

Digital Financial Development and Financial Risks of Real Estate Enterprises

—*Based on the Perspective of Financing Constraints*

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Abstract: This paper focuses on 2011-2022 A-share real estate listed enterprises and digital financial data as objects, and empirically studies the relationship between the development of digital finance and the financial risks of real estate enterprises. Studies show: (1) the reasonable application of digital finance can effectively suppress the financial risks of real estate enterprises; (2) digital finance reduces the financial risks of real estate enterprises by easing the financing constraints. Based on this, the paper proposes policy suggestions for improving the use of digital finance and the digital financial supervision system.

Keywords: digital financial development, real estate enterprises, financial risk, financing constraints

1. Introduction

In recent years, with the rapid development of new digital technology, digital finance has ushered in vigorous development. As a new generation of financial innovation models, digital finance relies on a variety of digital technologies to help real estate enterprises carry out financing activities through digital means, playing a pivotal role in the development and operation of real estate enterprises.

In today's market, real estate enterprises often face the dilemma of high financing costs and limited channels, which increases the difficulty of financing [1] and the financial risks [2]. Therefore, real estate enterprises should accelerate the pace of easing financing constraints to curb the generation and expansion of financial risks. According to existing research, the development of China's digital finance can reduce the financial risks of enterprises [3]. With the dual effect of resources and governance, by alleviating financing dilemmas such as "financing difficulties", "matching difficulties" and "supervision difficulties" [4], it can improve the efficiency of capital allocation in the industry [5], inhibit the level of financing constraints of enterprises [6], and reduce the financial risks [7]. At present, there are still few papers studying the relationship between the development of digital finance and the financial risks of real estate enterprises based on financing constraints. Therefore, the internal mechanism of the three is of great theoretical and practical significance to help real estate enterprises analyze financial risks from the perspective of financing constraints and promote their long-term development.

2. Research Hypotheses

2.1. Hypothesis 1

The real estate industry is a typical capital-intensive industry, which needs a huge amount of capital in the process of land development and operation. Thus, the information asymmetry in the traditional financial model is an important factor for enterprises to fall into financing difficulties [8]. However, relying on new digital technology, digital finance certainly breaks the physical limitations of traditional finance, promotes the effective growth of capital turnover speed and utilization rate of real estate enterprises, and provides more and broader financing channels to effectively curb financial risks [9]. Based on this, this paper proposes the following hypothesis:

H1: Digital financial development can reduce the financial risks of real estate enterprises.

2.2. Hypothesis 2

With the further development of China's restrictions on sales, loans, purchases, prices and other macroeconomic policies in the real estate industry, the financing risks of real estate enterprises have also continued to increase. It has been found that the macro-control of fiscal policy will have a significant impact on the demand for operating funds of real estate enterprises [10]. Under the dual restrictions of national macro-control and self-financing constraints, once the financing of real estate enterprises is limited or blocked, it is very likely to affect the normal operation of the enterprise's capital chain and cause financial risks. However, digital finance can reduce the financial risks of real estate enterprises by identifying external information in a timely and accurate manner, reducing financing costs, improving financing efficiency, and alleviating financing constraints. Based on this, this paper puts forward the following hypothesis:

H2: Digital financial development reduces the financial risks of real estate enterprises.

3. Study Design

3.1. Sample Selection and Data Sources

Taking A-share real estate listed companies from 2011 to 2022 in China as the research object, the paper excluded ST and ST* listed companies and samples of missing data and insolvency respectively and obtained 996 observation values. The digital financial data comes from the Digital Finance Research Centre of Peking University, and other data are from the Choice financial terminal.

3.2. Select and Design Variables

3.2.1 Dependent Variables

Dependent variables: financial risks of real estate enterprises (ZS). This paper draws on the risk Z-value method proposed by Altman [11] to carry out the calculation. The calculation method is $ZS = (1.2 * \text{working capital} + 1.4 * \text{retained income} + 3.3 * \text{profit before interest and tax} + 0.999 * \text{sales income}) / \text{total assets} + (0.6 * \text{total market capitalization of stocks}) / \text{total liabilities}$. In this model, the smaller the Z value, the higher the financial risks of the real estate enterprises. This paper takes the natural logarithm after adding 1 to the value of the index. If the results show that the coefficient of digital finance development and the financial risks of real estate enterprises are positive, it means that the development of digital finance reduces the financial risks of real estate enterprises, and vice versa.

3.2.2 Independent Variables

Independent variables: digital financial development (DF). The paper uses the Digital Inclusive Financial Index developed by Peking University to measure the development of digital finance and uses the data at the provincial level to measure it with its natural logarithm.

3.2.3 Control Variables

Control variables: Referring to the relevant literature, this paper selects enterprise age (AGE), enterprise size (SIZE), ownership concentration (TOP1), the proportion of independent directors (INDEP), leverage (LEV), enterprise cash flow (CFO), capital expenditure (EXP), profitability (ROA) and enterprise growth (GR) as control variables. The definition of specific variables is shown in Table 1.

Table 1: Definition of variables.

| Type | Name of variables | Short name | Definition |
|------|--|------------|---|
| DV | Financial risks of real estate enterprises | ZS | The calculation method refers to the above |
| IV | Digital financial development | DF | Peking University Digital inclusive finance general index |
| CV | Enterprise age | AGE | Ln (The year of the year – the year of establishment + 1) |
| | Enterprise size | SIZE | Ln (Total assets) |
| | Ownership concentration | TOP1 | The shareholding ratio of the largest shareholder |
| | The proportion of independent directors | INDEP | The number of independent directors/the number of board members |
| | Leverage | LEV | Asset-liability ratio |
| | Enterprise cash flow | CFO | Net cash flow from operating activities/total assets |
| | Capital expenditure | EXP | Fixed assets/total assets |
| | Profitability | ROA | Return on assets |
| | Enterprise growth | GR | The growth rate of operating income |

To test hypothesis H1, set up the following model:

$$ZS_{it} = \alpha_0 + \alpha_1 DF_{it} + \alpha_2 control_{it} + \alpha_3 year_{it} + \varepsilon_{it} \quad (1)$$

In this model, *ZS* indicates the financial risk of real estate enterprises and *DF* indicates the digital financial development index, the *control* indicates the control variable other than the year, the *year* indicates the annual dummy variable, and ε is the random interference item.

4. Empirical Analysis

4.1. Descriptive Statistical Analysis

According to Table 2, the maximum financial risk of real estate enterprises (*ZS*) is 4.210 and the minimum value is 0.037, indicating that the financial risks of each real estate enterprise are quite different. The standard deviation of digital finance development (*DF*) is 0.561, the maximum value is 6.068, and the minimum value is 2.786, indicating that the development of digital finance is different in different regions and years.

Table 2: Descriptive statistics.

| Type | Variable | Obs | Mean | Std.Dev. | Min |
|-------|----------|--------|--------|----------|---------|
| ZS | 996 | 0.977 | 0.409 | 0.037 | 4.210 |
| DF | 996 | 5.391 | 0.561 | 2.786 | 6.068 |
| AGE | 996 | 23.088 | 5.022 | 10.00 | 38.00 |
| SIZE | 996 | 23.528 | 1.407 | 19.708 | 28.257 |
| TOP1 | 996 | 39.973 | 15.856 | 7.120 | 80.650 |
| INDEP | 996 | 0.380 | 0.075 | 0.188 | 0.667 |
| LEV | 996 | 0.659 | 0.166 | 0.118 | 0.941 |
| CFO | 996 | 0.012 | 0.100 | -0.402 | 0.494 |
| EXP | 996 | 0.036 | 0.079 | 0 | 0.736 |
| ROA | 996 | 0.048 | 0.044 | -0.488 | 0.358 |
| GR | 996 | 0.596 | 11.680 | -0.909 | 367.532 |

4.2. Regression Analysis

As is shown in Table 3, the coefficient of *DF* is 0.1844, and it is significant at the level of 1%, indicating that digital financial development can reduce the financial risks of real estate enterprises, assuming that H1 is verified.

Table 3: Regression results.

| Variable | ZS |
|----------|------------|
| DF | 0.1844*** |
| | (0.023) |
| AGE | -0.0307*** |
| | (0.006) |
| SIZE | -0.0966** |
| | (0.032) |
| TOP1 | -0.0003 |
| | (0.001) |
| INDEP | 0.1193 |
| | (0.100) |

Table 3: (continued).

| | |
|------|------------|
| LEV | -1.7041*** |
| | (0.183) |
| CFO | 0.0608 |
| | (0.049) |
| EXP | -0.1633* |
| | (0.244) |
| ROA | 1.1296*** |
| | (0.192) |
| GR | 0.0000 |
| | (0.000) |
| year | Y |
| Cons | (0.676) |
| Obs | 996 |
| R2 | 0.5703 |
| F | 45.37 |

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

4.3. Endogenous Test

4.3.1 Variable Lag

Because the impact of digital financial development on the financial risks of real estate enterprises is not immediate, the regression analysis of the digital financial development index lags one phase. The second column of Table 4 shows that the coefficient of L.DF is significantly positive, consistent with benchmark regression results, and the research conclusion remains robust.

4.3.2 Tool Variable Method

This paper draws on the spherical distance from the local area to Hangzhou adopted by Zhang Xun and others [12] as a tool variable for digital financial development. The third column of Table 4 indicates that the coefficient of DF_IV is significantly negative, indicating that the smaller the spherical distance to Hangzhou, the lower the financial risks of real estate enterprises, and the research conclusion is still stable.

Table 4: Endogenous test.

| Variable | Variable lag | IV |
|----------|--------------|------------|
| | ZS | |
| L.DF | 0.1983*** | |
| | (0.027) | |
| DF_IV | | 1.1918*** |
| | | (0.227) |
| AGE | -0.0461*** | -0.1981*** |
| | (0.007) | (0.040) |
| SIZE | -0.0833** | -0.1141*** |
| | (0.033) | (0.030) |

Table 4: (continued).

| | | |
|-------|------------|------------|
| TOP1 | -0.0001 | 0.0003 |
| | (0.002) | (0.002) |
| INDEP | 0.0644 | -0.0390 |
| | (0.094) | (0.163) |
| LEV | -1.7788*** | -1.7903*** |
| | (0.208) | (0.163) |
| CFO | 0.0562 | -0.1360 |
| | (0.049) | (0.094) |
| EXP | -0.1108 | -0.0357 |
| | (0.254) | (0.303) |
| ROA | 1.1520*** | 1.4238*** |
| | (0.217) | (0.307) |
| GR | 0.0003 | 0.0001 |
| | (0.000) | (0.000) |
| year | Y | Y |
| Cons | (0.689) | (0.519) |
| Obs | 896 | 996 |
| R2 | 0.4867 | 0.0595 |
| F | 45.75 | 4797.35 |

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

4.4. Intermediary Effect

To test hypothesis H2, learn from the SA index built by Liu Liya and others [13] as a measurement index of financing constraints and establish an intermediary effect model:

$$\text{medium}_{it} = \alpha_0 + \alpha_1 \text{DF}_{it} + \alpha_2 \text{control}_{it} + \alpha_3 \text{year}_{it} + \alpha_4 \varepsilon_{it} \quad (2)$$

$$\text{ZS}_{it} = \alpha_0 + \alpha_1 \text{DF}_{it} + \alpha_2 \text{medium}_{it} + \alpha_3 \text{control}_{it} + \alpha_4 \text{year}_{it} + \varepsilon_{it} \quad (3)$$

In this model, the *medium* represents an intermediary variable, that is, the financing constraint (SA). Table 5 shows the regression results of the intermediary effect test of financing constraints. According to the second and third columns, the coefficient of DF is significantly negative, indicating that the development of digital finance has eased the financing constraints of real estate enterprises; the coefficient of SA is significantly positive, which means that the more serious the financing constraints of real estate enterprises, the greater the financial risks. In the third column, the coefficient of DF is slightly larger than that of Table 3, indicating that the alleviation of financing constraints plays an intermediary effect on the reduction of the development of digital finance to the financial risks of real estate enterprises. From this, the hypothesis of H2 is verified.

Table 5: Regression analysis of intermediary effect.

| Variable | Intermediary factor: financing constraints | |
|----------|--|-----------|
| | SA | ZS |
| DF | -0.0356*** | 0.1975*** |
| | (0.008) | (0.024) |

Table 5: (continued).

| | | |
|-------|------------|------------|
| SA | | 0.3669*** |
| | | (0.124) |
| AGE | -0.0315*** | -0.0192** |
| | (0.003) | (0.008) |
| SIZE | 1.2981*** | -0.5729*** |
| | (0.019) | (0.177) |
| TOP1 | -0.0008 | -0.0000 |
| | (0.001) | (0.001) |
| INDEP | 0.0053 | 0.1174 |
| | (0.033) | (0.096) |
| LEV | -0.0651 | -1.6802*** |
| | (0.073) | (0.179) |
| CFO | 0.0288 | 0.0502 |
| | (0.023) | (0.048) |
| EXP | -0.2399* | -0.2514 |
| | (0.137) | (0.219) |
| ROA | -0.1296* | 1.1772*** |
| | (0.071) | (0.192) |
| GR | 0.0004*** | -0.0001 |
| | (0.000) | (0.000) |
| year | Y | Y |
| Cons | (0.391) | (3.337) |
| Obs | 996 | 996 |
| R2 | 0.9961 | 0.5962 |
| F | 2783.96 | 44.67 |

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

5. Conclusion

This paper takes the data of A-share real estate listed companies and the digital financial development from 2011 to 2022 in China as the research object, empirically testing the impact and mechanism of digital financial development on the financial risks of real estate enterprises. The research shows that the development of digital finance has a significant inhibitory effect on the financial risks of real estate enterprises, and it reduces financial risks by alleviating financing constraints. After fully considering the influencing factors such as endogeneity and stability, the conclusion of this paper is still robust.

In summary, the following policy suggestions are put forward in the paper: (1) The application of digital finance in real estate enterprises should not only be reflected in expanding the popularization of digital finance, but also focusing on the depth of its use, so that it can serve real estate enterprises more sustainably; (2) Establish and improve the digital financial supervision system, create a healthy and good financial environment, and prevent the uncertainty brought by the complexity of digital technology to the financial risks of real estate enterprises.

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