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Study on the Impact of Local Government Debt on Industrial Structure Optimization

-- An Empirical Analysis based on the New Development Pattern of Double Cycle

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Abstract

Based on the panel data of 31 provinces, autonomous regions and municipalities in mainland China from 2015 to 2019, the article explores the impact of local government debt on the optimization of industrial structure in the context of the "double cycle" and takes the factors related to the "double cycle" as mediating variables. The article explores the impact of local government debt on industrial structure optimization based on the panel data of 31 provinces, autonomous regions and municipalities in mainland China from 2015 to 2019, with the "double cycle" related factors as mediating variables. The study found that In the context of "double-loop", local government debt has an inhibitory effect on the rationalization of industrial structure and a facilitating effect on the heightening of industrial structure. The study found that In terms of industrial structure rationalization, the internal circular variables of consumption structure, fixed asset investment rate, real interest rate, technology level and urbanization rate have a significant impact on local government debt. In terms of industrial structure rationalization, there are significant mediating effects of local government debt on industrial structure rationalization, and there are significant mediating effects of external circular variables such as foreign trade level and foreign direct investment rate on industrial structure rationalization. There is no significant mediating effect of the variables foreign trade level and foreign direct investment level on the rationalization of industrial structure by local government debt. In terms of industrial structure rationalization, the internal loop variables technology level, real interest rate, urbanization rate, and external loop variables FDI level have significant mediating effects on the rationalization of industrial structure. In terms of industrial structure heightening, the level of technology, real interest rate, urbanization rate, and the level of foreign direct investment have significant mediating effects on the influence of local government debt on industrial structure heightening. The effect of local government debt on industrial restructuring is significant. In the future, the spending of local government debts should be planned more scientifically, so as to promote the rational allocation of resources in domestic and international markets, promote technological progress, and improve the urban structure by In the future, the spending of local government debt should be more scientifically planned to better promote the optimization and upgrading of industrial structure by promoting the rational allocation of resources in domestic and international markets, promoting technological progress, and improving urbanization.

Keywords

'Double Cycle'; Local Government Debt; Industrial Structure Rationalization; Industrial Structure Heightening.

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1. Introduction

The Third Plenary Session of the Eleventh Central Committee of the Party in December 1978 made the great choice of reform and opening up, which is a historical turning point, and opened a new chapter of China's economic and social development. After unremitting efforts, China has become the world's second largest economy, but is still in the ranks of upper-middle-income countries, compared with developed countries, there is still a large gap. Entering a new era, to maintain rapid economic growth and achieve continuous improvement in economic efficiency, we must constantly optimize the layout of the industrial structure and promote the further development of the industrial structure in the direction of rationalization and heightening.

On December 15, 1993, the State Council issued the Decision on the Implementation of Tax-Sharing Financial Management System, deciding to reform the existing local financial lump-sum system from January 1, 1994, and to implement the tax-sharing financial management system for provinces, autonomous regions, municipalities directly under the Central Government and municipalities separately listed in the plan. During the implementation of the policy, the failure to adjust local expenditure responsibilities in a timely manner has led to a significant increase in local government leverage and an expansion in the scale of local government debt. Data from the Ministry of Finance show that by the end of 2020, the national government debt balance was 46.49 trillion yuan, the national government debt ratio was 45.76%, and the local government debt balance was 25.60 trillion yuan. Although the national government debt ratio is lower than the internationally accepted warning line of 60% and local government debt has not yet exceeded China's government debt limit of RMB 28.81 trillion, it is highly likely to trigger regional or even global risks if risk control is not carried out in a timely manner.

First of all, among the three pillars of investment, export and consumption that drive economic growth, investment is the most powerful factor and has the most significant stimulating effect on the economy, which is the reason why China has been implementing an investment-driven economic development model for a long time. However, looking at the past decade of China's economic adjustment, the investment and savings rates are on a downward trend, the capital coefficient is rising rapidly, and an investment-driven economy no longer fits the current economic development model. China's savings rate declined from 51.8% in 2011 to 44.2% in 2019, rising to 50.65% in 2020 due to the new crown pneumonia epidemic, and then falling to 46% in 2021. Meanwhile, the share of residential savings remains unchanged at around 20% and is unevenly distributed, mostly concentrated in high-income households. The investment-driven economic development model has further accentuated the gap between the rich and the poor. In order to boost China's economic development, it is necessary to expand the proportion of middle-income people and shift to a consumption-driven economy. In the short-term economy, low investment rates have been a typical problem in recent years, with real GDP growth of 8.1% in 2021, but only 4.9% growth in fixed asset investment and 0.2% growth in infrastructure construction investment. This is related to the structural adjustment of the Chinese economy, which makes the effective demand for capital formation insufficient, and it is evident that relying on investment to stimulate the economy is not a long-term solution.

Second, in terms of exports, China's export-oriented approach to economic development has been widely developed since its accession to the World Trade Organization in 2001. But on the other hand, it has also led to problems such as China's excessive external dependence and serious domestic economic imbalances. From the changes over the past two decades, the share of exports in GDP has shown a downward trend after peaking in 2006, and the contribution of net exports of goods and services to GDP growth once fell from 14.3% to -42.8% in 2009, after which the role of exports in driving China's economic growth has been weakening for a long time. As we can see, this externally oriented economy is very sensitive to the international

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situation, and once the economy of developed countries falls into recession or depression, it will directly lead to a decline in exports, which in turn will affect China's economic growth rate.

Finally, in terms of consumption, it occupies an important position in the national economy and is the key to pull the country's economic growth. Looking at China's economic development in the last decade, the proportion of consumption to GDP has been increasing, with the contribution of final consumption expenditure to GDP rising from 47.4% in 2010 to 58.6% in 2021, which shows that consumption has been increasing its position among the three pillars driving economic development. Among them, in terms of consumer supply, China has developed into the world's largest manufacturing country. By 2021, China's industrial value added will exceed 35 trillion yuan, accounting for a quarter of the world's total manufacturing industry, and will have the most complete industrial chain system in the world. In terms of consumer market, China has a huge consumer market of 1.4 billion people. China's total retail sales of consumer goods will exceed 44 trillion yuan in 2021, ranking second in the world.

2. Literature Review

There are studies that mostly explore the influence of government actions and fiscal policies on industrial structure, and relatively few studies on the influence of government debt on the optimization of industrial structure. For example, Lichtenberg believes that by intervening in the economy, the government can expand the scope of government fiscal spending, accelerate the development of the national economy and promote the optimization and transformation of industrial structure; Feldman believes that the government should increase the special investment in scientific research funds to improve the enthusiasm of relevant enterprises to carry out technological R&D and innovation, and promote the continuous optimization and transformation and upgrading of industrial structure; Wang Kai finds that capital and labor Wang Liyong believes that local governments have more autonomy in economic activities and can promote the optimization of industrial structure, and the influence is on the rise in the long run; Ren Aihua believes that China's fiscal policy Jia Jingquan believes that local governments can effectively promote the optimization of industrial structure by increasing fiscal expenditures in various fields such as social security, medical and health care, and cultural communication; Zhang Guojian finds that there is an inverted "U" shaped relationship between local government debt and the rationalization and heightening of industrial structure. Zhang found that there is an inverted "U" shaped relationship between local government debt and industrial structure rationalization and industrial structure advancement, within a certain range, expanding the scale of local government debt can effectively promote industrial structure rationalization and advancement, while beyond this range, it will inhibit industrial structure rationalization and advancement.

In addition, after the new development pattern of "double-loop" was proposed, some scholars have studied the impact of "double-loop" on industrial structure. For example, Wang Jinbin believes that the "double cycle" can tap the potential of China's domestic market and give full play to China's competitive advantages in the international market, thus boosting China's economic growth; Li Meng believes that in the context of the "double cycle", we should promote our economic development by increasing investment and stimulating consumption. Sun Pan believes that the core of the "double cycle" is the industrial chain and supply chain, and extending the industrial chain of resource-based cities and ensuring the safety and efficiency of the supply chain can not only promote economic growth, but also attract foreign direct investment; Chen Lin believes that in the context of the "double cycle Chen Lin believes that in the context of "double-loop", efforts should be made to promote consumption upgrading and independent innovation, which will in turn promote the heightening of industrial structure.

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Taken together, most studies believe that local government debt can promote the upgrading of industrial structure, but its scale must be controlled within a certain range, otherwise it will inhibit economic development and industrial structure optimization. However, the studies have neither placed the impact of local government debt on industrial structure optimization in the context of the "double cycle" nor studied the impact of local government debt on different levels of industrial structure optimization in depth. Therefore, the possible contribution of this paper is to explore the mechanism and path of local government debt's influence on different levels of industrial structure optimization in the context of "double-loop", quantify the factors related to "double-loop" into various indicators and act as mediating variables, and analyze the influence of each factor on industrial structure optimization. The effect of local government debt on industrial structure optimization is analyzed, with a view to providing policy suggestions for local government debt control and industrial structure optimization in the context of "double-loop".

3. Theoretical Analysis of the Impact of Local Government Debt on Industrial Structure Optimization in the Context of Double Cycle

The optimization of industrial structure refers to the efforts to promote the development of China's industrial structure in the direction of rationalization and heightening. Among them, the rationalization of industrial structure emphasizes the degree of coordination among industries, which is an indicator of whether the resources are effectively utilized; the heightening of industrial structure refers to the evolution of industrial structure from low level to high level, that is, in the whole industrial structure, the dominant proportion of primary production gradually evolves to the dominant proportion of secondary and tertiary production. In the context of "double cycle", the optimization of industrial structure is the result of a series of factors such as investment, consumption and export, and the effect of local government debt on the optimization of industrial structure is also realized through these factors.

3.1. The Mechanism of the Role of Local Government Debt on Industrial Structure Optimization

Generally speaking, local governments mostly finance by issuing bonds, and enterprises and individuals concentrate idle funds in the hands of the government by purchasing bonds, which are then used by the government for the construction of public facilities and increasing the supply of public goods, providing a good external environment for industrial structure upgrading. However, at the same time, local government debt may also have a crowding-out effect on private investment, which is not conducive to industrial structure upgrading.

In the context of the "double cycle", local government debt affects both the domestic and international markets. At the domestic market level, local government debt affects the optimization of industrial structure by influencing market supply and demand. On the supply side, the use of local government debt for science and technology innovation is conducive to the development of advanced manufacturing and other industries, thus promoting the optimization of industrial structure; on the demand side, the use of local government debt to increase workers' income will increase people's demand for high-quality products and services, thus promoting the optimization of industrial structure. At the international market level, local government debt can be used to create a better business environment and provide more convenience for foreign investment, which is conducive to attracting foreign investment and promoting exports, thus promoting the optimization of industrial structure. However, under the circumstances of increasing trade frictions and weak external demand, the impact of local government debt on industrial structure optimization is uncertain, and the role of investment attraction may or may not be more obvious.

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In general, the effective allocation of local government debt to the following areas is conducive to the optimization of industrial structure: First, the field of capital construction. Infrastructure construction projects and industrial projects are mostly large investment amounts, long construction cycles, high investment risks, private investment or private investment is limited, but these projects are vital to economic development and improve people's livelihood, so the local government needs to solve the problem of insufficient funds in the field of capital construction. Second, the field of science, education, culture and health. Promoting high-quality development of education and improving the quality and skills of workers are important elements in economic and social development, while the optimization and upgrading of industrial structure will also put forward new requirements for the labor force, thus it is important to increase investment in education and training. In addition, the role of technological progress in the development of modern industry is self-evident, but enterprises tend to invest more limited in technological research and development for financial or risk considerations, which also requires increased investment by local governments. Therefore, the fields of science, education, culture and health are important investment directions for local government debt. Third is the social security field. Insufficient social security spending will make people more inclined to save, resulting in reduced consumption, which is not conducive to economic development. Investing local government debt in social security can reduce people's aversion to future risks, expand consumption demand, upgrade consumption structure, and thus promote industrial structure optimization. Fourth, the agricultural sector. Agriculture is the foundation of China's national economic development. Investing local government debt in agriculture can not only improve rural infrastructure, raise the technical level and production efficiency of agricultural production, but also promote farmers' income, which in turn can drive consumption and investment and promote national economic development and progress. Fifth, the field of energy conservation and environmental protection. An important direction for the optimization of China's industrial structure is the development of energy-saving and environmental protection industries to achieve green, healthy and sustainable economic development. Energy-saving and environmental protection spending can promote the development of research institutions and environmental protection industries by promoting enterprise technology innovation, which in turn will optimize the industrial structure. At the same time, a good ecological environment is also conducive to improving people's living standards.

However, local government debt has different impacts on different levels of industrial structure optimization. As mentioned earlier, industrial structure optimization is divided into two levels: industrial structure rationalization, which focuses on the allocation of resources among different industries, and industrial structure heightening, which focuses on the development of tertiary industries. Tilting local government debts toward industries related to people's livelihood is beneficial to the development of service industries; tilting toward infrastructure industries is beneficial to industrial development, thus providing better infrastructure conditions for the development of tertiary industries. Therefore, it can be broadly concluded that local government debt is beneficial to the heightened industrial structure, but the impact on the rationalization of the industrial structure is somewhat uncertain. The investment direction of local government debt will affect the allocation of production factors in different industries, make resources concentrated in the areas tilted by debt investment, which will interfere with the investment and factor flow among industries to a certain extent, distort factor prices, lead to the allocation of resources not in line with the Pareto improvement principle, and thus inhibit the rationalization of industrial structure. Therefore, the effects of local government debt vary for different levels of industrial structure.

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3.2. The Impact Path of Local Government Debt on Industrial Structure Optimization

In the context of the "double cycle", the impact of local government debt on industrial structure optimization can be analyzed at both domestic and international market levels, and its impact is realized through specific paths. According to this paper, local government debt affects the optimization of industrial structure in the domestic market, mainly based on the financial market and land market, through the paths of consumer and investment demand, technological progress, urbanization rate and real interest rate, while in the international market, mainly based on foreign trade, through the paths of foreign trade level and foreign direct investment level.

Financial market. In order to make up for the fiscal balance, local governments need to raise debt financing, and to obtain financing, they need to borrow from the financial market. At present, China's local government debt is mainly financed by commercial banks and policy banks, etc. The government's borrowing from financial institutions will have three effects on economic development and industrial structure adjustment. First, commercial banks and other financial institutions and some informal financial institutions as part of the tertiary industry, the government's borrowing from them will promote the development of the tertiary industry and lead to changes in the proportion of the three industries in the national economy. Second, under the premise of constant monetary aggregates, the government's borrowing from the financial market for investment changes the allocation of capital and will affect the development of other industries. The larger the scale of government debt and the more money it invests, the fewer resources will be available for private lenders, which may hinder the development of the private economy. Third, large-scale government borrowing can affect the price of capital, i.e., interest rates. Increased government borrowing demand will increase its debt burden and may choose to relieve government debt pressure by lowering interest rates, which will have an impact on both investment and consumption demand, thus affecting the development of related industries. Therefore, this paper argues that using the financial market as a medium, local government debt can act on industrial structure optimization through interest rates, consumption, and investment.

Land market. In the process of urbanization, investment in infrastructure construction directly leads to the accumulation of local government debt, and at the same time gives rise to the land market. Local governments, under the soft constraints of fiscal budget, mostly promote regional industrial growth and thus economic development and increase fiscal revenue, but this also promotes the booming development of real estate and its related industries, which is beneficial to the growth of tertiary industry. It should be noted that due to different economic development environments and regional land resource endowments, local governments' reliance on the land market can negatively affect regional economic development and industrial structure optimization in different ways. The land market is closely linked to the real estate market, and local governments mostly repay their debts through land concession revenues, which can inhibit investment and construction in other industries while accelerating the development of real estate and its related industries. At the same time, people will reduce consumption and other financial investments in order to buy properties, which in turn will hinder the optimization of industrial structure. In addition, investing local government debt in the land market will reduce investment in technological innovation and human capital, which is detrimental to enterprise technological innovation and product upgrading, and thus to industrial structure optimization. Therefore, this paper argues that using the land market as a medium, local government debt can contribute to industrial structure optimization through technology, human capital, and urbanization.

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In conclusion, in the context of "double-loop", local government debt may have heterogeneous effects on the rationalization and heightening of industrial structure.

4. Empirical Results and Analysis

4.1. Data Source

In this paper The data mainly comes from the China Digital Inclusive Finance Index compiled by the Digital Finance Research Center of Peking University and Ant Financial Services Group, as well as provincial data from the China Statistical Yearbook in previous years. The Digital Inclusive Finance Index consists of three dimensions: breadth of coverage, depth of use and digitalization index, as well as indices for payments, insurance, money funds, credit services, investment, credit and other categories. The index was first released in 2011, and for the sake of data availability and comparability, the provincial panel data of 31 provinces, autonomous regions and municipalities directly under the Central Government of China from 2011 to 2020 were selected for analysis and examination.For the sake of data availability and comparability, the provincial panel data of 31 provinces, autonomous regions and municipalities directly under the central government from 2010to 2020 were selected for analysis and testing.

4.2. Variable Selection and Handling

According to the previous theoretical analysis, the influence of local government debt on industrial structure optimization is realized through a series of specific paths. This paper adopts a mediating effect model to investigate how local government debt acts on industrial structure optimization through these mediating variables.

The explanatory variable of this paper is local government debt. The local government debt data in the study are obtained from the China Local Government Bond Information Disclosure Platform, which is the annual implementation data of local government debt reported by localities. Although the total debt balance aggregated by monthly disclosure differs from the national data, this data is the only official data available at present, so this paper chooses this data for relevant measurement analysis.

In addition, resident consumption structure, fixed asset investment rate, technology level, real interest rate, urbanization rate, foreign trade level and foreign direct investment level are selected as mediating variables in this paper. Resident consumption structure is the proportion of consumers' consumption to enhance human capital, which can measure the impact of local government debt spending on the optimization of industrial structure; fixed asset investment rate is the variable that local government debt affects industrial structure through financial and land markets, and can measure the impact of local government debt spending on infrastructure on the optimization of industrial structure; technology level is the variable that reflects enterprises' R&D investment, which can measure the impact of local government debt spending on the optimization of industrial structure; technology level is the variable that reflects enterprises' R&D investment, which can measure the impact of local government debt spending on the optimization of industrial structure. can measure the impact of innovation-type expenditures in local government debt on industrial structure optimization; urbanization rate can measure the impact of local government debt on industrial structure optimization through the land market; real interest rate can measure the impact of local government debt on industrial structure optimization through the financial market; foreign trade level and foreign direct investment level can measure the impact of local government debt on industrial structure optimization through the export-oriented economic system The level of foreign trade and foreign direct investment can measure the impact of local government debt on industrial structure optimization through the export-oriented economic system. Among them, the resident consumption structure, fixed asset investment rate, technology level, real interest rate

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and urbanization rate are used to measure the effect of local government debt on industrial structure optimization through internal circulation, and the level of foreign trade and foreign direct investment are used to measure the effect of local government debt on industrial structure optimization through external circulation.

4.3. Model Setting

Based on the available Based on the available data, the following panel model is constructed to study the impact of digital inclusive finance on the income gap between urban and rural residents.

$$GAP_{it} = \beta_0 + \beta_1 DIFI_{it} + \propto X_{it} + \mu_i + v_{it} \quad (1)$$

Introducing The quadratic term of the DIFI index can be introduced to explore whether the impact curve of the DIFI index on the Thiel index, and explore whether the current development of digital inclusive finance in China has reached the inflection point of the U-shaped or inverted U-shaped curve, which is conducive to judging the specific impact of digital inclusive finance on the urban-rural gap according to its development in each region.The higher the coupling between the allocation of workers in the three industries and the output ratio, the higher the utilization rate of resources and the more reasonable the industrial structure; the opposite indicates that the industrial structure is not reasonable enough. Industrial structure heightening refers to the degree of industrial structure evolution, which is usually measured by the proportion of the value added of tertiary industry to GDP. According to the general rule of industrial structure evolution in developed countries, the growth rate of tertiary industry should be higher than the growth rate of secondary industry, and the ratio of added value of tertiary industry to added value of secondary industry is used in this paper to measure the level of industrial structure heightening.

The regression equations in the study were all fixed effects models of the following form.

$$IS_{it} = \alpha + \beta_1 Debt_{it} + \beta_2 fdi_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

In equation (2): i denotes the city, t denotes the year; IS_{it} denotes the level of industrial structure optimization of i city in year t; Debt is the scale of local government debt; μ is the individual effect, ε and is the random disturbance term.

5. Empirical Results and Analysis

5.1. Full Sample Analysis

This paper analyzes the impact of local government debt on the rationalization of industrial structure and the heightening of industrial structure through a static panel data model, and uses the factors related to the "double-loop" as mediating variables to analyze the impact of the new development pattern of the "double-loop" on the research results through mediating effects. The impact of the new "double-loop" development pattern on the research results is analyzed through mediating effects. Since the real interest rate is mostly negative, all variables except the real interest rate are logarithmic. The regression coefficients of local government debt and industrial structure rationalization are basically negative at the 1% level, indicating that local government debt has an inhibitory effect on industrial structure rationalization; the regression coefficients of local government debt and industrial structure heightening are basically positive at the 1% level, indicating that moderate debt size can promote industrial structure heightening. This finding remains robust after adding mediating variables, indicating that local government debt has an inhibitory effect on industrial structure rationalization and a facilitating effect on industrial structure heightening in the context of the "double cycle".

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Specifically, the effect of local government debt on the mediating variables in the second step shows that local government debt significantly enhances the structure of residential consumption, raises the level of technology, urbanization and foreign direct investment, and significantly reduces the rate of fixed asset investment and real interest rate, but does not have a significant effect on the level of foreign trade. This indicates that local government debt increases consumption expenditure to enhance human capital, which is beneficial to technological progress, increase urbanization rate, and attract foreign direct investment, but has a certain crowding out effect on private capital.

The regression results after adding mediating variables in the third step show that for industrial structure rationalization, local government debt, fixed asset investment, residential consumption structure, technology level, and urbanization rate all have significant negative effects on industrial structure rationalization, and real interest rate has significant positive effects on industrial structure rationalization. In addition, since the mediating effects of foreign trade level and foreign direct investment level are not significant, the Sobel test is conducted in this paper, and the results are still not significant. This indicates that the influence of local government debt on industrial structure rationalization is not based on the external circulation level, while the mediating effects of all variables except real interest rate at the internal circulation level are significantly negative, indicating that the inhibitory effect of local government debt on industrial structure rationalization is mainly based on the internal circulation level. In terms of industrial structure heightening, local government debt, technology level, urbanization rate, and foreign direct investment level all have significant positive effects on industrial structure heightening, while real interest rate has a significant negative effect on industrial structure heightening. Meanwhile, the mediating effects of resident consumption structure, fixed asset investment rate, and foreign trade level are not significant. Since there is no significant effect of local government debt on foreign trade level in the second step, Sobel test is also required. The results show that the Z-values of foreign trade level, resident consumption structure, and fixed asset investment rate are 0.7439, 0.6492, and -0.6082, respectively, which do not pass the test, indicating that these three paths have no mediating effect in the influence of local government debt on industrial structure heightening. In the "double-loop" context, the level of technology, urbanization rate, and foreign direct investment have a significant contribution to the effect of local government debt on the heightened industrial structure, while the real interest rate has a significant inhibitory effect on the effect of local government debt on the heightened industrial structure.

5.2. Sub-regional Analysis

In this paper, the selected samples are divided into eastern, central and western regions according to geographical regions for regression analysis, and no mediating variables are included in the regression, and a semi-logarithmic model is adopted for robustness testing. The regression results of the sub-regional regressions are basically consistent with those of the full sample, but the degree of impact shows obvious heterogeneity. The expansion of local government debt has the largest inhibitory effect on the rationalization of industrial structure in the eastern region and the smallest inhibitory effect on the rationalization of industrial structure in the western region; the expansion of local government debt has the largest promoting effect on the heightening of industrial structure in the central region and the smallest promoting effect on the heightening of industrial structure in the western region. This indicates that the effect of local government debt on the optimization of industrial structure in the western region is relatively small, and the effect on the east and central regions is relatively large. This may be due to the fact that the eastern region has a more developed economy and the employed people are mostly concentrated in the financial industry and modern service industry, thus inhibiting the reasonable distribution of labor among various industries, so the

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local government debt has the greatest inhibiting effect on the rationalization of industrial structure in the eastern region, while the opposite is the case in the western region. In the future, the eastern region should allocate local government debt more rationally, the central region should focus on exerting the favorable influence of local government debt on the heightened industrial structure, and the western region should pay attention to controlling the scale of debt and improving the efficiency of local government debt use.

5.3. Cause Analysis

The possible reasons for the inhibiting effect of local government debt on the rationalization of industrial structure are: First, local government debt is mostly invested in infrastructure industries such as construction, transportation, storage and postal services, which are mostly owned by Chinese enterprises and have more employees and require large amounts of financial support, while construction projects in these fields often have large investment amounts and long construction cycles, so the concentration of resources in these industries will To a certain extent, the concentration of resources in these industries will reduce the level of industrial structure rationalization. Second, the huge long-term pressure of debt repayment leads to the strain of public finance of local governments, and public investment may be reduced. At the same time, land concessions account for a large proportion of the funds used by local governments to repay debts, and local governments will suppress the sharp decline in housing prices, which may lead to the concentration of resources in real estate-related industries, thus inhibiting the rationalization of the industrial structure. Third, the expansion of local government debt will crowd out enterprise credit resources and cause the leverage ratio of non-state enterprises to rise, resulting in unreasonable credit allocation, thus leading to unreasonable allocation of financial resources and ultimately inhibiting the rationalization of industrial structure. It is worth noting that an increase in local government debt will lower the real interest rate, while an increase in the real interest rate will promote the rationalization of industrial structure, which indicates that the practice of alleviating the burden of local government debt by lowering the interest rate in the financial market will aggravate credit rationing and lead to irrational industrial structure.

The possible reason for the promotion of local government debt to the heightened industrial structure is that the tertiary industry will develop rapidly at the stage of higher technological progress and urbanization, and thus the industrial structure will become more heightened. Investing local government debt into infrastructure industry increases the expenditure of people's livelihood category, improves the necessary conditions needed for industrial optimization, and helps to promote the transformation and upgrading of industrial structure. Investing local government debts in infrastructure construction and public welfare projects also attracts foreign direct investment and drives the development of high-end manufacturing and supporting productive service industries, thus improving the heightened level of industrial structure in general. In addition, the funds raised through debt will also be partly used for financial subsidies and public R&D platform construction, as well as for introducing talents, supporting innovation projects and promoting high-tech industry development. Local governments bear the uncertain risks of the innovation market and concentrate their capital and market forces on technology R&D and application, which can give full play to the agglomeration effect and thus improve the heightened level of regional industrial structure. The eastern region is more economically developed, and the proportion of tertiary industry is relatively high. Compared with the central region, the impact of the expansion of local government debt on the heightened industrial structure is relatively small, while the western region is relatively backward in economic development, local government debt is mostly invested in the secondary industry, and the development of tertiary industry is relatively weak, and the western region has a smaller labor force, a relative lack of advanced technology and

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high-end service industries, and the added value of tertiary industry Therefore, the expansion of local government debt in the western region has less effect on the promotion of industrial structure heightening. At the same time, local government debt affects industrial structure heightening mainly through the paths of technology level, urbanization rate and foreign direct investment level, so local government debt investment should pay more attention to these areas. The rise of real interest rate has a suppressing effect on industrial structure heightening and a promoting effect on industrial structure rationalization, which is because the rise of real interest rate will make the financing cost of enterprises rise, leading to the retention of resources in traditional industries and hindering the flow of capital to higher industries, while the expansion of local government debt scale may reduce the real interest rate in order to reduce the debt burden, which will be beneficial to industrial structure heightening.

6. Key Research Findings and Policy Implications

6.1. Research Findings

Based on the panel data of 31 provinces, autonomous regions and municipalities in mainland China from 2015 to 2019, this paper selects residential consumption structure, fixed asset investment rate, technology level, urbanization rate, foreign trade level and foreign direct investment level as mediating variables to discuss the influence mechanism, path and effect of local government debt on industrial structure optimization in the context of "double cycle". The main conclusions of the study are as follows.

Firstly, local government debt has an inhibiting effect on the rationalization of industrial structure in China, and the expansion of local government debt will lead to the relative concentration of resources, resulting in the unreasonable allocation of resources, which is not conducive to the rationalization of industrial structure. Secondly, local government debt has a promoting effect on the highly rationalized industrial structure, the expansion of local government debt scale can promote the development of tertiary industry, increase the added value of tertiary industry, and even make the added value of tertiary industry higher than the added value of secondary industry. Thirdly, the overall view of residents' consumption structure, technology level, urbanization rate and foreign direct investment level has a promoting effect on the optimization of industrial structure influenced by local government debt, while the fixed asset investment rate has a suppressing effect. The impact of local government debt on industrial structure rationalization is mainly realized through the internal circulation level, but the resident consumption structure, fixed asset investment rate, technology level and urbanization rate all reduce the level of industrial structure rationalization, which indicates that there is a big problem of resource allocation among three industries in China at present; the external circulation level factors do not have a significant effect on industrial structure rationalization. The impact of local government debt on industrial structure heightening is mainly realized through technology level, urbanization rate and foreign direct investment level. Fourth, the expansion of local government debt reduces the real interest rate as a whole, while the increase of real interest rate promotes the rationalization of industrial structure and inhibits the heightening of industrial structure. The opposite effects of real interest rates on industrial structure rationalization and industrial structure heightening further verify the heterogeneous effects of local government debt on industrial structure optimization.

6.2. Policy Recommendations

First, when using debt to make investments, local governments should choose the industries they invest in more carefully and optimize the investment structure. It should moderately reduce the proportion of investment in traditional infrastructure industries such as

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construction, pay more attention to environmental protection, biotechnology, information network and other fields, provide a good facility environment for the development of advanced manufacturing and high-end service industries, and promote the heightening of industrial structure. Second, local government debt investment should be more diversified to better promote the optimal allocation of factors among industries, especially to livelihood-related industries and support financing related to science, technology, culture and consumption. This can help promote the direction of resource flow in line with the direction of industrial development, as well as diversify local government debt risks and promote the rationalization of industrial structure. Third, improve debt management, supervision and accountability mechanisms to prevent the excessive scale of local government debt and unclear debt investment; and promote the establishment of accountability mechanisms to reduce unreasonable investment and financing practices. Fourth, give fuller play to the role of the government in the "double cycle". Actively transform the government's functions, give full play to the government's regulatory role, can cooperate with private capital to jointly carry out public infrastructure construction, create a good investment environment, while using the international market cycle to achieve a positive interaction between internal and external cycles, and jointly optimize China's industrial structure. Fifth, optimize the way of solving the government's debt burden, avoid excessive monetization financing, reduce the debt burden through market-oriented methods, stabilize the interest rate level, attract foreign investment, introduce advanced technology and high-end services, ensure that new financing focuses on flowing to advanced manufacturing and high-end services, and promote the heightened and rationalized industrial structure through expanding domestic demand and stimulating consumption.

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