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INPUT-OUTPUT ANALYSIS OF CHINA'S REAL ESTATE INDUSTRY

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Abstract

In recent years, the real estate industry is booming, the industry chain of real estate industry is very complex. On the one hand, it led to the development of many industries, on the other hand, high prices also affect the national economy and the people's livelihood. By using the input-output model, this paper analyzes the impact of the real estate industry on the forward and backward industries quantitatively. The study found that the real estate industry and financial industry has a high industrial relevancy. So, the key to the healthy development of real estate industry is handle the relationship between real estate and finance correctly. In addition, the driving effect of real estate industry to manufacturing industry is the most obvious, however, the driving effect of real estate industry to service industry is not obvious, which shows that China's real estate industry should strengthen the industry association with service industry, to promote industrial restructuring and upgrading.

Keywords: real estate industry; input output analysis; driving effect

Introduction

In recent years, China's real estate industry has developed rapidly, occupying an important position in the national economy and becoming a new economic growth point. The study found that the contribution rate of real estate to GDP is around 10%, driving GDP growth by 1.5-2 percentage points. The real estate industry chain has a complex structure and a wide range of interactions. There is a complex interaction mechanism with the entire economic system. From the perspective of the supply industry, the development of the real estate industry can drive the steel, cement, building materials and other industries. In view, the development of the real estate industry can drive renovation, residential services and other industries.

Due to the special industrial nature, the real estate industry has always been an important means for China to promote economic development. Especially in the global financial crisis, various industries in China have suffered a big or small impact, and the real estate industry has flourished. However, the situation of price differentiation in the real estate industry has become more and more obvious. The prices of first- and second-tier cities are high, and the third- and fourth-tier cities have little effect on inventory. In the government work report, Premier Li Keqiang also pointed out that it is necessary to solve the problem of the city, resolve the property inventory, and establish a rent. A system of mergers and acquisitions. As a key industry of “three to one, one reduction and one supplement”, how the real estate industry will continue to develop in the future and how to drive the development of the entire national economy deserves our research and exploration. From the quantity, it is clear that the development of the real estate

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industry has a driving effect on economic development, which is of great significance for establishing the coordinated development of the real estate industry and the national economy and other industries.

China has compiled the input-output table in a five-year cycle. Therefore, this paper uses the newly released 2012 input-output table to analyze the development of the real estate industry to play a role in economic development. The input-output model contains various industries of the activities of the national economy. The checkerboard structure accurately reflects the relationship between various industries and can comprehensively reflect the quantitative relationship between the real estate industry and various industries, so the input and output are utilized. The model analyzes the development of the real estate industry and has a certain persuasive effect on the national economy.

Summary of research status

As an important industry in the national economy, the real estate industry's influence on the overall economic development has always been the focus of scholars at home and abroad. As early as 1995, G. Richard. K discovered that the real estate industry had a certain driving effect on the national economy by studying the real estate investment and GDP data from 1959 to 1963 in the United States [2]. Later, scholars generally use the input-output model for the study of this problem. Li et al. used input-output data to find out that the real estate industry is increasingly important in the national economy and has a significant role in promoting the formation of final consumption and fixed capital [3]. Wang Guojun [4] and Zhao Long Festival [5] used the input and output tables of 1997 and 2002 respectively. Through comparative analysis, it was found that the total driving effect of China's real estate industry is very close to that of other countries, but it consumes more material products. Li Xiuting and others used the input and output tables of 1997, 2000 and 2002 to find out through the analysis that the proportion of the added value of the real estate industry in the value-added of GDP has increased year by year, and has a significant impact on the changes in employment level and price level. [6]. Some scholars have innovated the input-output model, and used the HEM model to analyze the input-output tables of China's four periods, and then measured the contribution of the real estate industry to the national economy [7].

Scholars at home and abroad have conducted a lot of research on the development of the real estate industry and have obtained rich research results. Based on the previous researches, this paper analyzes the driving role of real estate development to related industries by using the latest input-output tables, and puts forward its own suggestions for the formulation of industrial policies based on the conclusions drawn from the research.

Introduction to the input-output model

Basic structure of input-output table

The input-output model is based on the input-output table, which was developed and researched and compiled by the American economist W. Leontief, reflecting the input of various industries

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during the period. The coordinated relationship of output explains the balance between production and distribution and use among industries of the national economy.

The input-output table is shaped like a chessboard and consists of three quadrants, as shown in Table 1.

Table 1 Input-Output Table

Output / input		Intermediate Use				Final Use	Total Output
		1	2	…	n		
Intermediate Inputs	1	x_{11}	x_{12}	…	x_{1n}	y_1	X_1
	2	x_{21}	x_{22}	…	x_{2n}	y_2	X_2
	…	…	…	…	…	…	…
	n	x_{n1}	x_{n2}	…	x_{nn}	y_n	X_n
Value-added	Labor Compensation	v_1	v_2	…	v_n		
	Net Production Tax	w_1	w_2	…	w_n		
	Depreciation of Fixed	d_1	d_2	…	d_n		
	Operating Surplus	m_1	m_2	…	m_n		
Total Input		X_1	X_2	…	X_n		

The first quadrant is the core part of the input-output table. The row direction represents the intermediate input between the industrial sectors, and the column indicates the intermediate output between the industrial sectors. Each element in the quadrant has a double meaning. From the perspective of the point, it indicates the value of the output of the i-th department to the j-th department. From the perspective of the column, it indicates the input of the i-th department to the j-th department.

The second quadrant is a horizontal extension of the first quadrant, and the direction consists of various end-use projects, including consumption, capital formation, and exports, indicating the amount of value that each industry sector uses for final use. From this we can get the balance of the direction:

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$\sum_{j=1}^{n} x_{ij} + y_i = X_i$ (i=1,2,...,n)(1)

The third quadrant is a longitudinal extension of the first quadrant, which adds value to each sector, including lab or compensation, net production tax, depreciation of fixed assets, and operating surplus, indicating the initial input of each industry sector. From this we can derive the equilibrium relationship of the column direction:

$\sum_{i=1}^{n} x_{ij} + v_j + w_j + d_j + m_j = X_j$ (j=1,2,...,n) (2)

The three quadrants of the input-output table are closely related and mutually influential, and comprehensively reflect the quantitative relationship between the industrial sectors from the beginning of production to the final use of this economic activity.

Main factors of the input-output model

Direct consumption coefficient and complete consumption coefficient

The direct consumption coefficient refers to the value of the direct consumption of the i-sector products by the production unit of the j department in economic activities, which is recorded as (i, j = 1, 2... n), and constitutes the direct consumption matrix A. The direct consumption coefficient reflects the direct economic relationship between the two industries, and the formula is as follows:

$a_{ij} = \frac{x_{ij}}{x_j}$ (i, j=1, 2,...,n) (3)

The complete consumption coefficient refers to the value of the direct and indirect consumption of i-sector products in the production unit of the j department in economic activities, which is recorded as (i, j=1, 2, ..., n), which constitutes the complete consumption matrix B, and the unit matrix is I., calculated as follows:

B= (I-A)-1-I (4)

The direct consumption coefficient reflects the direct backward pulling effect of the target industry on related industries. The complete consumption coefficient reflects the complete backward pulling effect of the target industry on related industries. The difference between the two is due to the indirect backward pulling effect between industries. Caused.

Direct distribution coefficient and complete distribution coefficient

The direct distribution coefficient refers to the proportion of the value of the i-industry output directly allocated to the j-th industry in the economic activity to the total output of the i-th industry, expressed by (i, j = 1, 2, ..., n), which constitutes direct Assign matrix R. The direct distribution system reflects the direct distribution relationship between the two industries, and the calculation formula is as follows:

$r_{ij} = \frac{x_{ij}}{x_i}$（i，j=1,2，…，n） (5)

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The complete distribution coefficient refers to the proportion of the value of the i-industry output directly and indirectly allocated to the j-th industry in the economic activity to the total output of the i-th industry, expressed by (i, j = 1, 2, ..., n). Form a complete distribution matrix D. The full distribution coefficient reflects the direct and indirect distribution relationship between the two industries, and the formula is as follows:

$$D=(I-R)-1-I \quad (1)$$

The direct distribution coefficient reflects the direct forward driving effect of the target industry on related industries. The complete distribution coefficient reflects the full forward driving effect of the target industry on related industries. The difference between the two is due to the indirect forward driving effect between industries. Caused.

Analysis of the driving effect of real estate industry on related industries

From the perspective of the relationship between supply and demand between industries, the effect of the real estate industry on its related industries mainly has a backward pulling effect and a forward driving effect. The backward pulling effect is the impact of the real estate industry on the industry that directly or indirectly supplies the production factors to the industry. The real estate industry mainly generates demand for the industry. The forward driving effect is that the real estate industry directly or indirectly needs the industry. The impact of the industry of products or services, the real estate industry has a major supply-driven role in the industry. The driving effect of the real estate industry on related industries refers to the total effect of the real estate industry driven by demand and supply. Through the analysis of the driving effect of the real estate industry, the role of real estate development in economic development can be clarified in quantity, which is conducive to the formulation of relevant industrial policies.

This paper uses the input and output tables of the 139 departments published by the National Bureau of Statistics in 2012, and merges them into the 19-sector input-output table according to the national economic classification standard (GB/T 4754-2011), which in turn analyzes the development of the real estate industry. The driving effect of the department.

The backward pull effect of the real estate industry on related industries

The direct consumption coefficient and the complete consumption coefficient both reflect the consumption of the target industry to other industries, and can be used to indicate the effect of the target industry on other backward industries. Using the 2012 departmental input-output basic flow table, calculate the 2012 departmental consumption coefficient table and the complete consumption coefficient table in 2012, and take the corresponding column value of the real estate industry to reflect the direct and complete backward direction of the real estate industry to other industries. Pull effect, as shown in Table 2.

Table 2 Pull-Back Effect

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Department	The Direct Consumption Coefficient	Ranking	The Complete Consumption Coefficient	Ranking
Agriculture, Forestry, Animal Husbandry	0.0002	16	0.0174	10
Mining Industry	0.0001	18	0.0233	8
Manufacturing	0.0205	5	0.2083	1
Electricity, Gas And Water Production And Supply	0.0072	6	0.0248	7
Construction Industry	0.0240	4	0.0280	5
Wholesale And Retail Trade	0.0041	10	0.0195	9
Transportation, Warehousing And Postal Services	0.0059	7	0.0250	6
Accommodation And Catering Industry	0.0047	8	0.0141	11
Information Transmission, Software And Information Technology Services	0.0042	9	0.0110	12
Financial Industry	0.1052	1	0.1335	2
Real Estate Industry	0.0321	3	0.0444	4
Leasing And Business Services	0.0400	2	0.0637	3
Scientific Research And Technical Services	0.0002	17	0.0045	14
Water, Environmental And Public Facilities Management	0.0003	15	0.0011	18
Resident Services, Repairs And Other Services	0.0020	12	0.0052	13
Education Industry	0.0003	14	0.0012	17
Health And Social Work	0.0000	19	0.0001	19
Culture, Sports And Entertainment	0.0020	11	0.0043	15

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Public Administration, Social Security And Social Organization	0.0013	13	0.0022	16
Average	0.0134	—	0.0332	—

From the data in the table, the real estate industry has a large or small backward pulling effect on 19 industrial sectors. The quantitative relationship shows that the real estate industry has a long industrial chain and complex structure, and has a backward relationship with various industries. Due to the different nature of the industry, the real estate industry has obvious differences in the driving effects of different industries.

From the perspective of direct pull effect, the top three are the financial industry, leasing and business services, and the real estate industry itself. The real estate industry is a capital-intensive industry. The capital is the "blood" of the real estate industry. The financing services of the financial industry provide sufficient funds for the real estate industry to guarantee the supply and flow of "blood". The demand for funds in the real estate industry has stimulated the financing of the financial industry. The development of services has the most direct effect. When considering the direct and indirect pull effects, it is the top three in the manufacturing, financial, and leasing and business services industries. China's real estate industry directly related to the backward industries are the industries of the tertiary industry, and the fully backward related industrial manufacturing industry has returned to the top, and the coefficient value is large, which is caused by the indirect consumption between industries, indicating the current The real estate industry still relies on the supply of the secondary industry through indirect linkage, and the real estate industry still needs to be transformed and upgraded.

From the perspective of the impact of the real estate industry on its own industry, both direct and complete backward pulling effects are at the forefront, far exceeding the average pulling effect, indicating that the healthy development of each sub-industry in the real estate industry can drive the overall development of the real estate industry, thus forming a benign Cycle development.

The forward driving effect of the real estate industry on related industries

Both the direct allocation coefficient and the full distribution coefficient reflect the distribution of the target industrial unit products among other industries, and can be used to indicate the driving effect of the target industry on other forward industries. Using the 2012 departmental input-output basic flow table, calculate the 2012 departmental consumption coefficient table and the complete consumption coefficient table in 2012, and take the corresponding direction value of the real estate industry to reflect the direct and complete forward direction of the real estate industry to other industries. The driving effect is shown in Table 3.

Table 3 Forward Push Effect

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Department	The Direct Allocation Coefficient	Ranking	The Full Distribution Coefficient	Ranking
Agriculture, Forestry, Animal Husbandry	0.0000	19	0.0138	12
Mining Industry	0.0003	16	0.0134	13
Manufacturing	0.0091	6	0.2782	1
Electricity, Gas And Water Production And Supply	0.0002	18	0.0175	10
Construction Industry	0.0003	17	0.0467	4
Wholesale And Retail Trade	0.0791	2	0.0987	3
Transportation, Warehousing And Postal Services	0.0053	10	0.0313	6
Accommodation And Catering Industry	0.0056	9	0.0122	14
Information Transmission, Software And Information Technology Services	0.0128	5	0.0222	8
Financial Industry	0.0890	1	0.1097	2
Real Estate Industry	0.0321	3	0.0444	5
Leasing And Business Services	0.0072	8	0.0220	9
Scientific Research And Technical Services	0.0032	12	0.0121	15
Water, Environmental And Public Facilities Management	0.0006	15	0.0030	19
Resident Services, Repairs And Other Services	0.0186	4	0.0234	7
Education Industry	0.0045	11	0.0088	17
Health And Social Work	0.0030	13	0.0088	16
Culture, Sports And Entertainment	0.0023	14	0.0045	18

Public Administration, Social Security And Social Organization	0.0079	7	0.0171	11
Average	0.0148	—	0.0415	—

As can be seen from the above table, the real estate industry has direct or indirect forward-looking effects on 19 industrial sectors, once again indicating that the real estate industry has a wide range of influences.

The three industries with the most direct forward-looking role in the real estate industry are the financial industry, the wholesale and retail industry, and the real estate industry itself, which are much higher than the average. The total proportion has reached 71.23% of the total promotion. The booming development of the real estate industry not only increased the demand for home purchase loans from homebuyers, but also increased the loan demand for construction developers' real estate development, which in turn promoted the rapid development of the financial industry's loan business. As the real estate industry's housing transaction area has increased year by year, the wholesale and retail industry and the real estate industry's own property management, intermediary services and other business volume have also been significantly promoted.

Combining the direct forward driving effect and the indirect driving effect, we can see from the complete distribution coefficient that the financial industry and the wholesale and retail industry are still in the top three, but the first is the manufacturing industry belonging to the secondary industry, that is to say The real estate industry's full forward-looking effect on manufacturing is the biggest, mainly due to the indirect impact of the real estate industry on manufacturing through other industries. The development of the real estate industry has driven the development of the home appliance industry, building materials industry, decoration industry and other industries, and these industries are closely related to the manufacturing industry, which has led to the full driving effect of the real estate industry on the manufacturing industry. This also shows that China's real estate industry is still closely related to the secondary industry, and there is still a long way to go before industrial transformation and upgrading.

The total driving effect of the real estate industry on related industries

By summing up the full backward pull effect and the full forward push effect, the total effect of the real estate industry on the development of other industries can be obtained. The total effect is sorted from large to small, and the average value is calculated. The total effect is greater than the average. The real estate industry is closely related to the industry, and the total effect is less than the average is the non-close related industries of the real estate industry, as shown in Table 4.

Table 4 Total Driving Effect

Department	完全消耗系数和完全分配系数之和	排名

密切相关产业	Manufacturing	0.4866	1
	Financial Industry	0.2432	2
	Wholesale And Retail Trade	0.1182	3
	Real Estate Industry	0.0888	4
	Leasing And Business Services	0.0857	5
	Construction Industry	0.0747	6
非密切相关产业	Transportation, Warehousing And Postal Services	0.0563	7
	Electricity, Gas And Water Production And Supply	0.0423	8
	Mining Industry	0.0367	9
	Information Transmission, Software And Information Technology Services	0.0332	10
	Agriculture, Forestry, Animal Husbandry	0.0312	11
	Resident Services, Repairs And Other Services	0.0285	12
	Accommodation And Catering Industry	0.0263	13
	Public Administration, Social Security And Social Organization	0.0193	14
	Scientific Research And Technical Services	0.0165	15
	Education Industry	0.0100	16
	Health And Social Work	0.0089	17
	Culture, Sports And	0.0088	18

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	Entertainment		
	Water, Environmental And Public Facilities Management	0.0041	19
Average		0.0747	—

As can be seen from the above table, there are six industries closely related to the real estate industry. The top one is still the manufacturing industry in the secondary industry. The industrial structure of the real estate industry still needs to be optimized. The real estate industry as a tertiary industry should be service-oriented. The transformation of the real estate industry. Followed by the financial industry, no matter from the backward pull effect or the forward push effect, the dependence of the two industries is very high. It is a good thing that the two industries promote each other to promote the development of the national economy. Behind the pattern are also hidden a series of problems such as excessive bank risk and a strong atmosphere of speculation in the real estate industry. The problem of excessive housing prices caused by overheating of the real estate industry has directly affected the people's housing. If they are not handled well, they will become an insurmountable livelihood issue.

We can also see that the real estate industry has relatively small driving effects on the tertiary industry such as public facilities management and public services, which shows that there is still a huge space for the transformation and upgrading of the real estate industry, and it can strengthen the industrial linkage with these industries. Promote the healthy development of the real estate industry.

Finally, the total backward pull effect of the real estate industry is 0.6316, and the sum of the full forward driving effects is 0.7876. Both are at a high level, and the forward driving effect is greater than the backward pulling effect, indicating that the real estate industry in China is going forward and backward. The driving effects are very obvious, and the industrial efficiency is high.

Research conclusions and policy recommendations

This paper uses the latest 2012 input-output table to study the driving effect of real estate development on the development of related industries. It is found that the real estate industry has a large or small driving effect on all industries, and the differences between different industries are very obvious. The most obvious driving effect is the manufacturing and financial industries. The public facilities management industry has the least effect, and the transformation and upgrading of China's real estate industry needs to be strengthened.

For the conclusion of the study, we can propose the following policy recommendations:

First, we must strengthen the transformation and upgrading of the real estate industry. With the decrease of population growth and the digestion of stock houses, the growth of housing demand will inevitably slow down. It is unlikely that real estate development investment will develop again. In 2015, the growth rate of real estate development investment is only 1%. The driving force for the development of the real estate industry to drive economic development will become

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smaller. At the same time, large-scale housing construction will basically end in the late 13th Five-Year Plan. Therefore, the growth model of the real estate industry needs to be transformed to develop into a service-oriented real estate industry.

Second, strengthen the relationship between the real estate industry and the community public service industry to promote the transformation and upgrading of the real estate industry. At this stage, the real estate industry contributes a small percentage to most of the infrastructure and community public services. Therefore, the cost of real estate holdings can be increased to promote the development of tertiary industries such as infrastructure and community public services, thereby promoting the transformation and upgrading of the real estate industry.

Third, promote the healthy development of the real estate industry itself. The current stage of prosperity in China's real estate industry relies mainly on the development and management of real estate, so it will be closely linked to the manufacturing industry. The areas of property management, real estate agency services and self-owned real estate business activities have not adapted to the rapid development of the real estate industry. Therefore, in order to promote the healthy and sustainable development of the real estate industry, real estate management and real estate agency services should also be promoted through reasonable policies. The development of the industry within the industry.

Fourth, correctly handle the close industrial relationship between the real estate industry and the financial industry, and adopt appropriate policies to enable the two industries to promote each other and develop healthily together. The real estate industry and the financial industry are two-way related industries, and they are closely linked. Therefore, in the future development of the real estate industry, it is necessary to distinguish between residential and non-residential properties. The use of financial policies and taxation policies will increase the investment cost of residential buildings, reduce the investment cost of non-residential properties, and transfer investment behavior to non-residential properties to curb short-term speculation. At the same time, appropriate development of real estate finance, through real estate trust investment funds (REITs) and other means, enrich commercial real estate, office real estate, warehousing real estate and other non-residential real estate investment channels, so that more investors can invest in non-residential real estate through the fund. At the same time, we must also pay attention to the prevention and control of relevant financial risks and strengthen risk management.

In short, the real estate industry is a complex industry involving all aspects of the national economy. Through the research in this paper, we clearly see the driving effect of the real estate industry on various industrial sectors, so as to clarify the future transformation direction of the real estate industry and continue to maintain the financial industry. Close industrial linkages, promote the development of industries such as infrastructure and community public services through appropriate policies, so that their industries can be successfully transformed and upgraded, and healthy and sustainable development.

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