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# Research on the optimization of investment structure of China's high-tech industries under the new development model of dual circulation

Xuan Zhao[1], Sisi Chen[2], Jinyu Shi[2], Ziyue Deng[3]

[1]School of Accountancy, Anhui University of Finance & Economics, Bengbu Anhui 233030, China;

[2]School of Law, Anhui University of Finance & Economics, Bengbu Anhui 233030, China;

[3] School of Finance, Anhui University of Finance & Economics, Bengbu Anhui 233030, China.

## Abstract

**On May 14, 2021, at the Standing Committee of the Political Bureau of the CPC Central Committee, General Secretary Xi Jinping first proposed the concept of "dual circulation", emphasizing the construction of a new development pattern in which domestic and international dual circulations promote each other. Capital circulation is the primary link in opening up the circulation, and high-tech industries are the key areas in this new development pattern. In this context, it is of great significance and value to study the optimization of the investment structure of high-tech industries. This study takes the new dual circulation model as the starting point and conducts an in-depth analysis of high-tech industries from the perspective of investment structure optimization. By applying theories such as capital circulation, dynamic comparative advantage, and investment portfolio, the relationship between China's current economic development status and dual circulation is explained. At the same time, the development status of China's high-tech industries is compared with that of foreign high-tech industries, and the advantages, gaps, and problems between China's high-tech industries and developed countries are analyzed. The research plan explores the rationality of the investment structure of high-tech industries in the internal circulation, external circulation, and dual circulation from multiple perspectives such as industrial growth, investment efficiency, industrial upgrading, and global value chain. This will provide a theoretical basis and practical guidance for optimizing the investment structure of high-tech industries and help China achieve high-quality development under the new development pattern.**

## Keywords

**Dual circulation, high-tech industry, investment structure optimization, economic development pattern.**

## 1. Introduction

### 1.1. Research background and significance

With the complexity and volatility of the global economic situation and the need for domestic economic transformation and upgrading, China has proposed a new development pattern with domestic circulation as the main body and domestic and international circulations mutually reinforcing each other. This strategy is proposed to cope with the uncertainty of the external environment and enhance the autonomy and resilience of economic development. In this context, as an important engine for promoting high-quality economic development, the

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optimization of the investment structure of high-tech industries has become an urgent problem to be solved.

This study's in-depth study of the optimization of the investment structure of high-tech industries under the new development model will help optimize my country's high-tech industry investment structure and promote the investment cycle of high-tech industries, thereby helping to achieve the goals of the new dual-circulation development model. The new dual-circulation model can optimize the investment structure of high-tech industries, promote industrial transformation and upgrading, and achieve various economic development goals. High-tech industries are highly innovative and are key areas of development and important breakthroughs in the national economy. By studying the current status of capital investment in high-tech industries and their development trends under the new development context, this study aims to provide valuable insights for understanding and optimizing the investment structure of my country's high-tech industries under the new development model. By conducting in-depth research on these issues, it is expected that we can better understand the optimization path of my country's high-tech industry investment structure under the new dual-circulation development model and its interactive relationship with the dual-circulation strategic development goals, and provide important practical support for the optimization of the investment structure of high-tech industries and the realization of the dual-circulation strategic goals.

## 1.2. Literature review

There is a mutually reinforcing bidirectional causal relationship between the development of high-tech industries and economic growth (Zhang Huaping, 2013). Among all industries, high-tech industries are the key to determining whether a country can achieve strong growth and enter the ranks of developed countries. Maintaining strong internal and external knowledge capabilities can help companies mitigate the impact of financial crises and adverse external economic factors. However, the overall efficiency value of high-tech industries is low (Chen Yingwen, 2018), and the overall innovation efficiency is not high (Yi Ming, 2019). The relationship between high-tech industries and economic development is becoming increasingly close, and the development of high-tech industries has a positive role in promoting economic stability and development (Li Haichao et al., 2019). At present, China's R&D output is shifting from simply pursuing quantity to paying equal attention to quantity and quality (Cheng Shixiong et al., 2019). In addition, the core technological capabilities of high-tech industries are crucial to improving corporate competitiveness and industry status, enabling companies to maintain absolute advantages in a complex external environment. Although high-tech industries are a continuous source of power for a strong country in science and technology, the overall investment efficiency of China's high-tech industries is still not high (Ma Sai et al., 2022) .

## 1.3. Research Content

This study aims to explore the investment structure optimization path of China's high-tech industry under the new development model of dual circulation. The study will be carried out from the following aspects. First, the background, connotation and impact of the new development model of dual circulation on high-tech industry are analyzed. The new development model of dual circulation emphasizes the mutual promotion of domestic and international dual circulation, among which the domestic circulation is the main body. The proposal of this model provides new opportunities and challenges for the development of high-tech industry. Therefore, it is necessary to deeply understand the essence of the new development model of dual circulation and its far-reaching impact on the investment structure of high-tech industry. Secondly, the current situation and development trend of high-tech industry are studied. By analyzing the development of high-tech industry at home and abroad, especially the investment structure of high-tech industry in key countries and regions, the

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advantages and disadvantages of my country's high-tech industry in investment structure are found. This part will reveal the positioning and development trend of my country's high-tech industry in the global value chain through literature review, data analysis and comparative study. Furthermore, a theoretical model is constructed to explore the path of optimizing the investment structure of high-tech industry. Based on the theories of capital circulation, production compromise and dynamic comparative advantage, an analytical framework is constructed to analyze the impact of internal investment changes and external factors on the investment structure of high-tech industry. At the same time, by comparing and analyzing the successful experiences of high-tech industry investment structures in different countries, an optimization strategy suitable for my country's national conditions is proposed. Finally, policy recommendations and practical paths are proposed. Combining theoretical analysis and empirical research results, specific policy recommendations are put forward to optimize the investment structure of high-tech industries, promote industrial upgrading, and achieve high-quality development under the new development model of dual circulation. These recommendations will cover government policies, corporate strategies, technological innovation, capital allocation and other aspects, aiming to provide scientific decision-making basis for governments and enterprises.

## 2. A theoretical overview of dual cycle development and investment structure of high-tech industries

### 2.1. Capital circulation theory

Capital circulation theory holds that the circulation and turnover of capital in the production process determines the efficiency and effect of investment. For high-tech industries, the speed and efficiency of capital circulation are particularly important, because high-tech industries are usually characterized by high R&D investment, high technological innovation, and high market uncertainty. By optimizing capital circulation, the efficiency of capital use can be improved and technological innovation and industrial upgrading can be promoted. Capital input and output: The capital cycle of high-tech industries requires a large amount of initial investment, which is mainly used for research and development, the purchase of technical equipment and the introduction of high-end talents. The output cycle after capital investment is long, but once a technological breakthrough is made, it can often bring significant economic benefits. Capital recycling: By optimizing capital recycling paths, such as using technology patents, commercialization and marketization of results, capital recycling can be accelerated, capital utilization efficiency improved, and more technological innovation and industrial development promoted.

### 2.2. Production trade-off theory

The production compromise theory emphasizes that when resources are limited, enterprises need to make trade-offs and choices between different production factors. Investment in high-tech industries involves a large amount of R&D investment, technological innovation, and the introduction of high-end talents. When formulating investment strategies, enterprises need to balance the relationship between short-term returns and long-term development, innovation risks, and market returns. This theory helps to understand the rational allocation of the investment structure of high-tech industries. In high-tech industries, enterprises need to choose the best allocation plan among limited resources, ensuring R&D investment while maintaining normal operations and market expansion. Since high-tech industries are characterized by high risks and high returns, enterprises need to balance innovation risks and market returns through effective risk management strategies to ensure the safety and profitability of investment.

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### 2.3. Dynamic Comparative Advantage Theory

The dynamic comparative advantage theory is an extension of the traditional comparative advantage theory, emphasizing that through technological progress and industrial upgrading, a country or region can continuously improve its position in the global industrial chain. High-tech industries are an important manifestation of dynamic comparative advantages. Through continuous technological innovation and industrial upgrading, new comparative advantages can be formed. Therefore, optimizing the investment structure of high-tech industries will help enhance the country's dynamic comparative advantages and achieve sustainable economic development. Through continuous technological innovation and R&D investment, we can promote the continuous progress of high-tech industries, form new comparative advantages, and enhance the country's position in the global industrial chain. By optimizing the investment structure, we can promote the upgrading and transformation of industries, enhance the competitiveness of high-tech industries, and promote sustainable economic development.

### 2.4. Portfolio Theory

The portfolio theory was proposed by Harry Markowitz and is mainly used in the financial field, but it can also be used for industrial investment analysis. The theory emphasizes that through diversified investment, risk can be dispersed and returns can be optimized. For the optimization of the investment structure of high-tech industries, we can refer to the portfolio theory, reasonably allocate industrial investments at different technological levels and development stages, reduce overall investment risks, and improve investment returns. In high-tech industries, enterprises can diversify their investments to disperse the risks of a single technology or project and ensure the security and stability of the overall investment. By reasonably allocating investments at different technological levels and development stages, we can ensure short-term returns while focusing on long-term development, form a balanced investment portfolio, and maximize investment returns.

## 3. Research status of dual circulation development and high-tech industry investment structure

### 3.1. Research status of the new dual circulation development model

New dual circulation development model was first proposed by General Secretary Xi Jinping at the Standing Committee of the Political Bureau of the CPC Central Committee on May 14, 2021. It aims to achieve high-quality development of China's economy through the mutual promotion of domestic and international dual circulation. The background of the proposal of this model is that the global economic situation is complex and changeable, especially external factors such as trade frictions and the COVID-19 pandemic have had a profound impact on China's economy. Against this background, the new dual circulation development model emphasizes taking the domestic big cycle as the main body, while actively participating in the international cycle to promote the mutual promotion of domestic and international markets. Domestic and foreign scholars have conducted extensive research on the new dual circulation development model. Domestic research mainly focuses on the connotation, implementation path and impact of the dual circulation model on China's economy. Many scholars have discussed issues such as industrial structure adjustment, consumption upgrading and technological innovation under the dual circulation model. Research believes that by strengthening the domestic big cycle, the autonomy and resilience of China's economy can be enhanced and its dependence on external markets can be reduced. At the same time, active participation in the international cycle can promote Chinese companies to go global and enhance their international competitiveness and influence. Foreign research focuses more on the impact of the dual circulation model on the global economic landscape. For example, some studies point out that China's dual circulation

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strategy may change the layout of the global supply chain and industrial chain and affect global trade and investment patterns. Other studies have explored the impact of the dual circulation model on the multilateral trading system and international economic cooperation, arguing that China's strategy may promote changes in the global economic governance system.

Overall, the current status of research on the dual circulation new development model shows that this strategy has important theoretical and practical significance. It not only provides a new path for the high-quality development of China's economy, but also injects new impetus into the global economic recovery and sustainable development. Future research can further explore the specific implementation paths of the dual circulation model in different regions and industries, as well as its practical effects in the global economy.

### 3.2. Current research status of investment structure in high-tech industries

High-tech industry is an important engine of economic growth, and the optimization of its investment structure is of great significance to economic development. The definition of high-tech industries usually includes information technology, biomedicine, new energy, aerospace and other fields. These industries have high added value, high innovation and high growth, and are an important force in promoting economic transformation and upgrading. Regarding the research on the investment structure of high-tech industries, domestic and foreign scholars mainly conduct research from the perspectives of investment efficiency, investment model and investment effect. First of all, investment efficiency is one of the core issues in high-tech industry research. Many studies have pointed out that the investment efficiency of high-tech industries still needs to be improved, especially in terms of R&D investment. The overall efficiency value of China's high-tech industry is not high, and the overall innovation efficiency is also not high. These studies show that although high-tech industries are developing rapidly, their investment structures still need to be further optimized. Secondly, research on investment models has also attracted widespread attention. Investment models in high-tech industries include government investment, corporate self-financing, venture capital and other forms. The study found that different investment models have different impacts on the development of high-tech industries. For example, government investment plays an important role in promoting basic research and key technological breakthroughs, while venture capital has a significant effect in promoting the growth of start-ups and technological innovation. By comparing the effects of different investment models, we can provide a reference for optimizing the investment structure of high-tech industries. In addition, research on investment effects mainly focuses on the economic contribution and social impact of high-tech industries. The relationship between high-tech industry and economic development is getting closer and closer. Vigorously developing high-tech industry has a positive role in promoting economic stability and development. The study found that China's R&D output is gradually developing from focusing on quantity to focusing on both quantity and quality, which shows that the investment effect of high-tech industries is gradually improving.

## 4. Dual circulation development and existing problems in high-tech industry investment structure

### 4.1. The external circulation is blocked, facing the dual pressures of technical barriers and supply chain blockages

The instability and uncertainty factors facing China's development have increased significantly, and high-tech industries are still under pressure in terms of imports and supply chain security in key technology fields . The first is technical barriers. At present, there is still a significant gap between China's high-tech field and the world's leading level. It is difficult for high-tech enterprises to quickly master and improve technology and industrial levels through digestion,

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absorption and re-innovation. With the introduction of a series of policy documents such as the "Innovation and Competition Act of 2021" and the "Higher Education Research Protection Act of 2021", it has become more difficult for China to exchange scientific and technological talents, and there is a risk of being excluded from the global core innovation network. In particular, after the cancellation of the Civil End-User (CIV) license exception, related activities must obtain a BIS license in advance before they can be carried out, which has caused serious obstacles to China's R&D activities and technical exchanges. The second is supply chain blockage. The market entities of high-tech industries have long been integrated into the international industrial division of labor and are generally highly internationalized. With the accelerated adjustment and reconstruction of the global supply chain and innovation chain, the stability of the supply chain of high-end products of high-tech enterprises has been impacted. Since the fourth quarter of 2020, the supply of semiconductors has been insufficient, and as many as 169 industries in the country have been affected to some extent. Data shows that in 2021, global automobile production will be reduced by about 10 million vehicles due to chip shortages, of which my country's production will be reduced by about 2 million vehicles.

## 4.2. Rising material prices and the continued impact of dual carbon constraints have led to rising production and operating costs

High prices of basic raw materials and the sharp rise in production costs have squeezed the profit margins of downstream industries. The PPI of upstream industries such as mining and raw materials has remained high, and profit improvements are mainly concentrated in upstream enterprises, while the profit margins of mid- and downstream enterprises, which account for a large proportion, have been significantly squeezed. In particular, small and medium-sized micro-enterprises are facing problems such as increased production but no increased revenue and declining profits under the "double-sided attack" of rapid upstream price increases and difficult downstream price increases. The investment willingness and investment capacity of some industries are restricted. For example, the high price of silicon raw materials has greatly increased the cost of raw material procurement in industries such as photovoltaics and integrated circuits. Some companies have reduced production due to lack of raw materials or have been forced to hoard raw materials. At the same time, the "carbon peak" and "carbon neutrality" actions will have a greater impact on the production standards and process flows of enterprises, and will push up the production and operation costs of enterprises in the short term. The energy consumption in data centers, LCD screen manufacturing, new materials and other fields is relatively high . Under the constraints of "dual carbon", the production standards and process flows of related enterprises may undergo major changes, which will bring a series of chain reactions to the industrial chain and supply chain, and the development and growth of related market players may face certain pressure.

## 4.3. Insufficient original technology momentum and shortage of high-end talents

The original technology is not powerful enough, and key and core technologies and components still need to rely on imports, especially in integrated circuits, key components, key materials and other key technologies that cannot meet the needs of industrial development. The China Optical and Optoelectronics Industry Association proposed that organic light-emitting materials for AMOLED display devices (panels), display device (panel) measurement equipment, polarizer material brightening film, inkjet printing equipment and other upstream materials and equipment are mostly imported from the United States and are mostly exclusive monopolies. The original technology requires a large amount of funds, and there is uncertainty in the return on investment. The tendency of "independent research and development is not as good as purchase" is obvious. There is a shortage of high-end talents and insufficient stamina for technological innovation. Especially in the fields of software development, data analysis and

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mining, information security, visual recognition, etc., there is a large gap in leading talents, high-end research and development and practical skills . There is also a shortage of general workers in some fields. For example, the loss rate of general workers in Chongqing in the key electronic information product manufacturing fields such as mobile phones is relatively high, and some enterprises are as high as 20%. In terms of industry-university-research cooperation, there is an asymmetric situation that enterprises lack capabilities and resources, and universities and research institutes lack the traction based on industrialization application goals. The efficiency and level of cooperation are not high, and there is a certain degree of disconnection between the innovation chain and the industrial chain.

## 5. Countermeasures and Suggestions

### 5.1. Strengthen the dominance of the domestic circulation and adjust and optimize the international circulation

With the domestic circulation as the leading factor, the key is to give full play to the advantages of the strong domestic market, form a virtuous cycle with scientific and technological innovation as the core driving force, enhance its own capabilities and rely on market scale to drive external demand. Promote domestic substitution in an orderly manner. For industries such as digital communications and semiconductors that have a high degree of external dependence but have a certain industrial foundation and innovation capabilities in China, on the one hand, reduce dependence on the US market and try to expand the source of imports. On the other hand, guide enterprises and government departments to purchase more domestic products and encourage domestic substitution. Encourage low-dependence high-tech industries such as audio-visual technology and telecommunications to actively participate in the division of labor in the international industrial chain, make up for the shortcomings of industry development, cultivate new advantages in international competition, use the scale of the domestic market to accelerate technology iteration, and continue to maintain strong innovation capabilities. Consolidate and strengthen the existing good investment structure, and continuously improve the unreasonable investment structure.

### 5.2. Promote tax and fee reductions and ensure supply and price stability to reduce business operating costs

In light of the characteristics of different industries in high-tech manufacturing, targeted tax and fee reduction policies and measures will be introduced to reduce corporate taxes, fees, land, electricity, logistics and other expenditures, and improve the profitability of mid- and downstream enterprises. Special actions will be carried out to clear arrears of payments to small, medium and micro enterprises , and efforts will be intensified to rectify illegal charges involving enterprises. Factor guarantee work will be strengthened, and local governments will be guided to attract investment at a higher level. Guidance on land use for new manufacturing projects will be strengthened, and good experiences and practices of local governments in tapping the potential of land supply will be summarized and promoted. The international pricing power of bulk raw materials will be accelerated, and the "buyer's advantage" will be formed by the large domestic market demand. The monitoring of bulk commodity prices will be strengthened, abnormal prices will be discovered and dealt with in a timely manner, and market disruptive behaviors such as malicious hoarding and speculation, and price gouging will be severely cracked down on to maintain market order. The market regulation role of national reserves will be fully utilized, and the reserve release of key products will be further improved.

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### 5.3. Strengthen technical research and talent training to improve scientific and technological innovation capabilities

Adhering to scientific and technological self-reliance and reducing external dependence is the fundamental way to deal with the technological blockade of the United States and the West. However, considering the high degree of global division of labor in high-tech industries and the difficulty of catching up with the world in key areas in the short term, the pursuit of "complete self-sufficiency" is not only inconsistent with the law of industrial development, but also lacks the material basis for achieving the goal. Therefore, we must persist in promoting scientific and technological research in key areas and key links. Focus on solving the institutional bottlenecks in key industries, break the development model of "self-contained system, fragmentation, and fighting alone", and explore the establishment of a key common technology discovery mechanism. For the key core technologies that have been mastered, continue to expand horizontally and integrate vertically. Pay close attention to leading enterprises with platform effects in key industries, strengthen inter-industry collaboration, promote product research and development and production process transformation, and effectively utilize research and development innovation resources. Second, we must start to establish a local chip supply chain and create a domestic equipment chain. Strengthen the sorting of the industrial chain, and implement special innovation policies and industrial policies under special conditions for key industrial clusters and leading enterprises. Comprehensively use effective means such as finance, taxation, innovation, and standards to strengthen the research and development and industrialization of "spare tires" in key areas and key links, and accelerate the filling of weak links in core areas such as chips, domestic equipment, and industrial software. Third, we must create a strong magnetic field for attracting talents , launch a number of international large-scale scientific plans based on innovative platforms, and actively carry out scientific and technological innovation cooperation with major scientific and technological powers such as the United States, Japan, Germany, and the United Kingdom, as well as key small countries, to attract outstanding scientific and technological talents to conduct research on major scientific issues.

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