Supply-Side Structural Reform, Digital Economy and Corporate Default Risk

Xiaojie Jiang[1,2]

[1]College of Economics and Management, Qingdao University of Science and Technology, Qingdao, China
[2]Department of Teacher Work, Qilu University of Technology, Jinan, China
Email: jxj@qlu.edu.cn

Abstract

In recent years, a lot of corporate defaults have had an impact on the capital market. How to prevent corporate default risks has become an important topic of concern for the academic community, enterprises and the government. We took China's A-share listed companies from 2012 to 2018 as a sample, and used the double difference method to analyze the impact of supply-side structural reforms on corporate default risks. We found that supply-side structural reforms have reduced the risk of corporate default, and the inhibitory effect has gradually increased. In the relationship between supply-side structural reforms and corporate default risks, corporate financing capabilities have played an intermediary role. Supply-side structural reforms can improve the company's endogenous financing capabilities, thereby reducing the risk of corporate default. However, we also found that the mediating effect of a company's exogenous financing capability is not significant. At the same time, the regression results show that the digital economy can play a regulatory role. It can not only actively regulate the relationship between supply-side structural reforms and corporate default risks, but also mediate the mediating effect of corporate endogenous financing capabilities. The results of this article provide some evidence for the synergy between supply-side structural reforms and the digital economy.

Keywords

Supply-Side Structural Reform, Default Risk, Endogenous Financing, Exogenous Financing, Digital Economy

1. Introduction

Since the reform and opening up, China's economy has made tremendous achievements that have attracted worldwide attention, but it has also been ac-

companied by many problems and hidden dangers. For example, the "factor dividend" is gradually disappearing, high leverage and overcapacity seriously hinder high-quality economic development. Against this background, the Chinese government proposed a supply-side structural reform in November 2015. Through this reform, excess production capacity was effectively reduced and the long-term economic trend was improved. However, there are risks in the reform process. The most important risk that cannot be ignored is the gradual emergence of long-term latent systemic financial risks, and the corporate default risk is one of the important sources of systemic financial risks [1]. While supply-side structural reforms continue to advance, the digital economy is also developing in full swing in China. It not only promotes the transformation and upgrading of enterprises, improves the efficiency of resource allocation [2], but also plays an active role in alleviating information asymmetry and reshaping the credit system. It is of great significance to help supply-side structural reforms to resolve excess capacity and prevent corporate default risks. However, the dynamic and complex nature of digital technology also poses regulatory challenges [3]. Issues such as information security and monopoly by internet giants have to a certain extent constrained the high-quality development of enterprises. This is not conducive to promoting structural reform on the supply side and preventing the risk of corporate default. How do supply-side structural reforms affect corporate default risk? What role does the digital economy play in this process? Research on the above issues will not only help to evaluate the economic consequences of supply-side structural reforms from the perspective of enterprises, but also provide reference for the government to play the enabling role of the digital economy and prevent major risks in the economic field.

The existing literature typically examines the factors influencing corporate default risk from both an internal and an external perspective. From an internal perspective of the enterprise, some scholars have analyzed the impact of corporate internal characteristics such as corporate repayment ability and willingness to repay [4], financial asset holding [5] and innovation [6] on the risk of default based on the cash flow hypothesis and corporate governance theories. Some scholars have also focused on the external environment perspective of enterprises, finding that the national economic downturn [7] and environmental uncertainty [8] can raise the default risk of enterprises; while the development of the digital economy [9] can help promote the digital transformation of enterprises and improve their total factor productivity, thus reducing the probability of default risk. However, there is little literature examining the impact of supply-side structural reform on corporate default risk and the synergistic effects played by the digital economy in this process. Supply-side structural reform is a major strategic program for China in the context of the new normal. It is of great theoretical significance that investigates the policy effects of supply-side structural reform from the perspective of corporate default risk. The introduction of the digital economy into the research framework can also expand the influencing factors of corporate default risk from a new perspective.

The contribution of this article is mainly reflected in the following two aspects. On the one hand, we take China's supply-side structural reforms as a quasi-natural experiment, and select annual data from listed companies to establish a double differential model to further analyze the impact of supply-side structural reforms on corporate default risk and its dynamic effects. We expand the empirical research on the implementation effects of supply-side structural reforms from the perspective of default risk. On the other hand, from the perspective of corporate financing capabilities, we also consider the two paths of corporate endogenous financing capabilities and exogenous financing capabilities, and introduce digital economic factors to build a moderated intermediary effect model. This is conducive to in-depth exploration of the impact of supply-side structural reforms and the digital economy on corporate default risks, and enriches research on corporate default risks.

2. Theoretical Analysis and Research Hypothesis

2.1. The Direct Effect of Supply-Side Structural Reforms on Corporate Default Risk

In the context of the new normal of China's economic development, overcapacity and zombie companies have caused misallocation of production resources. The cost of enterprises has increased year by year, which has led to the deterioration of business conditions and greatly increased the risk of enterprise default [1]. China's supply-side structural reforms take the five major tasks of "three eliminations, one reduction and one supplement" as the starting point to improve the profitability of enterprises from different channels, increase their repayment capabilities, and reduce the risk of corporate default. In the process of de-capacity and de-inventory, excess capacity in the market is cleared. A large number of production resources are released, and the imbalance of supply and demand is alleviated, thereby creating effective demand and realizing effective supply. This is conducive to the recovery of product prices [10], which improves the profitability of enterprises to a certain extent, and further enhances the solvency of enterprises. In the process of deleveraging, the implementation of relevant policies has led to a gradual decline in the leverage ratio of enterprises, which not only reduces their interest expenses and eases their debt servicing pressure, but also optimizes their financing decisions and inhibits the rapid expansion of their investment scale [11]. It is helpful to reduce the inefficient investment of the enterprise, increase the investment income of the enterprise, and then reduce the enterprise's default risk. In the process of cost reduction, the government has reduced the tax burden, financing costs and institutional transaction costs of enterprises through a series of policy initiatives such as tax cuts, fee reductions and interest rate reductions to make enterprises lighter, which is conducive to stimulating the vitality of enterprises, improving their business performance [12] and reducing the probability of default risks. In the process of making up for shortcomings, supply-side structural reforms require technologi-

cal innovation to make up for market supply shortcomings caused by low technological levels, and use government subsidies and other means to encourage enterprises to carry out entrepreneurial activities, which helps companies to develop new products, improve the competitiveness of their products, enhance their enterprise value and provide a solid economic basis for debt repayment, thereby reducing the risk of default.

It should be noted that enterprises bear the burden of local employment and taxation policies, the government has an incentive to intervene in the allocation of resources in the financial market. As a result, many low-efficiency enterprises are still able to obtain loans, squeezing the credit resources of other high-quality enterprises [13]. The government's intervention makes the allocation of funds in the financial market more subordinate to political goals, and deviates from the market efficiency goal, which reduces the rationality of the allocation of resources in the financial market and creates hidden dangers for non-performing loans [14]. The supply-side structural reform requires the government to transform its functions, strengthen their regulatory functions, and adopt a series of reform policies to improve the quality and efficiency of the financial market supply system. These policies have created a good environment and conditions for the development of enterprises, and thus played a positive role in reducing the risk of enterprise default. Specifically, the transformation of government functions and the decisive role of the market in the allocation of resources are important elements of China's supply-side structural reform. The market mechanism identifies and screens high-quality enterprises and guides the rational allocation of credit resources. In this process, the government assumes supervision and service functions, thereby removing the system and mechanism obstacles to the optimal allocation of production factors and correcting the distortion of incentives and constraints [15]. This approach can effectively reduce the risk of corporate default. At the same time, in the process of the transformation of government functions, the regulatory authorities have severely cracked down on the deliberate default of enterprises, which has increased the cost of default by enterprises. These measures can not only inhibit the adverse selection and moral hazard behavior of enterprises, but also increase the willingness of enterprises to repay. This effectively reduces the enterprise's risk of default.

Based on the above analysis, we propose the following hypothesis:

Hypothesis 1: Supply-side structural reforms can help reduce the risk of corporate default.

2.2. The Intermediary Effect of Corporate Financing Constraints

Existing research has found that corporate financing capacity will have an important impact on corporate default risk [5]. Therefore, supply-side structural reforms may affect the corporate default risk by affecting corporate financing capabilities.

From the perspective of a company's endogenous financing capability, a

company's strong endogenous financing cap-ability can effectively reduce its financing costs, ease its financing constraints, and thereby reduce its risk of default. Policies such as "three removals, one reduction and one supplement" not only help resolve excess capacity and promote the transformation and upgrading of enterprises, but also reduce the burden on enterprises caused by financing costs and transaction costs, which can increase the net profit of enterprises [12]. This allows enterprises to have more sustainable and stable cash flow, which in turn enhances their endogenous financing capacity and reduces their default risk.

From the perspective of a company's exogenous financing capabilities, a company's strong exogenous financing capabilities can increase the company's external funding sources, but the high financing costs will also weaken the company's ability to bear risks. In addition, when the company's external sources of funds are sufficient, managers may make inefficient investments out of consideration for their own interests, which increases the company's risk of default [16]. After the start of the supply-side structural reform, policies such as "deleveraging" were introduced, which increased the uncertainty of the external environment. Due to the existence of financial friction factors such as information asymmetry, when companies raise funds from external financial institutions, financial institutions will comprehensively consider business operating conditions to assess the company's risk of default [17]. The uncertainty of the economic environment has increased the volatility and unpredictability of corporate earnings, leading to a decrease in the willingness of financial institutions to lend. It is more difficult for companies to raise funds from external sources. Therefore, supply-side structural reforms may reduce the risk of corporate default by restricting the exogenous financing capabilities of enterprises.

Based on the above analysis, we propose the following hypothesis:

Hypothesis 2: Supply-side structural reform affects the corporate financing capacity and then acts on the corporate default risk.

2.3. The Moderating Role of the Digital Economy

After the supply-side structural reforms began, the Chinese government adopted a series of macro-policy control reforms, which deepened the uncertainty of the economic environment [18]. In addition, there may be contradictions between certain policies and the development goals of the company, which will inevitably have a certain negative impact on the production and operation of the company in the short term [12]. With the continuous development of the digital economy, digital technologies such as Big Data, the Internet, and blockchain have been deeply integrated with other industrial sectors, resulting in disruptive changes in product form, business model, organizational model, and production methods [2]. Cross-border operations, Cross-border competition and so on are becoming more common. It not only has a significant impact on the production and operation activities of micro-enterprises, but also relieves the "short-term pains" in the process of supply-side structural reforms, thus playing an active role in the

process of supply-side structural reforms in reducing corporate default risks.

First of all, the development of the digital economy is conducive to promoting the expansion and quality of new types of consumption, empowering supply-side structural reforms, and thereby enhancing the inhibitory effect of supply-side structural reforms on corporate default risks. On the one hand, the openness of the digital platform connects the supply of enterprises and consumer demand, and reduces the cost of consumer product search. The scalability of digital technology breaks the boundaries of time and space and provides convenience for consumers' consumption behavior [19]. This helps stimulate consumption, provides a market for companies to clear excess capacity, and improves corporate performance. On the other hand, digital technology eases the friction between market demand and enterprise supply, and provides a foundation for the integration of online and offline markets, which intensifies market competition to a certain extent. In order to gain a competitive advantage, enterprises have to actively carry out technological innovation activities, which will help increase the added value of products and provide high-quality products to the market [20]. This has greatly increased the profitability of enterprises, which in turn strengthened the restraint of supply-side structural reforms on enterprise default risks.

Secondly, the development of the digital economy has continuously integrated digital technology into various enterprise activities and promoted the gradual transformation of enterprises to digital and intelligent [21]. Specifically, in the production process, data integration systems such as sensors and the Internet of Things realize the optimal allocation of production resources such as manpower and raw materials, and improve the production efficiency of the enterprise. In the sales process, information technologies such as big data and the Internet can collect information such as user preferences and product transactions, which is conducive to improving the accuracy of corporate supply and the effectiveness of corporate decision-making, avoiding overcapacity, and reducing corporate operating costs [19]. In the management process, the digital platform shortens the communication distance between all levels of the enterprise, makes communication and information transfer between employees more convenient and rapid, enhances the internal collaboration capabilities of the enterprise, and improves management efficiency. Therefore, the digital economy can improve the business performance of enterprises by reducing costs and improving efficiency, enhance the endogenous financing capabilities of enterprises, and strengthen the inhibitory effect of supply-side structural reforms on enterprise default risks.

Third, supply-side structural reforms may increase the uncertainty of the external environment of companies in the short term, leading to increased volatility of corporate earnings and limiting the ability of companies to raise funds from external sources. The development of the digital economy can effectively reduce the degree of information asymmetry and alleviate the business dilemma caused by the exogenous financing constraints of enterprises. Digital technology is widely used in the traditional financial field, which helps optimize the financial structure and promote the digital and intelligent development of the finan-

cial system. The digital economy uses its technical advantages in big data traceability, information collection and credit evaluation to reduce the degree of information asymmetry in the transaction process between financial institutions and enterprises [22]. This can help financial institutions to provide scientific and comprehensive financial services to enterprises, weaken the negative impact of the pressure of exogenous financing constraints on the development of enterprises in the process of supply-side structural reform, and thus strengthen the inhibiting effect of supply-side structural reform on the default risk of enterprises.

The model is shown in Figure 1. Based on the above analysis, we propose the following hypotheses:

Hypothesis 3: The digital economy plays a moderating role in the process of supply-side structural reforms affecting corporate default risk.

3. Research Design

3.1. Data Sources

We used listed companies in Shanghai and Shenzhen A-shares from 2012-2018 as the initial screening study samples. The enterprise data in this paper are obtained from China Stock Market & Accounting Research Database (CSMAR), and the province data are obtained from the China Statistical Yearbook.

Research samples have been processed as follows.
- Deleted the financial industry and ST and *ST listed companies.
- Deleted the sample companies listed after 2012.
- Deleted samples with missing core indicator data.
- Performed 1% Winsorize on all continuous variables

After the above processing, 9723 observations were finally obtained. In addition, all results are calculated by stata16.

3.2. Definition of Variables

1) Supply-side reform
The main task of supply-side structural reform is to "de-capacity", which have
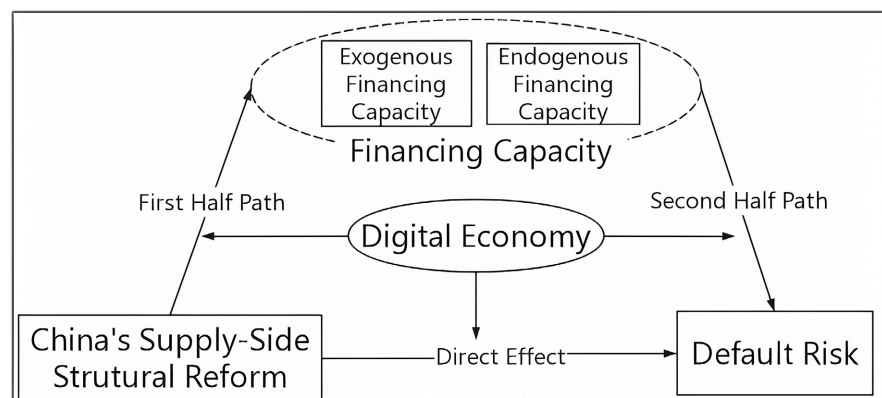

Figure 1. Mechanism of supply-side structural reforms affecting enterprise default risk.

a greater impact on industries with overcapacity. In addition, the "deleveraging" and "cost reduction" tasks of supply-side reforms also have made important impacts on the risk of corporate default. Therefore, we refer to the research of Lu *et al.* [23] and consider supply-side structural reform policies as quasi-natural experiments. We set those companies in industries with overcapacity as the experimental group, and other industries as the control group. Among them, the industries defined as overcapacity industries mainly include coal mining and washing (B06), ferrous metal mining (B08), non-ferrous metal mining (B09), textiles (C17), paper and paper products (C22), petroleum processing, Coking and nuclear fuel processing industry (C25), chemical raw material and chemical product manufacturing (C26), chemical fiber manufacturing (C28), non-metallic mineral product industry (C30), ferrous metal smelting and rolling processing industry (C31), non-ferrous metal smelting and Rolling processing industry (C32), metal products industry (C33), shipbuilding industry (C37), electric power, heat production and supply industry (D44). In addition, China's supply-side structural reforms were implemented in November 2015. Due to the time lag of the policy, the effects of the supply-side structural reforms may not be visible that year. Therefore, we finally use 2016 as the time for policy shock.

2) Corporate default risk

We draw lessons from Zhang [24], and use the Z-score model based on the analysis of Chinese corporate financial data to measure corporate default risk. The Zscore model evaluates a company's default risk level from the perspective of corporate solvency, operating capacity, and profitability. The larger the value calculated according to the model, the smaller the company's default risk.

$$\text{Z-score} = 0.517 - 0.460 \times \frac{Tl}{Ta} - 0.388 \times \frac{Wc}{Ta} + 9.32 \times \frac{Np}{ATa} + 1.158 \times \frac{Re}{Ta} \quad (1)$$

Tl represents *Total liabilities*, *Ta* represents *Total assets*, *Wc* represents *Working capital*, *Np* represents *Net profit*, *ATa* represents *Average total assets*, *Re* represents *Retained earnings*.

3) Financing capacity

The financing channels of enterprises are mainly divided into exdogenous financing and exogenous financing. Drawing on the research of Zhu [25], we choose the net flow of fund-raising activities to measure the proxy index of the company's exogenous financing ability. With reference to the research of Dong *et al.* [26], we choose net operating cash flow as an indicator to measure the company's endogenous financing ability. In order to eliminate the influence of factors such as the size of the enterprise, the above indicators are divided by the total assets of the enterprise at the end of the period.

4) Level of development of the digital economy.

Zhang *et al.* [27] constructed a digital economy development level evaluation index system from the dimensions of digital development potential, digital infrastructure construction, digital production applications and digital life applications. Among them, digital development potential indicators are mainly meas-

ured from the perspective of digital technology input and output; digital infrastructure construction is mainly measured from the perspective of transmission foundation and staffing foundation; digital applications are mainly measured from the perspective of digital production applications and digital life applications. The specific measurement index system is shown in Table 1. We use the above indicator system and the entropy method to measure the weight of the indicators. Finally, we get the digital economy development level index of 30 provinces in China.

5) Control variables.

In this paper, we control the following variables:

- firm's guarantee capacity (Guarantee), measured by the ratio of net fixed assets to total assets;
- nature of ownership (SOE), measured by 1 if the firm is a state-owned enterprise and 0 otherwise;
- firm's age (Age), measured by the natural logarithm of the firm's IPO time;
- firm's size (Size), measured by the natural logarithm of the firm's total assets;
- equity concentration (Shr1), measured by the shareholding ratio of the first largest shareholder of the enterprise;
- regional economic development level (GDP), measured by the natural logarithm of regional GDP;
- industry competition degree (HHI), measured by the Herfindahl index.

Table 1. Digital economy development level measurement index system table.

Primary indicator	Secondary indicator	Measurement method
Development potential	Direct benefit	Software business income/GDP
	Capital investment	High-tech enterprise R&D internal expenditures/Total R&D internal expenditures
	Talent investment	Full-time equivalent of R&D personnel/R&D personnel in high-tech enterprises
Infrastructure construction	Transmission basis	Cable length per capita
	Carrying capacity	Mobile phone exchange capacity
	Personnel allocation	Number of employed persons in the information industry/total number of employed persons in urban areas
Production application	Participation level	Companies with e-commerce trading activities/Total number of enterprises
	Business Benefits	E-commerce sales/GDP
	Production input	Number of computers × 100/Total population
Life applications	Broadband life	Internet broadband penetration rate
	Mobile life	Mobile phone penetration rate
	Internet consumption	Express revenue/GDP

3.3. Parallel Trend Test

The prerequisite for the double difference test is that the control group sample and the experimental group sample have the same trend before the policy is implemented. Therefore, we further tested the annual trend distribution of default risks of the sample companies in the control group and the sample companies in the treatment group, and drew related parallel trend graphs (see **Figure 2**). It can be seen from **Figure 2** that the trend of default risk levels of the sample companies in the control group and the sample companies in the experimental group during 2012-2015 is basically the same, which shows that the parallel trend hypothesis in this article is basically satisfied.

3.4. Model Setting

We adopted a double difference model to examine the impact of supply-side structural reforms on corporate default risk. The specific model is as follows:

$$\text{Risk}_{i,t} = \alpha_0 + \alpha_1 \text{Treat} \times \text{Post} + \alpha_2 \text{Control}_{i,j,t} + \text{Firm}_i + \text{Year}_t + \varepsilon_{i,t} \qquad (2)$$

On the basis of model (2), we further constructed models (3)-(8) to test the mediating effect of corporate financing capabilities and the moderating effect of the digital economy. Among them, models (3)-(4) are test models for intermediary effects, and models (5)-(7) are test models for regulation effects of digital economy. According to the research of Wen *et al.* [28], if the coefficient λ_2 of model (5) is significant, it indicates that the direct effect is regulated when the mediation effect is not considered. When considering the mediating effect, if φ_1 is significant and μ_2 is significant, moderator regulates the second half path of the mediating effect; if φ_2 is significant and μ_1 is significant, moderator regulates the first half path of the mediating effect; if φ_3 is significant and μ_2 is significant, moderator regulates the front and back path of the mediating effect.
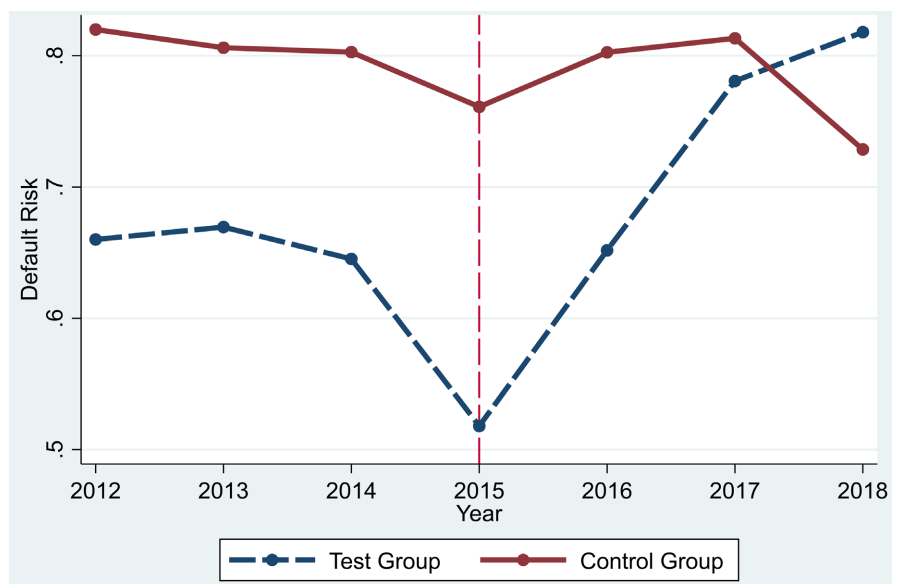

Figure 2. Parallel trend chart.

$$M_{i,t} = \beta_0 + \beta_1 \text{Treat} \times \text{Post} + \beta_2 \text{Control}_{i,j,t} + \text{Firm}_i + \text{Year}_t + \varepsilon_{i,t} \tag{3}$$

$$\text{Risk}_{i,t} = \gamma_0 + \gamma_1 \text{Treat} \times \text{Post} + \gamma_2 M_{i,t} + \gamma_3 \text{Control}_{i,j,t} + \text{Firm}_i + \text{Year}_t + \varepsilon_{i,t} \tag{4}$$

$$\text{Risk}_{i,t} = \lambda_0 + \lambda_1 \text{Treat} \times \text{Post} + \lambda_2 \text{Treat} \times \text{Post} \times \text{DE}_{j,t} + \lambda_3 \text{DE}_{j,t} + \lambda_4 \text{Control}_{i,j,t} \\ + \text{Firm}_i + \text{Year}_t + \varepsilon_{i,t} \tag{5}$$

$$M_{i,t} = \varphi_0 + \varphi_1 \text{Treat} \times \text{Post} + \varphi_2 \text{Treat} \times \text{Post} \times \text{DE}_{j,t} + \varphi_3 \text{DE}_{j,t} + \varphi_4 \text{Control}_{i,j,t} \\ + \text{Firm}_i + \text{Year}_t + \varepsilon_{i,t} \tag{6}$$

$$\text{Risk}_{i,t} = \varphi_0' + \varphi_1'' \text{Treat} \times \text{Post} + \varphi_2' \text{Treat} \times \text{Post} \times \text{DE}_{j,t} + \varphi_3' \text{DE}_{j,t} + \mu_1 M_{i,t} \\ + \mu_2 \text{DE}_{j,t} \times M_{i,t} + \mu_3 \text{Control}_{i,j,t} + \text{Firm}_i + \text{Year}_t + \varepsilon_{i,t} \tag{7}$$

Among them, the subscript i represents an enterprise, j represents a province, and t represents a year. Risk is the enterprise default risk level; Treat is a grouping variable, if the company belongs to an overcapacity industry, the value is 1, otherwise it is 0; Post is a time variable, and the value is 1 after the supply-side reform starts, otherwise it is 0. M is the company's financing capacity, including the company's endogenous financing capability (IF) and exogenous financing capabilities (OF); DE is the digital economy development level of the province where the company is located, Firm is the individual effect, and Year is the time effect. Control represents control variables at the company level, regional level, and industry level.

4. Empirical Test and Analysis

4.1. DID Model Test Results and Analysis

The regression results of the double difference model are shown in Table 2. The results in column (1) of Table 2 show that the regression coefficient of Treat × Post is significantly positive after the control variables are introduced. This shows that the implementation of supply-side structural reforms has significantly reduced the enterprise's default risk, and Hypothesis 1 is valid. In addition, due to the lag and timeliness of policy implementation effects, we believe that the impact of supply-side structural reforms on corporate default risk is non-linear. In order to reveal the dynamic effects of supply-side structural reform shocks affecting corporate default risk, we introduced the Year2016, Year2017, and Year2018 variables. The grouping variable Treat is used as an interactive item. The results are shown in columns (2) to (3) of Table 3. The results show that regardless of the introduction of control variables, as the supply-side structural reforms continue to deepen, the inhibitory effect of reforms on corporate default risks is gradually increasing.

4.2. Analysis of the Test Results of the Mediation Effect of the Enterprise's Financing Ability

Table 3 reports the regression results of the mediating effect of corporate financing capabilities. From the perspective of the firm's endogenous financing capacity, the results from columns (1) to (2) of Table 3 show that the coefficient

Table 2. Regression results of double difference table.

Variables	Risk	Risk	Risk
	(1)	(2)	(3)
Treat × Post	0.164***		
	(7.975)		
Treat × Year2016		0.024	0.049*
		(0.786)	(1.659)
Treat × Year2017		0.142***	0.166***
		(4.737)	(5.584)
Treat × Year2018		0.264***	0.276***
		(8.808)	(9.302)
Constant	−1.091	0.775***	−1.113
	(−1.535)	(64.192)	(−1.569)
Control/Year/Firm	Yes	Yes	Yes
N	9723	9723	9723
R²	0.045	0.016	0.050

Note: Robust t-statistics in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$ (the same below). Due to space limitations, the regression results of the controlled variables are not listed. Interested readers can ask the author.

Table 3. Regression results of mediation effect table.

Variables	IF	Risk	OF
	(1)	(2)	(3)
Treat × Post	0.006**	0.152***	0.002
	(2.451)	(7.555)	(0.635)
IF		1.916***	
		(21.646)	
OF			
Constant	0.0387	−0.894	−1.284***
	(0.433)	(−1.251)	(−9.573)
Control/Year/Firm	Yes	Yes	Yes
N	9499	9499	9471
R²	0.018	0.098	0.114

Note: Due to space limitations, the regression results of the controlled variables are not listed. Interested readers can ask the author.

of supply-side structural reform in model (3) is significantly positive at the 1% level. The results show that the supply-side structural reform can significantly enhance the enterprise's endogenous financing capabilities. The coefficient of

the firm's endogenous financing capability in model (4) is significantly positive, which shows that the improvement of the firm's endogenous financing capability will significantly reduce the company's default risk. From the perspective of exogenous financing capabilities of enterprises, the results in column (3) show that the regression coefficient between supply-side structural reforms and exogenous financing capabilities of enterprises is not significant, which preliminarily shows that the mediating effect of exogenous financing capabilities of enterprises is not significant. The Sobel test and Bootstrap test are still insignificant, which shows that the exogenous financing capacity of the company has not played an intermediary effect in the process of supply-side structural reforms affecting the company's default risk. The possible reason for this phenomenon is imperfect supervision. After the beginning of the supply-side structural reform, the Chinese government used measures such as restricting bank loans and debt issuance to promote tasks such as reducing overcapacity and deleveraging. However, due to imperfect supervision, companies would seek financial leasing and other loosely regulated exogenous financing channels, which weakened the effect of policy implementation [29]. In the end, the supply-side structure did not have a significant impact on the company's exogenous financing capabilities. It can be seen that the supply-side structural reform mainly reduces the company's default risk by improving the company's endogenous financing capabilities. Hypothesis 2 holds.

4.3. Analysis of the Test Results of the Regulation Effect of the Digital Economy

After the test mediation effect was established, we adopted the stepwise regression method and added the moderating variables to the benchmark model to construct an regulated mediation effect model. The model test results are shown in Table 4. The results in column (1) of Table 4 show that the coefficient $\lambda 2$ is significantly positive at the 1% level, which shows that the digital economy can positively regulate the direct effect of supply-side structural reforms on corporate default risks. The regression results of columns (2)-(3) of Table 4 show that the coefficient φ_3 in model (6) is significantly positive at the 10% level, and the coefficient μ_2 in model (7) is significantly positive at the 1% level. It shows that the first half path and the second half path of the intermediary effect of the company's endogenous financing capacity can be regulated by the digital economy. In addition, because the mediating effect of the firm's exogenous financing capacity is not significant, and the regression results of columns (4)-(5) in Table 4 show that the coefficients φ_2 and φ_3 in model (6) are not significant. This shows that the moderating effect of the digital economy is not significant in the path of corporate exogenous financing capabilities. Based on the above analysis, it can be concluded that the digital economy only regulates the intermediary effect of enterprises' endogenous financing capabilities. This also shows that the moderating effect of the digital economy is partly played by the endogenous financing capabilities of enterprises, and the hypothesis 3 holds.

Table 4. Regression results of regulating effect table.

Variables	Risk	IF	Risk	OF	Risk
	(1)	(2)	(3)	(4)	(5)
Treat × Post	0.096***	0.003	0.088***	0.001	0.095***
	(3.749)	(0.849)	(3.516)	(0.171)	(3.684)
IF			1.922***		
			(21.791)		
OF					−0.312***
					(−5.147)
DE	0.019***	0.0001	0.018***	0.0004	0.019***
	(4.015)	(0.177)	(3.987)	(0.4847)	(3.928)
Treat × Post × DE	0.021***	0.001*	0.017***	0.0005	0.021***
	(3.762)	(1.768)	(3.208)	(0.477)	(3.715)
DE × IF			0.118***		
			(5.405)		
DE × OF					−0.050***
					(−3.080)
Constant	−1.321*	0.038	−1.009	−1.290***	−1.707**
	(−1.857)	(0.419)	(−1.412)	(−9.573)	(−2.304)
Control/Year/Firm	Yes	Yes	Yes	Yes	Yes
N	9723	9499	9499	9471	9471
R²	0.051	0.018	0.106	0.115	0.055

Note: Due to space limitations, the regression results of the controlled variables are not listed. Interested readers can ask the author.

There may be "selection bias" when using the double difference model to evaluate policy effects. In order to alleviate this problem, we adopted the double difference propensity score matching method to test the empirical results. We adopted the kernel matching method and selected the control variable as the matching covariate. The results show that after controlling for the observable selection differences, the significance of the core variable coefficients does not change much, indicating that the results of this article are robust (Due to space limitations, the regression results of the controlled variables are not listed. Interested readers can ask the author).

5. Conclusions

Based on the real situation in China, we used the double difference method to investigate the mechanism of the impact of supply-side structural reform on enterprise default risk, and to further explore the moderating effect of the digital economy. Through analysis, we come to the following conclusions.

● China's supply-side structural reform significantly reduced the risk of corpo-

rate default. From the perspective of the dynamic effects of reforms, with the continuous deepening of supply-side structural reforms, the restraining effect of reforms on corporate default risks gradually increased.

- The author divides corporate financing capabilities into two categories: exogenous financing capabilities and external financing capabilities. The study found that the company's endogenous financing capability has a partial intermediary effect in the relationship between the supply-side structural reform and the company's default risk. But on the other hand, because of the imperfect supervision, the supply-side structural reform cannot reduce the corporate default risk by affecting the corporate's exogenous financing capacity.

- The digital economy not only positively moderated the relationship between supply-side structural reform and corporate default risk, but also played a positive moderating role in both the first half of the path and the second half of the mediating influence mechanism on the endogenous financing capacity of enterprises.

Based on the above conclusions, we make the following recommendations.

- China should continue to promote supply-side structural reforms to provide policy guidance for the high-quality development of enterprises. It is necessary to strengthen the coordination of policies, realize the synergy and complementarity of fiscal and taxation policies and financial policies, and reduce the burden on enterprises. And through government subsidies and other means to promote enterprise reform and innovation, change the profit model, so as to improve the ability to resist risks. At the same time, it is necessary to accelerate the transformation of the Chinese government's functions from a construction-oriented government to a service-oriented government. It is important to ensure the implementation and implementation of various policies of the central government, and strengthen government supervision responsibility, so as to create a fair business environment for the development of enterprises and avoid concentrated outbreaks of corporate default risks.

- Corporate financing capacity is an important factor influencing corporate default risk. However, the impact of supply-side structural reforms on corporate endogenous financing capabilities and exogenous financing capabilities is quite different. This requires the government to advance the task of "three removals, one reduction and one subsidy" through a combination of macro policies and micro prudential supervision, to improve the business performance of enterprises and enhance their endogenous financing capabilities. This is the fundamental means to prevent the risk of corporate default. On the other hand, the government should strengthen the monitoring of the level of corporate leverage, improve the exogenous financing environment for companies, and prevent default risks caused by high corporate leverage.

- In the process of deepening supply-side structural reforms, the government should give full play to the enabling effects of the digital economy. The government should encourage enterprises to accelerate the application of digital

technology and promote their digital transformation. Companies should make full use of digital technologies such as the Internet and Big Data to obtain information related to decision-making in a timely manner and reduce the degree of information asymmetry between themselves and the external market. On this basis, enterprises use the acquired information to rationally allocate funds, talents, data and other elements to improve the efficiency of enterprise resource allocation, thereby improving the economic efficiency of the enterprise, reducing the enterprise's risk of default, and making the reforms fully effective.

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Conflicts of Interest

The author declares no conflict of interest.

References

[1] Han, X.L. and Han, B.J. (2017) Systematic Financial Risks under Supply Side Structural Reform: Generation Logic, Risk Measurement and Prevention Countermeasures. *Finance & Economics*, No. 6, 1-13. (In Chinese)

[2] He, Y.C. and Liu, Q.L. (2021) Technology Basis, Value Essence and Value Composition of Digital Economy. *Journal of Shenzhen University* (*Humanities & Social Sciences*), **38**, 57-66. (In Chinese)

[3] Chen, L.L., Xia, J.C. and Liu, C. (2021) Market Oriented Supervision of Digital Economy and the Construction of Fair Competition Order. *Reform*, No. 7, 44-53. (In Chinese)

[4] Peng, H.F. and Ye, Y.G. (2011) Loan-Pricing Model Based on Repayment Ability and Repayment Willingness. *Chinese Journal of Management Science*, **19**, 40-47. (In Chinese)

[5] Hu, W.X., Zhu, G.P. and Li, X.F. (2021) Financial Asset Holdings and Corporate Default Risk: The Mediating Effect of Financing Constraints. *Frontiers of Science and Technology of Engineering Management*, **40**, 39-46. (In Chinese)

[6] Meng, Q.B., Hou, C.R. and Lu, B. (2019) Firms' Innovation and the Risk of Default. *The Journal of World Economy*, **42**, 169-192. (In Chinese)

[7] Li, Y.C. and Bao, X.J. (2020) Integration Degree, Macroeconomic Fluctuation and Default of Corporate Debt. *Modern Finance and Economics—Journal of Tianjin University of Finance and Economics*, **40**, 73-87. (In Chinese)

[8] Zhang, J., Xiao, X. and Li, X.Y. (2018) Environmental Uncertainty, Corporate Social Responsibility and Debt Default Risk—Empirical Study Based on Chinese A-Share Listed Companies. *Economic Survey*, **35**, 136-142. (In Chinese)

[9] Guo, J.T. and Zhu, Y.X. (2021) The Impact of Digital Economy on Corporate Credit Risks. *Journal of Shenzhen University* (*Humanities & Social Sciences*), **38**, 69-80.

[10] Ding, Z.G, Zhang, Y.Y. and Ren, H.F. (2020) De-capacity Effect of Supply-Side Structural Reform. *The Journal of Quantitative & Technical Economics*, **37**, 3-25. (In Chinese)

[11] Ma, C.Y. and Zhu, Y.F. (2020) Deleveraging, Optimal Capital Structure and Real-Economy Enterprise Productivity. *Finance & Trade Economics*, **41**, 99-113. (In Chinese)

[12] Zhang, H.L., Tang, Z.B. and Wang, H.J. (2018) Pains Gains Energy?—The Impact of Economy Policy on Enterprise Performance. *Research on Economics and Management*, **39**, 78-91. (In Chinese)

[13] Lin, Y.F. and Li, Z.Y. (2004) Policy Burden, Moral Hazard and Soft Budget Constraint. *Economic Research Journal*, **39**, 17-27. (In Chinese)

[14] Chen, D.Q., Liu, J.W. and Dong, Z.Y. (2013) Social Bankruptcy Cost, Debt Default and Credit Fund Allocation. *Journal of Financial Research*, No. 11, 68-81. (In Chinese)

[15] Lin, W.B. and Su, J. (2016) The Nature and Way of Supply-Side Reform. *Price: Theory & Practice*, No. 1, 16-19. (In Chinese)

[16] Gu, H.F. and Zhu, H.P. (2021) Economic Policy Uncertainty, Financial Constrains and Corporate Investment Efficiency. *Modern Economic Research*, No. 12, 93-104. (In Chinese)

[17] Li, H.J., Li, K., Su, N.F., *et al.* (2017) Soft Budget Constraint, Financing Premium and Leverage: Micro-Mechanism and Economic Effects of the Supply-Side Structural Reform. *Economic Research Journal*, 52, 53-66. (In Chinese)

[18] Liu, J.Q. and Ai, X. (2020) The Regulation Effect and Strategy Choice of Macro Leverage from the Perspective of Economic Policy Uncertainty. *Reform*, No. 3, 74-84. (In Chinese)

[19] Yang, W.P. (2021) Digital Economy Drives High-Quality Economic Development: Efficiency Improvement and Consumption Promotion. *Journal of Shanghai University of Finance and Economics*, 1-14. (In Chinese)
http://kns.cnki.net/kcms/detail/31.1817.C.20210928.1057.004.html

[20] Hou, S.Y. and Song, L.R. (2021) Digital Economy, Market Integration and Corporate Innovation Performance. *Contemporary Finance & Economics*, No. 6, 78-88.

[21] Liu, J., Shi, M.X. and Zhao, Y.H. (2021) The Impact of Intelligentization on China's Economic Growth. *Journal of Hohai University* (*Philosophy and Social Sciences*), **23**, 44-50. (In Chinese)

[22] Ouyang Z.S., Lu, M. and Xiong, J.Y. (2021) Research on the Impact of Digital Financial Inclusion Development on China's Regional Financial Risks. *Journal of University of Finance and Economics*, **34**, 5-16. (In Chinese)

[23] Lu, L. and Yang, W.H. (2020) Supply-Side Structural Reform and Business Leverage Ratio Adjustment: An Empirical Study Based on the Data of Listed Industrial Enterprises. *Contemporary Finance & Economics*, No. 7, 15-27. (In Chinese)

[24] Zhang, L. (2000) Financial Crisis Early Warning Analysis and Discriminant Model. *The Journal of Quantitative & Technical Economics*, No. 3, 49-51. (In Chinese)

[25] Zhu, H.L. (2020) Impact of Financing Structure on Total Factor Productivity: Evidence from A-Share Listed Companies. *Scientific Decision Making*, No. 1, 72-89. (In Chinese)

[26] Dong, Y.D. and Chen, B. (2021) Financial Constraint, Outward Direct Investment and Corporate R&D Expenditure. *World Economy Studies*, No. 3, 121-133. (In Chinese)

[27] Zhang, Y.H. and Wang, J.T. (2020) Can Digital Economy Reduce the Factor Mismatch of China? *Journal of Statistics and Information*, **35**, 62-71. (In Chinese)

[28] Wen, Z.L. and Ye, B.J. (2014) Different Methods for Testing Moderated Mediation

Models: Competitors or Backups? *Acta Psychologica Sinica*, **46**, 714-726. (In Chinese) https://doi.org/10.3724/SP.J.1041.2014.00714

[29] Shi, Y.P., Yang, T. and Pang, J.R. (2021) De-Capacity Policy and Financial Leasing. *Journal of Financial Research*, No. 4, 73-91. (In Chinese)