

Based on Evergrande Group's Debt Default Case Analysis——Constructing Multiple Regression Model to Explore the Debt Paying Ability of Real Estate Enterprises with High Debt Default Risk

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Abstract. In recent years, China's domestic real estate market is facing the deterioration of the financing environment, the pressure of capital chain rupture is increasing, and a large number of debt risks are exposed after experiencing rapid development. This paper analyzes the debt default risk and solvency of real estate enterprises and its representative indicator 'current ratio' was analyzed by multiple regression modeling, as well as their internal and external influencing factors, which object is Evergrande Real Estate Group which has defaulted on its debts. It is found that there are few studies on the influencing factors of real estate enterprises' solvency and the treatment after debt default. Then by studying the above significant factors separately, we found three important business matters that affect the solvency. Finally, three targeted countermeasures are proposed through those. And on this basis, combined with asset securitization, three feasible schemes are proposed, which through issuing convertible bond options, issuing REITs trust funds and issuing income vouchers for land entity asset securitization. It is of theoretical and practical significance to take Evergrande Group as a typical case of a high debt default real estate enterprise to study its solvency.

Keywords: Debt default risk; Real estate enterprises; Solvency; Multiple regression; Asset securitization

1. Introduction

Since 2016, in order to curb the real estate bubble and adhere to the implementation of "no speculation of housing" policy, the government introduced restrictive policies for the real estate industry frequently. Under the background of issuing limit enterprise financing "three red line" new rules by the Housing and Construction Ministry and the Central Bank in August 2020, two intriguing conclusion have been proposed: that since the leverage ratio of the real estate industry is high, especially in recent years, the debt ratio of some housing enterprises has even reached more than 90% which have led to frequent debt defaults in the real estate industry [1], and that even though the study of real estate enterprises' debt default cases among domestic scholars are more and more, but most of them are only some case study about small and medium-sized real estate enterprises, for some large real estate default research less, this is because generally large real estate enterprise financing ability is stronger, strong ability to cope with risk, the possibility of debt default is smaller [2]. Especially due to the close connection between Chinese real estate

enterprises and the financial industry, large real estate enterprises have a huge scale of capital and close connection with financial institutions, once large-scale debt default breaks out, the stability of the financial industry and the development of China's economy will be seriously affected, which also makes it necessary to study in this respect [3].

However, since 2020, along with the impact of epidemic and global inflation, the economic went downturn and domestic financing policy was gradually tightening, which made large real estate companies also gradually produce debt default. In 2021 alone, large and well-known real estate companies, like Evergrande Real Estate Group, Taihe and China Fortune, were reported to default on their debts, especially Evergrande violated all the "three red lines" policies so that it could not continue to issue interest-bearing bonds to raise financing, which increased the risk of its debt default sharply (The "three red lines" refer to the return on equity of no more than 70%, the net debt ratio of no more than 100% and the cash short debt ratio of less than 1). These debt default real estate enterprises, in addition to China Fortune and Taihe actively in the debt restructuring, other enterprises do not have a clear debt default response arrangement. Practically and theoretically speaking, Evergrande group debt default to some extent also reflects the domestic real estate enterprise debt default, this paper selects Evergrande group default as a case analysis by using the quantitative model method, study the significant factors affecting its solvency, can further enrich the real estate enterprise debt default case study, for the current liquidity tightening real estate enterprises can have the effect of risk warning, for enterprise after default processing and how to improve solvency also has certain significance.

2. Literature Review

Through reading and summarizing domestic and foreign literature, it can be found that research on the debt default of real estate enterprises mainly focuses on the causes and the risk of debt default, and have less research on the factors influencing the solvency of real estate enterprises and the treatment after debt default. In this section, former works and practices will be explained.

Speaking of risk of the company's debt default, James [4] pointed out that there are two factors, one is due to the impact of the change of the macro environment, and the other is due to the unreasonable development strategy of the company. In terms of macro environmental impact, Diana Bonfim [5] explored the development relationship between credit risk and macro economy, and found that in the period of macroeconomic growth, enterprises often tend to overexpand, which is prone to debt default. When it comes to the essential factor of solvency, Prodromos Vlamis [6] by constructing the merger probability model, found the results which show that the British real estate company's liquidity, profitability, debt coverage, financial market volatility, interest rates, economic cycle factors are affect the company debt default and solvency, the macro economy of real estate company solvency has crucial influence. Hellmann [7] Research shows that the excessive leverage ratio of enterprises will lead to the reverse change of earnings per share, increase the financial risk and the probability of debt default, while the excessive financial risk will lead to the loss of solvency and cash flow crisis. Marshall et al. [8] are believed that capital structure management is very important, and the structure of assets and liabilities determines the degree of financial risk. The imbalance of assets and liabilities structure will increase the probability of the company's debt default and decrease its solvency.

Domestic scholars have also reached roughly the same conclusions, for example: Yuting Liu, etc. [9] believe that increase the leverage ratio of real estate companies will lead to the increase of bank credit risk and the formation of real estate bubble. Chen Kejing, etc. [10] control the endogenous variables of the sample through the control variable method, found that the increase of the debt default risk of enterprises is closely related to the government's deleveraging policy.

3. Case Analysis

3.1. Analysis of Sales

From the analysis of Evergrande profitability statement, Figure 1 shows that its gross profit rate and net interest rate have decreased in the past five years. The return on equity and the net interest rate of total assets have declined seriously since 2018, reaching only 5.69% and 0.37% respectively by 2020, and Evergrande's return on equity in 2020 has not reached the average. To some extent, this reflects the problems of Evergrande Group in recent years, such as the gradual decline of input-output level, the low efficiency of asset operation, and the obvious weakening of profitability.

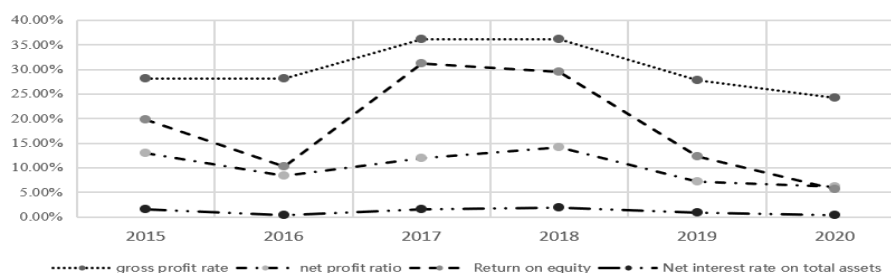


Figure 1: Trend of gross profit rate, net profit rate, return on equity and return on total assets of Evergrande Group from 2016 to 2020

In terms of sales collection, Evergrande affected by financing restriction policy shall not have new interest-bearing liabilities, so can not get enough loans to pay project, workers wages and supplier ticket ,several suppliers refused to Evergrande to continue to supply, lead to a lot of project shutdown. Higher bank interest rates and policies to stabilize housing prices have limited the decline in housing prices, which further limits Evergrande's promotional effect. All these reasons make it more difficult for Evergrande to collect sales payments .

3.2. Analysis of Financing Situation

Evergrande has rich financing channels. From the perspective of total financing, Table 1 shows that the growth rate in 2016 peaked from 2014 to 2018, as shown in the figure below. The continuous growth of financing scale indicates that Evergrande has accelerated the speed of business expansion. At the same time, Evergrande's financing strategy is aggressive and has great financial risks, which makes the company's own leverage ratio continuously increase and reduces its solvency. However, even though its financing scale continues to expand, the cash flow of Evergrande Group's financing activities is not optimistic. Since 2018, the cash flow of

activities has been negative, which has recovered slightly in 19 years, but has been negative in the past three years. Evergrande's capital chain is more dangerous.

Table 1: Total financing table of China Evergrande

project	a particular year				
	2014	2015	2016	2017	2018
Total financing	362084	614893	1158336	1519544	1571402
Growth	-	252809	543443	361208	51858
speed increase	-	69.82%	88.38%	31.18%	3.41%

As can be seen from the figure below, Table 2 shows that the main financing mode of Evergrande Real Estate is debt financing. Although it has declined in the past five years, the financing structure is still very uncoordinated Evergrandet Real Estate faces financing pressure in the later stage. Compared with other real estate companies, Evergrande real estate bond financing scale, unreasonable financing structure under the limitation of the national three red line policy, Evergrande real estate is facing an unprecedented financing debt crisis. From the above problem facts, we can see that Evergrande Group's solvency is facing a great test, which is worth analysis and research.

Table 2: China Evergrande financing structure trend

year	equity financing		debt financing	
	Amount (RMB 100 million)	proportion	Amount (RMB 100 million)	proportion
2015	654.89	18.53%	2876.37	81.47%
2016	655.34	18.44%	2898.37	90.32%
2017	734.46	17.56%	3446.64	82.54%
2018	850.45	18.38%	3775.55	81.62%
2019	866.21	19.57%	4562.41	74.43%

At the same time, the problems existing in financing include: high asset-liability ratio, excessive proportion of indirect financing, excessive dependence on bank loans, and high proportion of short-term bank loans. Although equity concentration can solve the problem of low management efficiency, it will also cause the problem of major shareholders to erode the interests of minority shareholders.

3.3. Analysis of the Cause of Crisis

As shown in Figure 2, the financial risk of Evergrande can be analyzed from the internal factors and external factors. Internal factors include unreasonable capital structure, blind diversified investment and improper internal management. It can be found that there are two obvious features, respectively "too much reliance on debt financing" and "obvious characteristics of short-term".

External factors include "the characteristics of the real estate industry" and "a tightening real estate policy". Due to the epidemic, the sales collection link of real estate enterprises has been disrupted, and the resumption of projects is subject to various restrictions. In addition, with the introduction of the tightening policy represented by the "three red lines", Evergrande cannot expand its enterprise scale through high debt, and bank financing channels have been hit hard. For the high leverage and high turnover of Evergrande, it further increases the risk of debt default and reduces its solvency.

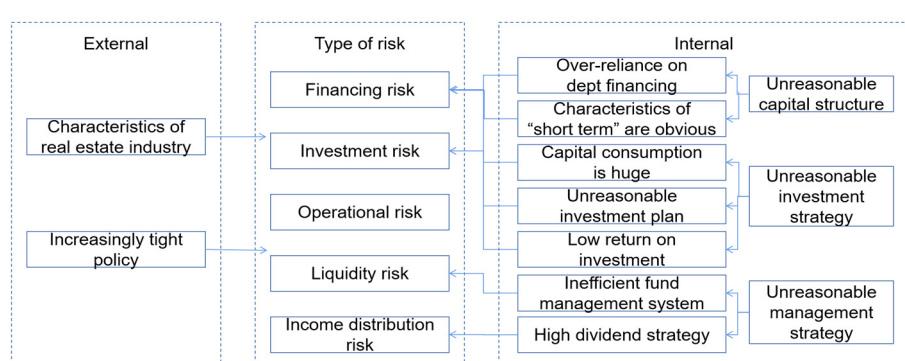


Figure 2: Internal and external factors and financial risk relationships

3.4. Analysis of Solvency

For the solvency analysis of Evergrande, select the index of current ratio, and the current ratio = current assets / current liabilities. The more current assets, the less short-term debt, the stronger the solvency. The more working capital, the less the risk of not repaying. In addition, Evergrande has a large number of short-term debts that are about to mature, so it needs to consider its short-term solvency, so the current ratio is selected as the representative index of Evergrande's solvency analysis.

Observe the current assets and current liabilities of enterprises can distinguish the ability of enterprises to "eat both ends", that is, "eat" upstream suppliers and "eat" downstream consumers [11]. For large enterprises with good credit, taking the goods from the supplier and delivering the goods is the optimal state of the enterprise capital chain and cash flow, because this can not only ensure the safety of cash, but also use the most funds into the new round of production and sales, which can create greater profits. Thus, it shows that it has a small short-term debt pressure and a good short-term solvency.

Table 3: Key solvency indicators of Evergrande Group

financial index	a particular year				
	2016	2017	2018	2019	2020
current ratio	1.52	1.40	1.36	1.37	1.26
quick ratio	0.62	0.52	0.42	0.38	0.33
Industry flow ratio	1.90	2.00	2.00	2.10	2.10
Industry speed ratio	0.64	0.70	0.67	0.67	0.65

As shown in Table 3, the overall is downward trend, fell to 1.26 in 2020, which shows that every 1 yuan liabilities only 1.26 yuan current assets as security, and real estate industry flow ratio

numerical basically stable and far lower than 2020 industry average, and it shows that Evergrande's short-term solvency is under great pressure, and its asset liquidity is constantly weakening. In short, Table 3 shows that the flow and quick ratio of Evergrande Group has always been lower than the industry average in the past five years, indicating the lack of short-term solvency. In addition, the difference between the quick ratio and the current ratio of Evergrande Group is large and has a gradually expanding trend, indicating that the inventory is a large amount in the current assets. The excessive overstocked inventory will lead to the weak liquidity of the current assets and increase the short-term debt repayment pressure. It also can be seen that Evergrande's operating capacity is weakened, its ability to repay short-term debt is weak, and the risk of debt default is large. It is necessary to enhance its solvency, so it is necessary to analyze the factors affecting its solvency.

4. Research Design

4.1. Model and Variable

Data Sources. Model selection Evergrande group as a research object, the data of the three financial statements are processed, because the balance sheet indicates the stock of a certain period, the data obtained remains unchanged, and due to the cash flow statement and income statement represent the period flow, the data obtained in the statements are processed by the annual report minus the semi-annual report to calculate the flow of the second half year. The final sample contains a total of 480 observations of Evergrande Group from 2009 to 2021.

Model Design and Description of the Variables. The following regression model is constructed to test the study hypothesis:

$$Y = \beta_0 + \beta_i + \beta_{i+1}CV + \mu_i \quad (1)$$

Among them, the explained variable Y represents the liquidity of real estate enterprises. The explanatory variable X represents the factors affecting company liquidity, the details are shown in Table Table 4.

CV represents the control variable of the model. In this paper, the total output value of the real estate industry is used as the control variable to control the impact of the industry development on the liquidity of the company, and the standardized data (stdIGP) is taken in the regression. Table 4 lists the description of all the variables.

X_i The i represents the number of explanatory variables to represent the full explanatory variables, and i takes the number between 1 and 11.

μ Is the random error term of Eq.

Table 4: variable description

explained variable	English abbreviation	definition
current ratio	CRR	Current assets than current liabilities
explanatory variable	English abbreviation	definition

average accounts receivable turnover ratio	RTR	Main business revenue / average receivables
Return on equity	ROE	Net profit / ending shareholders' equity
Inventory ratio total assets	ITA	summary
Net interest rate on assets	ROA	Net income / average total assets
Accounts receivable than total assets	RTA	summary
inventory turnover ratio	ITR	Main business cost / average inventory
Fixed assets than total assets	FAR	summary
Current liabilities ratio to total assets	CLA	summary
Owners' equity ratio to total assets	EA	summary
Dividend per share	DPS	summary
Total operating income than the total assets	TIA	summary
controlled variable	English abbreviation	definition
Total output value of industry	IGP	summary

4.2. Regression Analysis

Correlation Analysis. In the initial regression, the regression results were found to be not significant, and multiple collinearity was found. After testing, the stepwise regression method was used for model correction. However, when the model is tested for sequence correlation, the p-value of Breusch-Godfrey LM test =0.063, indicating that the model may have autocorrelation problems at this time. All the autocorrelation robust standard error is used to calculate $\sqrt[4]{n} \approx 2.21$, so the lag order of the Newell-West estimator is taken as p=3, and the regression results are shown in Table 5.

Table 5: Revised regression model

CRR	Coef.	St.Err.	t-value	p-value	[95% ConfInterval]		Sig
RTA	-140.04	18.869	-7.42	0	-179.849	-100.231	***
RTR	2.452	0.215	11.39	0	1.998	2.906	***
TIA	-65.969	4.75	-13.89	0	-75.991	-55.948	***
ITA	-30.592	3.73	-8.2	0	-38.463	-22.722	***
FAR	179.431	54.02	3.32	0.004	65.458	293.403	***
stdIGP	-0.533	0.628	-0.85	0.408	-1.857	0.791	
Constant	42.555	2.513	16.93	0	37.254	47.857	***
Mean dependent var		23.52			SD dependent var	10.421	
Number of obs		24			F-test	463.221	

*** p<.01, ** p<.05, * p<.1

4.3. Regression Results Analysis

It can be seen from the regression conclusion that accounts receivable ratio total assets, accounts receivable turnover rate, total operating income ratio total assets, inventory ratio total assets and fixed assets than total assets have a significant impact on the short-term debt paying ability of real estate enterprises. Through the above analysis of the influencing factors, the final model explains the factors affecting the solvency of Evergrande Group as follows.

First, the coefficient of RTA (accounts receivable proportion) is -140.04, which is negative. That is, the higher the proportion of accounts receivable, the worse the liquidity. In the short term, accounts receivable if can recover as soon as possible, bad debt rate is low, and the recovered funds can be a good complement to the liquidity. However, the long-term possession of enterprise capital causes the slowdown of enterprise capital turnover, reduces the use efficiency of funds, and increases the operating cost of enterprises, resulting in the long-term development of the enterprise blocked [12].

Second, the coefficient of RTR (accounts receivable turnover) is 2.452, which is positive. That is, the faster the turnover rate of accounts receivable, the faster the recovery rate of receivables of the enterprise, the stronger the liquidity of assets, and the stronger the ability of the enterprise to meet the payment needs of production and operation with cash, including the solvency. It is mentioned that if the real estate enterprises can reasonably use the credit sales policy, the scale of receivables will have a positive impact on the liquidity [13].

Third, the coefficient of TIA (proportion of total operating income) is -65.969, which is negative. This result is different from the theoretical result. The main reason is that Evergrande's operating income mainly comes from the sales of real estate and the subsequent property income. And these are the gains of its fixed assets, Sacrifice is the cash-flow gains from its asset liquidity. And often insolvency result in that the increase in the proportion of operating income instead leads to a decline in solvency, Therefore, enterprises need to avoid the blind pursuit of revenue growth and at the expense of capital liquidity and corporate short-term solvency.

Fourth, the coefficient of ITA (inventory ratio) is -30.592, which is negative. When the inventory proportion increases, the current ratio will decrease, which reduces the short-term solvency of Evergrande. Speaking of asset profitability and liquidity, higher liquid assets with poorer profitability, and better profitability may be obtained by giving up liquidity, which indicating that Evergrande has too much inventory that is difficult to be quickly realized at a reasonable price. Such as in the product inventory of unfinished variety of land, housing and other development products. These inventories are not only difficult to realize, but also continuously absorb the cash flow of Evergrande company, increasing the capital chain pressure of Evergrande, reducing its short-term solvency.

Fifth, the coefficient of FAR (proportion of fixed assets) is 179.431, which is positive. In the data, fixed assets are obtained by equipment plant and land use right. We believe that land use right will bring long-term cash flow income to real estate enterprises in the future. Simultaneously, it can be seen that the proportion of fixed assets is the primary factor affecting the solvency of Evergrande Group. In addition, short-term financing cash flow can also be obtained through the mortgage of plant equipment and land use right, which can relieve the capital chain pressure of Evergrande, thus improve its short-term solvency, and alleviate the pressure of the possible default risk of the maturing debt.

5. Strategy and Enlightenment

It can be seen from the conclusion of the regression analysis that the three types of business matters, accounts receivable, inventory (covering the developing property + holding property) and land use right, have a significant impact on the short-term solvency ability of real estate

enterprises. Think need to pay attention to the above three kinds of business matters and research, so this paper will continue to for the above three significant factors put forward appropriate countermeasures and improvement suggestions.

5.1. Control the Enterprise Cash Flow

Through the study of the cash flow in each link, as it can be found, the net cash flow of financing activities has a great impact on replenishing liquidity in the short term, and has a positive effect on the short-term solvency of real estate enterprises. It can be said that the more cash inflow of short-term operating activities, the more abundant the liquidity of real estate enterprises relatively, and the higher the cash ratio.

Especially for Evergrande group, there is already a serious imbalance in the financing structure (the debt financing ratio is more than 75% and more than half of them are short-term bank loans), and the financing method is single, the expansion transition and the financial leverage is too high. now represented by Evergrande has debt default of real estate enterprises, its credit rating is low, and there are already a lot of overdue ticket, so, they need to control the scale of debt and interest expense, under the premise of broaden the financing channels, to ensure the stability of short-term cash flow, avoid persistent debt default, alleviate credit risk, for the company's subsequent as-going profit and profitability to win time.

Combined with the imbalance of the financing structure of Evergrande and the excessive concentration of equity, I think can adopt convertible bond option financing way, unpaid and upcoming maturing corporate debt and commercial notes will be added to convertible bond options into equity, when the shares of the major shareholders represented by the owners of the company are pledged, part of the option expenses can be offset by interest. While easing the pressure on debt repayment, it can also compensate investors, boost the bullish expectations of the market, while improving the shareholding structure and introducing new strategic investors.

5.2. Expand Financing Channels

Speaking of traditional financing methods of the real estate industry, which are basically issuing mortgage loans from banks and issuing general corporate bonds [14], cannot meet the needs of the enterprise development, and makes the enterprise cash flow's control received great challenges and pressure, especially when the economic goes downturn and a series of restrictions control policy produce. It is believed that it is no longer adapt to the current development trend, and we need to expand the financing methods of real estate enterprises through the increasingly developed financial market, especially the securities market. Because this amount of funds raised will not only be lower than the value of the assets themselves and cannot be created in the future, but also limit the income creation of the way of such assets and their liquidity, which is also a disguised asset loss for the enterprise. And, if selling assets to supplement cash flow, will disrupt the company's original strategic planning, thus affect the core competitiveness of the enterprise and sustained profitability.

Proposed recommend strategy is the way of REITs trust fund, after the valuation of the underlying assets, namely the real estate enterprise property assets and property development, through the way of equity transfer, through the public offering of trust fund, to realize the rapid withdrawal of funds, and can through the division of shareholding arrangement, to realize the gains

of property asset appreciation, can also be reasonable tax avoidance and lower value loss realized assets. And the final results of Xingye Wanxin REITs show that not only increases the liquidity of assets, but also even can obtain capital conversion higher than the asset valuation itself [15]. Which means, it has realized the transformation of housing and land to highly liquid monetary funds.

5.3. Strengthen Asset Management

For the fixed assets, the cash flow income from the lease and transfer of the reserved land use rights can increase the current ratio, and to improve the solvency of enterprises. But as with the inventory realization described above, in the process of transfer, the loss of the assets and the value loss in the process. For example, Evergrande has a large number of land reserves, the measure if Evergrande general all selling worth more than 400 billion land reserves, can completely solve the debt crisis, but is the land reserve is the foundation of the development of a real estate company, Evergrande should not sell land reserves. On the contrary, the asset management of land reserve should be strengthened, so that it can create more cash flow income, increase the company's cash flow control, relieve the financing pressure, and improve its short-term solvency.

Therefore, for the management of such assets as land use right, land asset securitization can be carried out with the help of the financial market to strengthen its asset management and improve the management mode. And here we tend to use land entities, the model of closed land trust can be adopted, Real estate companies delegate the land to dedicated land trust companies, The land trust company is also responsible for the financing activities, the land trust company issues the land income receipts with the future cash flow of the land as a guarantee, to develop, manage and sell the land of the land reserve with the funds raised. This will ease the short-term demand for cash flow, Will not lose the value loss of the land reserve assets, At the same time, the land development and project development of real estate companies can be retained, And the right to gain access to the proceeds, It can also introduce third-party trust companies and investors, Can strengthen the management of assets in a disguised way, It can promote the development of land and the project on schedule.

6. Conclusion

The research object of this paper is —— Evergrande Real Estate Group, a well-known real estate enterprise in China. Through the case analysis of Evergrande debt default events, it studies the solvency of Evergrande Group and its influencing factors, and explores how to improve the solvency Evergrandey of Evergrande Group through financial market intervention.

Through the representative indicators of Evergrande solvency liquidity ratio of regression modeling analysis, found that accounts receivable, inventory (including developing property + holding property), land use rights the three kinds of business matters of real estate enterprise short-term solvency has significant influence, and study the specific impact of the above three business matters.

By studying the specific impact of the above three business matters, put forward the enterprise should control the cash flow stability, enterprises should broaden the financing channels through financial markets and enterprises should strengthen asset management three measures, and put

forward the issuance of convertible bond options, issuing REITs trust fund and issuance of land entity asset securitization income certificate three combined with the feasible scheme of the financial market.

It is hoped that the improvement strategies and suggestions for the significant factors of Evergrande debt default risk will provide some reference and inspiration for other enterprises facing debt default risk in the real estate industry.

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