

# Can Fintech mitigate business risks?--Evidence from the Chinese market

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**Abstract.** Fintech is an important supplement to the traditional financial system, and its development is a good medicine to alleviate the financing constraints and business risks of enterprises. Based on the data of listed enterprises from 2004 to 2021, this paper adopts the method of panel linear regression to explore the impact of the level of Fintech development on the operating difficulties of local enterprises. The results show that increasing the level of Fintech development can effectively reduce the business risks faced by enterprises, and the conclusion still holds after a series of robustness tests such as adding control variables, replacing explanatory variables, multiple fixed effects, and changing the time interval. The mechanism analysis shows that the level of Fintech will affect the business risk of enterprises by changing the book-to-market ratio, and the heterogeneity analysis shows that the impact of Fintech on the business risk of private enterprises as well as non-Big 4 audited enterprises is more significant. The policy implication of this paper is that the government should actively guide, support and regulate the development of Fintech in different regions to provide policy support and guarantee for enterprises to reduce their business risks. However, attention should also be paid to balancing the relationship between innovation and risk management, data security and privacy protection to ensure the sustainable development of Fintech.

**Keywords:** Fintech, corporate distress, book-to-market ratio, panel linear regression.

## 1. Introduction

Enterprises are the microfoundation of China's economic operation, and the high-quality development of enterprises plays a crucial role in China's macroeconomic growth and industrial structure transformation (He Chong, 2022 ). In the increasingly competitive market environment, most enterprises are facing huge business risks and financing constraints, which to some extent limits their growth and compresses their space for further development. In recent years, science and technology have greatly promoted the development of the financial market, and the in-depth combination of new technologies such as blockchain, big data, interconnection technology, artificial intelligence and finance has given rise to a series of emerging financial businesses represented by Fintech. As an important supplement to the traditional financial system, Fintech has become a powerful hand for enterprise development by playing the function of resource allocation, injecting financial support for real enterprises, and helping enterprises on the verge of collapse to tide over difficulties. The emergence of Fintech undoubtedly brings a good opportunity to alleviate the risk of enterprise financing constraints and operational difficulties (Yi Zhichao, 2019 ). Therefore, how to better use financial technology to guide the flow of funds and optimise the allocation of resources, so as to effectively alleviate the risk of business difficulties, has gradually become a hot issue of common concern for scholars at home and abroad.

There has been a rich discussion on Fintech in the research . Much of the discussion has focussed on the meaning and evolution of Fintech (Asli Demirguç-Kunt, 2018<sup>[1]</sup>), the impact of Fintech on the greening transition of countries (Guangyou Zhou, 2022<sup>[2]</sup>), and the externalities of Fintech on industries such as banking and manufacturing (Chi-Chuan Lee, 2021<sup>[3]</sup>; G. Soni, 2022; V. Murinde, 2022), and so on. Accompanied by the deep intertwining of Fintech and real enterprises, how will Fintech affect the growth and development of enterprises? To address this question, some scholars

have tried to give answers from the financing model (Isil Erel, 2022<sup>[4]</sup>), and enterprise sustainable development (Yang Yuxue, 2021<sup>[5]</sup>). In short, academics generally agree that Fintech has a positive impact on all aspects of business and changes the traditional dynamics of business development. From a macro perspective, it is believed that Fintech development is conducive to China's overall economic growth and social progress; from a meso perspective, it is believed that Fintech development can promote the transformation of China's industrial structure; and from a micro perspective, it is believed that Fintech development can help enterprises to innovate, alleviate the constraints of enterprise financing, and expand the space for enterprise growth. However, due to the difficulty of quantitatively measuring the development of Fintech in various regions, few existing studies on Fintech involve empirical analyses. Therefore, as an important influencing factor on China's enterprise development, research on Fintech is not abundant, especially in terms of empirical research, there is still a large gap.

A large number of scholars have conducted research on enterprise business risk from different perspectives. Existing research on enterprise business risk at home and abroad mainly focuses on the identification of specific risk levels, which can be summarised as the analysis of the causes of enterprise "financing difficulties" and the construction of enterprise credit risk evaluation system. Regarding the analysis of the causes of "financing difficulties", Ayyagari M (2010), Li Guangzi (2020) and many other scholars pointed out that bank credit financing is still the most important source of external funds for enterprises, which can effectively help enterprises to carry out capital turnover. Stiglitz J E (1981), Greenwald B C (1986) believe that enterprise information asymmetry is the financing difficulties. Therefore, Allen F (2005) proposed that China's financial market is still underdeveloped on this basis. In the construction of credit risk evaluation system, Odom M D (1990) constructed a neural network model for predicting enterprise bankruptcy risk by using financial data of different enterprises. Duan Chong (2020) no longer takes the financial data of enterprises as a single indicator, but considers the information of listed enterprises in the same industry comprehensively, and constructs a more accurate evaluation system. However, few studies have focused on the impact of the degree of Fintech development on the business risk of local enterprises.

The marginal contributions of this paper are mainly in the following areas. First, this paper provides some empirical evidence on the positive effects of Fintech. Existing literature mainly focuses on the development process of Fintech itself, its core technology, its regulatory system and its epiphenomenal impact on some industries, such as traditional banking and finance, and very few studies focus on the impact of Fintech on business risks. The findings of this paper show that Fintech has a positive impact on enterprises, supporting the view that Fintech can defuse the operational risks faced by enterprises, thus avoiding them from falling into operational difficulties, and supplementing and improving the literature on Fintech. Second, this paper improves the level of Fintech research. Previous scholars (Liu Wenli, 2014; Qiu Han et al., 2018) have mostly studied the Fintech index from the provincial level or industry level, while this paper studies the impact of the Fintech development level on the business situation of enterprises from the prefecture and municipal level, which refines the level of research. The findings of this paper are complementary to and improve the research on the empirical aspects of the Fintech field. Thirdly, this paper provides a reference for understanding the mechanism of the role of the level of Fintech on the business risk of enterprises. The mechanism analysis reveals that Fintech improves the business risk of enterprises by affecting the book-to-market ratio of enterprises, and the mediation effect model shows that improving the book-to-market ratio of enterprises can significantly reduce the business risk of enterprises, and it has a significant positive impact on the size of the enterprise, the gearing ratio, and the return on net assets. The level of Fintech improves the book-to-market gearing ratio of enterprises, which, to a certain extent, is conducive to expanding the enterprise scale and increasing the net assets, thus reducing the probability of enterprises falling into operational difficulties, as well as enhancing the enterprise's risk-resistant ability. This conclusion provides the necessary theoretical basis for promoting the development of financial technology. Fourth, this paper provides a new perspective for studying enterprise business risk. There have been many discussions on the paths to reduce business risks, such as internal corporate governance (Yang Yiping, 2021; Zhang Lihua et al., 2020) and accumulating tax credit (Li

Jialiang, 2011). However, no study has yet explored the development of Fintech from the perspective of reducing operational risk and enhancing risk resistance. Nowadays, Fintech is booming globally and has a great impact on various industries, and has quite sufficient potential to become an important grip for enterprises when they face operational difficulties in the future, but there is very little literature that cuts through and explores Fintech from the perspective of its impact on business risks. Therefore, this paper, as one of the first empirical papers on Fintech and business risk, provides a new perspective on the mitigation of business risk and tries to fill the corresponding gap.

## 2. Literature review and research hypothesis

In recent years, China has been vigorously promoting the digital transformation of enterprises, and governments around the world have also actively responded to the central government's call to promote the enhancement of the local level of Fintech, with a view to driving the rapid development of local enterprises. Compared with traditional industries, Fintech has certain advantages at the level of information acquisition. The information in the financial industry is extremely time-sensitive, and the development and application of Fintech can enable enterprises to use Fintech to more quickly and accurately obtain the required financial information, improve the information asymmetry with customers and the market, thus improving productivity and reducing the possibility of getting into operational difficulties. Fintech alleviates information asymmetry with the help of technological advantages, and the innovative financial infrastructure, new financial industries and new financial business models derived from it help to improve the total factor productivity of the region, and under the conduction of spatial knowledge spillovers, the innovation of Fintech can also effectively lead to the enhancement of the total factor productivity in the neighbouring regions (Tang Song, Lai Xiaobing, Huang Rui, 2019) . Therefore, the development of financial technology can effectively reduce the risk problem of enterprises in business difficulties. In summary, this paper puts forward the following hypotheses.

**H1: The development of Fintech can reduce the probability of firms getting into business difficulties.**

## 3. Data and Modelling

### 3.1. Data sources and data processing

The data of all Chinese A-share listed companies used in this paper are from Guotai Junan database, and the degree of Fintech development at prefecture-level city or municipality level is from the number of results of Baidu News advanced search for relevant keywords. In order to avoid outliers affecting the regression results, this paper treats the sample data as follows: (1) excluding the samples of listed financial companies such as banks, securities, insurance, etc.; (2) excluding the samples with missing data of the main variables; and (3) applying bilateral 1% shrinkage treatment (Winsor) to the continuous variables in order to eliminate the interference of the outliers on the results of this paper. After the above treatments, we finally get 53,283 samples involving 53,283 companies from 2004-2021 - annual observations.

### 3.2. Modelling

Referring to the studies of Nanda and Rhodes-Kropf (2013<sup>[6]</sup>), Cai Jing and Dong Yan (2016<sup>[7]</sup>), and Zhang Jie et al. (2017<sup>[8]</sup>), this paper constructs the following regression model to analyse the impact of Fintech development on business difficulties, we also controlled for both year fixed effects and firm individual fixed effects:

$$F Risk_{i,t} = \alpha + \beta Fintech_{m,t} + \gamma Controls + \delta_i + \theta_{t,j} + \varepsilon_{i,t} \quad (1)$$

### 3.3. Definition of variables

(1) Operational risk (F risk ----lnZScore)

$$Z = 1.2x_1 + 1.4x_2 + 3.3x_3 + 0.6x_4 + 0.999x_5 \quad (2)$$

Z (ZScore) indicates the business risk of the firm.  $x_1$  (ZScore) denotes working capital/total assets; reflects the liquidity and size characteristics of assets.  $x_2$  (ZScore) denotes Retained Earnings/Total Assets; reflects the cumulative profitability of the business.  $x_3$  Denotes Earnings Before Interest and Tax (EBIT)/Total Assets; reflects the profitability of assets.  $x_4$  Indicates the market value of owner's equity/book value of total liabilities; a ratio that measures the financial structure of an enterprise, indicates the relative relationship between owner's equity and creditor's equity, and can reflect the solvency of an enterprise.  $x_5$  Operating income/total assets: reflecting the turnover of enterprise assets, used to measure the efficiency of the use of enterprise assets operating risk is the risk of changes in corporate earnings due to the uncertainty of the production and operation process in the absence of liabilities, is a component of the total risk of the enterprise, is an important factor affecting the necessity of the rate of return on investment, and is also an important object of enterprise risk management, value management research. Enterprise business risk is generally measured by operating leverage, and its influencing factors can be reflected by the operating leverage formula. Enterprises encounter two different types of risk in the course of their operations: the risk of fluctuating operating income and the risk of loss (see Figure 1). Du Yuan et al. 2014<sup>[9]</sup>). In this paper, in the process of regression analysis, the natural logarithm is taken to get the enterprise business risk indicator (lnZScore).

(2) Fintech level (Fintech). In this paper, we refer to (Chuntao Li et al, 2020<sup>[10]</sup>), extract keywords related to Fintech from news reports and government documents, match these keywords with all prefecture-level cities or municipalities directly under the central government in China, search for prefecture-level cities or municipalities directly under the central government + keywords in Baidu News Advanced Search by year, crawl the webpage source code of the Baidu News Advanced Search page by web crawler technology, extract the number of search results, and sum up the number of search results of all keywords of the same prefecture-level city or municipality directly under the central government to get the total search volume. The number of search results was extracted, and the total search volume was obtained by adding the number of search results for all keywords at the same prefecture-level city or municipality level.

### 3.4. Other control variables

(1) company size (Size ); (2) the company's gearing ratio (Lev ); (3) Growth rate (GROWTH), measured by the ratio of (previous year's operating income - previous year's operating income)/previous year's operating income; (4) Investment opportunity (TOBINQ); (5) Number of independent directors (Indep), measured by the ratio of the number of independent directors to the total number of directors on the board of directors; (6) Cash flow, measured by the net cash flow of the previous period/total assets at the beginning of the year; (7) Type of actual corporate controller (SOE), which takes the value of 0 if the controlling shareholder is state-owned and 1 if the controlling shareholder is state-owned; and (8) percentage of executive shareholding (HOLD), which measures the variable with the percentage of shareholding of all executives.

## 4. Empirical analyses

### 4.1. Descriptive Statistics Descriptive Statistics

The basic statistical characteristics of the main variables in this paper are shown in Table 1. The mean of the unaligned Z-value data is 5.083, and the standard deviation is 16.460, and the difference between the maximum and minimum values is very large, which indicates that there is a great deal of variability in the Z-value data of different companies. The mean of the unaligned Z-value is much

larger than the median, indicating that the Z-value has obvious right skewed characteristics. Therefore, the logarithmic transformation ( $\text{LnZscore}=\ln(\text{Z-Score})$ ) of the Z-Score data to compute the corporate financial distress measure in this paper is reasonable. Table 1 also reports the statistical characteristics of the Fintech measure (Fintech). The mean of Fintech is 3.945 and the median is 4.043, which can be approximated as a normal distribution; the standard deviation is 1.989, with a large gap between the maximum and the minimum values, and the distribution of the data is relatively dispersed.

**Table 1.** Basic statistical characteristics of the main variables

Variable	N	Mean	p50	SD	Min	Max
ZScore	25970	5.083	2.845	16.460	0.004	1861.000
LnZscore	25970	1.095	1.046	0.901	-1.350	3.598
Fintech	25970	3.945	4.043	1.989	0.000	7.464
Size	25970	22.170	22.020	1.300	19.090	26.020
Lev	25970	0.451	0.454	0.202	0.059	0.996
ROE	25970	0.066	0.069	0.126	-0.855	0.396
ATO	25970	0.670	0.559	0.481	0.044	2.812
Cashflow	25970	0.047	0.046	0.072	-0.195	0.254
REC	25970	0.114	0.091	0.101	0.000	0.469
INV	25970	0.153	0.116	0.145	0.000	0.731
BM	25970	1.104	0.735	1.125	0.083	6.639
SOE	25970	0.461	0.000	0.498	0.000	1.000
ListAge	25970	2.328	2.485	0.699	0.000	3.332

#### 4.2. Correlation analysis Correlation analysis

We also conducted a correlation analysis among the variables and the results show that the financial distress measure of listed companies (LnZscore) is positively correlated with the regional Fintech development index (Fintech) at 5% significance level, return on equity (ROE) at 1% significance level, return on equity (ROE) at 1% significance level, total asset turnover (ATO) and cashflow ratio (Cashflow), accounts receivable ratio (REC), and size, gearing (Lev), inventory ratio (INV), book-to-market ratio (INV), and book-to-market ratio (REC). ATO) and Cashflow ratio (Cashflow), and Accounts Receivable ratio (REC) are positively correlated, while they are negatively correlated with Size, Gearing ratio (Lev), Inventory ratio (INV), Book-to-market ratio (BM), Whether or not they are state-owned enterprises (SOE), and Age at listing (ListAge). It should also be noted that although there is correlation between the explanatory variables, the correlation coefficients are very small and it can be assumed that there is no multicollinearity in the multiple regression.

#### 4.3. Benchmark regression

Table 2 reports the correlation between Fintech as well as the control variables and LnZScore, from which it can be seen that Fintech is significantly correlated with LnZScore, and in the case of the control variables, the correlation between Fintech and LnZScore is also stronger.

**Table 2.** Benchmark regression

	(1) LnZScore
Fintech	0.0543*** (14.32)
Size	-0.0992*** (-30.34)
Lev	-3.338*** (-165.35)
ROE	0.172*** (18.66)
ATO	0.374*** (69.62)
Cashflow	0.809*** (18.61)
REC	0.467*** (14.08)
INV	0.761*** (32.70)
BM	-0.0692*** (-22.26)
SOE	-0.0489*** (-6.70)
ListAge	0.128*** (24.08)
_cons	3.909*** (56.37)
Year fixed effects	Yes
Firms fixed effects	Yes
N	25976
Adj_r2	0.714

The t-statistics are in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 5. Robustness Test(loanword)

### 5.1. Adding control variables

Considering that the business risk of enterprises is affected by market factors as well as the global environment, therefore, in order to avoid the impact of omitted variables on the results of the study, this part of the study further adds control variables to the main regression and re-estimates the regression coefficients, and the results are shown in Table 3.

**Table 3.** Robustness test

	Panel A: Adding Control Variables		Panel B: Substitution of explanatory variables	Panel B: Changing the Time Interval
	(1) LnZScore	(2) OScore	(3) OScore	(4) Fintech
Fintech	0.050*** (13.14)	-0.046*** (-3.84)	-0.045*** (-3.90)	0.0884*** (13.47)
Controls	YES	YES	YES	YES
_cons	4.088*** (56.09)	-0.016 (-0.07)		
Year fixed effects	Yes	Yes	Yes	Yes
Firms fixed effects	Yes	Yes	Yes	Yes
N	25964	23005	22975	14958
r2_a	0.715	0.664	0.677	0.537

t-statistics in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 5.2. Replacement of explanatory variables

Column (3) in Table 3 shows that for the other explanatory variable OScore (a proxy measure of firms' financial distress), the level of Fintech is still significantly and inversely related to it, suggesting that Fintech can alleviate the business distress faced by firms.

## 5.3. Change of time interval

Considering the different impacts of each element on the business at different times, a discussion of too broad a time horizon cannot support the conclusions, especially since the outbreak of a new Crown epidemic would have a greater impact on the business risk of the business. Therefore, we chose a specific time and selected the time period before the epidemic outbreak to analyse the data. The impact of the independent variables on firms at different time periods is again measured and the results are shown in column (4) of Table 3.

## 5.4. Multiple fixed effects

In the benchmark regressions, only individual and time effects are controlled for in this paper, given that there are large differences in market resources and development environments across industries, which may have an impact on the business conditions of enterprises. In addition, different attitudes and policies towards enterprise development in each province may also lead to differences in the operating conditions of enterprises. Therefore, this paper successively adds industry interaction terms and province interaction terms to the baseline regression, and the regression results are shown in columns (1) and (2) of Table 4. The results show that after further controlling for industry and province, Fintech development is still effective in mitigating the risk of business difficulties faced by local firms. The table is not shown due to space constraints.

## 6. Further analysis

### 6.1. Analysis of mechanisms

In order to investigate the ways in which Fintech affects corporate risk, we use a mediation effect model with KV index as the mediating variable to investigate whether Fintech affects corporate distress mediated through KV index. The regression results are shown in the table below. In this paper, two regressions were carried out with Fintech denoting the independent variable, LnZScore denoting the dependent variable, KV index denoting the control variable, the first column is the regression analysis of Fintech on LnZScore, and the second column is the regression analysis of Fintech on KV, the third column is the regression analysis of KV on LnZscore. It is easy to see from the table that Fintech can indeed affect the likelihood of a firm facing business risk by affecting the KV index.

**Table 4.** Analysis of mechanisms

	KV index (1)	LnZScore (2)
Fintech	-0.003** (-2.38)	0.038*** (11.24)
KV index		0.547*** (33.38)
Controls	YES	YES
_cons	-0.692*** (-27.46)	5.460*** (92.60)
Year fixed effects	Yes	Yes
Firms fixed effects	Yes	Yes
N	25514	25514
Adj_r2	0.341	0.783

t statistics in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 6.2. Heterogeneity analysis

### 6.2.1 Nature of the enterprise

Considering that the nature of firm ownership affects the relationship between Fintech and business risk, this part will explore the heterogeneous impact of Fintech on firms with different ownership natures. When  $SOE = 1$ , the sample enterprises are state-owned enterprises; when  $SOE = 0$ , the sample enterprises are non-state-owned enterprises. From the table, it can be seen that Fintech has different impacts on firms with different ownership natures, and Fintech has a significant impact on the business risk of firms that are not yet nationalised.

**Table 5.** Heterogeneity analysis

	Panel A :Nature of Business		Panel B: Audit quality	
	(1) SOE=1	(2) SOE=0	(3) Big4=0	(4) Big4=1
Fintech	0.008 (1.11)	0.040*** (5.22)	0.059*** (10.15)	0.110*** (6.76)
Controls	YES	YES	YES	YES
_cons	0.000 (.)	4.646*** (34.23)	-0.500*** (-4.09)	-1.373*** (-3.69)
Year fixed effects	Yes	Yes	Yes	Yes
Firms fixed effects	Yes	Yes	Yes	Yes
N	11976	14,000	25084	1551
Adj_r2	0.714	0.714	0.827	0.855

t-statistics are in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 6.2.2 Audit quality

Considering that audit quality affects the relationship between Fintech and firm business risk, this section explores the heterogeneous impact of Fintech among firms with high audit quality. When  $BIG=1$ , the sample firms are firms with high audit quality; when  $BIG=0$ , the sample firms are firms with low audit quality. The table shows that Fintech has different impacts on firms with different audit quality, and Fintech has a significant impact on the business risk of firms with low audit quality.

## 7. Conclusion

With the development of Fintech and its increasing impact on enterprises, academics are likewise gradually discovering and recognising the impact of Fintech on business risk. Specifically, based on the data from 2004-2021, this paper finds that (1) the improvement of Fintech level can effectively resolve the business risk of local enterprises (2) Fintech can reduce the business risk of local enterprises by improving the book-to-market ratio. (3) Fintech has a particularly significant impact on non-Big 4 audit firms as well as private enterprises. After a series of robustness tests, the regression results remain significant.

Based on the above conclusions, this paper proposes the following countermeasures: (1) The government and regulators should actively support the development of Fintech in order to promote the growth of enterprises. (2) Firms on their part should actively adopt Fintech-based solutions, especially non-Big 4 auditors and state-owned enterprises, in order to improve their business management capabilities. (3) Academics and the industry should actively study the impact of Fintech for example KV index on businesses to better exploit its potential value and meet future challenges.

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