Research on the Financial Risks of China's Listed Real Estate Enterprises: Empirical Research based on Debt Solvency and Stock Price Performance

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Empirical Research Based on Debt Solvency and Stock Price Performance

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by

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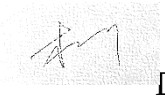
Signature：  Date：2021.07.05

Abstract

The real estate industry is an important industry in the national economy and belongs to the leading industry. After more than ten years of development, China's real estate finance has tried almost all financial instruments or models in the world, such as residential savings banks, provident funds, housing cooperatives, housing mortgage loans, etc., but has not yet formed a real estate finance model suitable for China's real estate industry and the development of the national economy. The real estate financial system is not perfect, and the management system needs to be improved, such as pre-intervention mechanism, whole-process management mechanism, scientific decision-making mechanism, risk early warning mechanism, etc. These are all pregnant with potential risks. Therefore, the study of real estate financial risks has become a very important topic. First of all, this paper constructs a real estate company's solvency index scoring model, which can effectively measure the financial risk of real estate companies. Secondly, this paper conducts an empirical analysis on the impact of real estate operation indicators and financial indicators on the solvency and stock price of real estate companies, and finds that sales and land reserves have a significant impact on the solvency of real estate companies. At the same time, this paper finds that the net debt level of real estate companies, return on net assets and the ratio of net cash to interest-bearing debt have a significant positive impact on a company’s stock price. Lastly, this paper examines the impact of corporate operations on the stock prices after incorporating corporate micro-solvency. The conclusion indicates that the growth rate of advanced receivables has a significant positive impact on the stock price without considering the financial factors. Upon the inclusion of the financial factors, there is a significant positive impact of the average premium for new land acquisitions on the stock prices.

Key words: real estate; financial risks; operation indicators; Financial indicators

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1. Research Background

The real estate industry refers to an integrated industry incorporating various economic activities with land and buildings being the operational objects and engaged in real estate development, construction, operation, management, maintenance, renovation and services, representing a pioneering, underlying, driving and risk-based industry. Following decades of progress, the real estate industry has performed a pivotal role in the economy.

As a pillar industry of the national economy, there is a long upstream and downstream industry chain and a great industrial connection in real estate industry. It is closely interlinked with industries such as construction, building materials and in particular, the financial industry. While driving the advancement of its upstream and downstream industry chains, it also involves tremendous systemic risks. There is a great dependence of the real estate industry on the financial sector. Various factors, including the excessive industry volume and the perennial high leverage of real estate ventures, have contributed to the huge financial risks in the real estate industry. High leverage has enabled the rapid expansion of real estate ventures, while also featuring a high risk of debt default. Excessive pressure has been placed on corporate debt repayment. On the one hand, volatility factors in the real estate market, such as the selling price of commercial housing and rental prices, influence the sales returns of real estate ventures. On the other hand, the fluctuation of interest rates and other macro factors impact the financing cost and debt value of real estate ventures. Under the high leverage ratio, the risk resistance and financial liquidity of real estate ventures have been greatly challenged. The year 2020 marks a peak period for the payment of credit debt and other interest-bearing liabilities of real estate ventures, with the size of maturing debts in the industry amounting to RMB 1.46 trillion. With restricted financing channels and persistently high gearing ratios, real estate ventures have carried on their operating mode of "borrowing new to repay old" and "borrowing short to repay long", further intensifying the financial risks of the real estate industry.

As a business operating on liabilities, there is a phenomenon of multiple interests focusing on the solvency of real estate ventures. For examples, for shareholders, solvency of real estate ventures constitutes an important part of corporate value and

future performance; for financial institutions, solvency is a critical factor in determining corporate credit ratings; for the government, the formulation of regulatory policies correlates closely with the solvency of real estate ventures. Particularly underlying the foregoing real estate financing environment and policy background, the solvency of real estate ventures is not only essential for their sustainable and robust development, but also is directly attributable to the continuity of the capital chain of the real estate finance industry. It is pivotal to the stability of the real estate financing environment and the control of real estate financial risks. Furthermore, the operating indicators of real estate ventures represent a key component of the real estate financial risk index system. By conducting an in-depth study on the impact of the operating indicators of real estate ventures on their financial risks, and inquiring into the correlation between their internal operations and solvency, it is of great significance and relevance to assist real estate ventures to enhance their future business model, to optimize their financial structure, to strengthen their debt servicing capacity for lowering the risk of debt default, to contribute to the reduction of financial risks in the real estate industry, to construct a favourable financing environment, and to secure a smooth operation and development in the future.

2. Literature Review

In the wake of the financial crisis, the Chinese government embarked on a vigorous "four trillion" policy, which has ushered the real estate industry into a golden decade. Real estate sector has assumed a relatively vital role for the Chinese economy. Attention has been given by scholars to the correlation between the stock price, operating conditions and debt structure of real estate ventures. Currently, China has embraced a new era and the real estate industry has gradually matured. In view of various policies such as "no speculation in housing" and "three red lines", there have been new transformations in the production and operation of real estate ventures. As a result, considering the rising uncertainty in the real estate industry, it is particularly relevant to explore the solvency and corporate value of real estate ventures. A new research interest has emerged on how to measure the operating conditions of real estate ventures in a more objective manner, and its impact on solvency and stock prices.

2.1. Research on Corporate Solvency Evaluation Indicators

First of all, in terms of the construction of corporate solvency indicators, Zheng and Cao (2005) adopted the Principal Component Analysis (CPA) to develop a comprehensive performance index and to investigate the effect of capital structure on corporate performance. It has been revealed that there is a negative correlation between leverage ratio and corporate performance, with such effect being more significant for firms exhibiting inferior growth. Yu et al. (2007) developed a comprehensive evaluation model on the basis of traditional solvency indicators. Xia (2010) suggested that one should hold the stakeholder's stance while refining and improving solvency indicators. Qin (2011) put forward to quantify the solvency indicators and categorize the corporate solvency into short-term solvency represented by strong liquidity indicators (e.g., current assets, current gearing ratio) and long-term solvency represented by weak liquidity indicators (e.g., ownership equity and long-term gearing ratio). Zhang (2012) recommended that the corporate solvency should be evaluated from a practical perspective with the following suggestions: 1. the cash required for corporate regular needs should be considered while paying off the debt cash; 2. the realization capacity of accounts receivable and inventory should be taken into account in considering the solvency; 3. When upgrading the corporate solvency, it is necessary to consider the corporate short-term solvency; 4. eventually, supplementary remarks

are made on the fixed cost coverage multiples and debt principal-interest cash coverage ratios, etc.. Chuai and Wang (2013) proposed that it is important to incorporate static and dynamic analysis indicators in the analysis of corporate solvency. The conventional static analysis ratios consist of gearing ratio, cash ratio, current ratio, and quick ratio/Acid-test Ratio. In addition, indicators such as cash flow should be given consideration to present a more comprehensive picture of corporate solvency. By using fuzzy mathematics, Guo and Ma (2014) constructed a comprehensive solvency model by means of indicators such as quick ratio, gearing ratio, current ratio, equity ratio and receivables turnover ratio to further investigate the solvency of real estate ventures. According to the three aspects of short-term, long-term and comprehensive solvency, Peng (2019) established an evaluation model of corporate solvency, and broadened the scope of corporate solvency indicators on the basis of the industry perspective.

2.2. Research on the Influence Mechanism of Corporate Solvency

Secondly, regarding empirical studies concerning the influence mechanism of corporate solvency, numerous scholars have addressed the influence mechanism of corporate solvency from both liquidity and liability structure.

For a capital-driven industry like the real estate industry, liquidity analysis is crucial. Bhimani (1996) argued that illiquidity, which compromises corporate solvency, will lead to eventual bankruptcy of the firm due to lack of solvency when liabilities exceed assets. Raheman and Nasr (2007) primarily concerned with corporate liquidity in their study to analyze solvency. A number of financial indicators affecting liquidity, such as average collection period, average payment period, ratio of financial assets to total assets, current ratio, firm size and inventory turnover days, were selected as explanatory variables. Subsequently, upon examining the impact of debt service ratio on profitability, an exceptionally strong negative correlation was observed between the two. Zhang (2012) comprehensively applied a combination of static indicators (e.g., cash ratio, current ratio, interest-bearing debt ratio, etc.) and weighted average of static indicators (e.g., cash flow from financing, investing and operating activities, etc.) of listed real estate companies to perform trend analysis and evaluate the current situation and development tendency of solvency across the real estate industry. Ultimately, a number of measures were proposed to enhance corporate solvency.

On top of liquidity, it is believed by plenty of scholars that the impact of liability structure on corporate solvency is also valuable to be studied. Liang (2007) carried out an empirical analysis regarding the relationship between solvency and asset structure of listed companies. It was concluded that making full use of assets and continuously adjusting and optimizing the asset structure constitute a significant approach for listed companies to improve their solvency. Li (2014) choose seven indicators, such as current ratio, to establish consolidated scores of solvency for real estate ventures. Panel data regression was utilized to derive the influence of different maturities and types of liabilities on solvency. As the results indicated, there is a significant impact of liability structure on the solvency of real estate industry, in which the amount of bank loans affects corporate solvency the most. According to Jiang et al. (2018), when the policy uncertainty rises, the reduction of bank loan level is more significant for enterprises with higher financing constraints, unsupportive industrial policies and in cyclical industries. By selecting 114 listed real estate ventures in Shanghai and Shenzhen and integrating thirteen indicators such as profitability index and development capacity index, Jia (2017) developed a comprehensive evaluation model of solvency. Afterwards, the regressions were conducted by taking the overall solvency score as the dependent variable and the liability structure such as bank loan ratio as the independent variables. It was discovered that the solvency of real estate ventures is more influenced by long-term gearing ratio and less influenced by short-term gearing ratio and commercial credit ratio.

2.3. Research on the Correlation between Stock Price and Operational Condition of Listed Companies

Last but not least, there are many scholars offering a wider range of ideas for studies on the correlation between the operational conditions and stock prices of listed companies. With both theoretical and empirical dimensions, Collins (2004) conducted an empirical study on the mechanism of stock returns. In this regard, the authors considered production earnings, asset investment, rate of return, growth and depreciation as explanatory variables, and stock price as the explained variable, which revealed that the explanatory variables can contribute 20% of the explanatory effect on the explained variable. Aheame et al. (2010) investigated the correlation between financial information of manufacturing firms and their stock prices, whose findings

indicated that there is a significant impact of financial information of manufacturing firms on stock returns. Clarkson et al. (2011) argued that the corporate stock price is influenced not only by the corporate intrinsic value, but also by the extrinsic environment, such as oil price, interest rate and stock price index. Park and Shin (2013) concluded that the stock price of listed companies is strongly correlated with their financial indicators, and the influence from profitability of listed companies on the stock price is greater than that of other indicators on the stock price. With a sample of more than 1000 listed companies in Shanghai and Shenzhen, Li (2014) established a multivariable linear regression model to analyze the correlation between the stock price increase rate and the change rate of financial indicators of listed companies. The conclusion demonstrated that there is a significant positive correlation between stock price increase rate and earning per share (EPS), and there is a significant negative correlation between stock price increase rate and long-term gearing ratio. By selecting 718 listed companies in Shanghai, Huang et al. (2016) established a panel regression model to empirically analyze the correlation between financial indicators and stock prices of listed companies. As disclosed in the findings, in contrast to other indicators, profitability has the highest impact on stock price, and EPS shows the most significant impact on stock price. Wu (2018) extracted 13 financial indicators from five aspects including profitability measurement of real estate listed companies from a financial perspective. The relationship between financial indicators and stock prices was explored via a multivariable regression model. On the basis of a multivariable VAR regression model, Yang et al. (2020) measured the effect of monetary policies on stock index variations in China, revealing that there is a significant holistic effect of the monetary policy instruments on stock price volatility in China.

As a conclusion, over the research process on the evaluation indicators of corporate solvency, the majority of them are derived from the traditional financial indicators by subjectively selecting one or more indicators for analysis. However, this paper argues that a wide range of financial indicators have an impact on corporate solvency. The most thorough and effective approach is the factor analysis method, which incorporates various financial indicators to evaluate corporate solvency in a holistic manner, representing the consolidated solvency of different enterprises as exact values, while comparing the consolidated solvency values of different enterprises through standardization.

Regarding the research on the influence mechanism of corporate solvency, a large number of scholars have primarily researched from the perspective of corporate liquidity and liability structure. There is no denying that a certain influence mechanism is present between liquidity and liability structure, and corporate solvency. This paper argues that as either liquidity or liability structure is a outcome of a firm's day-to-day business activities, it is more valuable to investigate the relationship between corporate daily business activity data and corporate solvency.

With respect to the correlation between the operational conditions of listed companies and their stock prices, previous studies have generally utilized different methods to explore the correlation between the industry operational conditions as a whole and the stock prices. This paper recognizes that for leading and tail-end firms operating in the same industry, the impact of the firm's operational conditions on the stock price is varied. Hence, a classification of firms based on solvency is presented in this paper, followed by a study of the relationships between their operating conditions and stock prices, respectively.

In short, in the new era, it is worthwhile to examine the impact of the operations of Chinese real estate listed companies on solvency and stock prices. This paper highlights the empirical study of Chinese real estate listed companies.

3. Research Idea and Methodology

3.1. Research Idea

This paper intends to select annual data of A-share listed real estate ventures from 2014 to 2019 with the removal of data anomalies and risk warning signs, including but not limited to character indicators such as profitability, operational capacity and stock prices of real estate ventures and common indicators such as stock index fluctuations, M2 growth rate and interest rate changes. Following the relevant processing, the impact of operational indicators on corporate solvency and corporate share prices is studied, with the use of the software Stata.

Firstly, the study is conducted on the impact of operational discrepancies of real estate ventures on the financial risk (solvency), which is proposed to into two steps. The first step consists of the construction of solvency index for real estate ventures. In the second step, a panel data regression analysis of operational conditions on the solvency of real estate ventures is conducted. It is aimed to compare and analyse the impact of cash flow variance, land reserve variance, and sales variance on the financial risk of listed companies. Following the overall regression of the panel data, this paper intends to classify real estate ventures into two groups for comparison in terms of their operating indicators, the worse ones and the better ones. The above regressions are conducted respectively to investigate the impact of real estate operational discrepancies on financial risk at different operating levels, and eventually to draw relevant conclusions and to offer policy recommendations.

Subsequently, it is a study about the impact of real estate operational discrepancies on their stock prices. The dependent variable of this paper is the quarterly increase of real estate corporate stock price minus the net growth of CSI 300 index or Hong Kong Stock Index, and the independent variables are character indicators, including cash flow, land reserve, sales amount, financing situation, corporate asset turnover, corporate gearing ratio, and macro indicators such as M2 growth rate, interest rate change, GDP growth rate. This paper intends to perform an empirical analysis with a random effects panel model, and ultimately draw conclusions and offer relevant policy recommendations.

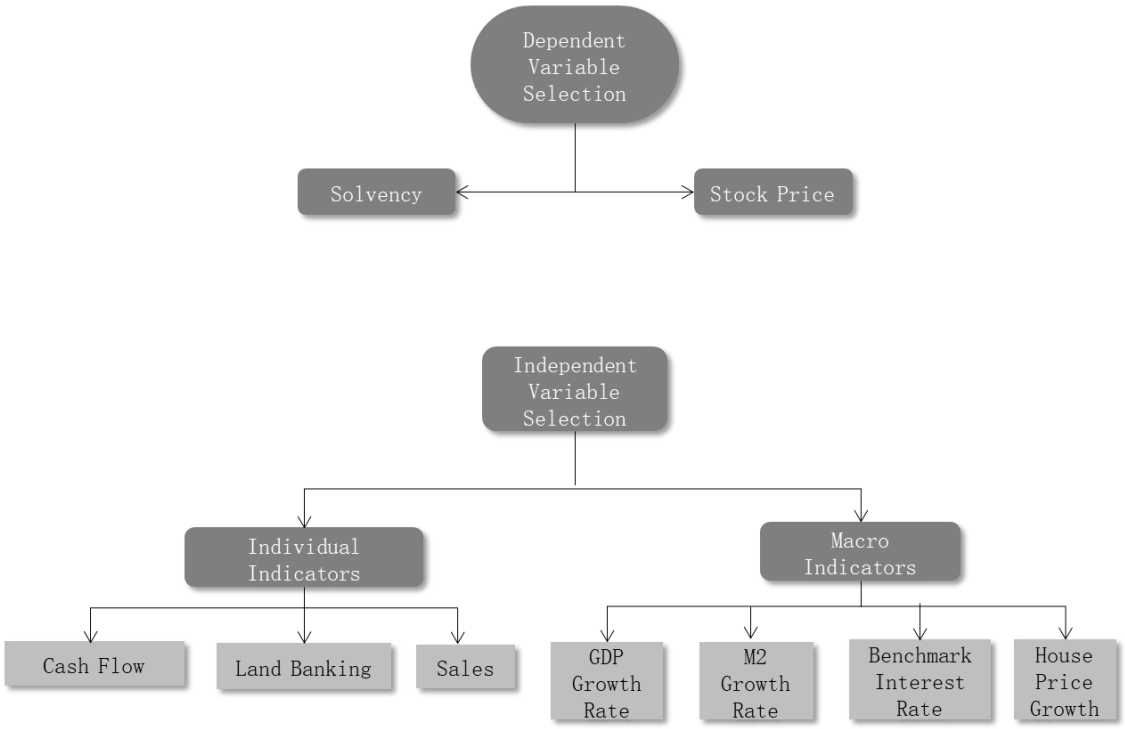

Figure 1: Technology Roadmap

3.2. Research Methodology

The following research methods have been applied in the study:

Factor Analysis Method. With regard to the selection of indicators for measuring the solvency of real estate ventures, this paper employs factor analysis owing to the wide variety of indicators and their high relevance. SPSS software is utilized to analyze the indicators of solvency of real estate ventures and calculate the composite score of each real estate venture.

Panel Data Econometric Analysis Method. In this paper, it is necessary to examine both the patterns among different firms and the laws of such firms across time. A panel data econometric model is the only way to achieve this objective. Meanwhile, the use of panel data will also expand the data volume of this paper, leading to more convincing conclusions.

Integration of Theoretical and Empirical Analysis. The analysis of real estate ventures' solvency and of stock prices and operations requires both theoretical elaboration and empirical analysis. It is also relevant and closely integrated with the results of the empirical analysis to put forward reasonable policy recommendations for reference purposes.

3.3 Innovations and Limitations

Innovations:

Taking the financial data of real estate listed companies for the past seven years as a sample, this paper empirically analyzes the solvency and the relationship between share price and operation of 29 A-share and Hong Kong-share real estate listed companies in China.

In this paper, the comprehensive solvency indexes take into account several aspects of corporate operations. Moreover, in light of the operational characteristics of real estate ventures, target adjustments are carried out to some conventional financial indicators to ensure a more realistic reflection of the actual situation among real estate ventures. Ultimately, 10 financial indicators are selected for factor analysis, yielding a composite score that evaluates corporate solvency in a comprehensive manner, rather than just from individual indicators or short- and long-term solvency.

This paper considers both stock investors and bond investors. It not only studies the relationship between operational conditions and the solvency of real estate companies, but also studies the relationship between operational conditions , financial conditions and changes in stock prices.

This paper considers that companies with different solvency capabilities may have different influencing factors. Therefore, this paper divides the real estate companies into high-solvency groups and low-solvency groups for empirical analysis.

Limitations:

In this paper, the sample is composed of listed companies. Due to the availability of data, it does not cover the entire real estate industry and the conclusions drawn may not be applicable to non-listed companies.

4. Construction of Solvency Index

There are various indicators affecting corporate solvency. In the past, it was not possible to fully reflect the real situation by adopting individual indicators in financial statements to analyze corporate solvency. Hence, this paper intends to evaluate the solvency of real estate companies by selecting multiple indicators from diverse aspects, employing the statistical factor analysis method to synthesize the solvency indicators of real estate ventures, and establishing a comprehensive evaluation model to acquire the solvency index.

4.1. Sample Selection

In this paper, relevant annual financial data of real estate ventures in the Chinese A-share and Hong Kong stock markets are selected over the period from 2013 to 2019. The factor analysis method is employed to develop a comprehensive evaluation model for the solvency of real estate ventures. Data are sourced from the wind database. For the authenticity and reliability of the research results, the sample data are screened in this paper, in accordance with the following criteria: (1)For the sake of data availability, the selected listed companies must have been listed prior to 1 January 2013.(2)The financial data of listed companies are intact and free from deficiencies.(3)ST companies are removed due to their abnormal stock price fluctuations and the low credibility of their financial data.

Following the screening process, a final sample of 29 listed real estate companies has been selected: Vanke A、Longfor Group、Country Garden、CR Land、China Evergrande、Poly Developments and Holdings、China Overseas Land & Investment、Sunac China、CRCC、Shimao Group、Logan Group、Gemdale Group、CIFI Group、Huaxia Happiness、Agile Group、Jinke Corporation、R&F Group、RiseSun、Greentown、Yuexiu Property、Aoyuan、Financial Street Holdings、Grand Joy、Yuzhou Group、Capital Development、Sino-Ocean Group、Central China Real Estate、Poly Property、Beijing Capital Land.

4.2. Variable Selection

This section is designed to evaluate the solvency of real estate ventures by calculating "solvency composite indicators" through factor analysis. Meanwhile, the obtained "solvency composite indicators" will be applied in the subsequent studies. Therefore, the following principles are observed in the selection of variables, which allows the selected indicators to be a better representation of corporate solvency: 1. Comprehensiveness: The corporate solvency is influenced by various aspects, therefore, this paper should be comprehensive in its selection of indicators. 2. Comparability: The selected indicators should be comparable among different companies at different periods, thus a uniform measurement method and caliber should be adopted to ensure the comparability of the sample data. 3. Appropriateness: The selected indicators should be associated with the corporate solvency rather than arbitrarily selected, to obtain the representative indicators. 4. Accessibility: The indicators are selected for the subsequent empirical analysis. The later analysis will not be completed unless the indicators are easily accessible. 5. Objectivity: The selected indicators should demonstrate objective facts and should not be subject to human factors that make the results worthless.

Considering several dimensions of companies based on the above principles, the following indicators are selected: Quick Ratio、Net Gearing Ratio、Gearing Ratio Excluding Advance Receivables、Cash Ratio、Cash to Short-term Debt Ratio、Inventory Turnover Ratio、Return on Equity、Return on Total Assets Ratio、Net Cash to Interest-bearing Debt Ratio、Total Asset Turnover.

4.3. Data Pre-processing

Data Forward Processing. Data indicators are classified into forward indicators and inverse indicators, with forward indicators being the larger the better, and inverse indicators being the smaller the better. The "solvency index", which is presented in this chapter, describes corporate solvency. The larger the solvency index is, the stronger the corporate solvency will be. In line with this criterion, among the 10 indicators selected for factor analysis, 8 are forward indicators and 2 are inverse indicators. For the inverse indicators, they should be forward converted so that they can be in the same direction

as the forward indicators to collectively measure the solvency. For the inverse indicator Xi, let Xp=-Xi, where Xi is the original value and Xp is the corrected value.

Data Standardization. Due to the different units or different dimensions of the raw data, the results obtained would be meaningless for direct calculation. Moreover, in case of factor analysis involving variables with excessive order-of-magnitude variations, the factor differences contributed by each indicator to the production of the common factor can also be significant, which is not conducive to a reasonable study result. Therefore, the forwarded data should also be standardized. The data can be standardized directly in SPSS, and usually the standardization is done by processing the data to a form with a mean of 0 and a variance of 1.

4.4. Correlation Analysis

The basic idea of factor analysis involves grouping variables that are more correlated into one group, with variables in different groups being less correlated. Multiple composite indicators are derived from this grouping, which are unrelated to each other and are referred to as common factors. The relevant data should be analyzed to examine the applicability of factor analysis in advance. Factor analysis aims to establish the correlation between each indicator and perform correlation analysis on the data, with the correlation coefficient matrix presented in the table below. As can be observed, there are still significant correlations between some of the indicators in the data, so factor analysis is applicable.

	X1	**X2**	**X3**	**X4**	**X5**	**X6**	**X7**	**X8**	**X9**	**X10**
X1	1	0.213	-0.258	0.648	0.391	0.24	-0.165	0.129	0.048	0.104
X2	0.213	1	0.402	0.229	0.488	0.315	0.033	0.362	0.369	0.375
X3	-0.258	0.402	1	-0.114	0.23	-0.176	0.168	0.361	0.115	-0.049
X4	0.648	0.229	-0.114	1	0.564	0.011	-0.109	0.234	0.087	-0.024
X5	0.391	0.488	0.23	0.564	1	0.086	0.023	0.391	0.311	0.093
X6	0.24	0.315	-0.176	0.011	0.086	1	-0.071	-0.012	0.134	0.904
X7	-0.165	0.033	0.168	-0.109	0.023	-0.071	1	0.574	0.037	0.045
X8	0.129	0.362	0.361	0.234	0.391	-0.012	0.574	1	0.093	0.151
X9	0.048	0.369	0.115	0.087	0.311	0.134	0.037	0.093	1	0.131
X10	0.104	0.375	-0.049	-0.024	0.093	0.904	0.045	0.151	0.131	1

Table 1: Indicator Factor Analysis Table

The KMO and Bartlett tests are used for testing the suitability of the data for factor analysis. The KMO and Bartlett tests for the above 10 indicators have yielded the following results:

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.587
Bartlett Test of Sphericity	Approximationχ^2	984.001
	Degree of Freedom	45
	Significance	.000

Table 2: The Results of Bartlett Test of Sphericity

The above table contains the results of KMO and Bartlett tests for the proposed 10 indicators. According to the criteria, the KMO value should be greater than 0.5. It can be noticed from the table that the KMO value is 0.587, greater than 0.5, suggesting that the sample data are ready for factor analysis. The purpose of Bartlett test is to verify whether the correlation matrix is an identity matrix. If the sample is an identity matrix, it is not appropriate for factor analysis. The original hypothesis of Bartlett Test of Sphericity is that the correlation matrix is an identity matrix and the factor is to be factor analyzed, therefore we should reject the original hypothesis. The above table indicates that the χ^2 value of Bartlett Test of Sphericity is 984.001 (df is 45) with a p value of 0.000, achieving the significance level and signifying the rejection of the original hypothesis. To wit, the correlation matrix is not an identity matrix and is appropriate for factor analysis.

4.5. Common Factor Extraction

The scree plot is designed to determine the number of factors, which generally takes the number of eigenvalues greater than 1 as the number of factors. As can be seen from the above figure, there are 4 factors with the number of eigenvalues exceeding 1, so the 4 factors can be considered for extraction.

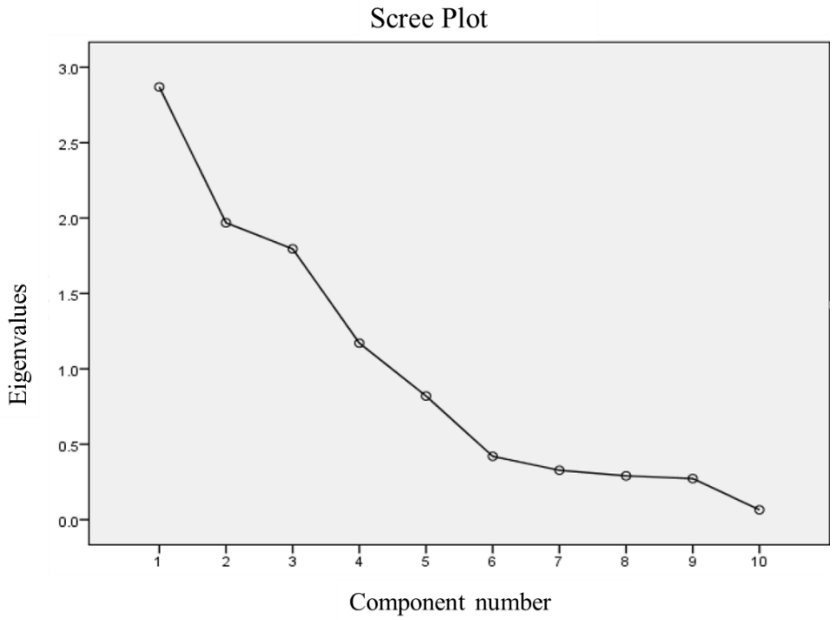

Figure 2: Scree Plot

	Initial Eigenvalues			Extraction Sum of Squared Loadings			Rotation Sum of Squared Loadings		
Component	Total	Variance Percentage	Cumulative %	Total	Variance Percentage	Cumulative %	Total	Variance Percentage	Cumulative %
1	2.87	28.696	28.696	2.87	28.696	28.696	2.172	21.719	21.719
2	1.969	19.689	48.385	1.969	19.689	48.385	2.052	20.517	42.235
3	1.796	17.955	66.34	1.796	17.955	66.34	1.882	18.819	61.054
4	1.171	11.709	78.049	1.171	11.709	78.049	1.699	16.995	78.049
5	0.82	8.2	86.249						
6	0.42	4.199	90.449						
7	0.327	3.274	93.723						
8	0.29	2.901	96.623						
9	0.272	2.723	99.346						
10	0.065	0.654	100						

Extraction Method: Principal Component Analysis.

Table 3: Total Variance Explained

The above table is the table of total variance explained by the factors, representing the degree of the overall data information interpreted by the selected factors. The initial eigenvalue consists of three columns: eigenvalue, explained variance, and accumulated explained variance. It can be seen from the table that only 4 components of the initial eigenvalues have eigenvalues exceeding 1, so eventually, 4 factors can be

extracted. And the variance contribution rate of the first component is the largest at 28.70%, the variance contribution rate of the second component is 19.69%, the variance contribution rate of the third component is 17.96%, and the variance contribution rate of the fourth component is 11.71. %, the cumulative contribution rate of the first four components reached 78.05%, making them qualified representatives of the company's solvency.

	Component			
	1	2	3	4
X1	.864	.177	-.070	-.070
X2	.224	.316	.757	.149
X3	-.267	-.233	.687	.328
X4	.903	-.074	.083	.030
X5	.634	-.012	.552	.170
X6	.080	.967	.058	-.072
X7	-.147	.012	-.075	.882
X8	.238	.030	.253	.853
X9	.058	.115	.657	-.121
X10	-.011	.955	.132	.097

Table 4: Component matrix after rotation

The rotated component matrix table represents the contribution of each indicator value in each factor. Typically, a value greater than 0.5 denotes that the indicator is the main one explained by the corresponding factor, as can be observed from the table above:

Factor F1, which is comprised primarily of quick ratio, cash ratio and cash to short-term debt ratio, captures corporate short-term solvency;

Factor F2, which is mainly composed of inventory turnover ratio and total assets turnover ratio, reflects corporate capital turnover ability;

Factor F3, consisting principally of adjusted net gearing ratio, adjusted gearing ratio excluding advance receivables and net cash to interest-bearing debt ratio, reveals corporate capital structure;

Factor F4 is mainly composed of return on equity and return on total assets ratio, which indicates corporate profitability.

4.6. Comprehensive Index Score Model

The factor score coefficient matrix can be obtained by SPSS software processing as follows:

	Component			
	1	2	3	4
X1	.423	.049	-.145	-.017
X2	.008	.092	.394	-.033
X3	-.195	-.151	.418	.075
X4	.438	-.090	-.052	.013
X5	.250	-.078	.241	.015
X6	-.018	.480	-.038	-.030
X7	-.054	.043	-.194	.581
X8	.096	.006	-.030	.506
X9	-.055	-.001	.416	-.195
X10	-.069	.477	-.011	.064

Table 5: Component Score Coefficient Matrix

From the above table of component score coefficient matrix, the factor score models for the four components F1, F2, F3 and F4 can be acquired:

F1=0.423X1+0.008X2-0.195X3+0.438X4+0.25X5-0.018X6-0.054X7+0.096X8-0.055X9-0.069X10

F2=0.049X1+0.092X2-0.151X3-0.09X4-0.078X5+0.48X6+0.043X7+0.006X8-0.001X9+0.477X10

F3=-0.145X1+0.394X2+0.418X3-0.052X4+0.241X5-0.038X6-0.194X7-0.03X8+0.416X9-0.011X10

F4=-0.017X1-0.033X2+0.075X3+0.013X4+0.015X5-0.03X6+0.581X7+0.506X8-0.195X9+0.064X10

For the calculation of the comprehensive evaluation score, the weighted average method is chosen. Considering the variance contribution of the eigenvalues from the four components, the weights of F1, F2, F3 and F4 can be calculated as 27.83%; 26.29%; 24.11%; and 21.77%, respectively, resulting in a comprehensive evaluation score model:

F = 0.2783*F1+0.2629*F2+0.2411*F3+0.2177*F4

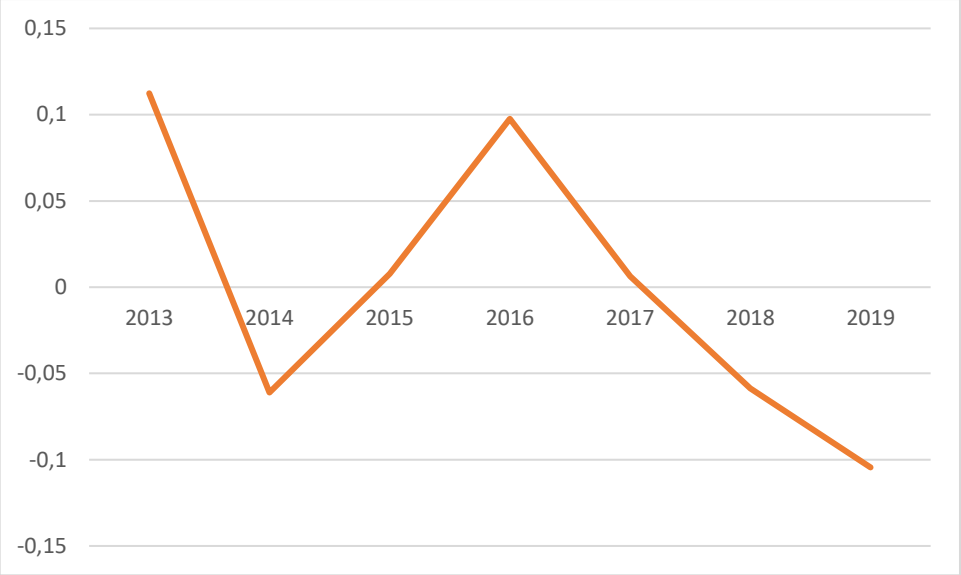

Figure 3: Average Solvency Comprehensive Indicators of Real Estate Listed Companies, 2013-2019

The above figure is obtained by averaging the sample data. As can be noticed from the above figure, there has been a large fluctuation in the average solvency of listed real estate ventures over the seven years from 2013 to 2019, which is consistent with the cyclical nature of the industry.

5. Empirical Analysis

5.1. Empirical Model Construction

Given that the object of this section is the impact of real estate operations on its debt solvency and stock price, the data has individual heterogeneity and to reduce the possibility of collinearity between variables, this paper adopts a static panel data model. Static panel models are divided into mixed regression, fixed effects and random effects models, and robust standard errors are used in the parameter tests. If all individuals have exactly the same regression equation, the equation is a mixed regression model with the following vector expressions.

$$y_{it} = \alpha + x_{it}'\beta + z_i'\delta + \epsilon_t$$

Fixed effects models can be divided into individual fixed effects models and time effect models. Firstly, the vector expression for the individual fixed effects model is

$$y_i = a_i 1_T + x_i\beta + Z_i\delta + \varepsilon_i$$

where $y_i = (y_{i1},\ y_{i2},\ \ldots,\ y_{iT})'$, $x_i = (x_{i1},\ x_{i2},\ \ldots,\ x_{iT})'$, $\varepsilon_i = (\varepsilon_{i1},\ \varepsilon_{i2},\ \ldots,\ \varepsilon_{iT})'$, $Z_i = (Z_1,\ Z_2,\ \ldots,\ Z_T)'$

The fixed effects model assumes that all explanatory variables are strictly exogenous and model homoscedastic. That is, the disturbance term ε_i is irrelevant from the current, prior and future values of the explanatory variable x_i, and $Var(\varepsilon_i|x_i, a_i) = \sigma^2 I_T$. Therefore, the above model is OLS.

This paper can also introduce time fixed effects, which can solve the problem of omitted variables that vary over time. The model regression is

$$y_{it} = \lambda_t + x_{it}\beta + Z_i\delta + \mu_i + \varepsilon_{it}$$

In the above equation, λ_t is an intercept term unique to period t of the data that can be used to explain the time effect at period t. For the above equation, T-1 dummy variables can be defined for LSDV estimation. Two-way fixed effects are time fixed effects models incorporating both time fixed-effects and individual fixed effects.

The random effects model is consistent with the regression model of the fixed effects model, with the equation

$$y_{it} = \lambda_t + x_{it}\beta + Z_i\delta + \mu_i + \varepsilon_{it}$$

However, the assumptions are different. The random effects model assumes that although different individual disturbance terms are not correlated, the disturbance terms of the same individual at different times have autocorrelation. The purpose of this assumption is to separate the long-term and short-term components of the variance, i.e.

$$Cov(\mu_i + \varepsilon_{it},\ \mu_s + \varepsilon_{is}) \begin{cases} {\sigma_u}^2 & if\ t \neq s \\ {\sigma_u}^2 + {\sigma_\varepsilon}^2 & if\ t = s \end{cases}$$

Where ${\sigma_u}^2$ is the variance of μ_i and ${\sigma_\varepsilon}^2$ is the variance of ε_i. In the random effect model, the autocorrelation coefficient for the same individual at different times does not change with time distance (t-s). Due to the presence of serial correlation, traditional OLS estimation is difficult to apply in the random effects model, so the random model effect is estimated using FGLS.

Then we discuss the hypothesis testing of the panel data model. The first issue is the selection of a fixed effects model versus a mixed regression model. The mixed regression assumes that there are no individual effects, so the statistical test is needed to establish such equation. The test method is to use OLS estimation to estimate the mixed regression, with the null hypothesis that individual effects are insignificant. This is shown as

$$a_1 = a_2 = a_3 = \cdots = a_n = a$$

F-statistic can be used to test whether the above hypothesis is rejected. If it is rejected, then the individual effect is significant, and the mixed regression model should not be used.

For the choice of fixed or random effects, this paper uses the Hausman test to test whether the fixed effect μ_i is correlated with other explanatory variables. The basic idea is that under the condition that μ_i is uncorrelated with the other explanatory variables, the parameter estimates of the random effects model using OLS and GLS estimation

are both unbiased and consistent. If the hypothesis does not hold, the fixed effects model remains consistent while the random effects model is not satisfied. Therefore, the null Hausman test hypothesis is that the parameter estimates will not differ significantly. Assume that β_1 and β_2 are the OLS estimation parameters for the fixed effects model and the GLS estimation parameters for the random effects model. If the null hypothesis holds, then the covariance

$$Cov(\beta_1 - \beta_2,\ \beta_2) = 0$$

Hausman test is based on the Wald statistic. The fixed effects model will be selected if the null hypothesis is rejected, and a random effects model will be selected if the null hypothesis was accepted.The paper then uses a permutation test to explore the issue of coefficient variability between groups.

5.2. Empirical Analysis Results

5.2.1. Empirical Analysis of the Impact of Operational Conditions on Solvency

The second section analyzes the impact of operational conditions on solvency of listed real estate ventures. First of all, it is the variable selection. In this paper, the micro operational conditions of enterprises are selected as the explanatory variable and the solvency constructed as the explained variable. Following the model setup test, subsequent research is conducted in this section using the RE model. the panel regression in this paper estimates the parameters with a robust standard deviation, as shown in the table below.

	(1)	(2)	(3)	(4)	(5)
	Cash Flow	Land Reserves	Sales	Comprehensive	Removing Insignificant Items
VARIABLES	Solvency	Solvency	Solvency	Solvency	Solvency
Land acquisition amount as a percentage of sales amount		0.000789		0.00346	
Net cash flow from operating activities as a percentage of net profit		(0.307)		(1.155)	
Land acquisition amount growth rate		-0.0242		-0.0305*	-0.0214*
Growth rate of land acquisition average price		(-1.564)		(-1.786)	(-1.908)
Percentage of land acquisition equity		0.0460		0.0684	
Average premium rate of new land acquisition		(0.222)		(0.330)	
Advanced receivables amount and growth rate		0.000321		0.0451	
Average sales price growth rate		(0.00420)		(0.869)	
Sales amount growth rate	-0.0711			-0.0423	
Land acquisition amount as a percentage of sales amount	(-0.759)			(-0.440)	
Net cash flow from operating activities as a percentage of net profit	-0.00227			-0.00111	

Land acquisition amount growth rate	(-1.116)			(-0.615)	
Growth rate of land acquisition average price			0.0464	0.0360	0.0284
Percentage of land acquisition equity			(0.739)	(0.577)	(0.454)
Average premium rate of new land acquisition			-0.0798	-0.118	
Advanced receivables amount and growth rate			(-0.553)	(-0.811)	
Average sales price growth rate			0.302***	0.303***	0.275***
			(3.430)	(3.359)	(3.494)
Average premium rate of new land acquisition*Average sales price growth rate			-0.273***	-0.282***	-0.250***
			(-3.276)	(-3.567)	(-3.334)
Constant	0.146	0.0957	0.0298	0.00268	0.0552
	(1.302)	(0.444)	(0.324)	(0.0117)	(0.602)
Observations	203	203	203	203	203
Number of idr	29	29	29	29	29

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Empirical results of the impact of operating conditions on solvency

The main conclusions from the empirical results are drawn as follows:

Out of the three explanatory variables for cash flow, land reserve and sales, there are significant impacts of sales and land reserves on the solvency of real estate ventures. To be specific, the growth rate of land acquisition average price poses a significant negative impact on solvency. The rise in land acquisition cost of real estate ventures at a time of prosperous land market will lead to a decrease in corporate solvency. Secondly, the sales amount growth rate has a significant positive impact on corporate solvency. The high sales growth demonstrates the company's excellent project realization and fast turnover rate. However, in the meantime, it is discovered that the growth rate of average sales price has no significant impact on solvency. It is less likely to demonstrate the impact of the average sales price of real estate ventures on their solvency. In contrast, the project realization and turnover capacity represented by the growth rate of sales scale is relatively more important.

Upon the introduction of the interaction term, different influences of each variable in the sales situation on corporate solvency are observed. In particular, there is a significant negative impact of the amount and growth rate of advanced receivables on corporate solvency, and a significant positive impact of the growth rate of sales amount on corporate solvency. Typically, sales amount and advanced receivables are changing in the same direction. Judging from the absolute value, the coefficient of sales amount growth rate outweighs that of advanced receivables growth rate. As a result, the high sales growth as a whole will still lead to a rise in solvency of real estate ventures. Whereas the growth rate of advanced receivables is the data of consolidated caliber, the growth rate of sales amount represents the full caliber. Consequently, by the time of larger cooperation scale, the growth rate of sales amount is likely to outpace that of advanced receivables, leading to an increase in the solvency of real estate development ventures.

Considering that the solvency between high and low liabilities may differ by the micro-operating conditions of enterprises, this paper classifies the top 14 enterprises with high solvency and the bottom 15 enterprises with low solvency, and performs the empirical model setting, model identification test and discussion of empirical results respectively. The paper ultimately employs a RE model with the model results shown below:

	(1)	(2)	(3)	(4)
	Low	High	Low	High
VARIABLES	Solvency	Solvency	Solvency	Solvency
Land acquisition amount as a percentage of sales amount			-0.0296	-0.327
Net cash flow from operating activities as a percentage of net profit			(-0.301)	(-1.617)
Land acquisition amount growth rate			-0.00281	0.00514
Growth rate of land acquisition average price			(-1.357)	(0.752)
Percentage of land acquisition equity			0.00555***	0.000605

Average premium rate of new land acquisition			(3.131)	(0.0920)
Advanced receivables amount and growth rate	-0.0342***	-0.00755	-0.0570***	0.00537
Average sales price growth rate	(-3.367)	(-0.620)	(-4.573)	(0.564)
Sales amount growth rate			0.146	-0.167
Land acquisition amount as a percentage of sales amount			(0.763)	(-1.097)
Net cash flow from operating activities as a percentage of net profit			0.0442	0.0692
Land acquisition amount growth rate			(0.625)	(0.576)
Growth rate of land acquisition average price	-0.125	0.200***	-0.103	0.221***
Percentage of land acquisition equity	(-1.199)	(3.439)	(-0.998)	(3.258)
Average premium rate of new land acquisition			-0.215	-0.308
Advanced receivables amount and growth rate			(-1.336)	(-0.919)
Average sales price growth rate	0.230***	0.414***	0.287***	0.453***
	(2.663)	(4.162)	(2.744)	(3.132)
Average premium rate of new land acquisition*Average sales price growth rate	-0.105	-0.535***	-0.174**	-0.567***
	(-1.252)	(-4.496)	(-2.174)	(-3.722)
Constant	-0.131	0.238*	-0.228	0.507***
	(-1.428)	(1.864)	(-0.904)	(3.151)
Time Effect	Control	Control	Control	Control
Observations	105	98	105	98
Number of idr	15	14	15	14

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Empirical results of the impact of different solvency companies' operating conditions on solvency

In this paper, Fisher's Permutation test is used to test the inter-group coefficient discrepancies after panel grouping regression. When the P-value is less than 0.05, it

signifies the existence of significant coefficient discrepancies between the different categories of models, with the empirical results shown below:

Variables	b0-b1	Fre	p-value
Land_reserve_2	0.027	226	0.226
Sales_1	0.326	32	0.032
Sales_3	0.184	174	0.174
Sales_1*Sale_3	-0.430	905	0.095
_cons	0.782	138	0.138

Table 8: The Results of Fisher's Permutation test

As the empirical results indicate, there are significant discrepancies in some variables in the sales of real estate ventures with different solvency levels, in specific, there are significant differences in Sales_1 and the interaction term Sales_1*Sales_3, while no significant differences are identified in other variables. As for the empirical results of the high solvency group, it is found that the negative effect of its interaction term is significantly larger than that of the low solvency group. Meanwhile, it is observed that the coefficient of the land acquisition growth rate is significantly negative in the low solvency group. Consequently, the higher land acquisition amount growth rate negatively impacts the low solvency group.

5.2.2. Empirical Analysis of the Impact of Financial Condition on Stock Price

This section presents the analysis regarding the impact of financial status on stock prices of real estate listed companies, first of which is the variable selection. In this paper, corporate financial variables are adopted as the explanatory variable and macro variables affecting corporate stock prices are controlled. Following the model setup test, subsequent research is conducted in this section using a FE panel model with individual effects by utilizing the historical data of 203 A-share listed companies. The explained variable is the stock price profile of real estate ventures, while the explanatory variable is corporate operating factors, incorporating macro variables as control variables in this paper. The panel regression in this paper estimates the parameters with a robust standard deviation, as shown in the table below.

	(1)	(2)	(3)	(4)
	a1	a2	a3	a4
VARIABLES	Stockprice	Stockprice	Stockprice	Stockprice
Quick_ratio	0.120	-0.269	0.0911	-0.269
	(0.315)	(-0.516)	(0.165)	(-0.516)
Net_debt_ratio	0.230*	0.720***	0.791***	0.720***
	(1.891)	(3.587)	(3.558)	(3.587)
Asset_liability	0.170	-0.879*	-1.122**	-0.879*
	(0.322)	(-1.806)	(-2.141)	(-1.806)
Cash_ratio	-0.0579	1.602	1.743	1.602
	(-0.0906)	(1.628)	(1.651)	(1.628)
Cash_debt_rati	0.0108	0.00429	0.0197	0.00429
	(0.277)	(0.215)	(1.281)	(0.215)
Inventory_turn	0.0587	0.0761	0.137	0.0761
	(0.229)	(0.863)	(1.002)	(0.863)
Roe	3.169***	6.689***	7.497***	6.689***
	(4.614)	(4.364)	(5.094)	(4.364)
ROA	-6.927*	-27.08***	-35.97***	-27.08***
	(-1.727)	(-3.373)	(-4.107)	(-3.373)
Net_cash_ratio	0.401*	0.738***	1.032***	0.738***
	(1.696)	(3.218)	(3.979)	(3.218)
Total_asset_tu	0.0209	-0.871	-1.717	-0.871
	(0.0237)	(-0.793)	(-1.391)	(-0.793)
GDP			11.17***	34.30***
			(3.216)	(3.984)
M2			6.529	34.46***
			(1.618)	(3.449)
Interbank_Off			-1.897	-96.22***
			(-0.378)	(-3.998)
house_sale_pri			-12.87***	-30.47***
			(-6.156)	(-5.822)
Constant	-0.515	-0.368	-0.926	0.0573
	(-1.446)	(-0.844)	(-1.192)	(0.0848)
Observations	203	203	203	203
R-squared	0.155	0.516	0.450	0.516
Ajusted R2	0.474	0.474	0.474	0.474
Number of idr		29	29	29

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Column (1) is an OLS regression, the rest are FE model regressions

Table 9: Empirical results of the impact of financial conditions on stock prices

The main findings of the empirical results are summarized as follows:

(1) There is a significant positive effect of the net liabilities level of real estate ventures on their stock prices.

(2) There is a relatively significant negative impact of the gearing ratio excluding advanced receivables on the stock price of real estate ventures.

(3) There is a significant positive effect of real estate ROE on corporate stock prices.

(4) There is a significant positive impact of net cash to interest-bearing debt ratio of real estate ventures on their stock prices.

(5) There are significant effects of various macro factors on the stock prices of real estate ventures, including significant positive effects from GDP and M2, and relatively significant negative effects from interbank offered rates and the year-over-year growth rate of national average commercial property sales prices on corporate prices.

It is believed that during the period from 2013 to 2019, housing prices have demonstrated an overall upward trend. Consequently, the high leverage operation is advantageous for real estate development companies to achieve scale expansion, positively impacting the stock price. The negative impact from the gearing ratio excluding advanced receivables may be attributable to the smaller advanced receivables of real estate development companies with a higher gearing ratio excluding advanced receivables. As a result, their potential revenue size is rather small, thereby creating a negative impact on the stock price. The real estate ROE can better reflect the corporate profitability level with a positive impact on the stock price. The net cash to interest-bearing debt ratio is a better indicator of the coverage of debt by corporate cash flow generated from operations. Favorable cash flow returns have a significant positive impact on stock prices.

Considering that the stock price changes between high and low liabilities may differ by the financial conditions of enterprises, this paper classifies the top 14 enterprises with high solvency and the bottom 15 enterprises with low solvency, and performs the empirical model setting, model identification test and discussion of empirical results respectively. The paper still employs a FE model with the model results shown below:

VARIABLES	(1) Low Solvency Stockprice	(2) High Solvency Stockprice
Quick_ratio	-0.955	0.840
	(-1.494)	(1.696)
Net_debt_ratio	0.903***	0.921**
	(3.696)	(2.596)
Asset_liability_ratio	-1.765	-1.126***
	(-1.669)	(-3.063)
Cash_ratio	5.045***	-0.650
	(5.228)	(-1.017)
Cash_debt_ratio	-0.112	0.0205
	(-0.783)	(1.307)
Inventory_turnover	-0.345	0.0574
	(-0.153)	(0.500)
Roe	6.651**	6.724***
	(2.509)	(5.315)
ROA	-25.52	-36.24***
	(-1.722)	(-4.003)
Net_cash_ratio	1.099**	0.950***
	(2.650)	(3.927)
Total_asset_turnover	-0.714	0.0120
	(-0.565)	(0.0189)
GDP	28.77**	36.45**
	(2.198)	(2.822)
M2	28.73*	37.50**
	(1.928)	(2.351)
Interbank_Offered_Rate	-72.98	-101.3**
	(-1.741)	(-2.521)
house_sale_price	-30.68***	-28.96***
	(-3.614)	(-3.956)
stock_H_all		
stock_A_all		
Constant	-0.0617	-0.213
	(-0.0508)	(-0.333)
Observations	105	98
R-squared	0.570	0.548
Number of idr	15	14
Ajusted R2	0.728	0.728

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Empirical results of the impact of different solvency companies' financial situation on stock price changes

In this paper, Fisher's Permutation test is used to test the inter-group coefficient discrepancies after panel grouping regression. When the P-value is less than 0.05, it signifies the existence of significant coefficient discrepancies between the different categories of models, with the empirical results shown below:

Variables	b0-b1	Fre	p-value
Quick_ratio	1.80	55.00	0.055
Net_debt_ratio	0.02	447.00	0.447
Asset_liability_ratio	0.64	354.00	0.354
Cash_ratio	(5.70)	994.00	0.006
Cash_debt_ratio	0.13	72.00	0.072
Inventory_turnover	0.40	324.00	0.324
Roe	0.07	457.00	0.457
ROA	(10.73)	722.00	0.278
Net_cash_ratio	(0.15)	609.00	0.391
Total_asset_turnover	0.73	396.00	0.396

Table 11: The Results of Fisher's Permutation test

The results indicate that there is a significant discrepancy between the effects of cash ratios on stock prices for different solvency levels of companies. With respect to the low solvency group, the cash ratio positively affects the stock price significantly. Regarding the low solvency group, investors are more concerned about their solvency situation, while companies with high cash ratios are relatively more sound in their operations.

5.2.3. Empirical Analysis of the Impact of Operational Condition on Stock Price

This section takes into account the impact of operational conditions on the stock prices of listed real estate companies after the inclusion of corporate micro-solvency. First of all, it is the variable selection. In this paper, the corporate micro-operating situation is selected as the explanatory variable, while the solvency constructed in the first part is taken as the explained variable. This paper performs the analysis by using a mixed panel regression model for this issue, and the results are presented in the following table.

	(1) Micro-operational Factors	(2) Financial Factor + Micro-operational
VARIABLES	Stockprice	Stockprice
Quick_ratio		0.0742
		(0.221)
Net_debt_ratio		0.201*
		(1.962)
Asset_liability_ratio		0.296
		(0.661)
Cash_ratio		0.226
		(0.408)
Cash_debt_ratio		0.0163
		(0.488)
Inventory_turnover		-0.110
		(-0.506)
Roe		2.281***
		(3.694)
ROA		-6.349*
		(-1.687)
Net_cash_ratio		0.379*
		(1.716)
Total_asset_turnover		0.618
		(0.796)
Land acquisition amount as a percentage of sales amount	-0.0942	-0.128
Net cash flow from operating activities as a percentage of net profit	(-0.461)	(-0.719)
Land acquisition amount growth rate	-0.0116	0.00191
Land acquisition average price	(-0.853)	(0.170)
Percentage of land acquisition equity	0.00340	-0.000877
Average premium rate of new land acquisition	(0.371)	(-0.119)
Advanced receivables amount and growth rate	-1.83e-05	-1.76e-05

Average sales price	(-1.144)	(-1.335)
Sales amount growth rate	0.220	0.0969
Land acquisition amount as a percentage of sales amount	(0.682)	(0.330)
Net cash flow from operating activities as a percentage of net profit	0.0705	0.327*
Land acquisition amount growth rate	(0.368)	(1.829)
Land acquisition average price	0.403***	0.198
Percentage of land acquisition equity	(2.733)	(1.555)
Average premium rate of new land acquisition	1.35e-05	4.60e-06
Advanced receivables amount and growth rate	(1.434)	(0.410)
Average sales price	0.128	0.276
	(0.626)	(1.530)
Constant	-0.114	-1.115***
	(-0.357)	(-2.797)
Time Effect	Controlled	Controlled
Observations	203	203
R-squared	0.106	0.502
Ajusted R2	0.368	0.368

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 12: Empirical Results on the Impact of Micro-Operational and Financial Factors on Stock price

The main findings of the empirical results are summarized as follows:

(1) Without considering the financial factors, there is a significant positive impact of the growth rate of advanced receivables on the stock price. Advanced receivables can reflect the potential revenue size of real estate development companies, therefore a higher growth rate positively impacts the stock price significantly.

(2) Upon the inclusion of the financial factors, the average premium rate of new land acquisitions exerts a significant positive influence on the stock price. Real estate ventures with higher average premiums for new land acquisitions invest relatively actively, contributing positively to stock prices.

6. Conclusions

6.1 Main Conclusions

This paper addresses the financial risk of China's real estate listed companies as a research question, from the two perspectives of solvency and stock price performance. Firstly, this paper collects relevant annual financial data of real estate ventures in the Chinese A-share and Hong Kong stock markets during the period from 2013 to 2019. A comprehensive evaluation model of solvency of real estate ventures has been established with the method of factor analysis, resulting in the solvency scores of 29 listed real estate companies.

The empirical analysis in this paper yields operating and financial indicators that significantly affect the solvency and stock price of real estate development ventures, with the empirical results discussed and analyzed in this paper.

First of all, concerning macro indicators, this paper identifies a significant positive impact of GDP growth rate and M2 growth rate on the stock price of real estate development ventures. There is a significant negative impact of interbank offered rate and national average sales price growth on the stock price of real estate development ventures. Higher GDP growth rate brings active social and economic activities, while real estate ventures also enjoy favorable operating conditions. With higher M2 growth rate, credit is more relaxed, which on the one hand, makes it easier for real estate development ventures to acquire loan financing, while on the other hand, residents will boost their demand for housing purchase at a higher M2 growth rate out of consideration of asset preservation and appreciation, thereby having an obvious positive impact on stock prices. The interbank offered rate also influences the financing cost of real estate ventures and the cost of mortgage funds for residents simultaneously, leading to a downward trend in the stock price of real estate ventures upon a rise in the interbank offered rate. It is worth noting that there is a declining trend in the stock prices of real estate ventures when the year-over-year growth rate of the national average price of commercial housing sales rises. It is believed that this is closely associated with the fact that Chinese real estate developers are highly susceptible to policy regulation. The government typically introduces real estate tightening policies when housing prices are on the rise, resulting in lower stock prices due to investors' pessimistic expectations about the subsequent development of the real estate market. As a result, with respect to real estate development ventures, their business development is inextricably related to

macroeconomic factors such as economic activity and credit environment on the one hand, but also greatly influenced by policies on the other. In the case of rising housing prices, real estate ventures are exposed to greater risk of policy tightening, at which point they should not be blindly optimistic and engage in significant expansion.

Secondly, concerning the empirical analysis of the impact of the operating indicators of real estate enterprises on their solvency, this paper discovers that the sales growth rate has a significant positive impact on the solvency of real estate. A growth in sales scale, on the one hand, demonstrates the expansion of the operating scale for real estate development ventures, while on the other hand, typically illustrates a favorable sales realization for real estate development ventures. Moreover, there is a significant negative impact of the growth rate of the land acquisition average price on the solvency of real estate development ventures. An increase in the land acquisition average price suggests a rise in land costs for real estate development ventures, which compresses their profitability and leads to a decrease in solvency. In the meantime, the average sales price growth rate has no significant impact on the solvency of real estate development ventures. As evidenced by the empirical results, real estate development ventures should acquire land rationally, and their solvency risk will increase if they actively engage in the booming land market. Simultaneously, it is important for real estate development ventures to attach more importance to the smooth project realization rather than being overly concerned with the increase in average sales price. Therefore, a moderate price reduction and promotion to smoothly realize the projects in the poor market environment will be beneficial to the solvency of real estate ventures. Meanwhile, the empirical analysis of low and high solvency sub-groups reveals that there is a significant negative impact on the growth rate of land acquisition price for low solvency real estate ventures. Therefore, it is prudent to invest in land acquisition at a time of low solvency for real estate ventures.

Through an empirical analysis of financial indicators on the stock price of real estate ventures, this paper concludes that there is a significant positive impact of the net gearing ratio of real estate ventures on their stock price. While in the construction of solvency indicators, this paper discovers that a higher net gearing ratio lowers the solvency of real estate ventures. It suggests that for equity investors, it is perceived by them that high leverage allows for a faster rate of scale expansion and therefore better stock price performance. Consequently, it is advantageous for real estate development

ventures to increase their net gearing ratio appropriately if they pursue an increase in market capitalization, but their solvency risk will also increase accordingly. In 2020, China's Central Bank introduced a new "three red lines" financing policy to constrain the financing growth rate of real estate development ventures. This is beneficial to restrain the leveraging behavior of real estate development ventures and prevent them from blindly expanding their liabilities in pursuit of faster scale expansion and better stock price performance. In parallel, it is found from the empirical results that there is a relatively significant negative impact of gearing ratio excluding advance receivables on the stock price of real estate ventures. Real estate development ventures with lower gearing ratio excluding advance receivables usually exhibit a higher percentage of advance receivables, representing a larger potential scale of operating income to be carried forward, which positively affects the stock price. Additionally, there is a significant positive impact of return on equity and net cash to interest-bearing debt ratio on the stock price of real estate ventures, while they likewise enhance the solvency of real estate development ventures. As such, it is advisable for real estate development ventures to emphasize on their profitability and cash flow return. Furthermore, there is a significant positive effect of cash ratio on stock price for real estate ventures with low solvency. This indicates that investors also are more concerned about the short-term solvency of real estate ventures with weaker solvency, and that should their solvency for short-term debt be weaker, their stock price performance will be worse. In contrast, investors are more forgiving of the short-term solvency for real estate ventures with stronger solvency, without a significant impact on stock prices.

Ultimately, the correlation between the indicators of real estate ventures' operating conditions and their stock price performance is actually not strong. Neither the growth rate of sales scale and average sales price on the sales side, nor the growth rate of land acquisition price and average land acquisition price on the land acquisition side, have a significant impact on real estate development ventures. Therefore, stock investors attach more importance to the reflection of the achievements of real estate ventures in financial terms. A reasonable financial structure and a sound profitability level will facilitate the stock price. However, short-term changes in sales and land acquisitions will not immediately impact the stock price.

6.2 Policy Recommendations

In the development course of the real estate market, the consolidation of elements and interaction of resources between the real estate sector and the land market, financial market, etc. have been gradually deepened. The financial risks of the real estate industry concern the overall macroeconomic risk prevention and control. The financial risks of China's real estate industry are highlighted in the following dimensions: I. The liabilities of listed real estate enterprises remain at a high level, with the pressure of deleveraging still in place; II. The enforcement of regulatory policies is inadequate, restricting the role of regulation and control; III. Real estate enterprises are polarized, with SMEs suffering from relatively high liabilities and high leverage. In the context of a tightening financing environment, rising financing costs and a large number of debt maturities, enterprises are under increased pressure to repay their debts and the solvency risk is elevated.

(I) Adhering to the principle of "no speculation in housing", Refining the long-term regulatory mechanism for real estate financial risks

It is necessary to elevate the prevention and resolution of real estate financial risks to the height of national policy requirements, and strengthen the policy enforcement. The government should concentrate on identifying the risk exposure of real estate ventures, households, banks and other financial institutions. There is a need to strengthen the control of financing for real estate ventures, including loans, trusts and bond financing at home and abroad, and to strengthen the supervision of real estate loans to banks. Control should be exercised from the level and structure of assets and liabilities of real estate ventures and the structure of bank real estate loans, while continuing to adhere to the "three red lines" requirements that the gearing ratio excluding advanced receivables should not be greater than 70%, the net debt ratio should not exceed 100% and the cash to short-term debt ratio should not be lower than one-fold. Effective management of the growth of interest-bearing debt of real estate enterprises should be carried out, strengthening the policy control on the concentration and proportion of real estate loans and the proportion of personal housing loans. Efforts should be made to uphold the concept of classification management, adopt different regulatory standards for various types of banking institutions, and accelerate deleveraging.

(II) Ensuring macro monetary policy stability

Each policy liberalization and tightening will significantly affect the expectations of China's real estate industry, which in turn will have a direct impact on sales, land acquisition, investment, price index and many other indicators. Be it from the perspective of social development or economic stability, robust monetary policies are imperative and can increase the stability of market expectations. Therefore, the central bank should insist on prudent monetary policies, and enhance their implementation and supervision, so that policies are implemented in the process. This will not only demonstrate the country's determination to control inflation, but also guide credit to a reasonable direction. The real estate industry restructuring should be guided to reduce the social property investment explosion and fulfill the principle of "no speculation in housing".

(III) Implementing the requirements of "classification and control, city-specific policies", Differentiating real estate credit policies

Firstly, commercial banks should strengthen the management of loan allocation in key popular cities, support third and fourth tier cities to destock, control the growth rate of real estate loans, strengthen asset portfolio management and prevent the risk of excessive concentration of real estate loans. Secondly, commercial banks should execute differentiated credit policies for real estate customers and adopt list access system management. Priority should be given to support leading enterprises with strong competitiveness, mature business model, sound management, outstanding brand image, favorable financial status and low leverage. Meanwhile, it is necessary to prudently intervene in real estate enterprises with overly aggressive expansion, large-scale cross-industry investment, high liabilities, high leverage, serious asset precipitation situation, long capital turnover cycle and small scale.

(IV) Broadening channels to diversify risks, Optimizing risk structure management

The key to broaden the financing channels of real estate ventures lies in the development of market-based direct financing, which should transform the current concentration of bank loan financing to a variety of financing channel models, such as bank loans, real estate trusts and housing asset securitization. Meanwhile, the full-caliber real estate risk exposure management of financial institutions should also be strengthened. Other than development loans and personal mortgage loans, the various businesses in which banks substantially bear credit risks, such as bond investments,

loan commitments, financial investments and SPVs, should be uniformly incorporated into customer credit management, comprehensively sort out and map out the baseline of real estate risk exposure, and strictly implement enclosed management of real estate development loans.

(V) Standardizing approval procedures, Preventing operational risks

Efforts should be focused on controlling the approval and management of financial institutions, and shall not issue loans in violation of the law to real estate development enterprises for the payment of land concessions; shall not issue loans for real estate developers for projects with incomplete four permits and inadequate capital ratios; shall not issue liquid capital loans, operating property loans, etc. to provide financing for real estate developers, etc.. Meanwhile, it is necessary to eliminate the occurrence of various kinds of human loans and relationship loans. It is feasible to improve regulations and strengthen education and training to better regulate the behavior of business personnel, continuously upgrade their comprehensive quality, and reduce the possibility of subjective indulgence risks.

(VI) Perfecting the system of laws and regulations, Strengthening the cultivation of rule awareness

The government should improve the system of laws and regulations to avoid the risks brought by the loopholes of the system. Meanwhile, it is recommended to strengthen the legal awareness of real estate ventures and actively guide them to acquire new laws and regulations related to real estate finance business. A sound system of laws and regulations should be used to restrain and regulate the financial behavior of enterprises and banks, and to actively cooperate with the government's macro-control policies in the real estate market, with a view to safeguarding the interests of enterprises, investors and the state in a more proactive manner.

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