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Research on Investment Efficiency of Real Estate Industry inAnhui Province Based on DEA Model

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Abstract

The real estate industry is an important force to support China's economic development and plays a key role in promoting economic growth and social stability. The investment efficiency of the real estate industry is an important symbol of the development level of the real estate market, and also an important standard to measure the maturity of the real estate market. This paper takes Anhui Province as an example to study the investment efficiency of real estate industry. Firstly, the data envelopment analysis method (DEA) is used to analyze the real estate investment efficiency of Anhui Province and its local cities. It is found that the real estate investment efficiency of Anhui Province maintains a good level on the whole, but still has a large space for development, and presents the characteristics of obvious regional gap. Then, on the basis of comprehensive analysis of investment status and policy guidance, the development trend of Anhui real estate investment in the next three years is predicted.Finally, according to the current situation and development trend forecast of Anhui real estate investment efficiency, we put forward the countermeasures and suggestions to promote the development of real estate industry.

Keywords

Real estate industry; Investment efficiency; DEA.

1. Introduction

The real estate industry is an important comprehensive industry in China, and the real estate investment plays a decisive role in the national economic growth. In 2022, under the influence of multiple factors such as the grim and complex external situation and multiple regional epidemics in China, downward pressure on the macro economy continues to expand, and the real estate market faces shocks and pressures on both sides of supply and demand. The real estate industry is in a period of deep adjustment. In order to restore the order of market operation and promote the stable development of the industry, the central government has emphasized the pillar position of real estate in the development of national economy, and relevant regulatory departments have repeatedly issued favorable policies to guide the recovery of market expectations and confidence. In 2022, Anhui Province steadily coped with the impact of factors exceeding expectations, sustained economic recovery despite the pressure, and the growth of fixed assets investment was stable. However, affected by the continuous adjustment of the real estate market, the capital pressure of real estate enterprises, and the restrictions of "three red lines", the investment in real estate development decreased significantly. With the release of positive and stable market expectations by various departments in succession, the decline of indicators of the real estate industry in Anhui Province is decreasing, and the real estate market is expected to recover stable development in the future. As an important index to measure the development quality of the real estate industry, the efficiency of real estate investment is worthy of further study and discussion. Based on this,

this paper makes a quantitative analysis of the investment efficiency in the real estateindustryin Anhui Province, and uses data envelopment analysis (DEA) to analyze the real estate investment efficiency of Anhui Province and its various cities, and then further predicts the future development trend of the real estate industry.Finally,it summarizes the problems existing in the real estate investment efficiency of Anhui Province and puts forward corresponding countermeasures and suggestions.

2. Efficiency Analysis of Anhui Real Estate Investment

As the economy enters the stage of high-quality development, the real estate industry has moved from the past rapid development stage of price increase to a new stage of deep adjustment and steady development. The healthy development of the real estate industry is an important aspect to measure the high-quality development of a region, and the efficiency of the real estate investment is an important indicator to measure the healthy development of the real estate industry. The higher the investment efficiency, the more reasonable the allocation of resources in the real estate industry, which is conducive to the healthy development of regional economy; Otherwise, it means that industrial resources have not been fully utilized, and there is a waste or insufficient phenomenon of resources, which is not conducive to the smooth operation of the real estate market, and thus has a negative impact on the regional economy. By studying the real estate investment efficiency in Anhui Province, the overall situation of resource allocation in the real estate industry in Anhui Province can be understood, and the overall level of the real estate investment efficiency in Anhui Province and the differences among different cities within the province can be analyzed, which is of great significance for further analyzing how to increase effective input and avoid investment excess or investment inefficiency. Based on these, this section adopts data envelopment analysis (DEA) to analyze the real estate investment efficiency of Anhui Province and its cities, in order to provide a theoretical basis for guiding the healthy development of the real estate industry.

2.1. Analysis of the overall efficiency of real estate investment

2.1.1. Construction of investment efficiency measurement model

Investment efficiency is mainly applied in the field of financial investment, which refers to the effectiveness of resource allocation. There are many measurement methods of investment efficiency in existing studies, including input-output method, analytic hierarchy process, fuzzy comprehensive evaluation method, frontier efficiency analysis method, etc. In recent years, data envelopment analysis (DEA) has gradually become the mainstream method to evaluate investment efficiency because of its objectivity, simplicity and practicability. DEA is a non-parametric efficiency evaluation method proposed by American operational research scholars Charnes, Cooper and Rhodes, which is used to evaluate the relative effectiveness of multi-input and multi-output decision-making units (DMU) of the same type. It quantitatively measures the technical efficiency through the ratio of output and input. The key is to construct a nonparametric piecewise surface (or frontier) of the observed data using a linear programming method and calculate the efficiency relative to this frontier. The measurement efficiency of DEA model is mainly divided into three categories, namely input-oriented, output-oriented and non-oriented. Although the analysis angles are different, they do not affect the final conclusion. The basic models of DEA are CCR model and BCC model. The CCR model obtains the investment efficiency based on the basic assumption that the return to scale remains unchanged. However, in practical problems, the returns to scale of many production units are variable, so the model may lack accuracy. In contrast, the BCC model based on variable returns to scale assumption is more practical. Therefore, this section adopts the input-oriented BCC model to analyze the efficiency of real estate investment in Anhui Province. The specific model is as follows:

$$\min \theta$$

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$$s.t.\ \begin{cases} \sum_{j=1}^{h} \lambda_j X_j + {S_p}^- = \theta X_{p0}, (p = 1,2,\dots,m) \\ \sum_{j=1}^{h} \lambda_j Y_j - {S_q}^+ = Y_{q0}, (q = 1,2,\dots,n) \\ \sum_{j=1}^{h} \lambda_j = 1, \forall \lambda_j \geq 0 \\ \forall \lambda_j \geq 0, \forall {S_p}^- \geq 0, \forall {S_q}^+ \geq 0 \end{cases} \quad (1)$$

The research assumes that there are h different decision units $DMU_j (j = 1,2,\dots,h)$, and each decision unit has p inputs and q outputs,$X_j$and Y_j are the input vectors and output vectors of DMU_j, $X_j = \left(X_{1j}, X_{2j}, \dots, X_{pj}\right)^T, j \in [1,h]$, $Y_j = \left(Y_{1j}, Y_{2j}, \dots, Y_{qj}\right)^T, j \in [[1,h]$. θ is the relative effective value of the decision unit DMU_0, λ_j is the weight of the decision unit, S^- and S^+ represent the relaxation variables of input and output respectively. The comprehensive efficiency measured by BCC model includes technical efficiency and scale efficiency, and the effectiveness of DMU can be judged by combining θ, S^- and S^+ values. When θ=1, and $S^- = 0$, $S^+ = 0$, the efficiency of the decision unit is called DEA effective, that is, both technical effective and scale effective are achieved at the same time; when θ=1, but S^- and S^+ are not all 0, the efficiency of the decision unit is called DEA weak effective. When θ<1, the decision unit is said to be non-DEA efficient, that is, neither technical efficiency nor scale efficiency reaches the optimal state.

2.1.2. Indicator selection

Based on domestic and foreign studies on the efficiency of real estate investment, combined with the requirements of the model itself on indicators and the actual situation of the real estate industry in Anhui province, this section selects input indicators from three aspects of labor, capital and land, respectively expressed in terms of the number of employees in the real estate industry, the completed investment in the real estate industry this year, and the area of housing construction. Output indicators are selected from two aspects of completion status and sales status, respectively expressed by the completed area of housing and commercial housing sales area. The evaluation index system of real estate investment efficiency constructed and the specific explanations of each index are shown in Table 1.

Table 1. Real estate investment efficiency evaluation index system

Indicator type		Indicator name	Indicator description
Input index	Labor input	Number of employees in the real estate Industry (10 thousand people)	It reflects the real estate industry market activity and talent supply and demand.
	Capital input	Completed investment of real estate industry this year (10thousandyuan)	It reflects the real estate industry's annual fixed capital input.
	land input	Building construction area (10 thousand square meters)	It reflects the real estate industry's annual land capital input.
Output index	Construction scale	Completed building area (10 thousand square meters)	It reflects the output of the real estate industry in terms of completion.
	Production income	Sales of commercial housing (10 thousand yuan)	It reflects the output of real estate industry sales

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2.1.3. Empirical results and analysis

According to the constructed evaluation index system, the relevant index data of the real estate industry in Anhui Province during 2012-2022 are selected, and the comprehensive efficiency, pure technical efficiency, scale efficiency and return to scale of the real estate investment in Anhui Province during 2011-2022 are calculated by using DEAP2.1 software. The specific values are shown in Table 2. Where, the comprehensive efficiency is equal to the product of pure technical efficiency and scale efficiency. Comprehensive efficiency refers to the technical efficiency when considering the industry scale, which is a comprehensive measurement of the resource allocation and utilization efficiency of the real estate industry. Its value ranges from 0 to 1, and the closer it is to 1, the higher the efficiency is. Pure technical efficiency refers to the technical efficiency without considering the scale of the industry. It measures the production efficiency of the real estate industry under the condition of constant input, which is affected by the management level and technological innovation ability. Scale efficiency is the efficiency value considering the influence of scale factors, reflecting the gap between the actual investment scale and the most effective investment scale, and is an important indicator to measure the effectiveness of real estate investment scale.

Table 2. Real estate investment efficiency of Anhui Province from 2012 to 2022

Year	Comprehensive efficiency	Pure technical efficiency	Scale efficiency	Returns to scale
2012	0.915	0.921	0.994	decrease
2013	0.984	1.000	0.984	decrease
2014	0.899	0.964	0.932	decrease
2015	0.927	1.000	0.927	decrease
2016	1.000	1.000	1.000	constant
2017	0.918	0.932	0.985	increment
2018	1.000	1.000	1.000	constant
2019	0.906	0.934	0.969	increment
2020	0.968	0.977	0.991	increment
2021	1.000	1.000	1.000	constant
2022	0.913	0.918	0.994	decrease
Average value	0.952	0.970	0.981	-

Note: Comprehensive efficiency = pure technical efficiency × scale efficiency

According to Table 2, the average comprehensive efficiency of real estate investment in Anhui Province is 0.952, the average pure technical efficiency is 0.970, and the average scale efficiency is 0.981. It can be seen that the overall level of the investment efficiency of the real estate industry in Anhui province is relatively high, and the scale efficiency level is higher than the pure technical efficiency level, indicating that the scale efficiency is in a dominant position and is the key factor affecting the comprehensive efficiency. Among them, the comprehensive efficiency, pure technical efficiency and scale efficiency of the real estate investment in Anhui Province in 2016, 2018 and 2021 are all 1, indicating that the efficiency level of the real estate investment in Anhui Province in these three years has reached a relatively optimal state, the input and output are relatively balanced, and the resource allocation of the real estate industry is in a relatively reasonable state. In 2013 and 2015, the pure technical efficiency was 1, but the comprehensive efficiency and scale efficiency were both less than 1, indicating that the pure technical efficiency reached the effective state. However, due to the restriction of scale efficiency, the comprehensive efficiency deviated from the effective frontier and was in the weak effective state of DEA. In 2012, 2014, 2017, 2019, 2020 and 2022, the comprehensive efficiency, pure technical efficiency and scale efficiency are all less than 1, which is not DEA

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effective, indicating that the investment efficiency in these years is low due to the limitations of technological innovation ability, management level and investment scale.

From 2012 to 2022, the real estate investment in Anhui Province was in a state of diminishing returns to scale in the first 4 years. During this period, the policy environment of real estate was relatively loose. In the context of "promoting consumption and destocking", loose policies on both sides of supply and demand of real estate occurred frequently, the industry developed rapidly, related enterprises had more opportunities to obtain manpower, capital and land, and the market supervision was not strict, which led to the excess of resource input and the formation of investment redundancy, which reduced the efficiency of resource production. From 2016 to 2021, the real estate investment in Anhui Province is basically in the stage of constant or increasing returns to scale, which may be due to the tightening of the national real estate policy, increased measures such as purchase restriction, sale restriction and price limit. During these years, speculation in the real estate industry has been restrained, the growth rate of real estate investment has begun to fall, the investment scale has been effectively controlled, and the allocation of resources has been more reasonable. Thus the production efficiency is effectively improved. In 2022, under the influence of a complex and severe external situation and repeated domestic epidemics, the downward pressure on the real estate market increased, the growth rate of development and investment turned from positive to negative, commercial housing sales remained low, housing prices stabilized and declined, and the real estate industry entered a period of deep adjustment. In this context, the efficiency of real estate investment in Anhui Province decreased in 2022, and the input and output failed to be effectively coordinated, resulting in diminishing returns to scale. It is necessary to further optimize the existing resources or properly control the investment scale to improve the investment efficiency. It can be seen that real estate investment does not blindly expand the scale of investment, its efficiency is higher, to improve the existing scale of resource utilization is the key to effectively improve the efficiency of investment. In the future, the improvement of the investment efficiency of the real estate industry in Anhui should be based on the demand of the real estate market, reduce blindness, rationally allocate resource input and output, and improve the utilization rate of idle resources.

2.2. Comparative analysis of real estate investment efficiency in different cities

Based on the BCC-DEA model and the evaluation index system in Table 1, the input-output data of 16 cities in Anhui in 2021 are put into DEAP2.1 software for calculation and analysis, and the comprehensive efficiency, pure technical efficiency, scale efficiency and returns to scale of real estate investment in cities across Anhui in 2021 are obtained. The specific values are shown in Table 3.

Table 3. Real estate investment efficiency of cities in Anhui Province in 2021

Region	City	Comprehensive efficiency	Pure technical efficiency	Scale efficiency	Returns to scale
Southern Anhui	Ma'anshan	1.000	1.000	1.000	constant
	Wuhu	0.840	0.885	0.949	increment
	Xuancheng	0.779	0.809	0.963	increment
	Tongling	0.799	0.832	0.960	increment
	Chizhou	1.000	1.000	1.000	constant
	Huangshan	0.762	1.000	0.762	increment
	Average value	0.863	0.921	0.939	-
Northern Anhui	Hefei	1.000	1.000	1.000	constant
	Chuzhou	1.000	1.000	1.000	constant
	Lu'an	0.825	0.827	0.998	increment
	Anqing	0.687	0.701	0.980	increment

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	Average value	0.878	0.882	0.995	-
Middle Anhui	Huaibei	0.731	0.893	0.819	increment
	Bozhou	0.634	0.637	0.995	increment
	Suzhou	0.658	0.687	0.957	increment
	Bengbu	0.935	1.000	0.935	decrease
	Fuyang	0.922	1.000	0.922	decrease
	Huainan	0.559	0.702	0.795	increment
	Average value	0.740	0.820	0.904	-
Average value		0.821	0.873	0.940	-

In 2021, the average real estate investment efficiency of 16 cities in Anhui is 0.821, which is good on the whole, but there is still a large space for development. From the perspective of regions, there are great differences in the efficiency of real estate investment among different regions, the highest in middle Anhui, the second in southern Anhui and the lowest in northern Anhui. This is mainly due to the superior geographical location of the middle Anhui region, which is the core area ofAnhui Province'seconomy andtechnology. It has relatively mature experience in urban construction and real estate development, so the real estate investment efficiency is relatively higher. However, northern Anhui has always been an agricultural base in Anhui Province, with relatively backward economic development and technological level, and land finance is an important source of local government finance. In recent years, a large number of land, capital and other resources have entered the real estate industry in northern Anhui, but the speed of urban construction does not match the scale of real estate development, which leads to the waste of resources. In addition, northern Anhui is also an important labor export area. Residents' demand for housing is relatively low, so a large number of commercial houses are idle, resulting in relatively low investment efficiency.

From the perspective of comprehensive efficiency, among the 16 cities in Anhui Province, there are 4 with comprehensive efficiency of 1, which are Ma'anshan, Chizhou, Hefei and Chuzhou, accounting for 25% of all the evaluated cities, indicating that the real estate investment efficiency of these four cities is in the effective state of DEA in 2021, with high investment efficiency and leading position among all cities in Anhui. Bengbu and Fuyang have a comprehensive efficiency between 0.9 and 0.9, Wuhu and Lu'an have a comprehensive efficiency between 0.8 and 0.9, while other cities have a comprehensive efficiency below 0.8, with Huainan having the lowest, only 0.559. It can be seen that there is a large gap in the efficiency of real estate investment among cities in Anhui, and the comprehensive efficiency of most cities has not reached the effective state, so it is necessary to further adjust the input-output structure of the real estate industry to improve the investment efficiency.

From the perspective of pure technical efficiency, the average value of the 16 cities in Anhui is 0.873, and the pure technical efficiency of 7 cities is 1, which were Ma 'anShan, Chizhou, Huangshan, Hefei, Chuzhou, Bengbu and Fuyang, accounting for 43.75% of all the evaluated cities. Among them, the pure technical efficiency of Huangshan, Bengbu and Fuyang is 1, but the comprehensive efficiency and scale efficiency are both less than 1, which is in the invalid state of DEA, indicating that the technology and management level of the real estate industry in these three cities is high, but the investment level needs to be optimized, and the scale efficiency needs to be further improved. The pure technical efficiency of 9 cities, includingWuhu, Xuanxeng, Tongling, Lu 'an, Anqing, Huaibei, Bozhou, Suzhou and Huainan, is all less than 1, indicating that the pure technical efficiency of these cities has limited the improvement of the comprehensive efficiency of real estate investment. In the future, more investment should be made in the management ability and technological innovation of the real estate industry, so as to optimize the allocation of resources and improve the efficiency of real estate investment.

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From the perspective of scale efficiency and returns to scale, among the 16 cities in Anhui, there are 4 cities with scale efficiency of 1, namely Ma 'anshan, Hefei, Chizhou and Chuzhou. These four cities are in the stage of constant return to scale, that is, the scale of real estate investment has reached the optimal state. The scale efficiency of other cities is not effective. The unreasonable scale of investment limits the improvement of the comprehensive efficiency of real estate investment in these cities. Among them, Wuhu, Tongling, Xuancheng, Huangshan, Lu 'an, Anqing, Huaibei, Bozhou, Suzhou and Huainan are in the stage of increasing return to scale. In the future, the investment scale of the real estate industry can be appropriately expanded to improve the efficiency of real estate investment. Bengbu and Fuyang are in the stage of decreasing returns to scale, which indicates that resource input in the real estate industry of these two cities is too large and redundant. Therefore, it is necessary to properly control investment scale and allocate resources to improve investment efficiency.

3. Trend Forecast of Anhui Real Estate Investment

In 2022, the downward pressure on the real estate market in Anhui Province increased. Under the combined influence of the repeated COVID-19 pandemic in many places and the weakening momentum of housing demand in the medium and long term, the real estate market continued to suffer from a downturn, with various investment and sales indicators bottoming out, and the development of the industry faced unprecedented challenges. With the continuous release of good news from various sectors and continuous optimization of policies on both sides of supply and demand, the decline of real estate investment in Anhui Province in the second half of the year narrowed compared with the first half of the year, but the pressure of real estate market adjustment is still in the short term. Overall, the real estate industry is in a period of deep adjustment. Looking forward to 2023, after the impact of the epidemic weakens, China's macro economy will be improved as a whole, the central government will further strengthen the pillar position of real estate in national economic development, and make every effort to promote the stable development of the real estate industry. Coupled with the continuous promotion of new urbanization and marginal improvement of the financial environment, the demand for urban housing, especially the demand for improved housing and affordable housing, may continue to be released. Market confidence will be steadily restored and Anhui's real estate market is expected to resume stable development. On the basis of the above analysis, this section predicts the future development trend of Anhui real estate investment according to the relevant data of real estate industry and policy guidance.

3.1. Investment in real estate development is expected to gradually rebound

The report to the 20th National Congress of the Communist Party of China pointed out that we should adhere to the principle of "no speculation in housing" and speed up the establishment of a housing system featuring multi-subject supply, multi-channel support, and simultaneous rental and purchase. In the Report on the Work of the Government in 2023, it is proposed to explore the construction of housing security system, prevent and resolve the risk of high-quality housing enterprises, support rigid and improved housing demand, solve the housing problems of new citizens and young people, and again emphasized the importance of real estate to set the tone for the development of the industry. In the future, the central government will continue to adhere to the keynote of "no speculation in housing", and the policies on both supply and demand will continue to be optimized, and the policy intensity is expected to be further strengthened. For Anhui Province, the overall real estate regulation policy of the whole province maintains the trend of stability with some relaxation, and the demand side policy may be increased to stimulate the market vitality and promote the expected repair. According to the analysis of the completed amount and growth rate of real estate development investment in Anhui from 2012 to 2022, combined with the relevant policies of the current real estate

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industry, it is expected that the growth rate of real estate development investment in Anhui from 2023 to 2025 is expected to gradually rebound, with year-on-year growth of 4.85%, 5.49% and 5.21% respectively. In addition, it is expected that in the next three years, the main indicators of real estate development in Anhui, such as construction area, completed area, and sales volume of commercial housing, will stabilize and rebound, and the development of the real estate industry will gradually return to the right track. The forecast of main indicators of Anhui real estate development in 2023-2025 is shown in Table 4.

Table 4. Forecast of main indicators of real estate development in Anhui from 2023 to 2025

Indicator	Unit	2023		2024		2025	
		Predicted value	Growth rate (%)	Predicted value	Growth rate (%)	Predicted value	Growth rate (%)
Investment completed in real estate development	100 million yuan	7142.06	4.85	7534	5.49	7926	5.21
Building construction area	10 thousand square meters	43488.13	6.48	45349.68	4..28	47211.22	4.10
Floor space of buildings completed	10 thousand square meters	6204.31	4.36	6355.03	2.43	6505.75	2.37
Sales of commercial housing	100 million yuan	6246.45	13.8	6746.68	8.01	7246.79	7.41

3.2. The source structure of real estate investment funds is basically stable

The real estate industry is a capital-intensive industry with large investment scale and long development process, so real estate enterprises usually obtain funds through financing for real estate development. Among the various sources of funds for investment in real estate enterprises in Anhui,the proportion of foreign investment accounts for almost zero, domestic loan funds steadily increase, self-raised funds and other funds have been the main component. In 2022, under the influence of such factors as risk spillover from real estate enterprises and frequent disturbance of COVID-19, the real estate market has been operating at a low level, with weak residents' willingness to purchase houses and loans, and other capital sources of real estate enterprises have dropped significantly, resulting in a poor overall financing environment. Since November, favorable real estate financing policies have been released in a concentrated manner, and the "three arrows" of real estate rescue have been successively landed, improving the financing environment. In the future, with the support of policies, the financing environment of real estate enterprises will continue to recover, the financing channels will continue to expand, and the pressure on funding sources is expected to be eased. According to the national macro-control policy on the real estate industry, combined with the composition of investment funds of Anhui real estate enterprises from 2012 to 2022, it is expected that from 2023 to 2025, various sources of funds for real estate investment in Anhui will increase steadily. Although the proportion of domestic loans, self-raised funds and other funds will change slightly, the overall structure will remain stable, and self-raised funds and other funds will still be the main pillar of real estate development funds in Anhui.

The predicted composition of investment funds for Anhui real estate enterprises from 2023 to 2025 is shown in Table 5.

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Table 5. Forecast of investment fund sources of Anhui real estate enterprises from 2023 to 2025

Unit: 100 million yuan

Source of funds	2023		2024		2025	
	Predicted value	Proportion (%)	Predicted value	Proportion (%)	Predicted value	Proportion (%)
Domestic loan	720.46	9.31	752.45	9.20	782.73	9.08
Utilization of foreign capital	0.77	0.01	0	0	0	0
Self-raised funds	2424.48	31.33	2432.38	29.74	2427.49	28.16
Other funds	4592.82	59.35	4993.98	61.06	5410.14	62.76
Total	7738.53	-	8178.81	-	8620.36	-

3.3. The trend of regional differentiation of real estate investment is more obvious

Anhui Province has a wide geographical area,and due tofactors such as comprehensive location conditions and economic development stages, there is a significant gap in the development of the real estate industry among various cities in the province.According to the above analysis, the imbalance of regional development of the real estate industry in Anhui has become increasingly prominent. Hefei, the provincial capital, leads the province in real estate investment, with an annual total far exceeding that of other Anhui cities combined. In recent years, the development of the real estate industry in northern Anhui has been constantly improving, catching up with the development speed of the central Anhui region. However, the development of the real estate industry in southern Anhui is still slow, and the gap with the central and northern Anhui continues to expand. Generally speaking, the investmentintensity in real estate development is closely related to local economic development and population flow. Cities with a large inflow of migrant population usually have a large increase in commercial housing investment, while cities with low migrant mobility, such as Chizhou and Tongling, have a significantly lower investment in real estate development. In addition, although cities such as Bozhou and Fuyang in northern Anhui have a relatively low level of economic development, they have a large population and a relatively low degree of urbanization, making them a growing market with great development potential.Coupled with the support of government policies, the investment in real estate development in these cities has increased rapidly in recent years. It is expected that from 2023 to 2025, the six cities in northern Anhui will still be the key object of real estate development in Anhui, the real estate development investment in northern Anhui will still be in a leading position, the real estate investment in other cities will gradually recover positive growth, and the problem of regional differentiation of real estate investment will continue to exist.

The predicted investment in the real estate industry in various cities in Anhui from 2023 to 2025 is shown in Table 6.

Table 6. Forecast of real estate investment in various cities in Anhui from 2023 to 2025

Unit: 100 million yuan

Region	2023		2024		2025	
	Predicted value	Growth rate	Predicted value	Growth rate	Predicted value	Growth rate

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		(%)		(%)		(%)
Hefei	1513.34	3.86	1569.58	3.72	1625.82	3.58
Huaibei	227.99	8.87	238.76	4.72	249.53	4.51
Bozhou	477.53	5.39	514.73	7.79	551.98	7.24
Suzhou	486.96	-2.12	529.23	8.68	571.50	7.99
Bengbu	301.03	-26.2	310.57	3.17	326.75	5.21
Fuyang	872.71	-1.26	924.97	5.99	985.90	6.59
Huainan	246.33	12.02	265.34	7.71	284.36	7.16
Chuzhou	596.87	1.70	633.66	6.16	670.44	5.81
Lu'an	501.04	9.61	539.28	7.63	577.52	7.09
Ma'anshan	225.42	1.68	242.78	7.70	276.47	13.88
Wuhu	546.98	-0.44	510.62	-6.65	577.82	13.16
Xuancheng	214.75	-4.04	224.14	4.37	233.52	4.19
Tongling	123.97	4.71	127.87	3.15	131.77	3.05
Chizhou	91.24	2.86	89.65	-1.73	88.07	-1.76
Anqing	310.43	5.66	329.52	6.15	348.62	5.79
Huangshan	144.41	0.84	145.50	0.76	146.60	0.75

4. Conclusions and Suggestions

Through the above research, it is found that the overall level of the investment efficiency of the real estate industry in Anhui Province from 2012 to 2022 is relatively high, and the scale efficiency level is higher than the pure technical efficiency level, indicating that the scale efficiency is in the dominant position and is the key factor affecting the comprehensive efficiency. In addition, the efficiency of real estate investment in Anhui Province decreased in 2022, and the input and output failed to be effectively coordinated, resulting in diminishing returns to scale. It is necessary to further optimize the existing resources or properly control the investment scale to improve the investment efficiency. Based on the analysis of the investment efficiency of the cities in Anhui province, the average value of real estate investment efficiency in 16 cities in Anhui Province in 2022 is 0.821, indicating a good overall level, but there is still a large space for development. From the regional perspective, there are great differences in the efficiency of real estate investment among different regions, with the highest in central Anhui, followed by southern Anhui, and the lowest in northern Anhui, showing aobvious regional gap. On the basis of comprehensive analysis of investment status and policy guidance, this paper predicts the development trend of Anhui real estate investment. In the next three years, Anhui real estate investment is expected to gradually rebound, the source structure of real estate investment funds will basically maintain stability, but the trend of regional differentiation of real estate investment will be more obvious.

Based on the research results, this paper puts forward the following suggestions for the development of the real estate industry in Anhui province:

(1) Adhere to the policy of "no speculation in housing" and promote integration into the Yangtze River Delta. Always adhere to the "housing without speculation" policy as the basic premise to promote the development of the real estate industry, and maintain the overall stability of the development of the real estate industry. As housing prices continue to rise, "real estate speculation" has become the main direction for many investors. On the one hand, the high enthusiasm of real estate speculation leads to the continuous sharp rise in housing prices.On the other hand, the real estate market is in short supply, and consumers with housing demand are faced with the dilemma of housing shortage. Only by adhering to the policy of "no speculation in housing" can the healthy development of the real estate industry be promoted. The government should accelerate the integration of Anhui Province into the Yangtze River

Delta, give full play to the economic driving effect of the Yangtze River Delta, establish industrial links between Jiangsu, Zhejiang, Shanghai and Anhui, attract investment through price advantages and policy support, optimize the rational allocation of inter-regional factor resources, deepen the integrated development of regional economy, and promote the real estate industry of Anhui Province to achieve new breakthroughs.

(2) Accurately regulate regional real estate development policies to adjust regional imbalances. The government should adhere to the policy concept of "one city, one policy", accurately adjust the real estate development policies in different regions according to the development characteristics and advantages of each region, and improve the regional imbalance in the development of the real estate industry. Each government should determine the number of commercial houses to be built in accordance with the regional economic development status, population and household trends, plan the scale of commercial and business houses in accordance with the industrial development status, guide the types of building of enterprises, and optimize the proportion of building for different purposes in the region, so as to meet the rigid and improving needs of consumers. The government should control local purchase and rental prices and keep them within a reasonable range to avoid breaching consumers' purchasing power. Preferential policies should be adopted for consumers at different levels, the second-hand housing trading system should be optimized, the cost of improved housing should be reduced, and residents should be encouraged to upgrade their homes.

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