of Optical Machinery (XIOME) has successfully accomplished major national strategic scientific research tasks in the past 50 years, including the "Two Bombs and One Star", manned spaceflight and lunar exploration. In the past 50 years, the institute has successfully accomplished major national strategic scientific research tasks, including the "two bombs and one satellite", manned space flight and lunar exploration, and has made outstanding contributions to national defense security and scientific and technological progress.

development model is evolving from a one-off approach to an integrated, ecological one. By adopting a four-in-one approach to development, encompassing science and technology, talent, finance, and services, we can attract top talent, foster deeper industry-academia-research integration, and drive the growth of emerging disciplines. Additionally, it bolsters the growth and performance of its own business units. We will now divide the WKSI development stage into start-up and growth periods. We will then compare and analyze the development and profit model in each period to gain further insight into the transformation process from one-piece development to eco-development.

#### 4.3.1 Start-up Period (2013-2015): Technology + Service Integration Development Model

**1. Early profitability:** The science and technology incubator, "Zhongke Chuangxing," was incorporated in September 2013. During the 2013 and 2014 fiscal years, the incubator did not generate any operating income. In 2015, it had partial operating income, but the net profit was negative.

**2. Early investment process:** The investment process for an early-stage enterprise primarily encompasses screening and project creation, due diligence, investment decision-making, investment execution, tracking management, and exit strategy development.

##### 3. Problems with the early development model:

**Inadequate resource docking:** Early incubators did not engage in market-oriented operations, and there was a significant shortage of docking services, including team combination, business model modification, investment and financing, product promotion, and more. There was also a considerable lack of transparency regarding information.

**Project screening problem:** The primary objective of technology incubators is to identify and select high-quality projects for incubation. One of the key challenges facing technology incubators is establishing their brand identity and attracting quality projects through the use of their unique resources.

**Low profitability:** For technology incubators, the profitability model represents a significant challenge and driver for their development. CSTC primarily generates profits through equity investments in incubates. However, it can be challenging to realize these profits in the short term.

#### 4.3.2 Growth Period (2016-): Talent + Technology + Capital + Service Four-in-one Ecological All-round Incubation Development Model

**(1) Improved design of operation mode:** "talent + technology + capital + service" four-in-one all-round incubation

**Talent introduction and talent cultivation:** The Xiguang Institute makes its scientific and technological resources available to the wider community, encourages its talented researchers to move into industry, and also recruits high-end external talent. It is committed to developing a diverse range of skills within its workforce.

**Expansion of technical support:** CSTC promotes the utilization of cutting-edge CAS technology to facilitate enterprise growth. This approach entails a symbiotic relationship between the enterprise and the institute, with both entities mutually reinforcing each other's development.

**Combination of capital and science and technology, establishment of CSTC Fund to promote enterprise innovation:** CSTC's primary investment focus is on "hard science and technology." Concurrently, the company has applied for government guidance to establish a series of specialized investment funds in diverse areas, including big data, opto-electronic integration, military-civilian integration, and the transformation of scientific and technological outcomes. These initiatives will collectively comprise a "hard science and technology" fund with a total management scale of 10 billion RMB. It has established a cluster of "hard science and technology" investment angel funds with a total management scale of 10 billion RMB.

**(2) Improvement of CSTC's operation model:** CSTC's new model optimizes and improves upon the original incubation process. Should a project pass the screening process and move into the incubator, it will be able to benefit from a comprehensive range of services, including seed investment and access to a free office. Following a 3-6-month incubation period, the incubator will evaluate the project for potential investment. If the project meets the investment targets of CSTC or demonstrates potential, the incubator may invest in the project with angel funds. In such cases, the project will then be eligible for additional services, including angel and VC investment.

#### 4.3.3 Comparative Analysis before and after the Improvement of the Development Model

**Comparison of development modes:** In terms of resource docking, the resource docking under the early mode was limited to the incubator itself, which proved to be insufficient. The new model establishes a close relationship between the incubator, other research institutes and universities, which provides a solid foundation for business development and the creation of a comprehensive system for science and technology entrepreneurship. In terms of project screening, the early model relied on the incubator's inherent channels for project selection. However, this approach has consistently presented a challenge for the incubator in identifying high-quality projects. The new model has enabled CSTC to establish an excellent investment and incubation team. In terms of profitability, the operating income under the early model was primarily derived from pure rental income, with limited profit potential and fluctuating income levels. The new model has enabled CSTC to adopt a mixed income profit model, which offers a variety of income streams.

**Comparison of investment process:** The new model introduces a market-oriented management approach to the investment process, with projects screened by an excellent investment and incubation team. The main objectives are clearly defined at each stage, from project initiation, due diligence, and incubation to investment.

## 4.4 Suggestions and Prospects of how Finance Serves Innovation in China

Technology finance provides funding support for technological innovation, transforming innovative achievements into tangible products and services. This not only drives economic growth and industrial advancement but also enhances international competitiveness. Technology finance provides a vital source of support for technology enterprises, particularly start-ups, enabling them to overcome financial barriers and accelerate their development. To better align finance with innovation, financial regulatory authorities provide policy support and financial institutions offer technology

financial services in line with the national strategy. In light of the advancements in digital technology and the growing significance of the capital market, a collaborative innovation ecosystem for technology finance will be established.

### 4.4.1 Strengthen the Top-level Design

The top-level design ensures that financial policies are coordinated with the national strategy for technological innovation, facilitates effective financial resource allocation in the field of technological innovation, and helps to prevent and control financial risks. It is therefore essential that financial regulatory authorities continue to reinforce the top-level design and optimize the policy framework in order to establish a comprehensive and multi-tiered technology financial service system.

**(1) Regulators should optimize the incentive-guided policy system.** Incentive measures encourage financial institutions to develop more innovative and tailored financial products and services, thereby better serving technology enterprises. This also ensures optimal resource allocation and improves the efficiency of financial services. It is therefore essential to implement a system for assessing the performance of technology financial services.

**(2) Regulators should cultivate long-term capital.** Given the high-risk, high-investment, and long-cycle nature of technological innovation, long-term capital plays a crucial role in providing sustained financial support and effectively reducing the risk of project interruption due to funding shortages. It is the responsibility of regulators to reinforce the policy protection of long-term investors, thereby enhancing market confidence in the future development of technology enterprises.

**(3) Regulators should improve market mechanisms and enrich financial support tools.** An efficient market is an important factor in the allocation of resources. Diversified financial instruments can help to mitigate the risks associated with technological innovation. Further reform of the science and technology innovation board, Beijing Stock Exchange, and the new third board is required to enable the capital market to serve technology enterprises more effectively. Support should also be provided to enterprises seeking to raise funds through the stock market. Furthermore, develop financial products tailored to the needs of technology enterprises, providing them with the necessary financing at each stage of their development.

### 4.4.2 Innovation in Credit Products and Service Models

Financing remains a challenge for small and medium-sized technology enterprises. Obtaining loans is challenging, particularly for startups that lack collateral. In light of these challenges, it is imperative for commercial banks and other financial institutions to innovate their credit-granting models and loan products to align with the unique characteristics of small and medium-sized technology enterprises. They must introduce more tailored financial products, and enhance the convenience of financing for small and medium-sized enterprises.

**(1) Financial institutions can develop new credit assessment models and innovate loan products.** The introduction of new assessment standards enables financial institutions to evaluate technology enterprises in a more nuanced manner, taking into account innovative capabilities and technological prospects in addition to traditional indicators. This approach allows for a more accurate assessment of credit risk and an increase in loan supply within a controlled risk environment. Furthermore, financial institutions should develop new credit products, such as intellectual property pledging, and reduce their reliance on traditional collateral. This facilitates more accessible credit

and a higher rate of credit approval for small and medium-sized technology enterprises.

**(2) Financial institutions should offer more customized financial products.** Given the varying funding requirements of technology enterprises at different stages of development, it is essential that financial products are able to meet these needs in order to support the continuous innovation and growth that is vital to the sector. Financial institutions also provide bespoke financial products and services for small and medium-sized technology companies, with a particular focus on inclusive technology innovation finance, and promote the high-quality development of technology enterprises.

**(3) Financial institutions should innovate financial service models.** Financial institutions can collaborate to develop innovative service models by integrating their resources. For instance, commercial banks collaborate with venture capital and private equity funds to develop "lending + investing" models. This represents a significant departure from traditional credit models, offering a more tailored service to small and medium-sized enterprises and start-ups.

### 4.4.3 Innovation in Capital Market System and Mechanism

At present, high-tech startups in China mainly rely primarily on indirect financing. The lack of tangible assets and high risks associated with these startups have deterred banks from lending, making it challenging for them to obtain traditional credit funding. As a result, high-tech startups face significant challenges in obtaining sufficient financial support.

It is therefore crucial to develop a financial system that is aligned with technological advancement, facilitate the reform of the capital market, and leverage direct financing to bolster technological innovation. This will provide a robust and sustainable financial foundation for high-tech startups, fostering a vibrant environment for technological innovation. To promote innovation in the capital market system and mechanisms, efforts should be made in the following areas:

**(1) Promote innovation in the venture capital fund system.** Firstly, it is essential to remove the institutional barriers that prevent long-term capital from entering the venture capital market. Furthermore, it is crucial to guide long-term funds, such as insurance funds, towards the venture capital market to alleviate the shortage of capital supply for venture capital funds.

Secondly, crucial to enhance the mechanisms for fault tolerance and exemptions and scientific evaluation for venture capital funds, encouraging them to invest in the field of technological innovation, thereby expanding the channels through which high-tech startups can obtain funding. Finally, it is essential to expand the exit channels and guarantee a smooth "fundraising, investment, management, and exit" process for venture capital funds.

**(2) Promote innovation in the listing system.** On one hand, the inclusiveness of the capital market towards high-tech startups should be enhanced. It is necessary to support high-tech startups in raising fund through initial public offerings (IPOs) by optimizing listing conditions, simplifying the approval process, and other means. On the other hand, the initial public offering (IPO) pricing mechanism should also be optimized.

**(3) Promote innovation in the seasoned equity offering (SEO) and mergers and acquisitions (M&A).** In order to optimize and accelerate the establishment of a shelf registration system for the Science and Technology Innovation Board and the Growth Enterprises Market, it is necessary

to make improvements to the seasoned equity offering (SEO) process. This will enhance the efficiency and convenience of SEO for all parties involved.

In the context of mergers and acquisitions (M&A), it is crucial to provide support to high-tech startups in leveraging a range of payment instruments, including shares and directional convertible bonds, to facilitate M&A transactions. This approach will bolster the capacity of listed companies on the Science and Technology Innovation Board to engage in M&A activities.

#### *4.4.4 Promoting Financial Service Innovation with Technological Means*

Currently, financial institutions face inherent challenges when serving traditional enterprises, including inefficiencies, high costs, information asymmetry, and inadequate risk management. The high-growth and high-risk nature of high-tech startups intensifies the challenges financial institutions face when providing services to these firms.

The development of technologies such as cloud computing, big data, and artificial intelligence has provided strong technical support for financial institutions. By applying these technologies in areas such as risk management and service models, financial institutions can improve service efficiency, reduce operating costs, alleviate asymmetric information, and better serve technological innovation. It is recommended that financial institutions should enhance the application of modern technologies, including the following aspects:

**(1) Enhance the risk assessment capabilities for high-tech startups by utilizing modern technologies.** Financial institutions should leverage modern technologies to gain deeper insights from incomplete information and develop intelligent risk assessment tools to evaluate the innovation capabilities, financial conditions, and other aspects of high-tech startups, thereby providing a comprehensive risk assessment. Concurrently, it is essential to implement regular updates and improvements to the assessment system in order to align it with the accelerated pace of technological advancement.

**(2) Utilize modern technologies to enhance the accuracy and timeliness of risk monitoring for high-tech startups.** It is recommended that financial institutions employ these technologies to create a risk monitoring and early warning system. This system should continuously monitor the business data of high-tech startups in real-time, allowing for the prompt identification of potential risks and the issuance of alerts.

**(3) Utilize modern technologies to improve the coverage and efficiency of financial services.** It is recommended that financial institutions enhance their information mining capabilities, transmission speeds, and analytical capabilities by applying modern technologies. Doing so will improve the coverage and efficiency of their services.

#### *4.4.5 Building a Collaborative Innovation Ecosystem for Technology Finance*

Financial institutions should strengthen open collaboration with government agencies, research institutions, and leading technology enterprises, etc. This helps to promote complementary advantages and resource sharing, thereby increasing efficiency and reducing costs, which in turn promotes technological innovation. Specific measures should include:

**(1) Collaborate with universities, research institutions, and leading technology enterprises to build a versatile financial talent team.** Financial institutions should enhance their employees' knowledge base by collaborating with universities and improve their understanding and professional level in the technology sector by collaborating with leading technology companies. This will enhance the comprehensive capabilities of employees, enabling them to serve technological innovation more efficiently.

**(2) Collaborate with the government and technology firms to establish an information sharing mechanism.** Financial institutions should promote the construction of a shared platform that encompasses relevant data from technology firms, financial institutions, and government agencies, with the objective of streamlining data sharing.

In conclusion, China has made notable progress in the areas of technological innovation and technology finance, achieving commendable milestones. However, it is evident that a multitude of challenges remain. To maintain a competitive advantage in technology innovation, a collaborative approach involving all stakeholders is essential. The government is a key player in this effort, with a vital role to play in strengthening strategic planning at the highest levels, refining the policy framework to drive technological innovation, and aligning financial resources accordingly. Furthermore, it is vital to cultivate the growth of long-term capital, refine market mechanisms, and reinforce financial resources accordingly.

In addition, it is crucial to cultivate the growth of long-term capital, refine market mechanisms, and reinforce financial instruments that facilitate innovation. During this process, financial institutions must develop credit products and service models that are aligned with the specific needs of technology-driven enterprises. It is essential that they construct a capital market system that is conducive to technological innovation and leverage modern technological advancements to augment their risk assessment methodologies and service delivery capabilities.

Furthermore, it is essential to reinforce collaborative initiatives between multiple entities to create an innovation ecosystem that is based on collaboration. This ecosystem should facilitate the convergence of industry, academia, and research, thereby promoting the sharing of resources and collective advancement of scientific and technological capabilities. By taking this approach, we can effectively overcome existing obstacles, support the growth of technology enterprises, and drive China's economy towards a high-quality, sustainable future. This approach will also establish China as a global leader in scientific and technological innovation, advancing us closer to achieving our goal of becoming a leading science and technology nation. These efforts will ultimately contribute to a sustained and vigorous momentum for the prosperity and advancement of the nation.

## International Finance Forum ( IFF )

The IFF is an international, independent, non-profit, non-governmental organization. It was founded in October 2003 by G20 countries and international organizations such as the United Nations, the World Bank, and the International Monetary Fund, and is a high-level permanent institution for dialog and multilateral cooperation in the field of global finance. The IFF is also known as the 'F20 (Finance 20)'.

The IFF's goal is to establish a platform for strategic dialogue, exchange and cooperation, practical innovation, academic research, and talent cultivation in fields such as the global economy, finance, and public policy through an international, market-oriented, and professional operating mechanism, as well as to promote the world of financial services along with comprehensive and sustainable development.



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